

**SCIENTOMETRIC BENCHMARKING OF
RASHTRASANT TUKADOJI MAHARAJ
NAGPUR UNIVERSITY AND SANT GADGE
BABA AMRAVATI UNIVERSITY:
A COMPARATIVE STUDY**

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ABSTRACT -

The study reports the comparative benchmarking of two well-known universities from the Vidarbha region of Maharashtra State- Rashtrasant Tukadoji Maharaj Nagpur University and Sant Gadge Baba University Amravati. Data were retrieved from the Web of Science Core Collection (WoSCC) for the period of five Years (2015-2019). A total of 1185 records were included in the study from both universities. The research output of SGB Amravati University shows declining trends in graphs and the research output of RTMN University shows consistent research productivity growth. Research depicts various core elements of Scientometrics like- Author Productivity (High Yielded Authors), Highly Producing Journals, Document Types, Languages, Institutional Collaboration and Productivity and Country Collaboration.

Keywords - Bibliometrics, Science Mapping, Scientific Communication, Scientometrics, Scientometric benchmarking.

INTRODUCTION

The reputation and status of an institution are directly associated with the outcome of research through the publication productivity of the faculty members of that institution. It also reflects the reputation, visibility, and academic interest of the individuals working in that institution. As a higher academic institute, the major mission of the university is imparting knowledge through, teaching, learning, and research in prime areas which is not only concerning that university but also to the Government as a whole for the benefit of society. Productivity is the indicator of efficiency in any production system. The research productivity is to create new knowledge through the process of inputs such as humans, scientific instruments, and materials along with the accumulated knowledge, social networks, and economic values.

The outputs will be publications, patents, conference proceedings, databases, standards, research reports, and so on. The principal efficiency indicator of any production unit is its productivity by an individual, research group, department, institution, field, or country. Scientometrics is to measure and identify the development of science and its research trend. It is a mathematical and statistical method of studying the trend and growth of the research output. The study will reveal the overall quantitative research aspects of both universities.

METHODOLOGY

The Scientometric method was used to assess the research productivity and trends based on sourced data from the Web of Science core collection database. The search strings used for data retrieval as an affiliation were:

1. Rashtrasant Tukadoji Maharaj Nagpur University and,
2. Sant Gadge Baba Amravati University.

Timespan set for the search string was 2015-2019, The following Scientometric and Computer tools have been employed for the study:

1. Biblioshiny (R-Metrics Package)(Aria & Cuccurullo, 2017)
2. HistCite Tool (Eugene Garfield, n.d.)
3. Microsoft Excel (Microsoft, 2018)

Area Study: Geographically, historically, politically, and according to cultural sentiments, Maharashtra has five main regions: 1. Konkan - (Konkan Division) 2. Paschim Maharashtra also known as Desh - (Pune Division) 3. Khandesh - (Nashik Division) 4. Marathwada - (Aurangabad Division) and 5. Vidarbha - (Nagpur and Amravati divisions) - formerly part of (Central Provinces and Berar). Both the universities under study are the leading non-agricultural universities

of the Vidarbha region of Maharashtra state.

A) Sant Gadge Baba Amravati University: Amravati University was established on Maharashtra Day, the 1st of May 1983 to cater to mostly the educational needs of the rural population of western Vidarbha. The university has its jurisdiction within five districts of Vidarbha viz. Amravati, Akola, Yavatmal, Buldana and Washim. By now, this sapling has grown into a gigantic tree having about 4 lacs students.

It is noteworthy to state that the University has a lush green campus of 470.63 acres with 28 Teaching Departments, a conducted Model Degree College at Buldana, and nine Faculties satisfying the knowledge appetite of the students. The University pays special attention to education upliftment of the backward and the downtrodden.

Sant Gadge Baba Amravati University has been determined and committed to creating a human resource capable of converting challenges into opportunities through imparting training to youth in various aspects of skill development. As such it addresses all dimensions of the higher teaching-learning process towards making the learners; the ideal citizens, the academic leaders, and the global entrepreneurs to represent the Leader Indian in the 21st Century. The vision of the University is student-centric. The Students Welfare Section truly incarnates this vision by providing the students, a platform for multi-dimensional and multi-faceted development.

B) Rashtrasant Tukadoji Maharaj Nagpur University: The Nagpur University was established on 4th August 1923 with six affiliated colleges and 927 students. During 1947, the number of students increased to about 9000 accompanied by the improvement and diversification of curricula and expansion in the range of subjects. The

expansion of the library and sports facilities occurred during these years for the intellectual and physical well-being of the students. It was in 1958 that some new Departments in Arts and Social Science faculties were opened; the major expansion, however, came in 1963 when several sciences and other teaching Departments were started. The Departments were shifted to spacious buildings on the main campus in 1972-73. In later years, several career-oriented courses have been started viz., Business Management, Fine Arts, Mass Communication, Library Science, Physical Education, etc.

Presently University comprises Forty-Four Postgraduate Teaching Departments (PGTD), and three Constituent Colleges/Institutions (Law College, Laxminarayan Institute of Technology, and College of Education). Five hundred and three colleges are affiliated with The Department and conducted college/Institution buildings are spread over several campuses in and around the city. More than four Lakh students are enrolled in different courses at the university.

REVIEW OF LITERATURE

It is a fact that Scientometric or bibliometric studies are applied for analyzing the usability and impact of particular scientific communications/publications of any Researcher, Journal or Institution. Researchers have gone through various similar studies to know about different aspects that can be explored.

Okubo (1996) evaluated many technological forecasting and innovation studies that rely on bibliometric methods as part of their analysis, if we understand the premise of scientific research to be the production or enhancement of knowledge then the literature of science can be

seen to be the –manifestation of that knowledge. The need to interrogate this knowledge via databases of citations is understandably critical to the process of technology forecasting.

Karidappa, et al. (2002) studied the distribution of productivity of authors and their collaboration in theoretical population genetics. The study reveals that the productivity of the distributions of authors is closer to Lotka's type of distribution for the latter group of authors and collaboration.

Ramesh and Nagaraju (2003) discussed the various features distribution of papers, the authorship pattern, and the year-wise distribution of the degree of collaboration in their study. They revealed that the author affiliations emphasize the dominance of Indian authors and the multiple authorship belonging to academic institutions.

Garg (2003) has given an overview of the studies published in the International Journal of Scientometric during 1978-2000 on cross-national, national, and institutional Scientometric assessment.

Abbas Horri (2004) made a bibliometric overview of library and Information Science research productivity in Iran over the years 1966-1988. His findings indicate that most contributions to the scientific production of the field are research papers, theses, and research reports respectively.

Kraus (2004) researched the citation patterns of advanced undergraduate biology students and later Kraus compared the differences between citation usage of undergraduates and faculty in the biology department. Graduate students are heavy users of library resources, and theses and dissertations are heavy users of library resources, and theses and dissertations are often readily available. This makes them a well-known user group for citation analysis.

Kadmani, et al. (2006) Scientometric study on

nuclear science and technology research in India for the period 1970-2002 has been done. The data source for the study was International Nuclear Information System (INIS). The study reported Year-wise and country-wise contribution of research papers in the nuclear science and technology field by Indian researchers and other countries, types of publications, language-wise, research collaboration, and frequency of keywords in nuclear science and technology research papers.

Bandyopadhyay and Nandi (2008) carried on a bibliometric study covering articles in the issues of 'The Indian Economic Review'. They examined authorship patterns and the degree of collaboration between authors and geographical distribution. The study analyzed 1653 citations appended to 68 research articles and found that the double-author and multiple-author publications are increasing in number.

Mahapatra (2009) describes in her book *Bibliometric studies in the internet era* (Indiana Pub.) the potential and value of science mapping and evaluation tools for science and technology forecasting in the internet era, the researchers described various aspects of *Scientometrics & Bibliometrics in the Internet era* that help evaluate the progress of scientific production and communications.

Simon (2011) in his project generated a theory of the process of expansion/contraction or staying stagnant of scientific knowledge, He applied a methodological approach that includes studies of four domains- Anaerobic Bacteriology, Aeronautics, Forensic Psychology, and Clinical Biochemistry- each with a different set of values on productivity and also institutionalization, Data came from Bibliometric Indicators derived from over 8500 Scientific Publications and interviews with 52

scientists actively working in four research domains.

Queupil (2016) in their work- 'Educational collaboration networks and leadership in Chile and Latin America: A social network analysis' examined relationships and patterns that emerge from a dataset of co-authored scholarly publications among the HEI (Higher Education Institutions) in Chile and Latin America. The Datasets were retrieved from the WoS (Web of Science). The researcher derived various sociograms and networks using centrality indicators like –Degree, Density, Betweenness (Collaboration), and Closeness (Co-authorships) along with all other bibliometrics aspects.

Bapte and Gedam (2018) presented a scientometric profile of Sant Gadge Baba Amravati University of India for 1996–2017. And Dubey and Dadhe (2020) gave the Scientometric Profile of Science Faculty of Rashtrasant Tukadoji Maharaj Nagpur University from 1990 to 2019.

Li et al. (2020a) made a scientometric study on the topic of terahertz research. The authors observed extensive research on the topic in subjects like chemistry, physics, food safety, communication, biology, biochemical, biological imaging, and medical sciences. Li et al. (2020b) evaluated 1,386 papers published over the last 20 years and obtained from Scopus to assess the important environmental issues of metal-organic structure. The study found China as the most published country with 626 papers. Based on 4,027 records retrieved from the Web of Science.

The above-reviewed researches show various aspects analyzed through the lenses of Scientometrics for evaluating different particulars like authors, specific subject domains, or different departments of the institution. The current study is

an exclusive comparative benchmarking of two HEIs with the degree of collaboration of affiliated institutes, sources, and countrywide research collaboration using impact indicators like CPP and RCI.

OBJECTIVES OF THE STUDY

Given the formulated research problem, the following objectives are framed to have a detailed analytical study.

- To identify and analyze the rate of growth of research output in both universities.
- To analyze the most prolific authors and their research collaboration in both universities.
- To examine the institution-wide and global collaboration share of research output of both universities.
- To know the impact of the research outcome among the surveyed universities.

SIGNIFICANCE OF THE STUDY

Scientometrics is a sub-field of Informetrics. It includes the measurement of the impact of research yield and its usability within other academia. The present study reveals how the science research output of both universities has grown in the last few years. The study will help policy-making and management contexts to HIEs (Higher Education Institutes) in their exclusive development towards scientific research activities and their dissemination through evaluating their performance using scientometric techniques.

Scientometric analysis, discussion, and results:

Research Productivity :

Yearly Research Productivity (Sant Gadge Baba Amaravati University): In this section, the researcher excerpted the data on the yearly research productivity of SGBAU University. The Statistics in the enlisted table 1

Table 1 : Yearly Research Productivity (SGBAU)

| Sr. No. | Publication Year | Record | Percent | TLCS | TGCS |
|---------|------------------|------------|------------|------------|-------------|
| 1 | 2015 | 88 | 24.3 | 223 | 1875 |
| 2 | 2016 | 101 | 27.9 | 294 | 1151 |
| 3 | 2017 | 70 | 19.3 | 136 | 666 |
| 4 | 2018 | 64 | 17.7 | 76 | 447 |
| 5 | 2019 | 39 | 10.8 | 7 | 201 |
| | Total | 362 | 100 | 736 | 4340 |

show 2016 was the highest-yielding year. In the years 2018 and 2019, it is shown negative growth. Citation ratings are also high in year 2016 only.

Yearly Research Productivity (Rashtrasant Tukadoji Maharaj Nagpur University): In this section, the table 2 shows the yearly research output of RTM Nagpur University. The statistics show that the year 2018 bagged the highest yield in productivity,

Research output has shown growth consistently but 2019 is lower because the recent data couldn't be updated still is a possibility.

Research productivity of SGBA University shows the Statistics that- the year 2016 was the highest yielding. In the years 2018 and 2019, it's shown negative growth. Citation ratings are also high in year 2016 only. And RTM Nagpur University statistics show that the year 2018 bagged the highest yield in productivity, Research output has shown

Table 2 : Yearly Productivity (RTMNU)

| Sr. No. | Publication Year | Records | Percent | TLCS | TGCS |
|---------|------------------|------------|------------|------------|-------------|
| 1 | 2015 | 177 | 21.5 | 240 | 1909 |
| 2 | 2016 | 154 | 18.7 | 158 | 1322 |
| 3 | 2017 | 172 | 20.9 | 143 | 1178 |
| 4 | 2018 | 180 | 21.9 | 56 | 893 |
| 5 | 2019 | 140 | 16.3 | 14 | 297 |
| | Total | 823 | 100 | 611 | 5599 |

growth consistently but 2019 is lower because the recent data couldn't be updated still is possibility Total productivity has much difference in both RTMNU produced a higher yield of academic research in science field during these five years (2015-2019).

Authors' Productivity :

Authors Productivity (Sant Gadge Baba

Amaravati University): In this section, the researcher enlisted highly yielded authors of SGBA University. In table 3, at top of the list is Rai M with 92 publications and his CPP is 21.17 and his RCI is 1.48. Second is Omanwar S K having 81 records in his account with 6.83 CPP and 0.48 RCI, Third is Anis M and whose yield is 42 and CPP is 19.64 and RCI is 1.38. The average CPP of a group of prolific authors is 13.95 and the Average RCI is 0.98.

Table 3 : Authors Productivity (SGBAU)

| Sr. No | Author | Records | Percent | TLCS | TGCS | CPP | RCI |
|--------|--------------|---------|---------|------|-------------|--------------|-------------|
| 1 | Rai M | 92 | 25.4 | 120 | 1948 | 21.17 | 1.48 |
| 2 | Omanwar S K | 81 | 22.4 | 219 | 553 | 6.83 | 0.48 |
| 3 | Anis M | 42 | 11.6 | 318 | 825 | 19.64 | 1.38 |
| 4 | Muley G G | 42 | 11.6 | 248 | 732 | 17.43 | 1.22 |
| 5 | Ingle A P | 34 | 9.4 | 49 | 599 | 17.62 | 1.23 |
| 6 | Waghuley S A | 28 | 7.7 | 17 | 109 | 3.89 | 0.27 |
| 7 | Bajaj N S | 27 | 7.5 | 142 | 264 | 9.78 | 0.68 |
| 8 | Palan C B | 24 | 6.6 | 100 | 182 | 7.58 | 0.53 |
| 9 | Koparkar K A | 22 | 6.1 | 80 | 178 | 8.09 | 0.57 |
| 10 | Shirsat M D | 22 | 6.1 | 202 | 471 | 21.41 | 1.50 |
| 11 | Katore S D | 21 | 5.8 | 20 | 74 | 3.52 | 0.25 |
| 12 | Baig M I | 20 | 5.5 | 129 | 353 | 17.65 | 1.24 |
| 13 | Hussaini S S | 19 | 5.2 | 180 | 400 | 21.05 | 1.47 |
| 14 | Gade A | 17 | 4.7 | 38 | 257 | 15.12 | 1.06 |
| 15 | Dahm H | 16 | 4.4 | 26 | 295 | 18.44 | 1.29 |
| | | | | | Avg. | 13.95 | 0.98 |

Authors Productivity (Rashtrasant Tukadoji Maharaj Nagpur University): This section shows the research productivity of the prolific authors of RTMN University. We can see in table 4, Dhobale S J is at the top of the list with

220 records in his account and his CPP is 7.16 and RCI is RCI is 0.87 second is Moharil S V with 60 publications and 4.63 CPP and 0.56 RCI, third in the list is Bhanvase B A with 35 publications 15.91 CPP and 0.84 RCI.

Table 4 : Author Productivity (RTMNU)

| Sr.No. | Author | Records | Percent | TLCS | TGCS | CPP | RCI |
|--------|---------------|---------|---------|------|-------------|-------------|-------------|
| 1 | Dhoble S J | 220 | 26.7 | 272 | 1575 | 7.16 | 0.87 |
| 2 | Moharil S V | 60 | 7.3 | 52 | 278 | 4.63 | 0.56 |
| 3 | Bhanvase B A | 35 | 4.3 | 40 | 557 | 15.91 | 1.93 |
| 4 | Dhoble N S | 35 | 4.3 | 56 | 242 | 6.91 | 0.84 |
| 5 | Sonawane S H | 30 | 3.6 | 37 | 528 | 17.60 | 2.13 |
| 6 | Nair G B | 28 | 3.4 | 100 | 312 | 11.14 | 1.35 |
| 7 | Singh V | 23 | 2.8 | 13 | 174 | 7.57 | 0.92 |
| 8 | Kokare D M | 22 | 2.7 | 36 | 178 | 8.09 | 0.98 |
| 9 | Gedam S C | 19 | 2.3 | 8 | 36 | 1.89 | 0.23 |
| 10 | Swart H C | 19 | 2.3 | 21 | 199 | 10.47 | 1.27 |
| 11 | Subhedar N K | 17 | 2.1 | 32 | 132 | 7.76 | 0.94 |
| 12 | Joshi C P | 16 | 1.9 | 28 | 102 | 6.38 | 0.77 |
| 13 | Kondawar S B | 16 | 1.9 | 7 | 86 | 5.38 | 0.65 |
| 14 | Patil R R | 16 | 1.9 | 10 | 52 | 3.25 | 0.39 |
| 15 | Belgamwar V S | 15 | 1.8 | 25 | 266 | 17.73 | 2.15 |
| | | | | | Avg. | 8.79 | 1.06 |

SGBA University's statistic of prolific authors shows that- at the top of the list author is Rai M with 92 publications and their CPP is 21.17 and RCI is 1.48. Second is Omanwar, S K having 81 records in his account with 6.83 CPP and 0.48 RCI, third is Anis M and whose yield is 42 and CPP is 19.64 and RCI is 1.38. The Average CPP of a group of prolific authors is 13.95 and the Average RCI is 0.98.

RTMN University's statistics show - Dhobale SJ is at the top of the list with 220 records in his account and his CPP is 7.16 and RCI is RCI is 0.87 second is Moharil SV with 60 publications and 4.63 CPP and 0.56 RCI, third in the list is Bhanvase BA with 35 publications 15.91 CPP and 0.84 RCI.

Comparatively CPP (Citation per Paper) of Authors from SGBAU is seen as higher than Authors of RTMNU and RCI (Relative Citation

Index) Impact seems comparatively equal for both Universities.

Research Source Collaborations:

Highly Producing Journals/Sources (Sant Gadge Baba Amaravati University): Table 5 depicts the most producing journals that collaborated publications of SGBA University during 5 years- at the top list comes OPTIK journal with 33 publications share and total global citation share is 374 numbers. Second journal is the Journal of Materials Science-Materials In Electronics and its publication share is 20 with 74 global citations. Third on the list is LET Nano-biotechnology with a total of 19 publications and 144 citation yields.

Highly Producing Journals/Sources (Rashtrasant Tukadoji Maharaj Nagpur University): Table 6 shows the High yielding journal that collaborated with RTMN

Table 5 : Prolific Journals (SGBAU)

| Sr. | Journal | Records | Percent | TLCS | TGCS |
|-----|--|---------|---------|------|------|
| 1 | OPTIK | 33 | 9.1 | 152 | 374 |
| 2 | Journal Of Materials Science-Materials in Electronic | 20 | 5.5 | 16 | 74 |
| 3 | LET Nano-biotechnology | 19 | 5.2 | 36 | 144 |
| 4 | Optical Materials | 12 | 3.3 | 74 | 198 |
| 5 | Bulletin of Materials Science | 8 | 2.2 | 25 | 57 |
| 6 | Journal of the Indian Chemical Society | 8 | 2.2 | 0 | 4 |
| 7 | Indian Journal of Physics | 6 | 1.7 | 15 | 26 |
| 8 | Journal of Alloys and Compounds | 6 | 1.7 | 9 | 51 |
| 9 | Materials Letters | 6 | 1.7 | 21 | 51 |
| 10 | Research on Chemical Intermediates | 6 | 1.7 | 9 | 32 |
| 11 | Indian Journal of Pure & Applied Physics | 5 | 1.4 | 0 | 10 |
| 12 | Optics and Laser Technology | 5 | 1.4 | 39 | 109 |
| 13 | Astrophysics and Space Science | 4 | 1.1 | 0 | 30 |
| 14 | Environmental Chemistry Letters | 4 | 1.1 | 6 | 74 |
| 15 | International Journal of Pharmaceutics | 4 | 1.1 | 2 | 142 |

University. At the top Luminescence with 73 records and its share is 362 citations of the total, second is the Journal of Luminescence with 34 publications and 236 citations, and Third is OPTIK with 33 publications and 144 citations.

It is seen that both the university authors are

collaborating and their choices of highly impacting journals mostly resemble.

4. Institutional Collaboration and Productivity:

4.1 Institutional Collaboration and Productivity (Sant Gadge Baba Amaravati

Table 6 : Prolific Journals (RTMNU)

| Sr. | Journal | Records | Percent | TLCS | TGCS |
|-----|---|---------|---------|------|------|
| 1 | Luminescence | 73 | 8.9 | 77 | 362 |
| 2 | Journal Of Luminescence | 34 | 4.1 | 43 | 236 |
| 3 | OPTIK | 33 | 4 | 32 | 144 |
| 4 | Journal Of Alloys and Compounds | 16 | 1.9 | 15 | 126 |
| 5 | Journal Of Materials Science-Materials in Electronics | 16 | 1.9 | 4 | 37 |
| 6 | RSC Advances | 12 | 1.5 | 38 | 320 |
| 7 | Current Science | 10 | 1.2 | 9 | 21 |
| 8 | Optical Materials | 10 | 1.2 | 20 | 78 |
| 9 | Ceramics International | 9 | 1.1 | 5 | 80 |
| 10 | International Journal of Biological Macromolecules | 9 | 1.1 | 16 | 127 |
| 11 | Journal Of Chemical Thermodynamics | 9 | 1.1 | 7 | 95 |
| 12 | Materials Chemistry and Physics | 9 | 1.1 | 16 | 62 |
| 13 | Journal Of Electronic Materials | 8 | 1 | 3 | 42 |
| 14 | Journal Of Heterocyclic Chemistry | 8 | 1 | 0 | 30 |
| 15 | Journal Of Thermal Stresses | 8 | 1 | 8 | 48 |

University): In this section Institutional collaboration under SGBA University has been tabulated in table 7. The researcher selected the top 15 contributors in the publication Share- at top of the list is Sant Gadge Baba Amravati University and its departments their contribution

is 335 with 3615 total citation count. Second is the University of Sao Paulo with 22 publications and a 285 citations count. The third is Dr. Babasaheb Ambedkar Marathwada University with 20 Publications and 425 citations.

Table 7 : Institutional Collaboration and Productivity (SGBAU):

| Sr.No | Institution | Records | Percent | TLCS | TGCS |
|-------|--|---------|---------|------|------|
| 1 | Sant Gadge Baba Amravati University | 335 | 85.4 | 621 | 3615 |
| 2 | University of Sao Paulo | 22 | 6.1 | 21 | 285 |
| 3 | Dr. Babasaheb Ambedkar Marathwada University | 20 | 5.5 | 176 | 425 |
| 4 | Milliya Arts Science & Management Science College | 19 | 5.2 | 174 | 397 |
| 5 | Prof Ram Meghe College of Engineering & Management | 19 | 5.2 | 121 | 338 |
| 6 | Shri Shivaji Science College | 16 | 4.4 | 6 | 62 |
| 7 | Nicolaus Copernicus University | 14 | 3.9 | 21 | 277 |
| 8 | King Khalid University | 13 | 3.6 | 36 | 180 |
| 9 | University of Sorocaba | 10 | 2.8 | 1 | 98 |
| 10 | Bhabha Atom Research Centre | 9 | 2.5 | 63 | 113 |
| 11 | Prof Ram Meghe Institute Technology & Research | 9 | 2.5 | 10 | 29 |
| 12 | Toshniwal ACS College | 8 | 2.2 | 48 | 93 |
| 13 | VIT University | 8 | 2.2 | 53 | 124 |
| 14 | University of Campinas | 7 | 1.9 | 24 | 109 |
| 15 | Kalyani University | 7 | 1.9 | 6 | 57 |

Table : 8 Institutional Collaboration and Productivity (RTMNU)

| Sr. No. | Institution | Records | Percen | TLCS | TGCS |
|---------|---|---------|--------|------|------|
| 1 | Rashtrasant Tukadoji Maharaj Nagpur University | 702 | 85.3 | 586 | 4989 |
| 2 | Visvesvaraya National Institute of Technology | 68 | 8.2 | 23 | 373 |
| 3 | Shri Ramdeobaba College of Engineering & Management | 62 | 7.5 | 34 | 258 |
| 4 | Laxminarayan Institute Technology | 39 | 4.7 | 42 | 368 |
| 5 | Bhabha Atom Research Centre | 37 | 4.5 | 33 | 216 |
| 6 | National Institute Technology, Warangal | 34 | 4.1 | 38 | 541 |
| 7 | Konkuk University | 23 | 2.8 | 13 | 174 |
| 8 | Sevadal Mahila Mahavidyalaya | 23 | 2.8 | 40 | 146 |
| 9 | K.Z.S. Science College | 19 | 2.3 | 8 | 36 |
| 10 | University of Free State | 19 | 2.3 | 14 | 143 |
| 11 | North Maharashtra University | 17 | 2.1 | 6 | 66 |
| 12 | Sri Venkateswara University | 16 | 1.9 | 7 | 174 |
| 13 | Indian Institute Technology | 15 | 1.8 | 7 | 183 |
| 14 | Institute of Chemical Technology | 15 | 1.8 | 23 | 209 |
| 15 | Nevajabai Hitkarini College | 14 | 1.7 | 18 | 67 |

Institutional Collaboration and Productivity (Rashtrasant Tukadoji Maharaj Nagpur University):

In this section Institutional collaboration under RTMN University has been tabulated in table 8. The researcher selected the top 15 contributors in the publication Share- at top of the list is Rashtrasant Tukadoji Maharaj Nagpur University and its departments their contribution is 702 with a 4989 total citation count. Second is Visvesvaraya Natl. Inst. Technology with 68 publications and a 373 citation counts. The third is Shri Ramdeobaba College of Engineering & Management with 62 Publications and 258 citations.

These statistics of both universities clearly show

that mainstream output through university departments is consistently more as compared to colleges affiliated with them.

Country Collaboration:

Country Collaboration (Sant Gadge Baba Amaravati University):

In this section, the researcher studied Collaborated countries in the research output of SGBA University. This list is of the top 15 countries in collaboration as shown in table 9. First on the list is India with 361 records and 4244 total global citations. Second is Brazil with 43 record shares and 556 global citations in their account.

Table 9 : Country Collaboration (SGBAU)

| Sr. No. | Country | Records | Percent | TLCS | TGCS |
|---------|------------------------|---------|---------|------|------|
| 1 | India | 361 | 99.7 | 732 | 4244 |
| 2 | Brazil | 43 | 11.9 | 46 | 556 |
| 3 | Poland | 17 | 4.7 | 26 | 297 |
| 4 | Saudi Arabia | 15 | 4.1 | 37 | 255 |
| 5 | USA | 10 | 2.8 | 26 | 383 |
| 6 | UK | 6 | 1.7 | 2 | 55 |
| 7 | South Korea | 5 | 1.4 | 43 | 119 |
| 8 | Egypt | 3 | 0.8 | 4 | 90 |
| 9 | Italy | 3 | 0.8 | 8 | 594 |
| 10 | Peoples Republic China | 3 | 0.8 | 0 | 32 |
| 11 | Argentina | 2 | 0.6 | 4 | 61 |
| 12 | Australia | 2 | 0.6 | 1 | 46 |
| 13 | Belgium | 2 | 0.6 | 1 | 21 |
| 14 | Czech Republic | 2 | 0.6 | 4 | 50 |
| 15 | Germany | 2 | 0.6 | 4 | 18 |

Country Collaboration (Rashtrasant Tukadoji Maharaj Nagpur University):

In this section, the researcher studied Collaborated countries in the research output of RTM University. This list is of the top 15 countries in collaboration as shown in table 10. First on the list is India with 823 records and 5599 total global citations. Second is South Korea with 31 record shares and 220 global

citations in their account.

India is at the top in Collaboration because of the home country of both universities so the degree of collaboration is high as compared to other countries, and while considering SGBAU, Brazil is second most collaborated country, and if we consider RTMNU- it is South Korea at second top in collaboration.

Table 10 : Country Collaboration (RTMNU)

| Sr. No. | Country | Records | Percent | TLCS | TGCS |
|---------|------------------------|---------|---------|------|------|
| 1 | India | 823 | 100 | 611 | 5599 |
| 2 | South Korea | 31 | 3.8 | 17 | 220 |
| 3 | South Africa | 29 | 3.5 | 26 | 276 |
| 4 | USA | 28 | 3.4 | 22 | 336 |
| 5 | UK | 17 | 2.1 | 13 | 131 |
| 6 | Japan | 11 | 1.3 | 4 | 93 |
| 7 | Australia | 10 | 1.2 | 8 | 96 |
| 8 | Taiwan | 9 | 1.1 | 8 | 135 |
| 9 | Italy | 8 | 1 | 6 | 74 |
| 10 | Brazil | 7 | 0.9 | 4 | 76 |
| 11 | Russia | 7 | 0.9 | 0 | 19 |
| 12 | Canada | 5 | 0.6 | 1 | 214 |
| 13 | Peoples Republic China | 4 | 0.5 | 0 | 35 |
| 14 | Saudi Arabia | 4 | 0.5 | 0 | 14 |
| 15 | Qatar | 3 | 0.4 | 0 | 22 |

CONCLUSION

After analysing a total of 362 records produced by 488 Authors in 345 contributed journals with SGBAU and Analysing a total of 823 records produced by 1419 Authors in 346 contributed journals with RTMNU, researchers conclude following insight about both universities have been presented collectively.

- (i) **Yearly Research Productivity:** Total productivity have much difference in both, RTMNU produced a higher yield of academic research in the science field during these five years (2015-2019). SGBAU research productivity is comparatively low to RTMNU but in qualitative terms, local citations (TLCS) and global citations (TGCS) SGBAU leads to RTMNU in more fraction. SGBAU holds more cited research than RTMNU in terms of research usability.
- (ii) **Author Productivity:** Comparatively, the CPP (Citation per Paper) Impact of Authors from SGBAU is seen as higher than Authors of

RTMNU and RCI (Relative Citation Index) Impact of Authors from SGBAU and RTMNU seems equal during these five years (2015-2019).

- (iii) **Highly Producing Journals:** It is seen that both the university authors are collaborating and their choices of highly impacting journals are resembling in subjects like- Physics, Electronics, Metallurgy, and Chemistry; Collaboration of these faculties seems more in the research yield of both universities.
- (iv) **Institutional Collaboration and Productivity:** Institutional collaboration under both universities has been seen with the renowned national research institutes like Bhabha Atomic Research Centre (BARC), National Institute of Technology, Warangal (NITW), Institute of Chemical Technology, Mumbai (ICT) along with many other international universities. These statistics clearly show that mainstream output through university departments is consistently more as compared to the collaborated institution with

them in research yield.

(v) Country Collaboration: India will remain at the top in Collaboration because of the home country of both universities, but countries like Brazil, South Korea, USA, UK, Saudi Arabia, and the People Republic of China seem to be common collaborations in both universities.

After analyzing a total count of 1185 records, 1419 authors, and 513 journals conclusions have emerged: - In research output or productivity terms RTMN University bags more points than SGBA University, but when qualitative terms are assigned (RCI and CPP indexes of authors) it is seen that SGBA University holds higher weight in their side.

However, the Application of Scientometrics to world-class universities no doubt can play a vital role in the competition among them for benchmarking the research progress. Various rankings of top universities are done using academic research yield. And now the Govt. of India and UGC also made it mandatory for Institutions to show their impact by evaluating their performances.

Suggestions: Nowadays research contribution and impact have become a new scale for evaluating any higher education institute. As a counterpart of different assessments like NIRF and NAAC for performance-based evaluation, universities are under increasing pressure to demonstrate their commitment to producing high-quality scientific outputs and promoting research excellence. This self-assessment should include a focus on the quality of the research conducted and the impact it has on society, as well as an evaluation of the resources and support provided to faculty members and researchers. In addition to self-assessment, universities must also showcase their eminent

research contributors through various mediums, such as publications, conferences, and online platforms. By highlighting the work of their top researchers, universities can attract and retain top talent, establish themselves as leaders in their respective fields, and increase their visibility and reputation among the broader scientific community.

Conflicts of Interest Statement:

The research can help to benchmark the academic progress of both universities effectively. The study has not been intuited to undermine any organization by any means.

REFERENCES

1. Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959–975. <https://doi.org/10.1016/j.joi.2017.08.007>
2. Bapte, V. D., & Gedam, J. (2018). A Scientometric Profile of Sant Gadge Baba Amravati University, Amravati During 1996-2017. *DESIDOC Journal of Library & Information Technology*, 38(5), 326. <https://doi.org/10.14429/djlit.38.5.13194>
3. Coates, V., Farooque, M., Klavans, R., Lapid, K., Linstone, H. A., Pistorius, C., & Porter, A. L. (2001). On the Future of Technological Forecasting. *Technological Forecasting and Social Change*, 67(1), 1–17. [https://doi.org/10.1016/S0040-1625\(00\)00122-0](https://doi.org/10.1016/S0040-1625(00)00122-0)
4. Dubey, M., & Dadhe, P. (2020). A Scientometric Profile of Science Faculty of Rashtrasant Tukadoji Maharaj Nagpur University, India during 1990-2019. *Library Philosophy and Practice (e-Journal)*. <https://digitalcommons.unl.edu/libphilprac/4663>

5. Garfield, E. (2009). From the science of science to Scientometrics visualizing the history of science with HistCite software. *Journal of Informetrics*, 3(3), 173–179. <https://doi.org/10.1016/j.joi.2009.03.009>
6. Garg, K. C. (2003). An overview of cross-national, national, and institutional assessment as reflected in the international journal *Scientometrics*. *Scientometrics*, 56(2), 169–199. <https://doi.org/10.1023/A:1021963010621>
7. Horri, A. (2004). Bibliometric Overview of Library and Information Science Research Productivity in Iran. *Journal of Education for Library and Information Science*, 45(1), 15. <https://doi.org/10.2307/40323918>
8. Kademani, B. S., Sagar, A., Kumar, V., & Gupta, B. M. (2007). Mapping of Indian Publications in S&T: A Scientometric Analysis of Publications in Science Citation Index. *DESIDOC Journal of Library & Information Technology*, 27(1), 17–34. <https://doi.org/10.14429/djlit.27.1.120>
9. Kraus, J. R. (2005). *Comparing Journal Use Between Biology Faculty and Undergraduate Students*. <https://doi.org/10.5062/F4736NVN>
10. Kumar, S., Gupta, B. M., & Karisiddappa, C. (2002). Scientific productivity of authors in theoretical population genetics. *Scientometrics*, 53(1), 73–93. <https://doi.org/10.1023/A:1014883904242>
11. Li, B., Hu, K., & Shen, Y. (2020a). A Scientometric Analysis of Global Terahertz Research by Web of Science Data. *IEEE Access*, 8,
12. Li, J., Wang, L., Liu, Y., Song, Y., Zeng, P., & Zhang, Y. (2020b). The research trends of metal-organic frameworks in environmental science: A review based on bibliometric analysis. *Environmental Science and Pollution Research*, 27(16), 19265–19284. <https://doi.org/10.1007/s11356-020-08241-1>
13. Mahapatra, G. (2009). *Bibliometric studies in the Internet era*. Indiana Publishing House.
14. Microsoft Corporation. (2018). *Microsoft Excel*. <https://www.microsoft.com/en-in/microsoft-365/excel>
15. Nandi, A., & Bandyopadhyay, A. (2008). Indian Economic Review (1998-2002): A Bibliometric Study. *Undefined*. <https://doi.org/10.17821/srels/2008/v45i1/44117>
16. Queupil, J. P. (2016). *Educational Collaboration Networks and Leadership in Chile and Latin America: A Social Network Analysis*. <https://etda.libraries.psu.edu/catalog/pr76f341v>
17. Ramesh, L., & Nagaraju, A. (2002). Publication pattern in International Journal of Tropical Agriculture, 1991-2000: A bibliometric study. *SRELS Journal of Information Management*, 39(4), 457–465.
18. Simon, R. M. (2011). *Explaining the differential outcomes of research topics: Productivity and institutional outcomes in four sciences*. The Pennsylvania State University. <https://etda.libraries.psu.edu/catalog/12420>

