



Mapping Trends in Science Doctoral Theses at RTM Nagpur University (2000–2020)

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Abstract

The present study undertakes a comprehensive scientometric examination of doctoral research output in the Faculty of Science at Rashtrasant Tukadoji Maharaj Nagpur University (RTMNU) during the period 2000–2020. A dataset comprising 913 Ph.D. theses was compiled from official records of the University Ph.D. Section and the Shodhganga digital repository. The analysis applies established bibliometric indicators to evaluate disciplinary distribution, temporal growth patterns, relative growth rate (RGR), doubling time (Dt), annual growth rate (AGR), quinquennium-wise productivity, gender participation, research supervisorship, pagination characteristics, and citation behavior.

The findings reveal that Chemistry emerged as the most prolific discipline, contributing nearly one-fourth of the total doctoral output, while the year 2016 recorded the highest number of thesis submissions. Citation analysis indicates a substantial reliance on journal literature, with an average of over 200 references per thesis, though marked disciplinary variations are evident. The study further highlights noticeable fluctuations in annual research productivity, persistent gender imbalance favoring male scholars, and a concentration of supervisory responsibility among a limited number of guides. Overall, the analysis provides valuable insights into doctoral research dynamics, supervisory practices, and scholarly communication trends within the sciences at RTMNU.

Keywords: Scientometric analysis, doctoral theses, RTM Nagpur University, research growth, citation patterns, science research.

1. Introduction

Doctoral research represents the highest level of academic inquiry and plays a pivotal role in advancing disciplinary knowledge and innovation. An examination of doctoral theses not only reflects the research culture of an institution but also reveals its academic priorities, disciplinary strengths, and evolving scholarly practices. Scientometric techniques offer systematic and quantitative tools to evaluate such research output by analyzing patterns of growth, authorship, supervision, and citation behavior.

In the Indian higher education context, the steady expansion of doctoral programs in science mirrors the increasing emphasis on research-oriented development and knowledge-based economies. Rashtrasant Tukadoji Maharaj Nagpur University, a major public university in Maharashtra, has significantly contributed to scientific research in the Vidarbha region. The present study analyzes two decades of doctoral theses submitted to the Faculty of Science at RTMNU in order to map trends in research productivity, subject preferences, supervisory distribution, gender participation, and bibliographic practices.



2. Objectives

The specific objectives of the study are to:

1. Examine the subject-wise and year-wise distribution of doctoral theses in science at RTMNU from 2000 to 2020.
2. Measure research growth using indicators such as Relative Growth Rate (RGR), Doubling Time (Dt), Annual Growth Rate (AGR), and quinquennium-wise output.
3. Analyze gender participation and patterns of research supervision.
4. Study pagination characteristics and citation behavior across scientific disciplines.
5. Identify leading supervisors and highly cited doctoral theses.

3. Methodology

The study is based on secondary data collected from two authoritative sources: the official records of the RTMNU Ph.D. Section and the Shodhganga repository maintained by INFLIBNET. A total of 913 doctoral theses awarded in the Faculty of Science during the study period were included.

Bibliometric and scientometric methods were employed for data analysis using MS Excel and R-Studio. The parameters considered include disciplinary affiliation, year of award, quinquennium grouping, gender of researchers, number of supervisors, pagination, and citation details. Growth indicators such as RGR and Dt were calculated following the model proposed by Mahapatra (1985). Citation analysis covered total citations, average citations per thesis, disciplinary distribution, and types of cited documents.

4. Results and Discussion

4.1 Disciplinary Distribution

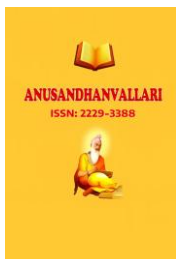
The analysis reveals that Chemistry accounts for the largest share of doctoral theses (24.42%), followed by Botany (13.47%) and Mathematics (11.94%). Disciplines such as Statistics and Home Science recorded comparatively low research output. The dominance of Chemistry may be attributed to its interdisciplinary applicability and strong research infrastructure.

4.2 Temporal Distribution

Year-wise analysis indicates considerable variation in doctoral output over the two decades. The peak productivity was observed in 2016, while the lowest output occurred in 2012. The absence of a consistent upward trend suggests that doctoral research growth at RTMNU has been influenced by policy changes, supervisory availability, and academic regulations.

4.3 Growth Indicators

The Relative Growth Rate shows a gradual decline over the years, indicating a slowdown in cumulative research expansion. Correspondingly, Doubling Time increased in later years, reflecting reduced acceleration in doctoral output. Annual Growth Rate values fluctuated considerably, with a sharp rise in 2016 and negative growth in select years such as 2004.



4.4 *Quinquennium-wise Productivity*

The periods 2000–2005 and 2016–2020 emerged as the most productive quinquennia, together accounting for more than half of the total theses. In contrast, the quinquennium 2011–2015 recorded the lowest contribution, suggesting a temporary stagnation in doctoral research activity.

4.5 *Gender Participation*

Gender-wise analysis indicates a clear predominance of male researchers, who contributed over 60% of the total theses. Disciplines such as Physics, Electronics, and Computer Science showed pronounced male dominance, whereas Home Science demonstrated equal gender representation.

4.6 *Research Supervisorship*

A total of 256 supervisors guided the 913 doctoral theses, yielding an average of 3.56 theses per supervisor. A small group of supervisors accounted for a disproportionately large number of theses, with the most prolific guide supervising 24 doctoral candidates. The data further indicate that the overwhelming majority of theses were guided by a single supervisor, highlighting limited interdisciplinary or co-supervisory practices.

4.7 *Pagination Analysis*

The cumulative pagination of all theses amounted to 318,772 pages, with an average length of approximately 349 pages per thesis. Botany theses were the most extensive in terms of average length, while Home Science theses were comparatively shorter.

4.8 *Citation Characteristics*

The total number of references cited across all theses exceeded 185,000, with an average of 203 citations per thesis. Microbiology and Electronics recorded the highest average citations per thesis. Chemistry contributed the largest share of total citations, reflecting its high research volume and extensive engagement with existing literature. The most highly cited thesis contained nearly 400 references.

4.9 *Types of Cited Documents*

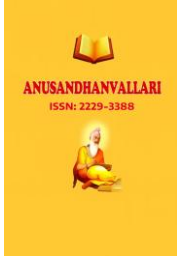
Journal articles constituted the primary source of citations across all disciplines, underscoring the reliance on current and peer-reviewed research. Books ranked second, followed by conference proceedings. Reports, theses, and web resources formed a smaller yet meaningful portion of the citation corpus.

5. Major Findings

- Chemistry dominates doctoral research output and supervision in the Faculty of Science.
- Research productivity shows considerable year-to-year variation rather than steady growth.
- Male scholars continue to outnumber female scholars in most science disciplines.
- Supervisory responsibility is concentrated among a limited number of faculty members.
- Journal literature remains the most heavily used source of scholarly information.

6. Conclusion and Recommendations

The scientometric assessment of doctoral theses in science at RTMNU reveals a robust but uneven research landscape. While certain disciplines demonstrate sustained productivity, others remain marginally represented.



To strengthen doctoral research outcomes, the University may consider encouraging interdisciplinary supervision, enhancing support mechanisms for female researchers, revitalizing underrepresented subjects through targeted funding and faculty development, and continuously improving access to high-quality scholarly resources. Regular monitoring of research trends can further help align doctoral studies with emerging global scientific priorities.

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