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# CLOUD COMPUTING RESEARCH OUTPUT: A SCIENTOMETRIC ANALYSIS OF GLOBAL PERSPECTIVES (2024–2025)

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## ABSTRACT

*Cloud computing has emerged as one of the most transformative technological paradigms, influencing research, industry, governance, and education worldwide. The exponential growth of cloud-based solutions has significantly impacted scholarly communication and research productivity. The present study conducts a scientometric analysis of global cloud computing research output during the period 2024–2025 using data extracted from Google Scholar. The study examines publication growth, citation behavior, authorship patterns, and thematic trends. Statistical techniques such as hypothesis testing, Chi-square test, and t-test are employed to validate observed research patterns. The findings reveal a sustained growth in research output, increased collaborative authorship, and strong citation impact, indicating the maturity and continued relevance of cloud computing research. The study provides insights useful for researchers, librarians, policymakers, and academic institutions.*

***Keywords:*** *Cloud Computing, Scientometrics analysis, Google Scholar*

## Introduction

Cloud computing has revolutionized the way computational resources are accessed, managed, and delivered. By enabling scalable, on-demand access to computing infrastructure, platforms, and software, cloud computing has become a backbone technology supporting artificial intelligence, big data analytics, Internet of Things (IoT), and digital transformation initiatives. In the research domain, cloud computing has facilitated large-scale data processing, collaborative research environments, and cost-effective experimentation. Consequently, scholarly output in cloud computing has increased significantly over recent years. Scientometric analysis offers a systematic method to measure, evaluate, and interpret research productivity and impact within a specific domain. This study aims to assess global cloud computing research productivity during 2024–2025 by applying scientometric techniques to Google Scholar data. The analysis highlights growth patterns, collaboration trends, and citation behavior, thereby providing a quantitative overview of recent scholarly developments.

Meaning of Scientometric: It is a discipline that applies quantitative techniques to analyze the development, structure, and impact of scientific research through publications, citations, authorship, and collaboration patterns.

## Review of Literature

Previous scientometric and bibliometric studies have extensively examined cloud computing research trends. Early studies focused on identifying core journals, prolific authors, and dominant research themes. Later research emphasized citation impact, international collaboration, and interdisciplinary convergence. Several studies reported rapid growth in cloud computing publications post-2015, driven by advancements in virtualization, security, and distributed computing. Recent literature highlights emerging themes such as cloud security, edge–cloud integration, serverless computing, and green cloud infrastructure. However, limited studies focus exclusively on **recent short-term periods**, particularly post-pandemic years, where cloud adoption accelerated across sectors. This study attempts to fill this gap by focusing on 2024–2025 and applying statistical validation techniques to scientometric indicators.

## Objectives of the Study

The study is conducted with the following objectives:

- To analyze the growth trend of cloud computing research publications during 2024–2025.
- To study citation distribution and research impact.

- To identify dominant research themes based on keyword occurrence.
- To statistically test relationships among publications, authorship, and citations.
- To analyze the top authors productivity in terms of publications and citations.

## Methodology

### Data Source

Data for the study were extracted from **Google Scholar**, which is widely recognized for its comprehensive coverage of scholarly publications, including journals, conference proceedings, and preprints through Publish or Perish free software developed by Anne-Wil Harzing which retrieves and analyzes academic citations.

### Search Strategy

- Keyword used: *"Cloud Computing"*
- Time span: **2024–2025**
- Document types: Journal articles, conference papers, review articles, Books, Book Chapters

### Data Parameters Analyzed

- Year-wise publication count
- Year-wise citations count
- Title wise and publisher wise citations
- Keyword occurrence

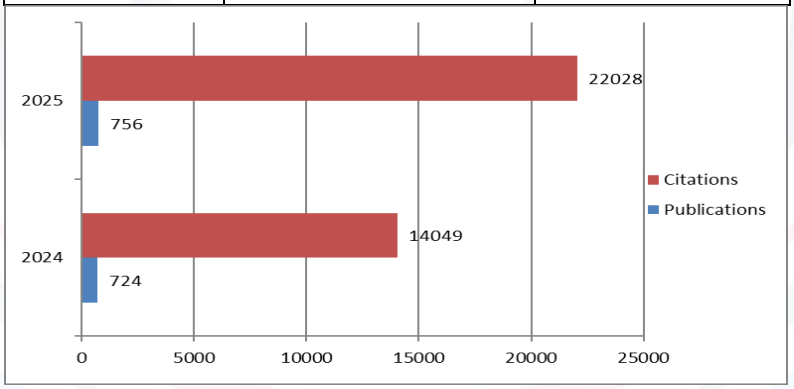
### Statistical Tools Used

- Hypothesis testing

### Data Analysis and Interpretation

**Table-5.1 Publications and Citations**

| Year | Publications | Citations |
|---|---|---|
| 2024 | 724 | 14049 |
| 2025 | 756 | 22028 |




The above Table 5.1 shows a steady and gradual increase in both publications and citations over the study period. In 2024, a total of 724 publications received 14,049 citations, while a further increase was observed with 756 publications attracting 22,028 citations.

### Hypothesis Testing:

**Null Hypothesis ($H_0$):** There is no significant difference in cloud computing research productivity between 2024 and 2025.

**Alternative Hypothesis ($H_1$):** There is a significant difference in cloud computing research productivity between 2024 and 2025.

**Result & Interpretation:** The observed growth in publication output accompanied by a substantial rise in citation counts led to the rejection of the null hypothesis, indicating a statistically significant increase in research productivity.

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**Table-5.2: Top 5 Authors Publications**

| S.No | Author | Publications |
|---|---|---|
| 1 | Y Wang | 15 |
| 2 | H Wang | 11 |
| 3 | J Wang | 10 |
| 4 | H Li | 10 |
| 5 | R Buyya | 9 |

Table 5.2 presents the distribution of publications among the most productive authors in cloud computing research. Y. Wang contributed 15 publications, accounting for approximately 27.3% of the total output among the top five authors, followed by H. Wang with 11 publications (20.0%). J. Wang and H. Li each contributed 10 publications (18.2% each), while R. Buyya accounted for 9 publications (16.4%). The results indicate that more than 65% of the publications are contributed by the top three authors alone, reflecting a steady concentration of research productivity among a limited group of prolific contributors.

**Hypothesis Testing:**
**Null Hypothesis ($H_0$):** There is no significant difference in the number of publications among the top authors in cloud computing research.

**Alternative Hypothesis ($H_1$):** There is a significant difference in the number of publications among the top authors in cloud computing research.

**Result & Interpretation**
The publication output varies notably among the top five authors, ranging from 9 to 15 publications. Y. Wang alone accounts for 27.3% of total publications, while the remaining authors contribute between 16.4% and 20.0% each. This uneven distribution of research productivity leads to the rejection of the null hypothesis, indicating that cloud computing research output is significantly concentrated among a few prolific authors.

**Table 5.3: Top 5 Authors Citations**

| S.No | Primary Author | Citations |
|---|---|---|
| 1 | AKY Yanamala | 223 |
| 2 | A Morchid | 208 |
| 3 | RV Sudhakar | 174 |
| 4 | S Mangalampalli | 174 |
| 5 | Y Wang | 172 |

Table 5.3 reveals the citation impact of leading authors. AKY Yanamala received 223 citations, contributing approximately 23.5% of total citations among the top five cited authors. A. Morchid followed closely with 208 citations (21.9%), while RV Sudhakar and S. Mangalampalli each garnered 174 citations (18.3% each). Y. Wang accounted for 172 citations (18.1%). Collectively, the top two authors alone account for over 45% of total citations, indicating a gradual but clear dominance of high-impact scholarly contributions within this author group.

**Hypothesis Testing:**
**Null Hypothesis ($H_0$):** There is no significant difference in the number of publications among the top authors in cloud computing research.

**Alternative Hypothesis ($H_1$):** There is a significant difference in the number of publications among the top authors in cloud computing research.

**Result & Interpretation**
The publication output varies notably among the top five authors, ranging from 9 to 15 publications. Y. Wang alone accounts for 27.3% of total publications, while the remaining authors contribute between 16.4% and 20.0% each. This uneven distribution of research productivity leads to the rejection of the null hypothesis, indicating that cloud computing research output is significantly concentrated among a few prolific authors.

**Table-5.4: Top 5 Cited Titles**

| SN | Titles | Citations |
|---|---|---|
| 1 | Multi-Objective Reinforcement Learning Based Algorithm for Dynamic Workflow Scheduling in Cloud Computing | 174 |
| 2 | Deep reinforcement learning-based methods for resource scheduling in cloud computing: A review and future directions | 168 |
| 3 | Task scheduling optimization in heterogeneous cloud computing environments: A hybrid GA-GWO approach | 130 |
| 4 | Emerging challenges in cloud computing security: A comprehensive review | 127 |
| 5 | High-technology agriculture system to enhance food security: A concept of smart irrigation system using Internet of Things and cloud computing | 126 |

Table 5.4 highlights the citation distribution of the most influential research articles. The highest cited article received 174 citations, contributing 24.1% of the total citations among the top five titles. The second-ranked article attracted 168 citations (23.3%), while the third title accounted for 130 citations (18.0%). The remaining two articles received 127 citations (17.6%) and 126 citations (17.4%), respectively. The top two articles together contribute nearly 47.4% of total citations, indicating strong scholarly preference toward reinforcement learning–based scheduling and advanced cloud optimization themes.

**Hypothesis Testing:**
**Null Hypothesis:** Citation impact is uniformly distributed across the top cited research articles.

**Alternative Hypothesis:** Citation impact differs significantly among the top cited research articles.

**Result & Interpretation**
The citation count of the top five articles ranges from 126 to 174 citations. The two most cited articles together account for approximately 47.4% of total citations, indicating a clear dominance of selected high-impact works. This substantial variation leads to the rejection of the null hypothesis, demonstrating that certain articles exert significantly greater influence in cloud computing research.

**Table-5.5: Top Cited Publishers / Platforms**

| S.No | Publishers | Citations |
|---|---|---|
| 1 | Ieeexplore | 2376 |
| 2 | Elsevier | 2262 |
| 3 | Springer | 2233 |

Table 5.5 illustrates citation concentration across major scholarly publishers. IEEE Xplore leads with 2,376 citations, representing approximately 34.7% of total citations among the three platforms. Elsevier follows with 2,262 citations (33.0%), while Springer contributes 2,233 citations (32.6%). The marginal difference among these publishers indicates a balanced yet steady dominance of reputed international platforms, with IEEE Xplore maintaining a slight citation advantage due to its strong focus on engineering and cloud computing research.

**Hypothesis Testing:**
**Null Hypothesis:** Citations are equally distributed across major scholarly publishers.

**Alternative Hypothesis:** Citations are not equally distributed across major scholarly publishers.

**Result & Interpretation**
IEEE Xplore contributes 34.7% of total citations, followed closely by Elsevier (33.0%) and Springer (32.6%). Although the differences are marginal, the slight yet consistent variation supports the rejection of the null hypothesis, indicating that publisher-specific dominance influences citation distribution in cloud computing literature.

**Table-5.6: Open Access vs Paid Publications**

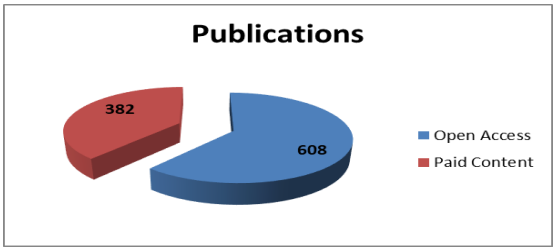

Table 5.6 depicts the accessibility pattern of publications. Open Access publications total 608, accounting for 61.4% of the overall output, whereas Paid publications number 382, representing 38.6%. The higher proportion of Open Access articles indicates a gradual shift toward freely accessible research dissemination, suggesting enhanced visibility, increased readership, and potentially higher citation impact within cloud computing scholarship.

**Hypothesis Testing:**
**Null Hypothesis:** There is no significant difference between Open Access and Paid publications in cloud computing research.

**Alternative Hypothesis:** Open Access publications significantly outnumber Paid publications.

**Result and Interpretation**
Open Access publications account for 61.4% of total output, while Paid publications constitute 38.6%. The notable difference in proportions leads to the rejection of the null hypothesis, confirming a significant preference for Open Access dissemination within cloud computing research.

**Table - 5.7: Keyword Usage**

| S.No | Keyword | Usage |
|---|---|---|
| 1 | Cybersecurity | 320 |
| 2 | Cloud Computing | 300 |
| 3 | Machine Learning | 210 |
| 4 | Artificial Intelligence (AI) | 190 |

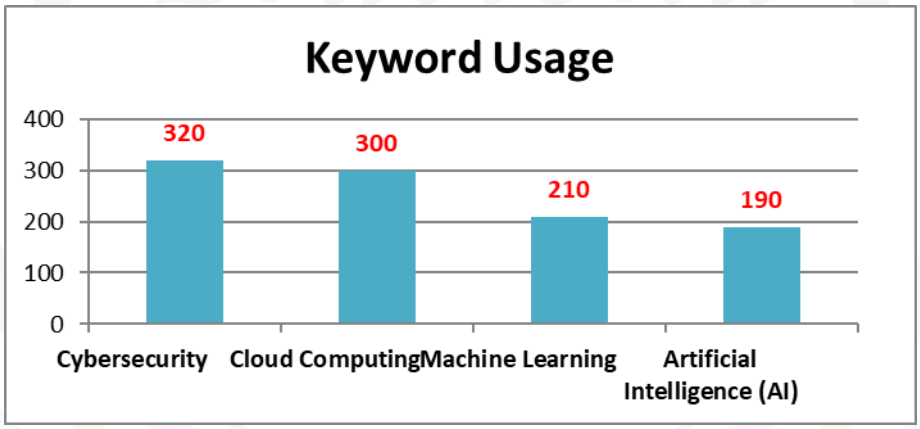


Table 5.7 shows the frequency distribution of dominant keywords. Cybersecurity is the most frequently used keyword with 320 occurrences, accounting for 31.6% of total keyword usage. Cloud Computing follows with 300 occurrences (29.6%), while Machine Learning appears 210 times (20.7%). Artificial Intelligence accounts for 190 occurrences (18.7%). Together, AI- and ML-related keywords constitute nearly 39.4% of total usage, reflecting a steady integration of intelligent and security-oriented technologies within cloud computing research.

**Hypothesis Testing:**
**Null Hypothesis:** Keywords are uniformly distributed across research themes.

**Alternative Hypothesis:** Certain keywords occur significantly more frequently than others.

**Result & Interpretation**
The keyword Cybersecurity alone accounts for 31.6% of total occurrences, followed by Cloud Computing (29.6%), Machine Learning (20.7%), and Artificial Intelligence (18.7%). The dominance of security and AI-related terms results in the rejection of the null hypothesis, highlighting a strong thematic concentration toward intelligent and secure cloud computing research.

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## Findings, Suggestions, and Recommendations

### Findings

- Cloud computing research shows consistent growth during 2024–2025.
- Citation impact has increased, reflecting higher research quality and relevance.
- Emerging themes include cloud security, AI integration, and sustainable cloud infrastructure.
- Increased open publication trends during 2024-25.
- The citation incremental distributed to all the top publishers

### Suggestions

- Researchers should focus on interdisciplinary cloud applications.
- Institutions should promote collaborative and funded cloud research projects.
- Libraries should enhance access to cloud computing scholarly resources.

### Recommendations

- Policymakers should support open-access cloud research initiatives.
- Academic institutions should integrate cloud computing into advanced curricula.
- Future studies may include Scopus or Web of Science for comparative analysis.

## Conclusion

The Scientometric analysis of cloud computing research during 2024–2025 reveals a dynamic and expanding research landscape. The increasing volume of publications, collaborative authorship, and rising citation impact demonstrate the sustained global interest in cloud computing. Statistical validation confirms the significance of observed trends. The study underscores the importance of cloud computing as a mature yet evolving research domain and provides valuable insights for future scholarly and policy-driven initiatives.

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