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Bibliometric Study of Research Productivity at the University of Mosul

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Abstract

Research output is one of the most important aspects of the productivity of universities and scientific institutions. In practice, measuring this productivity no longer depends on quantity only, but type and quality have become a key factor. In this work, the research's productivity and impact of the University of Mosul (UoM) was analyzed by implementing a complete bibliometric study. The OpenAlex database was used to create a dataset containing information on UoM research for the period 2018–2025. The results identified the most active researchers and the disciplines with the highest publication and international collaboration rates. The main contribution of this work is to provide a clear picture to decision-makers at the UoM about the activity of researchers, including names and specializations. Additionally, this study also aims to measure the accuracy and reliability of the use of OpenAlex data as an open-source bibliographic source

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1. Introduction

Measuring the overall research output of universities and scientific institutions is one of the most important indicators of educational quality. The number of research papers that published by a particular institution is not enough to determine the impact and scientific level of that institution. There are several metrics and standards, such as citations, that can be used today to measure research output. Citation rates and other metrics are indicators of bibliometric analyses.

Recent decades have witnessed an increasing use of bibliometric as a primary tool for measuring scholarly activity at the individual, university, and national levels. Bibliometric analysis is a field that aims to study research activity and various types of scientific publications. Through this field, many questions related to scientific research in a specific field or institution can be answered [1],[2]. Beyond the numerical indicators, bibliometric analysis seeks to transform data into strategic insights that support academic decision-making. Below is a set of quantitative indicators that bibliometric analysis is based on:

1. Publication Count
2. Citations
3. H-index
4. Collaboration Network Analysis:
5. Field Analysis

The first step in any bibliometric analysis is to determine a data source to be used. In previous periods, the analysis was most commonly based on Scopus database or Web of Science database. However, in recent year, an open database, called OpenAlex, has started to gain wide use in bibliometric analyses due to its comprehensive coverage and ease it access [3]-[6]. Table [1] presents a comparative summary of major academic papers databases, including OpenAlex, Scopus, Clarivate (Web of Science), and ResearchGate [7]-[9].

Table (1): Comparison of Research Data Sources

Category	OpenAlex	Scopus	Clarivate (Web of Science)	ResearchGate
Platform Type	Open Data	Commercial	Commercial	Academic Social Network
Coverage	Global, all DOI	Journals indexed	Limited to registered researchers	Nearly all research, including preprints
Data Accuracy	High	High	Variable	Medium
Citation Sources	Multiple sources	Accurate, institutional	Within the platform	Comprehensive but not official
Update Frequency	Daily	Weekly/monthly	Periodic updates	Nearly daily via crawling
Integration / API Access	Free API	Limited	Limited	No official API

In this work, the OpenAlex database was used, and the following bibliometric indicators were calculated:

1. Annual number of works
2. Annual citations
3. Subject distribution
4. Top authors by number of works
5. Top authors by number of citations
6. Number of authors by fields
7. Top partner countries
8. Top collaborating institutions.

1.1 Related Work

In recent decades, there have been a lot of studies employing **bibliometric analysis** to evaluate scientific output and monitor research trends across various disciplines.

Many of the previous works have used major databases such as **Web of Science** and **Scopus. However, recently**, open platform such as **OpenAlex** have emerged, offering large-scale data access for free, thereby enabling researchers in developing countries to conduct robust bibliometric studies.

Table [2] lists previous related works, showing the number of analyzed articles, the data sources, the software used, and the research topics covered in each study.

Table (2): Overview of Previous Bibliometric Research

Index	Reference	Articles Analyzed	Data Source	Topic
1	10	910	DJLIT Journal website	Bibliometric analysis of papers published during 1992–2019 in the DESIDOC Journal of Library and Information Technology
2	11	957	Scopus and Web of Science	Review of bibliometric studies in scientific research using R based on Scopus and Web of Science databases
3	12	290	Google Scholar	Bibliometric analysis of data science research: trends, contributions, and developments
4	13	1608	Scopus	Bibliometric study of published research related to the One Health concept
5	14	151	Scopus	Bibliometric analysis of publications addressing big data architecture

Index	Reference	Articles Analyzed	Data Source	Topic
6	15	233	Scopus	Bibliometric study of research development in the field of information technology governance
7	16	4756	Scopus	Analysis of research streams through co-occurrence networks of authors, countries, keywords, and titles
8	17	736	Scopus and Google scholar	Bibliometric analysis of cancer-related publications authored by Iraqi researchers
9	18	1278	Web of Science	Bibliometric study of papers published in the *Journal of Documentation* analyzing publication trends, citation impact, and journal rankings
10	19	456 and 548	Web of Science	Bibliometric analysis of papers published in the *Indian Journal of Chemistry – Section A and Section B* during 2015–2020
11	20	12670	Scopus	Bibliometric analysis of research trends in mathematics education

Unlike previous studies, this work uses the OpenAlex database, a modern, open-source, and freely available platform, to provide a comprehensive and up-to-date view of a university's scientific output. This work contributes to a better understanding of the current state of research at the institutional level and provides valuable insights to support strategic decision-making within the university.

2. Materials and Methods

The methodological steps of this work can be summarized as follows:

2.1 Data Source:

The OpenAlex website was used as a data source, which provides comprehensive information on authors, institutions, publications, journals, and citations. The main reason for using this database is its comprehensiveness and free access and use.

2.2 Data Extraction:

As the first step, and before starting extract data, the ID of UoM needs to be identified. The Research Organization Registry (ROR) was used to obtain the information. The ID of UoM is (112150220), according to ROR. The bibliometric data were then extracted via the OpenAlex API, which provides structured access to publication metadata in JSON format. A Python script was developed to collect all research works associated with the institution during the last seven years (2018–2025). As a result, the work of UoM staff, behind the work of graduate student was retrieved and stored in a database with the following information:

- Work title
- Year of publication
- Journal or source title
- List of authors and their affiliations
- Number of citations
- Related research fields or concepts

It is worth noting that the data was collected and extracted from the OpenAlex website in August, 2025. The number of collected papers is 10,498, while the number of unique authors is 15,618.

2.3 Data Cleaning:

In this step, data cleaning strategies were implemented to ensure data integrity.

- Records associated with invalid or non-UoM authors were excluded.
- Works affiliated with non-research entities or duplicate institutional names were removed.
- Missing or inconsistent metadata (e.g., missing publication year or venue) were manually verified or excluded.

2.4 Creating Intermediate Files:

Two mail files were created to store the extracted data:

- Works file: Contains all research published during the specified period.
- Authors file: Contains researchers with their scientific production.

2.5 Bibliometric Analysis:

After completing the above five steps, data is ready to implement some quantitive analysis, including the following steps:

a. Productivity Analysis: Number of works published annually.
b. Citation Analysis: Measuring scientific impact through the number of citations.
c. Discipline Analysis: Distribution of scientific production across various research fields.
d. International Collaboration Analysis: Across countries and collaborating institutions.

3. Results

3.1 Annual Research Productivity

To measure the research productivity of the UoM, the basic and the most important information is the number of published paper each year. Table (3) and Figure (1) present the annual number of papers. As previously mentioned, the data was collected in August 2025, which explains the relatively small number of papers recorded for that year.

Table (3): Annual number of works

Publication Year	Works Count	Total Citations
2018	277	2385
2019	976	5591
2020	1288	8584
2021	1734	7695
2022	2187	7064
2023	2218	4782
2024	1516	2461
2025	302	77

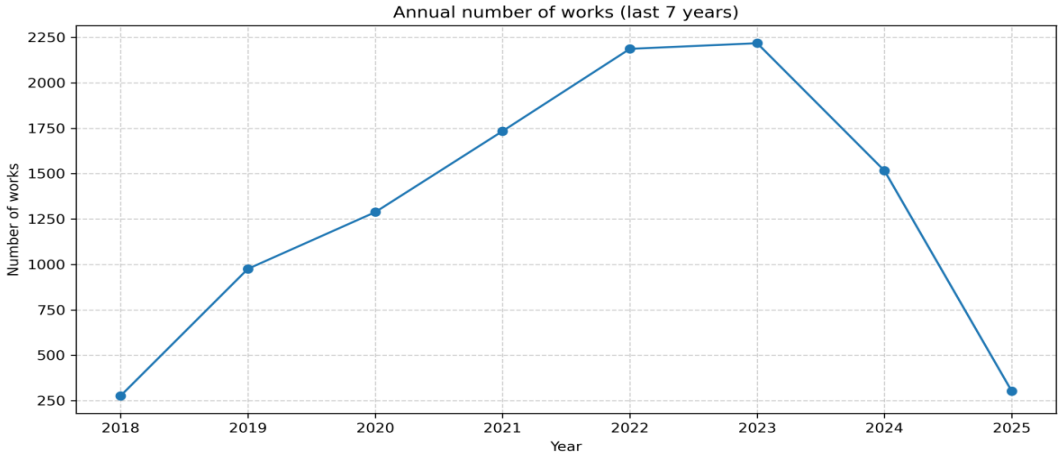

Figure (1): Annual number of works

Moreover, the number of published papers for each user was calculated to find the top authors based on their publications (Figure (2)).

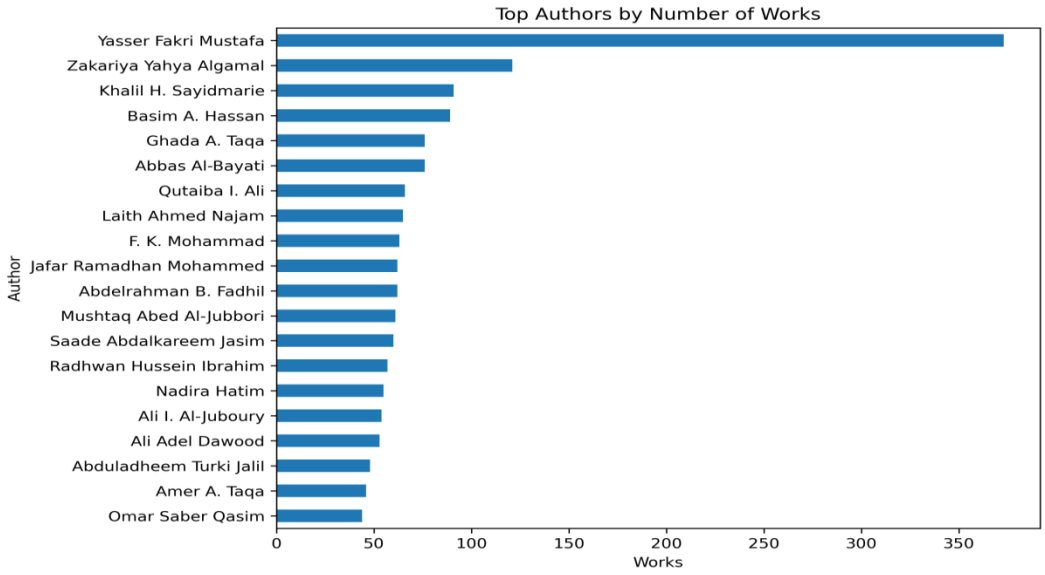

Figure (2): Top authors by number of works

3.2 Scientific Citations

In this step, the number of citations for each researcher was calculated to find the impact of each one. The result is explained in Figure (3). In addition, to calculate the impact of each researcher, the annual citations was also calculated and displayed in Figure (4). Moreover, Figure (5) shows the comparison between the number of researchers and the number of citations.

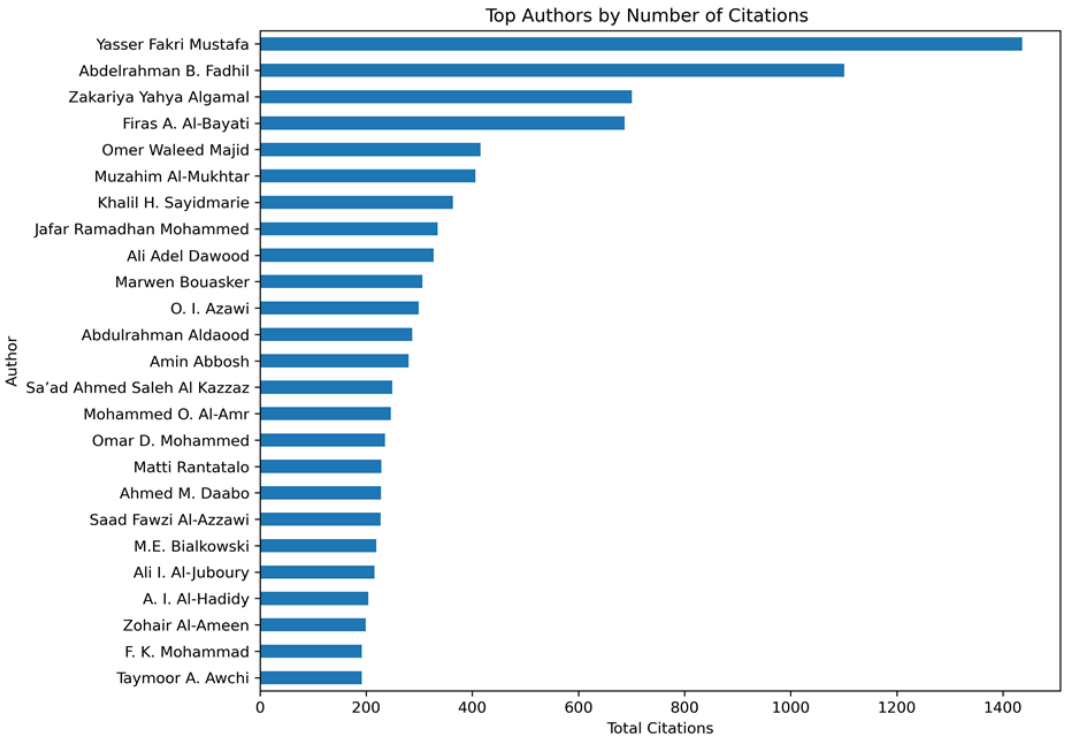

Figure (3): Annual number of works

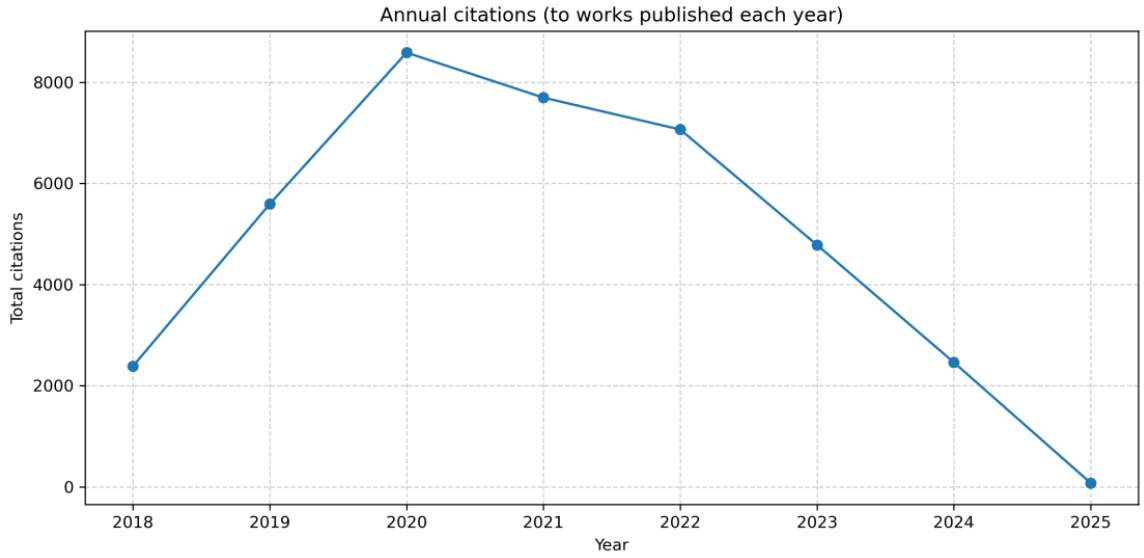

Figure (4): Annual citations

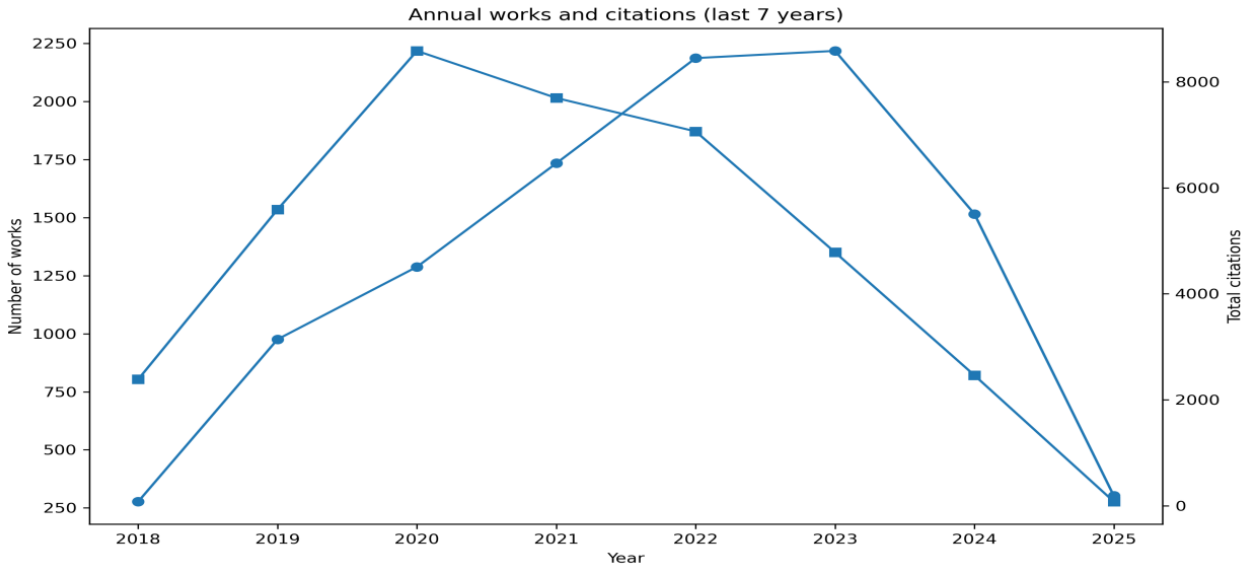

Figure (5): Annual works and citations

3.3 Subject Distribution (Scientific Disciplines)

To determine the primary fields of the published works and to illustrate the distribution of research subjects, the affiliations of authors were analyzed.

The results are presented in Table (4), where the 'primary_field' column indicates the name of each subject area, while the 'total_works' column represents the number of published papers within that field. The 'authors_count' column shows the number of authors associated with each subject. These results are also visualized in Figure (6) that shows the number of authors by field, while Figure 7 that shows a comparison of total work and citation by field.

Table (4): Top Primary Fields by Total Works

Primary Field	Total Works	Total Citations	Authors Count
Computer science	2632	12085	818
Medicine	2503	8420	693
Chemistry	1275	10403	272
Biology	1094	3813	255
Materials science	697	2999	224
Mathematics	536	2270	126
Geology	277	756	80
Physics	239	1581	29
Environmental science	204	787	66
Engineering	202	725	39

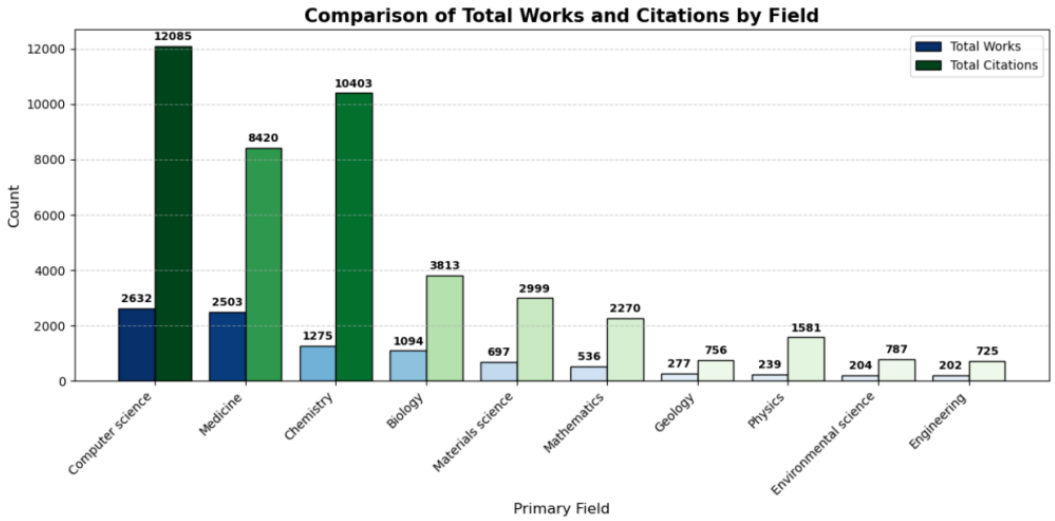

Figure (6): Comparison of total works and citations by field

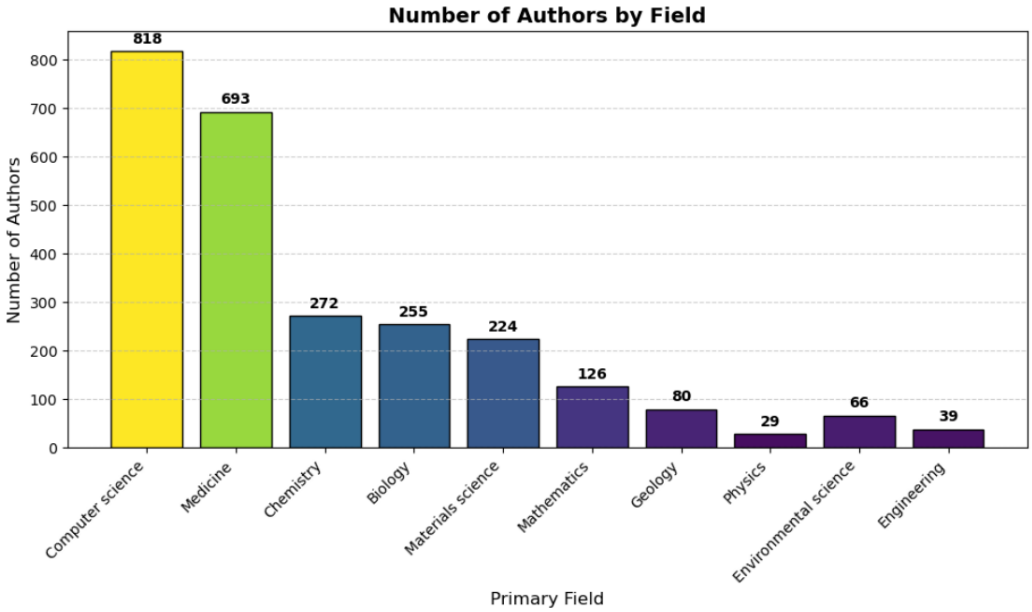

Figure (7): Number of authors by field

3.4 International and Institutional Collaborations

One of the most important bibliometric analyses conducted was identifying the partners of the University of Mosul, whether countries or institutions. Figure 8 shows the top partner countries, while Figure 9 presents the top collaborating institutions.

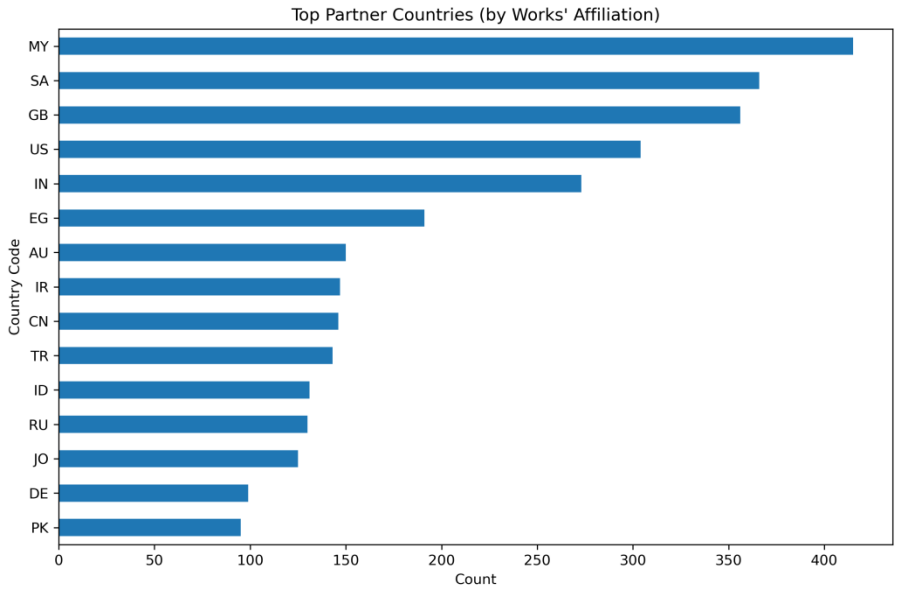

Figure (8): Top partner countries

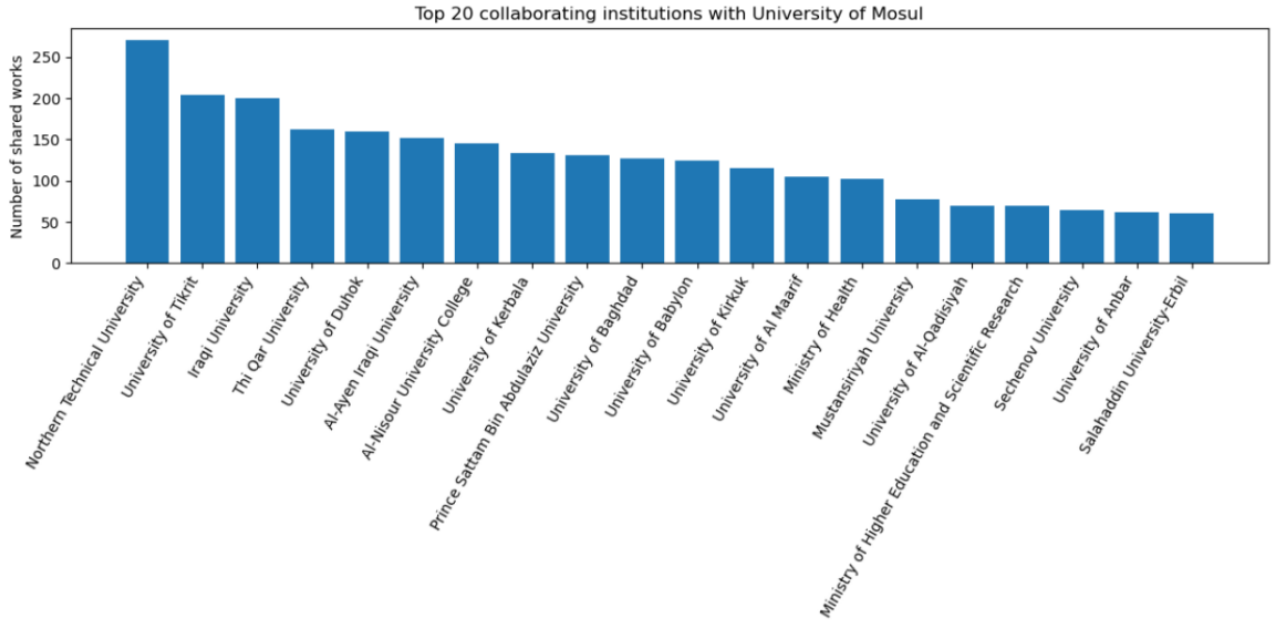

Figure (9): Top 20 collaborating institutions

4. Discussion

4.1 Growth in Research Productivity

Analysis of the collected data explained a big increase in the number of research papers, showing the university's ability to restore its research activity, especially after the challenges faced by Nineveh Governorate and the university over the last decade.

4.2 Quantity and Quality

The results showed that the number of citations was increased in recent years, which reflects the quality of the papers. This increase also implicitly reflects the publication of research in solid journals.

4.3 Diversity of Disciplines

The results also showed the variety of majors which is good indicator to diversity of disciplines. Also, this variety needs to be considered by the university decision-makers to ensure that all majors receive the necessary support to enhance their scientific research.

4.4 International Cooperation

One of the main observations is the increased research collaboration between University of Mosul researchers and other local and international universities. This collaboration reflects a growing awareness among University of Mosul researchers of the importance of international cooperation, which positively impacts the university's research standing. Furthermore, assessing the level of international collaboration across different scientific disciplines and among researchers provides a clear vision to university officials to support disciplines with high rates of international collaboration. It also allows for addressing the challenges faced by disciplines that still exhibit low levels of international cooperation.

5. Conclusion

This work introduced a bibliometric analysis of the University of Mosul's research output, using the OpenAlex database. The main goal of this study was to provide a clear picture of research activity, for individual researchers and across the various academic disciplines within the UoM. Analyzing the research landscape using numbers will help decision-makers to make important stepd to enhance the research process, including recognizing and encouraging disciplines whose research output remains below expectations. Overall, the results for the past seven years demonstrate increased research activity, both in terms of productivity (number of research papers) and impact (number of citations), as well as international collaboration with foreign researchers. This reflects the university's clear vision and commitment to enhance its research environment across multiple dimensions. In addition, as another benefit, the research demonstrates the effectiveness of using the OpenAlex database to measure research activity at the UoM, given its ease of programmatic access and data retrieval. Lastly, this work can be adapted to other Iraqi universities by first obtaining their research data and then attempting to analyze it using the same steps that were implemented in this paper. This will provide a clear picture of research activity across Iraq, contributing to the development of a plan that supports strengths and addresses weaknesses.

6. Declarations

Ethics approval and consent to participate: Not applicable. This study is based on secondary bibliometric data obtained from the OpenAlex database and does not involve human participants, personal data, or human-related experiments.

Consent for publication: Not applicable.

Availability of Data and Materials: The data used in this study were obtained from the OpenAlex database, which is publicly available. Any processed data supporting the findings of this study are available from the corresponding author upon reasonable request.

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7. Acknowledgements

Author would like to thank the OpenAlex platform for the data that that is freely available. Author also appreciates the reviewer's feedback to improve this work.

8. Conflict of Interest

The author declares that there are no conflicts of interest regarding the publication and/or funding of this manuscript.

9. References

[1] K. Garg, M. Lamba, and R. Singh, "Bibliometric Analysis of Papers Published During 1992–2019 in DESIDOC Journal of Library and Information Technology," *DESIDOC Journal of Library & Information Technology*, vol. 40, pp. 396–402, 2020, doi: 10.14429/djlit.40.6.15741.

[2] M. Yıldız and T. Karakus Yılmaz, "Bibliometric Analysis in Scientific Research Using R: A Review of Scopus and Web of Science Databases," *Journal of Data Applications*, pp. 31–46, 2024, doi: 10.26650/JODA.1462396.

[3] M. Juliardi and I. Malik, "Bibliometric Analysis of Data Science: Trends, Contributions, and Research Developments," *West Science Interdisciplinary Studies*, vol. 1, pp. 365–375, 2023, doi: 10.58812/wsis.v1i07.81.

[4] I. Passas, "Bibliometric Analysis: The Main Steps," *Encyclopedia*, vol. 4, pp. 1014–1025, 2024, doi: 10.3390/encyclopedia4020065.

[5] F. Maulana, L. Maghfiroh, S. Sari, and F. Rantam, "A Bibliometric Analysis of Worldwide Research on One Health from 2012 to 2022," *International Journal of One Health*, pp. 159–165, 2023, doi: 10.14202/IJOH.2023.159-165.

[6] A. Nuar and C. Seah, "Examining the Trend of Research on Big Data Architecture: Bibliometric Analysis Using Scopus Database," *Procedia Computer Science*, vol. 234, pp. 172–179, 2024, doi: 10.1016/j.procs.2024.04.010.

[7] R. Awad and H. Flayyih, "Artificial Intelligence and Trends in Use of Information Technology Governance: A Bibliometric Analysis," 2025, doi: 10.34093/1b4z7m91.

[8] J. M. Saiz-Alvarez, "Innovation Management: A Bibliometric Analysis of 50 Years of Research Using VOSviewer and Scopus," *World*, vol. 5, pp. 901–928, 2024, doi: 10.3390/world5040046.

[9] B. Shnawa and S. Al-Majmaie, "Oncology Research Productivity of Iraqi Authors: A Bibliometric Analysis During 1955–2019," *Medico-Legal Update*, vol. 21, pp. 174–182, 2021, doi:10.37506/MLU.V21I1.2300.

[10] B. Mezquita, L. Martín-Delgado, L. Wennberg Capellades, and Á. Borrego, "A Comparison of OpenAlex with Scopus and Web of Science for Tracking Scholarly Nursing Literature," *SAGE Open Nursing*, vol. 11, 2025, doi: 10.1177/23779608251361012.

[11] M. Zheng, L. Miao, Y. Bu, and V. Larivière, "Understanding Discrepancies in the Coverage of OpenAlex: The Case of China," *Journal of the Association for Information Science and Technology*, 2025, doi: 10.1002/asi.70013.

[12] A. Maddi, M. Maisonobe, and C. Boukacem-Zeghmouri, "Geographical and Disciplinary Coverage of Open Access Journals: OpenAlex, Scopus, and WoS," *PLOS ONE*, vol. 20, 2025, doi: 10.1371/journal.pone.0320347.

[13] S. Rochman, N. Rustaman, T. Ramalis, K. Amri, A. Zukmadini, H. Apriza, A. Putra, and I. Ismail, "How Bibliometric Analysis Using VOSviewer Based on," *ASEAN Journal of Science and Engineering*, vol. 4, pp. 251–294, 2024, doi: 10.17509/ajse.v4i2.71567.

[14] J. P. Alperin, J. Portenoy, K. Demes, V. Larivière, and S. Haustein, "An Analysis of the Suitability of OpenAlex for Bibliometric Analyses," *arXiv preprint arXiv:2404.17663*, 2024, doi: 10.48550/arXiv.2404.17663.

[15] J. Culbert, A. Hobert, N. Jahn, N. Haupka, M. Schmidt, P. Donner, and P. Mayr, "Reference Coverage Analysis of OpenAlex Compared to Web of Science and Scopus," *Scientometrics*, vol. 130, 2025, doi: 10.1007/s11192-025-05293-3.

[16] K. Garg, S. Kumar, and R. Singh, "Journal of Documentation: A Bibliometric Study of Papers Published from 2000 to 2023," *Journal of Data Science, Informetrics, and Citation Studies*, vol. 3, pp. 258–268, 2024, doi: 10.5530/jcitation.3.3.27.

[17] K. Garg and S. Kumar, "Bibliometric Analysis of Papers Published in Indian Journal of Chemistry—Section A and Section B During 2015–2020," *Journal of Data Science, Informetrics, and Citation Studies*, vol. 1, pp. 3–11, 2022, doi: 10.5530/jcitation.1.1.2.

[18] L. Céspedes *et al.*, "Evaluating the Linguistic Coverage of OpenAlex: An Assessment of Metadata Accuracy and Completeness," *Journal of the Association for Information Science and Technology*, vol. 76, 2025, doi: 10.1002/asi.24979.

[19] C. Stansfield, H. Dehdarirad, J. Thomas, S. Mathew, and A. O'Mara-Eves, "Analyzing the Utility of OpenAlex to Identify Studies for Systematic Reviews: Methods and a Case Study," *Cochrane Evidence Synthesis and Methods*, vol. 3, 2025, doi: 10.1002/cesm.70038.

[20] R. Julius, M. S. Abd Halim, N. A. Hadi, A. Alias, M. Khalid, Z. Mahfodz, and F. Farha, "Bibliometric Analysis of Research in Mathematics Education using Scopus Database," *Eurasia Journal of Mathematics, Science and Technology Education*, vol. 17, p. em2040, 2021, doi: 10.29333/ejmste/11329.

دراسة ببليومترية لإنتاجية البحث العلمي في جامعة الموصل

زيد عبد الاله منذر

قسم علوم الحاسوب, كلية علوم الحاسوب والرياضيات, جامعة الموصل, الموصل, العراق

الخلاصة:

يُعدّ الناتج البحثي أحد أهم جوانب إنتاجية الجامعات والمؤسسات العلمية. عمليًا، لم يعد قياس هذه الإنتاجية يعتمد على الكمية فقط، بل أصبح النوع والجودة عاملين أساسيين. في هذه الدراسة، تم تحليل إنتاجية البحث وتأثيره في جامعة الموصل من خلال دراسة ببليومترية شاملة. استُخدمت قاعدة بيانات OpenAlex لإنشاء مجموعة بيانات تتضمن معلومات عن أبحاث الجامعة للفترة 2018-2025. حددت النتائج الباحثين الأكثر نشاطًا والتخصصات ذات أعلى معدلات النشر والتعاون الدولي. تتمثل المساهمة الرئيسية لهذه الدراسة في توفير صورة واضحة لصناع القرار في جامعة الموصل حول نشاط الباحثين، بما في ذلك أسمائهم وتخصصاتهم. بالإضافة إلى ذلك، تهدف هذه الدراسة أيضًا إلى قياس دقة وموثوقية استخدام بيانات OpenAlex كمصدر ببليوغرافي مفتوح المصدر.