



**INTERNATIONAL SCIENTIFIC CONFERENCE  
SUSTAINABLE DEVELOPMENT FOR SUSTAINABLE FUTURE**

**FINTECH AND DATA ENVELOPMENT  
ANALYSIS: A BIBLIOMETRIC MAPPING OF  
EFFICIENCY EVALUATION STUDIES**

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# INTRODUCTION

- ▶ Global financial services and markets have been thoroughly redefined with the emergence of FinTech;
- ▶ On the one hand, these new technologies have the potential to **enhance efficiency**; on the other hand, they also **present certain challenges**;
- ▶ many customers struggle with **limited digital literacy**;
- ▶ Digital finance is threatening the traditional financial service suppliers, because it offers opportunities that are more attractive for the younger clients.

# STUDY

- ▶ The study conducts a bibliometric review of the intersection of financial technologies (FinTech) and DEA (Data Envelopment Analysis).
- ▶ It synthesises the current state of FinTech efficiency evaluation research with the application of the leading non-parametric DEA methodology.
- ▶ It provides a roadmap for advancing the understanding of how certain FinTech could be more efficient than others.

- DEA-developed by Farrell (1957) and introduced by Charnes, Cooper, and Rhodes (1978);
- The Data Envelopment Analysis (DEA), the leading non-parametric technique for evaluating the relative efficiency of homogeneous decision-making units (DMUs), has emerged as a powerful tool for assessing FinTech performance;
- DEA has been mostly applied in banking and finance due to its ability to handle multiple inputs and outputs without requiring a predefined functional form;

- Its adoption in FinTech research reflects a broader trend toward quantitative and data-driven methods for evaluating firm-level performance in technologically dynamic environments.;
- A growing body of literature has applied DEA methods to examine the efficiency of FinTech firms and their comparative performance against traditional financial institutions: Çağlar and Nişel (2024), Dutta, et al. (2020), Yang and Wang (2022), Song and Qin (2024) etc.

| AUTHORS AND YEAR OF PUBLICATION | SAMPLE AND OBSERVED PERIOD                           | METHODOLOGY  | VARIABLES  | FINDINGS  |
|---------------------------------|--|--|--|---|
| Camanho, et al. (2024)          | Economic efficiency in various sectors; 1978-2020    | DEA  | Cost, profit, revenue  | DEA studies mostly focus on cost efficiency; suggesting it should be expanded in broader areas;   |
| Li and Xu (2021)                | 848 publications on FinTech                          | Bibliometric analysis and science mapping  | Publication metrics; citation metrics; collaboration metrics | Blockchain, AI and big data contributed to the grown interest of FinTech research   |
| Alfawareh and Al-Kofahi (2023)  | Bibliometric analysis of FinTech research; 2008-2022 | Bibliometric analysis conducted through Excel, VOSviewer, Harzing’s Publish or Perish (citation metrics) | Publication and citation metrics                             | -Most active publisher: Bina Nusantara University (Indonesia)<br>-Most active country: China<br>-Most cited author: Buckley, R.P.; most publications: Rabbani, M.R. |
| Salem and Shahimi (2025)        | 2760 articles; 1968-2025                             | Bibliometric analysis conducted through VOSviewer, Harzing’s Publish or Perish                           | Publication and citation metrics                             | -growth in FinTech researcj, mainly in USA, England, China<br>-areas of interest: blockchain, mobile and internet banking, crowdfunding;                            |

# METHODOLOGY

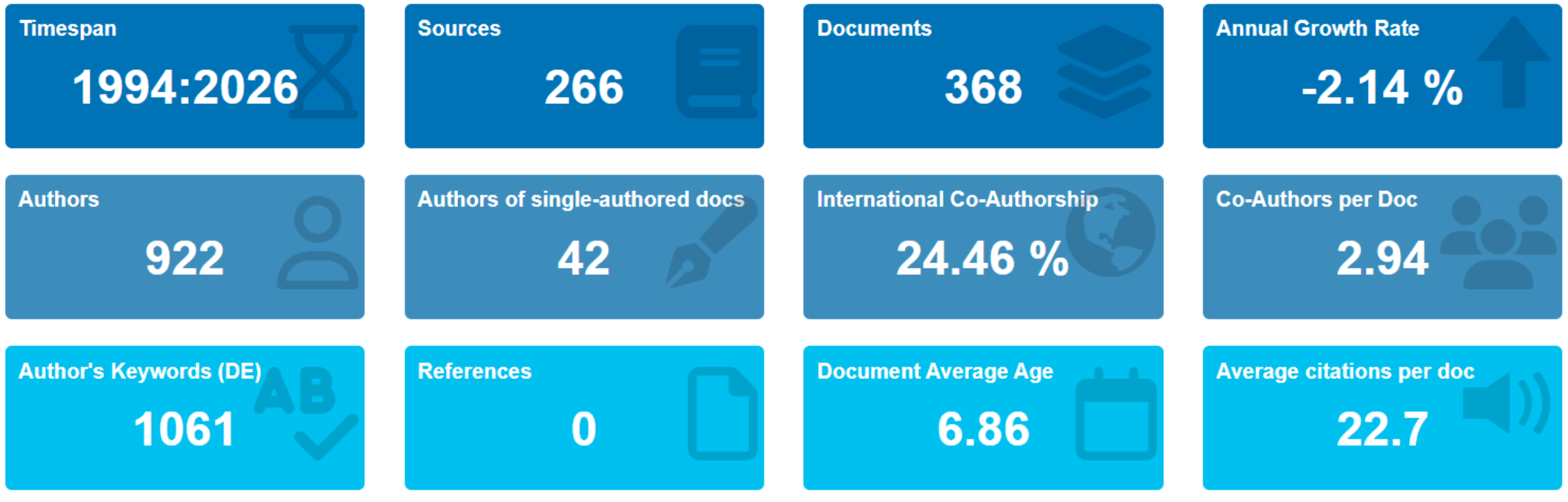
## ► Database Search Criteria:

| Criteria                         | Inclusion of Sample  | Exclusion of Sample   |
|----------------------------------|--|---|
| Search Scope                     | Scopus database  | Other databases   |
| Source                           | Peer-reviewed journal articles, book chapters, conference papers, and relevant online publications | Any other sources, e.g. books or dissertations  |
| Type of Research                 | Empirical and conceptual papers  | No exclusion  |
| Time Period                      | No exclusion   | No exclusion  |
| Search Parameters + Subject Area | Search terms appear in the title, abstract, or keywords provided by the author(s)                  | Search terms do not appear in the title, abstract, or keywords provided by the author(s); or any other subject area |
| Language                         | English  | Any other language  |

- ▶ The search focused on publications containing keywords such as “FinTech” OR “Financial Technology” AND “DEA”/ “Data Envelopment Analysis”.
- ▶ The PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines were implemented in the literature review, and the R studio’s Bibliometrix tool was applied;
- ▶ PRISMA method was created to assist reviewers to clearly explain why the review was done, what the authors did and to present the finding they obtained;
- ▶ Bibliometrics refers to the application of quantitative analysis of academic literature, which results in quantitative evaluation of the publications;
- ▶ A rigorous search and screening of the Scopus scientific database identified 386 articles for analysis;



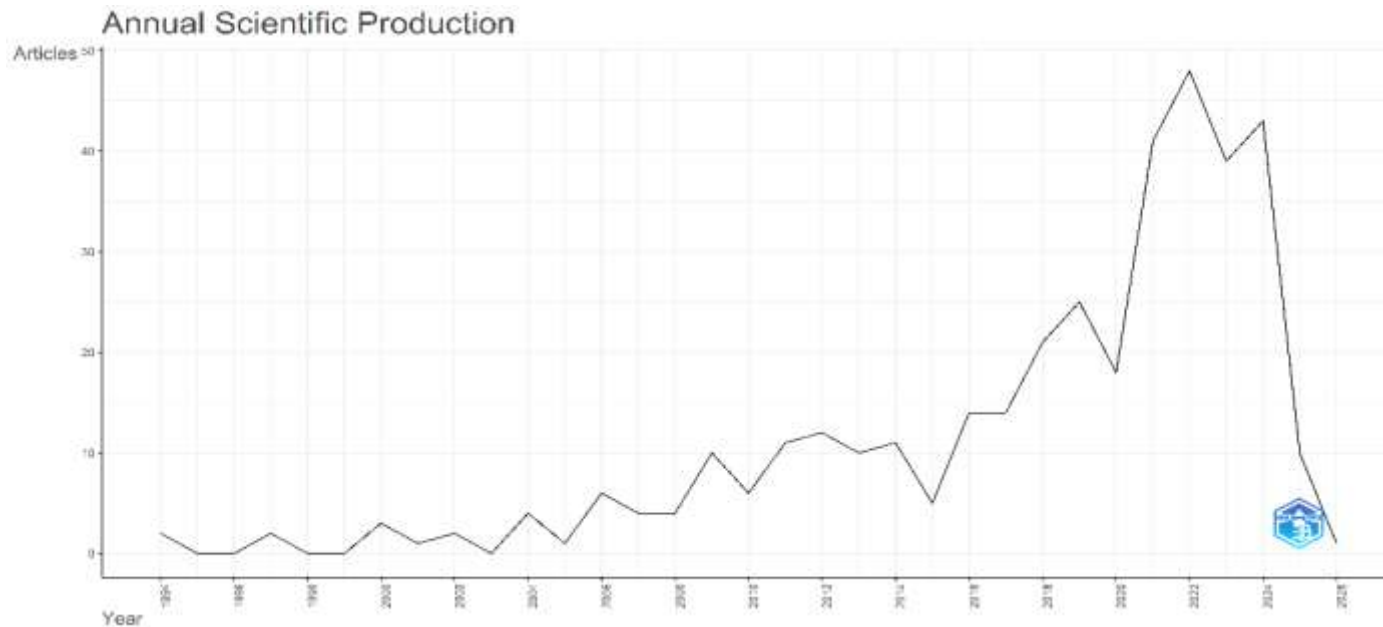
► Main information regarding the bibliometric study:



The analysis reveals key authors, influential publications, core journals, and dominant countries contributing to the literature. Co-citation and keyword co-occurrence analyses identify distinct research clusters, highlighting the growing interest in performance measurement, technological disruption in finance, and the application of non-parametric methods such as DEA.

# RESULTS

- ▶ The annual scientific production is presented in the Figure below, and it reveals relatively modest publication trends until 2016.
- ▶ There is a publication upward trend until 2020, and thereafter, one more upward trend is obvious. The sharp decline shown in the Figure (for year 2025) is the result of considering only papers published until June 30<sup>th</sup> 2025.



# RESULTS

- ▶ The most relevant (and productive) authors in the intersection between DEA and FinTech are Li, Y., Yang, Y. and Azhari A.
- ▶ The most relevant sources are:
  - European Journal of Operational Research* with 8 papers;
  - Journal of Cleaner Production, Managerial and Decision Economics and Sustainability (MDPI)* (all of them with 6 published papers);
  - Environmental Science and Pollution Research, Journal of Environmental Management, and Journal of the Operational Research Society* (all of them with 5 published papers).
- ▶ As for the most relevant affiliations, the findings reveal the Universitas Siyah Kuala (Indonesia) as the most relevant affiliation, followed by Soochow University (Taiwan) and University Tunku Abdul Rahman (Malaysia).

- ▶ The most relevant and mostly applied keywords in these papers are presented visually in the word cloud in the Figure below
- ▶ A word cloud is a visual representation of the most frequently occurring terms within a dataset, such as research publications, reports, or articles.
- ▶ the larger the word appears, the more often it occurs in the dataset



# CONCLUSION

- ▶ The study emphasizes the need for continued research and capacity building in the field of FinTech efficiency;
- ▶ Public institutions, especially those concerned with economic development and digital transformation, should support further academic-industry collaboration;
- ▶ This bibliometric review not only contributes to academic understanding but also equips policymakers with actionable insights;
- ▶ By embracing data-driven tools like DEA, governments and regulators can ensure that FinTech developments align with broader economic goals, enhance efficiency, and ultimately deliver inclusive, sustainable financial services.
- ▶ This bibliometric review's findings underscore the increasing relevance of efficiency analysis in FinTech, and offer strategic insights for future research directions in financial innovation, performance evaluation, and operational benchmarking;