BIBLIOMETRIC ANALYSIS

It reviews the existing body of research, productivity in this field in terms of authors and countries, co-authorship, most cited references and most popular journals that publish on this topic. Furthermore, the study also analyses the most common keywords and extracts relevant terms that reveal trending topics. (Jaleniauskiene et al., 2023)

The outputs from the bibliometric analysis are not just about productivity and trends. It is also a reflection of the performance and impact of a particular piece of academic work. The results and findings from the bibliometric study can also be used to tell stories about scholars, journals, institutions, countries, and research fields. (Ahmi, 2021)

Bibliometric analysis is a popular and rigorous method for exploring and analyzing large volumes of scientific data. It enables us to unpack the evolutionary nuances of a specific field, while shedding light on the emerging areas in that field.

The data that takes center stage in bibliometric analysis tends to be massive and objective in nature, though its interpretations often rely on both objective (e.g., performance analysis) and subjective (e.g., thematic analysis) evaluations established through informed techniques and procedures. In other words, bibliometric analysis is useful for deciphering and mapping the cumulative scientific knowledge and evolutionary nuances of well-established fields by making sense of large volumes of unstructured data in rigorous ways. Therefore, bibliometric studies that are well done can build firm foundations for advancing a field in novel and meaningful ways. It enables and empowers scholars to

1)   gain a one-stop overview,
2)   identify knowledge gaps,
3)   derive novel ideas for investigation,
4)   position their intended contributions to the field.

(Donthu et al., 2021)

Early discussion on bibliometrics started in the 1950s (Wallin, 2005), yet, the proliferation of bibliometrics is fairly recent. Specifically, publications using bibliometrics have grown over the past 15 years, which can be attributed to the growth of scientific research itself. The emergence of scientific databases such as Scopus and Web of Science has made acquiring large volumes of bibliometric data relatively easy, and bibliometric software such as Gephi, Leximancer, and VOSviewer enable the analysis of such data in a very pragmatic way, thereby raising scholarly interest in bibliometric analysis in recent times.
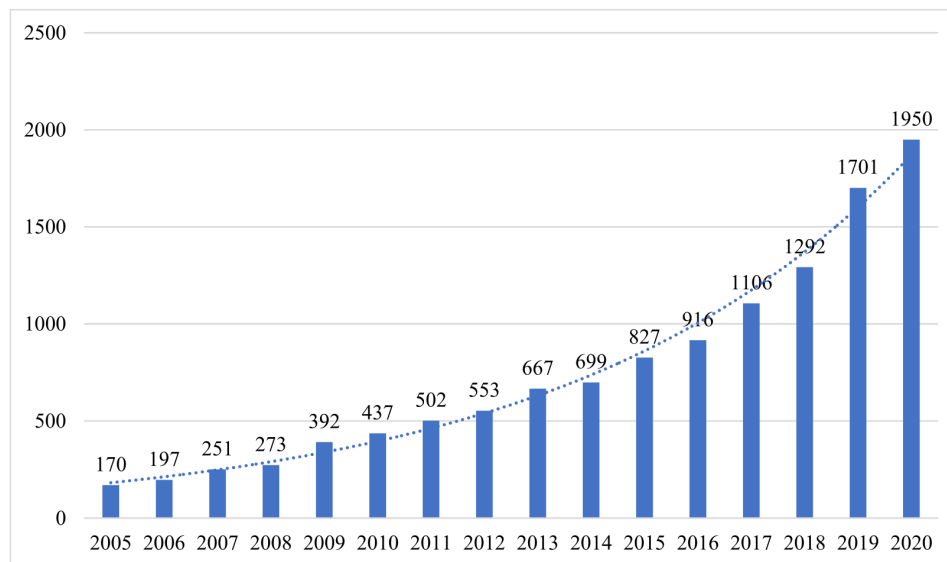

Fig. 1. Year wise publication of bibliometric papers. **Note(s):** This figure represents the publication trend of bibliometric papers between 2005 and 2020. The data was retrieved from the Scopus database in the subject areas of "business, management, and accounting," "economics, econometrics, and finance," and "social sciences" using the keyword "bibliom*".

Comparing bibliometric analysis with systematic literature reviews: systematic literature reviews encapsulate the acquisition, arrangement, and assessment of the extant literature using systematic procedures which are typically carried out manually by scholars. Systematic literature reviews using classic methods require a narrow scope of study and thus tend to include a lesser number of papers for review. They are better suited for confined or niche research areas. Unlike systematic literature reviews that tend to rely on qualitative techniques, which could be marred by interpretation bias from scholars across different academic background, **bibliometric analysis relies upon quantitative techniques** and thus can avoid or mitigate that bias.

In summary, bibliometric analysis summarizes the bibliometric and intellectual structure of a field by analyzing the social and structural relationships between different research constituents (e.g., authors, countries, institutions, topics).

The techniques for bibliometric analysis manifest across two categories: **performance analysis** and **science mapping**. In essence, performance analysis accounts for the *contributions* of research constituents, whereas science mapping focuses on the *relationships* between research constituents.

Bibliometric analysis

Main techniques | **Enrichment techniques**

Performance analysis | **Science mapping** | **Network analysis**

Publication-related metrics
- Total publications (TP)
- Number of contributing authors (NCA)
- Sole-authored publications (SA)
- Co-authored publications (CA)
- Number of active years of publication (NAY)
- Productivity per active year of publication (PAY)

Citation-related metrics
- Total citations (TC)
- Average citations (AC)

Citation-and-publication-related metrics
- Collaboration index (CI)
- Collaboration coefficient (CC)
- Number of cited publications (NCP)
- Proportion of cited publications (PCP)
- Citations per cited publication (CCP)
- h-index (h)
- g-index (g)
- i-index (i-10, i-100, i-200)

Citation analysis
- Relationships among publications
- Most influential publications

Co-citation analysis
- Relationships among cited publications
- Foundational themes

Bibliographic coupling
- Relationships among citing publications
- Periodical or present themes

Co-word analysis
- Existing or future relationships among topics
- Written content (words)

Co-authorship analysis
- Social interactions or relationships among authors
- Authors and author affiliations (institutions, countries)

Network metrics
- Degree of centrality
- Betweenness centrality
- Eigenvector centrality
- Closeness centrality
- PageRank

Clustering
- Exploratory factor analysis
- Hierarchical clustering
- Island algorithm
- Louvain method
- Multidimensional scaling
- Simple centers algorithm

Visualization
- Bibliometrix R
- Bibexcel
- Gephi
- Pajek
- UCINET
- VOSviewer
- SciMat
- Sci2