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How to design bibliometric research: an overview and a framework proposal

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Abstract

Bibliometric analysis has recently become a popular and rigorous technique used for exploring and analyzing the literature in business and management. Prior studies principally focused on ‘how to do bibliometric analysis’, presenting an overview of the bibliometric methodology along with various techniques and step-by-step guidelines that can be relied on to rigorously conduct bibliometric analysis. However, the current body of evidence is limited in its ability to provide practical knowledge that can enhance the design and performance of bibliometric research. This claim is supported even by the fact that relevant studies refer to their work as ‘bibliometric analysis’ rather than ‘bibliometric research’. Accordingly, we endeavor to offer a more functional framework for researchers who wish to design/conduct bibliometric research on any field of research, especially business and management. To do this, we followed a twofold way. We first outlined the main stages and steps of typical bibliometric research. Then, we proposed a comprehensive framework for specifying how to design/conduct the research and under what headings the relevant stages (step-by-step) will be used and/or presented. Thus, the current paper is expected to be a useful source to gain insights into the available techniques and guide researchers in designing/conducting bibliometric research.

Keywords Bibliometric research · Bibliometric analysis · Literature review · Bibliometric research design

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JEL Classification M1 · M19**1 Introduction**

Literature reviews play an important role in academic research to examine the general state of a research field, gather and categorize knowledge regarding that field, and identify gaps to be filled (Snyder 2019). Any research field's body of knowledge becomes a "heap" if such review efforts are not performed at certain time intervals (Öztürk 2021). The remarkable growth in the production of scientific knowledge has raised the need for such investigations in any research field. With the rapid increase in the number of academic journals, congresses, and other publication outlets in recent years, papers (e.g., articles, reports, and conference papers) are published in quantities surpassing millions each year, and thus scientific knowledge is exponentially increasing (Kraus et al. 2022). Accordingly, it is crucial for a researcher to identify the papers through which the literature on the relevant topic will be examined. Many reviews leave it up to the reader to appraise why only certain articles, conference papers, or books are included (or excluded) by authors (Linnenluecke et al. 2020). Without necessarily considering a wider variety of evidence, authors often cite evidence from 'high-quality' journals (Tranfield et al. 2003). Therefore, it has become very difficult for researchers to follow the state, developments, and evolution, to identify gaps, and to categorize the body of knowledge in a given field using traditional literature review methods (e.g., narrative, critical, and meta-analysis). Accordingly, bibliometric analysis—which enables a review that considers all the literature relevant to any research field—has gained more attention.

Due to the benefits and conveniences it offers, bibliometric analysis has recently begun to be widely employed in the fields of business and management (e.g., López-Fernández et al. 2016; Merigo and Yang, 2017; Castillo-Vergara et al. 2018; Ardito et al. 2019; Mas-Tur et al. 2020; Nicolas et al. 2020; Forliano et al. 2021; Khan et al. 2022; Mukherjee et al. 2022a; Bahuguna et al. 2023; Rao and Shukla 2023; Tigre et al. 2023) with the supporting infrastructural developments (i.e., data processing capacities of databases, increase in the number of package programs with various capabilities, different visualization tools, etc.). Accordingly, some scholars developed methodological guidelines for how to conduct bibliometric research (Koskinen et al. 2008; Andres, 2009; van Raan 2014; Donthu et al. 2021; Romanelli et al. 2021). They present an overview of bibliometric analysis and the procedures required to perform it to help business scholars learn about the bibliometric technique and use that knowledge to analyze specific topics in the body of current literature with vast bibliometric data. Additionally, they offer different techniques that can be used for bibliometric analysis and argue when they should be utilized, which helps widen the business scholars' perspectives on the options and justifications for employing the different bibliometric analysis variations (e.g., Zupic and Cater, 2015; Linnenluecke et al. 2020; Donthu et al. 2021). However, there are still significant shortcomings/gaps in the business and management field regarding how to conduct and structure "bibliometric research". In sum, several methodological publications have offered step-by-step guidelines for performing the bibliometric analysis,

but their contributions tend to be more conceptual than practical. Hence, there is still a lack of knowledge regarding the best practices of bibliometric research and how to conduct and design it. Accordingly, the guideline offered by Sauer and Seuring (2023) for guiding how to conduct a systematic literature review inspired this paper to propose a comprehensive framework for bibliometric research.

In fact, it is obvious that there is significant variability in the type and standard of bibliometric research across all papers employing bibliometric analysis, including those that (i) are ‘wrongly’ treated as bibliometric research despite being narrative literature reviews, (ii) only present a general view of the field, (iii) employ bibliometric analysis techniques only “technically” (i.e., citation analysis, co-word analysis, co-author, etc.), but perform almost no evaluation, discussion, or identification about the resulting pictures/maps related to the relevant research field (Block and Fisch 2020). Therefore, there seems to be ambiguity on what bibliometric analysis/research is, what it should include, and what determines its quality. These are largely issues related to the “research design” (Punch 2014), and a well-structured design is one of the most significant indicators of the quality of bibliometric research (Fisch and Block 2018). However, to the best of our knowledge, there is no “clear framework” for how bibliometric research should be designed and what elements should be included in bibliometric research. Accordingly, this paper aims to provide a framework guiding the design of bibliometric research to help researchers perform high-quality research. We describe methodological stages and steps for how researchers can design bibliometric research and offer a comprehensive framework of typical article structure for bibliometric research. Unlike other papers in the current body of literature, the value of this paper lies in this framework that practically guides academics.

2 Bibliometric analysis as a literature review tool

Bibliometric analysis emerged to be a crucial tool for measuring the scientific outputs of different scientific items (e.g., papers, authors, keywords, journals, institutions, and countries) in any research field and examining how the intellectual, social, and conceptual structure of the relevant field has evolved over time based on the relationships and interactions between these items (Donthu et al. 2021). With this analysis, researchers primarily aim to recognize, evaluate, and comprehend the literature (or part of the literature) within a specific research field (Öztürk 2021). Bibliometric analysis is the process of obtaining various scientific outputs resulting from examining publications in a certain field or in a certain academic journal with the help of numerical analyses and statistics on some bibliometric indicators (e.g., number of articles per year, most studied topics, universities with the most publications, top journals in the field, authors with the most papers, number of citations and keywords) (Pritchard 1969; Ellegaard and Wallin 2015). In this regard, bibliometric analysis is a technique employed to map the intellectual structure of any research field and/or discipline, as well as the evolution of the field and the relationships between authors-topics-papers (Osareh 1996; Fernandez-Alles and Ramos-Rodríguez, 2009). To do this, it divides the items (e.g., papers, authors, journals,

and words) into different groups. Then, it presents the visuals of the structure (classification) resulting from the analysis through the visualization process (Gutiérrez-Salcedo et al. 2018). Bibliometric analysis enables having a systematic and comprehensive understanding of the *de facto* structure in any field, evolutionary nuances of the field, identifying the research clusters that form the field, capturing emerging trends, and getting a broad perspective on the concepts that are the focus of the field and their relationships (Aria and Cuccurullo 2017; Mukherjee et al. 2022b; Kraus et al. 2024).

Bibliometric analysis should not be treated as a substitute for other conventional methods of discussing developments in a field, such as meta-analysis or systematic literature review; rather, it is complementary in matters where they are lacking (Donthu et al. 2021). Bibliometric analysis, compared to other review methods, employs a macro-level approach and typically reveals the structure and dynamics of a research field (Öztürk 2021). Even though traditional approaches (e.g., systematic literature reviews) offer deep insights into a narrow of papers, they may likely leave out significant field-related papers (Lacey et al. 2011). This is because large volumes of bibliographic datasets have rendered them impractical and cumbersome (Ramos-Rodríguez and Ruíz-Navarro 2004). However, the bibliometric method enables the analysis of hundreds or even thousands of papers (Ariaa and Cuccurullo, 2017). With the emergence of scientific databases such as Scopus and Web of Science, researchers can acquire large bibliometric datasets relatively easily, and recently developed bibliometric software (e.g., Gephi, Leximancer, and VOSviewer) enables them to analyze such data conveniently (Moral-Muñoz et al. 2020). Thus, it is possible to examine the field's structure, its dynamics and evolution, and the relationship between authors, papers, and word-concepts in the field from a broader perspective. Bibliometric analysis, if performed accurately, can also provide the objectivity offered by other methods (e.g., meta-analysis) (Zupic and Cater, 2015).

It is noteworthy to state that systematic literature reviews typically rely on qualitative techniques, which may be marred by interpretation bias from academics with diverse backgrounds (MacCoun 1998; Tranfield et al. 2003). On the other hand, both bibliometric analysis and meta-analysis can mitigate or avoid such bias since they rely upon quantitative techniques. Although these two analyses adopt quantitative approaches in nature and deal with large datasets, their use of quantitative methods is relatively different. In essence, meta-analysis summarizes the empirical evidence by examining the strengths and direction of effects, and relationships of variables with each other (Aguinis et al. 2011). Accordingly, Carney et al. (2011) suggest that it is useful in addressing clear research questions with datasets that are relatively more precise than those reported in any given primary study. Meta-analysis is often employed to shed light on mixed empirical evidence and boundary conditions and is thus treated as a theory extension tool (Combs et al. 2011). The statistical integration of study results through such analysis can build upon cumulative samples of several tens of thousands of data points, depending on the respective field under analysis (e.g. Hofmeister et al. 2023; Rieg and Vanini 2023). Unlike meta-analysis, bibliometric studies utilize quantitative methods to summarize the bibliometric capital of a field by analyzing the intellectual, social, and conceptual relationships between various scientific items (e.g., papers, authors, keywords, journals, institutions, and

countries). In this way, it enables scholars to gain an overview of the relevant field, identify knowledge gaps, generate novel research ideas, and determine how they contribute to that field (Donthu et al. 2021). Thus, bibliometric research that is well done is significant for establishing robust groundwork for the advancement of a field in meaningful and novel ways (Mukherjee et al. 2022b).

The main aim of all literature reviews discussed herein is much more than mapping any given field (Wright and Michailova 2023). The use of these review methods complementary to each other depends on why the review is conducted and what volume and nature the relevant literature has. Considering the points where it differs from other methods and the features it complements; bibliometric research offers various advantages to scholars who are interested in employing it. To conduct bibliometric research, scholars often employ four typical stages: definition of the research aim, data collection, analysis and visualization, and interpretation of findings and results.

3 Main stages in bibliometric research

In this section, we propose an applicable framework for the stages/steps and the hierarchy among them, which should be found in bibliometric research. In doing so, we primarily benefited from “methodological” papers (e.g., Glanzel, 2008; Cobo et al. 2011; Van Raan 2014; Zupic and Cater, 2015; Aria and Cuccurullo 2017; Gutierrez-Salcedo et al., 2018; Block and Fisch 2020; Linnenluecke et al. 2020; Donthu et al. 2021; Kraus et al. 2022; Sauer and Seuring 2023) and books (e.g., Andres, 2009; Glanzel et al., 2019) on bibliometric analysis, as well as “empirical research” employing bibliometric analysis in various research fields (e.g., Ferreira et al. 2013; Meyer et al. 2014; Khan and Wood 2015; Lopez-Fernandez et al., 2016; Leung et al. 2017; Hsu et al. 2018; Sanchez-Garcia et al., 2018; Aparicio et al. 2019; Baier-Fuentes et al. 2019; Block et al. 2020; Bahoo et al. 2020; Mishra et al. 2020; Alayo et al. 2021; Vogel et al. 2021; Deyanova et al. 2022; Perez-Vega et al. 2022; Bhardwaj et al. 2023; Lin et al. 2023)¹. Table 1 displays the main stages (step by step) that were derived from the relevant papers and should be employed in bibliometric research.

3.1 Stage 1-Aim of the research

As in every research, the first stage of bibliometric research should begin with the statement of the research aim. It should continue with a thorough justification of its objectives and the reasons for employing bibliometric analysis to achieve those

¹ To provide an applicable research design for bibliometric research, both “conceptual” papers describing the nature of bibliometric research and “empirical” papers revealing the structure of a research field using bibliometric analysis were considered. In identifying relevant papers, we considered how comprehensive they are. Hence, papers (i) that are “inaccurately” labeled as bibliometric research, (ii) that only provide an overview of the field, or (iii) that only “technically” carry out citation analysis and do not assess the relevant research field were excluded.

Table 1 The bibliometric research stages and steps *Source:* Authors' own drawn

Stages	Steps (Practice Guidelines)
(1) Defining the aim of the research	<ul style="list-style-type: none"> • What is the aim of the research? • What are the expected results from the research? • In line with the research aim, what are the research questions? • What is the scope and focus of the research? (e.g., performance analysis, science mapping, network analysis, etc.)
(2) Collecting data on the relevant literature	<ul style="list-style-type: none"> • Selecting the database(s) (e.g., WoS, Scopus, Google Scholar, PubMed, Microsoft Academic, Dimensions, EmBase, SpringerLink, etc.) • Initial search process: Identifying search terms • Filtering: Determining and applying the inclusion or exclusion criteria. • Downloading the dataset file (file format should be compatible with the preferred software to analyze).
(3) Analysis and visualization	<ul style="list-style-type: none"> • Identifying the bibliometric analysis techniques to meet the aim and scope of the research (e.g., citation analysis, co-citation analysis, co-word analysis, etc.) • Determining the appropriate software(s) for analysis (e.g., VOSviewer, BibExcel, Histcite, Bibliometrix, SciMat, etc.) • Determining the appropriate software(s) for visualization (e.g., VOSviewer, Pajek, Gephi, UCINET, etc.) • Analyzing the data and visualizing the findings.
(4) Interpreting the findings and results	<ul style="list-style-type: none"> • Were the research questions successfully addressed? • Did the study provide a new insight into the relevant literature? • Has the researcher drawn any determinations or inferences regarding the research field/literature? • Any suggestions for future research?

objectives. In other words, readers should be informed (satisfied) about the relationship and the methodological fit between the research aim and the bibliometric analysis.

The aim of the research and the justifications for employing bibliometric research to achieve it should be specified in the introduction (sometimes in the abstract) of the article. In this regard, the article's introduction serves a crucial function to satisfy and motivate the readers typically scanning these parts before deciding whether to continue reading (Gastel and Day 2022). As in every paper, the introduction is a crucial component of bibliometric research and the research question(s) are potentially the most important part of the introduction, maybe of the entire paper (Fisch and Block 2018). The most concrete statement describing the research is the aim statement and the one(s) that best reflects the aim of the research is the research question(s). Therefore, it is suggested that the research questions should be developed in line with the aim of the research and stated explicitly in the introduction (Linnenluecke et al. 2020). Bibliometric analysis has a unique nature (Öztürk 2021). Therefore, research questions in bibliometric research should be specific to the

nature of the analysis (Mishra et al. 2020). See Table 7 for typical research questions used in bibliometric research.

Research aims and questions determine the focus, scope, and direction of the research (Andres, 2009). The fact that those are explicit and unambiguous enables the scope and boundary of the research to be drawn more clearly. Thus, the type and scope of “data” and “analysis” may differ depending on the research aim and questions (Block and Fisch 2020). The fit between the research aims and questions with the respective analyses conducted is of utmost importance for a high-quality study. If this fit is not given, there is the danger of seemingly conducting random analysis disconnected from the respective research objective. To illustrate, for research that aims to “describe the subject clusters in a specific research field and reveal the conceptual development in the field in the historical process”, superficial bibliographic information such as “authors”, “authors’ institutions”, “countries”, “published journals” and/or “citation information” is quite inadequate and irrelevant (Waltman and van Eck 2012). With this information, only ‘performance analysis’ to get an overview of the field, citation analysis to identify influential papers (authors or journals) in the field, ‘co-author analysis’ to reveal networks of relationships between authors (institutions or countries), or ‘co-citation’ and/or ‘bibliographic coupling’ analyzes to reveal similarities and network in citations of papers can be performed. However, to achieve such an aim, ‘co-word analysis’ should be performed on data that includes details on “article titles”, “abstracts” and “keywords”. Therefore, a strong harmony is required between ‘the aim of the research and the research questions’ and ‘the data and the analyses’. The nature/scope of the data and information for the research may not be sufficient for some analysis. Hence, it is crucial to decide on the type and scope of the analyses to be performed as well as the data to be analyzed at the beginning. In this sense, it should be ensured that the data accurately represents the relevant research field (literature) and could address the research questions: i) the documents collected for analysis should completely cover the researched field, and ii) there should be no out-of-scope documents. The bibliometric studies by Vallaster et al. (2019), Kimpimäki et al. (2022), and Ammirato et al. (2023) serve as examples of clearly outlined research objectives.

3.2 Stage 2-Data collection

Having determined the aim of the research and the research questions, the next step is to decide on the literature (research field) to be examined and to create the dataset for the relevant literature. A systematic search process needs to be carried out to identify the relevant literature since bibliometric research must be replicable, which requires transparency regarding the steps performed within the scope of the research

(Tranfield et al. 2003; Block and Fisch 2020). In other words, the processes in bibliometric research should be repeatable by other researchers (Linnenluecke et al. 2020) and hence, the whole process (especially regarding data) needs to be performed transparently (Zupic and Cater, 2015)². In this sense, it should be ensured that each step of the procedure followed to get the dataset regarding the relevant literature determined in line with the research aim and research questions is explained transparently and explicitly (Andres, 2009). This indicates that all steps of the procedure for acquiring the required data should be specified in a way that readers can follow. Therefore, in bibliometric research, researchers cannot “randomly” include any paper in the review; instead, they are expected to demonstrate what steps have been taken in finding relevant papers to be added to the analysis (Linnenluecke et al. 2020). The study of Horvatinovic et al. (2023) serves as an example of a transparent outline of the data collection process. In bibliometric research, four steps are typically followed in identifying the relevant literature in a transparent and replicable manner:

3.2.1 Selecting the database

There are many databases that provide datasets for bibliometric research (e.g., WoS, Scopus, Google Scholar, PubMed, Microsoft Academic, Dimensions, EmBase and Springerlink) (Cobo et al. 2011; Moral-Muñoz et al. 2020). However, these databases have been developed for different purposes and have a variety of characteristics. To illustrate: WoS has long been the most comprehensive citation data source worldwide (Birkle et al. 2020). Scopus, on the other hand, is regarded as the second-largest comprehensive citation database (Zhu and Liu 2020). Despite having a wider range than either database (Vandagriff 2023), Google Scholar is typically not favored by researchers since it does not allow them to download data in a proper file format that can be utilized for bibliometric software tools, making it unable to provide a breakdown of the full dataset in a single file (Moral- Muñoz et al. 2020; Gürler 2021). Researchers should select one (or more, depending on the research’s objectives) of these databases based on bibliometric research criteria. There are some criteria that can be used in selecting any database in bibliometric research (Öztürk 2021):

- Number of journals covered for the research field,
- Accessibility to the database (e.g., free access, institutional memberships, etc.),
- Journal impact factors and their field-leading potential,
- The ability to download data in a format compatible with bibliometric analysis software,

² Traditional literature reviews (e.g., narrative, meta-analysis, and systematic review) have biases regarding whether they cover the entire research field (Tranfield et al. 2003). When examining any research field, bibliometric research has the potential to initiate a systematic, transparent, and repeatable review process in defining the relevant field and determining its scope, thereby raising the quality of reviews. Bibliometric research offers researchers the opportunity to map the relevant research field without subjective bias (Zupic and Cater, 2015).

- The ability to filter data in compliance with the software that enables to address research questions,
- Number of records that can be exported from the database.

Some scholars often ask whether they should use more than one database (e.g., WoS and Scopus) when designing bibliometric research for their respective fields of research. Moreover, reviewers recommend conducting searches on more than one database. However, it is not necessarily beneficial to employ multiple databases in bibliometric research. This may often cause some publications to overlap or become repetitious, which makes the results of the research questionable. Most of the journals are scanned simultaneously in both Scopus and WoS, especially in the field of Business and Management. Therefore, most of the publications found using the same search terms in the initial search overlap.³ Furthermore, it is not technically viable to integrate the large amounts of datasets obtained from two distinct databases since the downloaded file formats are different from each other and the downloaded dataset file provides article information in a different sequence and format.

Given the discussions above, researchers must have clear information about the benefits and drawbacks of diverse databases. It should be decided how to determine the scope of the research and which papers will be included in the analysis after selecting the appropriate database to identify the relevant literature. Accordingly, researchers first determine which terms (keywords, concepts) will be used for the initial search process from the selected database to include the papers best representing the relevant field.

3.2.2 Identifying search terms

When employing bibliometric analysis to examine any research field, a “topic-based” search should be performed⁴ (Dong et al. 2023). Hence, a search should be performed using “terms” that accurately describe the literature to be examined. Search terms might be (key) words or concepts used to access any form of publication (article, book, paper, report, etc.) related to the relevant literature (Gürler 2021). A researcher can obtain accurate and reliable results to the extent that these terms are directly related to the research questions (Synder, 2019). To get the desired results regarding the relevant literature, the codes to be utilized as well as the terms in the initial search are crucial. Code(s) are symbols (e.g., *,

³ Reviewing the studies using both the Resource-Based View and Resource Dependence Theory, Öztürk and Yıldırım (2023) found 106 studies in WoS and 103 studies in Scopus as a result of the initial search with the same search terms. They suggested that all the studies scanned in Scopus, except 2, were also obtained through the search in the WoS database.

⁴ Bibliometric analysis can sometimes be employed just to compile a bibliography of a journal or author. Therefore, a journal-based or author-based search will need to be performed to conduct analysis for such purposes. Also, there are many other criteria regarding where/how to search with the terms in databases (e.g., topic, author, title, source, publication year, publication name, funding agency, address, document type, editor, etc.).

Table 2 Typical inclusion or exclusion criteria applied in bibliometric research *Source:* Authors' own drawn

Criteria	Options (refined by selecting)
Publication years	e.g., 1980, ..., 2024
Document types	Article, Early Access, Review Article, Proceeding Paper, Book Chapter, Editorial Material, Book Review, etc.
Research fields (Categories)	Business, Management, Economics, Business Finance, Environmental Sciences, Political Science, Ethics, Psychology Applied, Communication, Social Issues, etc.
Languages	English, Chinese, Spanish, Turkish, German, Italian, etc.
Indexes	Social Science Citation Index (SSCI), Science Citation Index Expanded (SCI-E), Emerging Sources Citation Index (ESCI), Book Citation Index-Social Sciences & Humanities (BKCI-SSH), etc.
Affiliations	University of London, University of Oxford, Harvard University, Free University of Berlin, Stanford University, University of Toronto, Istanbul University, etc.
Published Journals (Publication Titles)	Review of Managerial Sciences, Journal of Business Research, Management Review Quarterly, Journal of Management, Strategic Management Journal, Academy of Management Journal, Organization Science, Journal of Marketing, etc.
Countries/regions	USA, China, Germany, Italy, England, Canada, Palestine, France, Türkiye, Netherlands, etc.
Content and/or Scope of Articles	After all, the titles and abstracts of the articles in the search results are meticulously read. Articles that are not related to the relevant research topic are excluded.

“...”, etc.) or short conjunctions (e.g., OR, AND, etc.) that will scope (constrict or expand) search results if more than one search term is used in the initial search (Zupic and Cater, 2015). In the initial search, even a slight change in search combinations (inserting/removing some words, symbols, or conjunctions) can lead the number of papers to vary enormously, which may adversely affect the ability of papers to represent the relevant literature (Linnenluecke et al. 2020). Such a representation problem might occur when papers are included in the analysis even though they are not within the research's scope and/or when papers are excluded although they are within the research's scope (Andres, 2009). This problem can substantially be addressed with the right combination of search terms. Nevertheless, the question of whether the dataset to be analyzed truly represents the relevant literature may still exist even if the correct search terms are used in the initial search. To minimize such doubts, filtering is typically employed on the papers that were available from the initial searching.

3.2.3 Filtering

In bibliometric research, researchers should specify how they will limit the research's scope and which papers will be included in the dataset. Filtering should be employed on the search results even when the search terms are very carefully identified, as

databases also find papers that are outside the scope of the scope (Tranfield et al. 2003), and these papers will affect the validity of the analysis as well as the results of the bibliometric analysis (Zupic and Cater, 2015)⁵. Accordingly, a set of inclusion/exclusion criteria is established and applied to relevant papers in accordance with the aim of the research and the research questions (Snyder 2019). These criteria have significant effects on the dataset (final sample) and thus the results of the analysis. Hence, the criteria to be applied need to be well justified (Block and Fisch 2020). These criteria may be determined using practical (e.g., database, publication language, etc.) and methodological (research field, document type, time, etc.) justifications, which strengthen the transparency of the research (Glanzel 2008; Fish and Block, 2018). Table 2 displays the typical inclusion or exclusion criteria applied in bibliometric research.

In the filtering process, a specified criterion requires the exclusion of others. For instance, selecting publications of certain document types or only articles within a certain year range means automatically excluding others (Linnenluecke et al. 2020). Researchers can identify document types as articles, early articles, and review articles. However, they should exclude review articles when they focus on peer-reviewed empirical research. This is because such publications often lead to biases due to their high citation numbers. Moreover, proceeding papers are generally excluded because they are considered as knowledge that is still being developed and they may duplicate or overlap when converted into articles. In addition, research fields (seen as categories in WoS) should be specified such as “business” “management”, and “business finance” depending on the research topic. All the filtering transactions can easily be carried out through both WOS and Scopus search engines.

Researchers are recommended to search manually to find papers related to the research topic that cannot be identified in the initial search although it is not widely applied in bibliometric research. Accordingly, progeny (citation) and ancestry (reference) searches on the top (best representative) papers can be performed to ensure comprehensiveness. Furthermore, databases can sometimes display studies unrelated to the research topic because they are unable to completely filter or exclude papers that do not meet predefined criteria. Therefore, it is necessary to eliminate papers that are found in the initial search results but are not actually related to the research topic. Researchers are recommended to peruse the titles and abstracts of all papers. In this way, irrelevant papers can be identified and excluded from the scope of the study. It is necessary to specify each of these procedures to ensure transparency and systematicity in bibliometric research. In bibliometric research, the “systematicity” logic which requires the identification of the research’s scope based on specified criteria provides a great deal of transparency but may lead to the representation problem regarding the relevant literature (Sauer and Seuring 2023). This can

⁵ A bibliometric search might provide very different responses to the same research questions and arrive at distinct results depending on which papers are included in the analysis (i.e., how the scope of the study is framed). For example, research can be conducted with a highly inappropriate sample, selecting only certain publications, years, or even search terms to limit the scope of the research. One may draw inaccurate inferences about gaps in the literature or, more seriously, provide false evidence for a given relationship or effect (Snyder 2019).

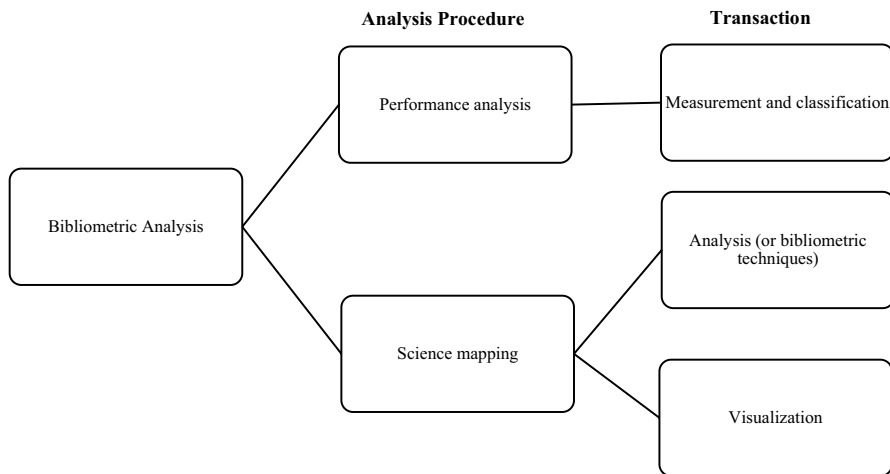


Fig. 1 Analysis procedure in bibliometric research *Source* Drawn by utilizing from Cobo et al. (2011), Zupic and Cater (2015), Aria and Cuccurullo (2017), Gutierrez-Salcedo et al. (2018), Block and Fisch (2020), and Donthu et al. (2021)

be expressed as a limitation of bibliometric research. The dataset obtained after the inclusion and exclusion criteria were applied accurately constitutes the final sample of the research. The next step is to download the dataset.

3.2.4 Downloading the dataset

Databases offer various file formats for saving the relevant files or transferring them to software programs (Andres, 2009). Having filtered the initial search results, the final sample should be downloaded in a file format compatible with the software tools that will be used for analysis. Furthermore, download options that the databases provide affect what information regarding the papers will be included (Mokhnacheva 2023). For instance, by selecting the “*author, title, source*” option from the WoS database, one can obtain a file that lists the titles, authors, and publication names for each study (e.g., article, proceeding, book, book chapter, etc.) in the downloaded file. On the other hand, one can access the file with more comprehensive information (e.g., titles, authors, publication names, institutions, keywords, abstracts, publication years, and references) for each paper by selecting the “*full record and references*” option (Vandagriff 2023). The researcher can select from various options to download the file including the data required during the analysis process (Dong et al. 2023).

3.3 Stage 3-Analysis and visualization

In bibliometric research, the analysis should start by applying a preprocessing on the data. Accordingly, data cleaning is required to get accurate and reliable results. For instance, (i) references listed in citations may occasionally refer to several editions

Table 3 Bibliometric indicators to measure the scientific outputs *Source:* (Gutiérrez-Salcedo et al. 2018)

Indicators	Content
Publication indicators	Total number of papers, number of papers by years, authors-countries-institutions with the most studies, journals where the most papers were published
Impact indicators based on received citations (Citation analysis)	Total number of citations of papers (or authors-journals-countries-universities) including or excluding self-citations, average number of citations per paper, self-citation rate, most cited (most influential) papers or authors, authors' h-index, g-index, hg-index, etc.
Indicators based on the impact of the journal	Impact Factor, most cited journals, SJR, h-index of journals, relative citations ratio, normalized impact factor, etc.

of the same book (e.g., Pfeffer and Salancik's "The External Control of Organizations: A Resource Dependence Perspective" published in two separate editions in 1978, and 2003), (ii) the names of the authors may be spelled in different ways (e.g., various combinations may be used to abbreviate the names of the author such as "Erdogan, B.", "Erdogan, BZ", "Erdogan B. Z." or "Erdogan, B. Z." for the abbreviation of the author named Erdogan, Bayram Zafer, iii) the names of the cited publications may also be given in different forms (e.g., Strategic Management Journal or SMJ). While it is up to the researcher to bring together different editions of the books, different spellings of author and journal names should be unified. This pre-process is crucial for the accuracy and reliability of the results from citation, co-citation (in terms of author and journal), and co-author analyses (Zupic and Cater, 2015).

Two main analysis procedures are applied in bibliometric research (Cobo et al. 2011; Gutierrez-Salcedo et al., 2018): *Performance analysis* (an overview of the field in terms of scientific outputs) and *science mapping* (relationship networks between authors-papers-concepts-citations). Depending on the aim of the research and the research questions, researchers can do one or both. Figure 1 displays the analysis procedure in bibliometric research. As outlined above, the selection of the respective bibliometric analyses must match the research aim and research questions.

3.3.1 Performance analysis procedure

With performance analysis, the performances of different scientific items are evaluated through a range of bibliometric indicators developed based on papers and citation data and thus, a general view of the field is presented (Cobo et al. 2011). This analysis aims to evaluate the "publication" and "citation" performances of researchers/authors, institutions/universities, countries, and journals (Öztürk and Dil 2022). In this regard, performance analysis is the assessment of scientific output in terms of *quality* and *quantity* indicators regarding the items (author, journal, country, institution/university) in the downloaded dataset related to the researched field. Moreover, within this analysis, *citation analysis* is also performed to see how effective the

outputs of the items are in the relevant field. Table 3 shows the bibliometric indicators employed to assess the performance (or scientific output) of relevant items.

As is seen, the information obtained through performance analysis can be accessed from databases or the websites of journals without the need for software-based calculations or formulations. Therefore, this analysis procedure can be performed without requiring the use of software. It may be sufficient to classify the relevant items and compare the outputs/amounts of each with each other, and the results can be displayed through a set of tables (Block et al. 2020). At this step, only “citation analysis” of bibliometric analysis techniques is employed. Accordingly, it could be necessary to utilize a software program specifically for this analysis (Öztürk 2021).

The simplest way to begin bibliometric research is the descriptive analysis of the fundamental performance characteristics of scientific items in the relevant field (Cobo et al. 2011). Just as an empirical research paper typically begins with descriptive statistics on the analyses’ findings, bibliometric research should begin with an overview of the relevant literature. In this respect, performance analysis is fundamentally a critical part of bibliometric research; but research must go beyond this stage. Nevertheless, it is seen that bibliometric research papers perform “only” performance analysis (Block and Fisch 2020). The recent studies by Halder et al. (2021) and Tiberius and Weyland (2023) serve as examples of performance analyses in bibliometric studies.

3.3.2 Science mapping procedure

Science mapping reveals the literature’s (the research field’s) intellectual, social, conceptual structure, and evolutionary processes (Cobo et al. 2011; Aria and Cuccurullo 2017). Accordingly, it is not sufficient to classify the items in the downloaded dataset, simply measure their performance (scientific output), or perform a simple citation analysis, further analysis is required (Block and Fisch 2020). To reveal the intellectual structure and dynamics of a field, it is necessary to make more macro-level (with a greater level of abstraction) analyses of the relevant field. Performance analysis yields results about the performances of scientific actors. Such an analysis does not enable the reader to obtain information regarding the relationship/interaction/collaboration between these actors (Öztürk 2021). This analysis cannot alone provide a comprehensive view of the structure and fundamental dynamics of the relevant field. Hence, science mapping is employed to get the big picture of the interactions between scientific actors (authors, papers, journals, concepts/words, universities, countries, and citations) from multiple perspectives (van Eck and Waltman 2014). In other words, it is the visualization of the relationship/collaboration network between scientific items, which enables mapping the relevant literature. Thus, the analyses in the scientific mapping procedure can be noted to be a form of network creation/revealing process (Block and Fisch 2020). In brief, science mapping is a spatial representation of the relationship/interaction between authors, concepts (keywords), and citations (in terms of papers, journals, or authors) in any research field (Gutierrez-Salcedo et al., 2018). To reveal and examine the relationship networks between the scientific items, co-author, co-word, co-citation, and

Table 4 Science mapping procedure *Source:* Formed by utilizing Zupic and Cater (2015), Aria and Cuccurullo 2017; Gutierrez-Salcedo et al. (2018) Block and Fisch (2020); Donthu et al. (2021); Mukherjee et al. (2022b)

Goal	Technique	Purpose of usage	Unit of analysis	Output of analysis	
Revealing social structure	Co-author analysis	To reveal/uncover the social interactions or relationships among authors and their affiliations (institutions and/or countries) within a research field.	Authors Institutions Countries	It reflects conscious social collaborations. One may explore the author collaboration, implicit communities of authors, relevant institutions, and their collaboration within a research field utilizing such a network.	<i>Collaboration Network</i>
Revealing conceptual structure	Co-word analysis	To identify/explore (i) the most important and cutting-edge keywords (periodical or present topics) and (ii) the existing or future relationships among the keywords—wherein keywords converging into a cluster represent a common theme- in a research field.	Words (In Title, Abstract, Author Keywords, Keyword Plus)	It represents relationships between concepts, keywords, or topics in a research field. Employing this analysis, one can identify dominant concepts/topics in a research field, examine the evolution of concepts/topics over time, and uncover the “cognitive relationships” between different research groups.	<i>Conceptual Network</i>

Table 4 (continued)

Goal	Technique	Purpose of usage	Unit of analysis	Output of analysis	Citation Network
Revealing intellectual structure	Co-citation analysis	To analyze the relationships among (co)cited publications to understand the development of the foundational or historical/retrospective knowledge -wherein cited publications converging into a cluster represent a common theme- in a research field.	Documents/ publications Sources/ journals Authors (In references of studies in the dataset)	It helps to reveal the historical roots and classical (or main fundamental works) of a research field. The research field (or the literature to be examined) can be analyzed over a long period of time through cited publications.	
	Bibliographic coupling	To analyze the relationships among citing publications to understand the development of periodical or present/trend knowledge -wherein citing publications converging into a cluster represent a common theme- in a research field.	Documents/publications Authors Sources/ journals Institutions Countries	It helps to detect the current and future trends in a research field. It can be used to identify new publications that have not yet been cited, emerging research streams, and smaller sub-fields.	Citation Network

bibliographic coupling analyses should be used. Accordingly, Table 4 presents the goals for which bibliometric research is typically employed, the different types of networks revealed, and the bibliometric analysis techniques utilized to reach these networks.

The science mapping procedure is a combination of two basic processes: “analysis” and “visualization” (Boyack and Klavans 2014). As part of the analysis, similarity matrices and relationships between items (authors, words, papers, journals, etc.) are calculated. Then, the relationship/collaboration “networks” between the relevant items are visualized (Öztürk 2021). Although BibExcel, one of the first software programs, follows this principle (Persson et al. 2009), researchers typically lack the skills needed to manually compute the similarity matrices and relationship/collaboration between items. Thus, they commonly employ up-to-date software tools to perform bibliometric techniques and obtain relevant visuals (Pan et al. 2018). Some software programs (e.g., VOSviewer, Biblioshiny, and SciMAT) can directly display visuals related to bibliometric analysis techniques without the need for researchers to perform extra analysis due to the advanced coding embedded within them. Therefore, such programs provide significant convenience and advantages to researchers (Zupic and Cater, 2015): (i) Papers can be exported from databases as a file (dataset), saved in the appropriate file type and easily uploaded to software programs, (ii) similarity matrices between items can be calculated, without the need for manual processing/calculations, (iii) visuals of the relationship networks between items can be easily generated, and (iv) these visuals can be exported and saved in formats that can be used in the relevant research. The studies by Alayo et al. (2021) and Molina-Garcia et al. (2023) serve as examples of science mapping as part of bibliometric research.

3.4 Stage 4-Interpreting the findings and results

The last stage in bibliometric research is the interpretation of the findings and results within the research field (Zupic and Cater, 2015). The analysis is the fundamental part of bibliometric research, but it is not sufficient to only report the results of the analyses and related visuals (Block and Fisch 2020). Performing analyses and compiling multiple lists regarding the relevant literature (*performance analysis*), revealing the relationship between scientific items, and presenting related visuals (*science mapping*) are treated as only the beginning acts for bibliometric research (Cobo et al. 2011). Accordingly, bibliometric research should portray the current state of the literature examined, organize the body of existing knowledge, determine the general trend and direction of the literature, prepare the ground for discussions about what has already been known, show the gaps in the literature and develop an agenda and road map for future research (Block and Fisch 2020). To do this, it is required to discuss and interpret how well bibliometric research supports the intended research aim and how well it can address the research questions.

It is crucial to address a common problem with bibliometric research/analysis. Many bibliometric research results are not associated with the gap(s) in the literature and, as a result, are unlikely to yield conclusions that are significant for the topic(s)

under research. Accordingly, we imply that this analysis is employed merely due to its widespread usage, disregarding the logic and intent behind the analysis. This leads research to begin without being based on an identification, curiosity, claim, or assumption. Thus, a gap emerges regarding the interpretation of the findings/visualization obtained through the analysis. Moreover, interpretations of the findings do not turn into a satisfactory output regarding the relevant field when the researchers lack in-depth knowledge about the field they examine. Thus, it requires expertise in the field (Öztürk 2021) and a field perspective (Fisch and Block 2018) to interpret the findings and results. Researchers who are well-versed in research field⁶ can discuss a research field's structure, fundamental dynamics, evolutionary past, or unfulfilled research gaps (Zupic and Cater, 2015).

The researchers' focus of effort in their research affects how the results and findings are interpreted. Such focus refers to what researchers seek to "achieve" through bibliometric research: Will the research (i) present the overall structure of the relevant field, (ii) derive an integrative framework of the field's current knowledge, (iii) reveal the field's evolutionary growth, (vi) address only several questions based on a range of identified gaps in the relevant field, or (v) outline potential avenues for future research? Table 5 demonstrates ways to interpret the findings and results of bibliometric research, depending on what the research focuses on.

Many research relying on bibliometric analysis tend only to describe results, rather than interpret them (Lim and Kumar 2023). Thus, such reviews fall short of elucidating the unique nuances of the field and their theoretical and practical implications. Accordingly, Mukherjee et al. (2022b) suggest that performance analysis and science mapping results help researchers advance theory and practice, serving as a springboard and complementary partner to other review techniques. The theoretical value of bibliometric research stems from science mapping's usefulness and novelty in the objective identification of knowledge clusters (Alayo et al. 2021; Molina-Garcia et al. 2023). The research can yield such value by enabling the discovery of knowledge clusters objectively, elucidating nomological networks to show the current state of the field, mapping social patterns to comprehend the social processes enhancing the knowledge in the field, tracking evolutionary nuances of the field, and identifying critical knowledge gaps to create future research avenues (Mukherjee et al. 2022b). On the other hand, the research's practical value comes from performance analysis objectively evaluating the productivity and impact of the research (Halder et al. 2021; Tiberius and Weyland 2023). Accordingly, bibliometric results can enhance practice by enabling objective assessment and reporting of research productivity and impact, determining reach for coverage claims, recognizing social dominance or hidden biases for efforts to improve, identifying anomalies for additional examination, and assessing relative performance for equitable decision-making (Mukherjee et al. 2022b).

To obtain valuable outputs from bibliometric research, Lim and Kumar (2023) propose a sensemaking approach requiring the transformation of raw information

⁶ Researchers having prior knowledge of a topic are required not to attempt and shoehorn bibliometric research/analysis into their existing preconceptions. Instead, they should utilize their expertise and knowledge of the relevant topic to analyze and interpret the findings and results.

Table 5 Ways for interpreting the findings and results *Source:* (Zupic and Cater, 2015; Mukherjee et al. 2022b) and authors' own analysis

Research focus	Interpretation ways
Presenting the field's overall structure	It happens when attempting to present the conceptual, social, and intellectual structure of a given research field. Based on an overview of the relationship between bibliometric items (e.g., papers, publication groups, authors, concepts, journals, universities, institutions, countries, and citations), the discussion in the results and discussion section should be performed with a focus on the current state, trends, and related gaps in the field. This way is favored by most of the bibliometric research. See Schröder et al. (2021), Ammirato et al. (2023), and Tiberius and Weyland (2023) for presenting the field's overall structure.
Deriving an integrative framework of the field's current knowledge	Based on the clustering of science mapping an integrative view on the knowledge in the respective research field can be derived. Such a (process) framework typically includes the different variables (e.g. independent, dependent, antecedent, outcome, moderators, mediators), contextual factors, and applied theoretical perspectives. See Tiberius et al. (2021), Fernandes and Ferreira (2022), Kimpimäki et al. (2022), and Horvatinovic et al. (2023) for the derivation of integrative frameworks.
Revealing the field's evolutionary growth	It is employed when attempting to reveal the evolution of a research field over time. In research with such a focus, data on the relevant literature should be divided into several periods that are significant for the dynamics of the field, and the structure of the field should separately be considered for each period. While interpreting the findings, one should attempt to explain why and how the structure of the research field has evolved over time. Also, it should be identified which elements/topics are new or which are in a downward trend in a certain period (e.g., Vogel 2012). See Halder et al. (2021) as an example for presenting the evolutionary growth of a field.
Seeking answers to a set of bounded research questions	Some bibliometric research may have focused on very specific research questions and gaps regarding the relevant literature. Such studies should typically include a "methods section" in which different bibliometric analysis techniques are used to demonstrate or prove the authors' assertions and their results are shared in relation to these assertions, and a "results section" where the relationship of the assertions to the existing literature is comprehensively discussed. To illustrate, Öztürk (2021) conducted bibliometric research with the focus of identifying "the intertwining of the Resource Dependency Theory (RDT) literature with the strategic management discipline". The research performed the co-citation and co-word to reveal the conclusion that the RDT literature focuses heavily on strategic actions rather than the main concepts and assumptions of the theory. In the results and discussion section of the study, the findings from analyses were discussed based on the evidence supporting the gaps the research identified.
Outlining potential avenues for future research	Based on the analyses, especially the integrated knowledge within the derived clusters, future research avenues can be outlined. It is relevant to clearly derive such directions which provide advancement to the field and not just make superficial recommendations. With this contribution, the authors of a bibliometric research paper have the opportunity to guide the future development of a field. See Vallaster et al. (2019), Fernandes and Ferreira (2022), and Horvatinovic et al. (2023) as examples of outlined avenues for future research.

into informed insights. Through the application of sensemaking to bibliometric research, researchers may present a nuanced view of the literature and thus may provide a more thorough knowledge of the field's current state, evolution, and future trajectories. This helps them mitigate the criticism raised against bibliometric

research for either misinterpreting or underinterpreting the data. In fact, the value of sensemaking mainly lies in bridging the gap between quantitative data and qualitative interpretation. Accordingly, emphasizing the need for careful planning, strategic implementation, and mindful interpretation in the integration of sensemaking into bibliometric research, Lim and Kumar (2023) offer a step-by-step guide (scanning, sensing, and substantiating) that enables researchers to not only interpret but also make plausible sense of their bibliometric results (see Table 6).

Given the discussions above, we acknowledge that understanding the social, conceptual, and intellectual structure of a research field through bibliometric research is a challenging yet crucial procedure. Accordingly, we offered some ways to interpret the bibliometric results that will guide future research. Furthermore, we suggested Lim and Kumar's (2023) robust framework including the application of the 3Ss of sensemaking to address the complexity of bibliometric research and provide insightful, practical knowledge about how a field of research is evolving. Thus, these efforts are expected to help researchers gain deeper insights, transforming raw data into narratives and action points (i.e. recommendations), revealing the hidden story behind data and significant implications.

4 Implications for academics: a comprehensive framework for bibliometric research

In the extant literature, especially with the widespread use of bibliometric analysis, many papers have discussed the stages of bibliometric analysis (e.g., Andres, 2009; van Raan 2014; Zupic and Cater, 2015; Aria and Cuccurullo 2017; Block and Fisch 2020; Linnenluecke et al. 2020, Donthu et al. 2021; Romanelli et al. 2021). However, technically describing bibliometric analysis falls short of how bibliometric research should be performed. Thus, the current paper offers a framework on how and under which headings the stages in bibliometric research might be reported in an article to make all the above explanations regarding the design of bibliometric research more functional and useful for academics.

A research design guides the researcher on what to perform and how to do it (Punch 2014). It helps academics decide on research objectives and questions, gather, and analyze data, and interpret findings and results (Yin 2003). Accordingly, research design essentially refers to the coherent and justified description of any research's stages, steps, and hierarchy (and linkages) between the stages. Following a "coherent article structure"⁷ provides great convenience to researchers for ensuring the hierarchy (and

⁷ An article has typically the following headings: introduction, literature review, methodology including sampling, data, analysis, etc., findings, implications, limitations, and conclusion (Coşkun et al. 2019). The article structure in bibliometric research differs partially due to the unique nature of bibliometric analysis: (i) The heading of 'literature review' is not included in bibliometric research since bibliometric analysis is already a tool for analyzing the relevant literature. (ii) Bibliometric research does not include the heading of 'sample and data' as in the method section of empirical papers because the structure of any research field is examined in this research (i.e., the literature examined is also the sample of the research). Therefore, a bibliometric research paper typically includes the headings of introduction, method (data, analysis, results/findings), and conclusion/ discussion.

Table 6 Application of sensemaking in the interpretation of bibliometric results *Source:* (Lim and Kumar 2023)

Steps	What includes?	What requires?	What provides?
Scanning	<ul style="list-style-type: none"> • Familiarization with the bibliometric results. • Identification of prominent patterns including the rise or decrease of publication and/or citation metrics over time, the most influential and productive authors, and clusters of related topics. 	<ul style="list-style-type: none"> • Skills for recognizing trends in bibliometric results. • Familiarity with the relevant field and expertise in various science mapping techniques (e.g., bibliographic coupling, co-citation analysis, citation, co-authorship, and co-occurrence). 	<ul style="list-style-type: none"> • Establishing a thorough foundational grasp of the field's intellectual structure by emphasizing the interconnectedness of various research topics. • Building a strong basis for the subsequent stages of sensemaking by laying the groundwork for the deeper interpretation.
Sensing	<ul style="list-style-type: none"> • Detailed interpretation of the data obtained in the scanning stage. • Inquiring about the “how,” “why,” and “so what” of the explored patterns, moving beyond observation to understand the root causes behind trends. • Comprehending the relationships between topics within a cluster and building a theme encapsulating the relevant topics. 	<ul style="list-style-type: none"> • Detailed interpretation of the data obtained in the scanning stage. • Comprehensive comprehension of literature and critical thinking. • Thorough examination and interpretation of the thematic focus of each cluster, recognizing and weighing opposing and supporting arguments, and thinking on potential causes for these disparities. • Application of analysis procedures with rigor, utilization of multiple triangulation approaches, thorough documentation, and evidence of the relevance of results. 	<ul style="list-style-type: none"> • Providing a deeper and more nuanced interpretation of bibliometric results by exposing underexplored as well as little-known aspects. • Deepening knowledge of the field's intellectual structure and helping to identify the underlying reasons for trends that are observed. • Serving as a groundwork for future research agendas and providing insightful interpretations that might influence the field's future pathways. • Strengthening the study's perceived validity and reliability, which increases its acceptability among academics and business professionals.
Substantiating	<ul style="list-style-type: none"> • Establishing the results' trustworthiness by demonstrating credibility, dependability, confirmability, and transferability of the interpretations. 		

Table 7 Typical article structure of bibliometric research *Source:* Drawn by utilizing Andres (2009), Zupic and Cater (2015), Aria and Cuccurullo (2017; Gutierrez-Salcedo et al. (2018), Block and Fisch (2020), Donthu et al. (2021); Mukerjee et al. (2022b); Sauer and Seuring (2023)

Headings	Stages	Steps
Introduction	(1) Research aim	<p>I. Main purpose/goal and expected results.</p> <p>Identifying productivity in the research field and analyzing the performance of scientific items</p> <p>Finding out the intellectual, social, and conceptual structure of the research field and revealing the evolutionary development of the field (in terms of concept, author, citation, and/or their relationship with each other)</p> <p>II. Typical research questions in bibliometric research</p> <p>A. Performance analysis</p> <p>Which author(s), institution(s), and country(s) have the most publications in the relevant research field?</p> <p>Which journals dominate the field (where the most papers are published)?</p> <p>What are the field's most influential (most cited) authors, papers, and journals? (citation analysis)</p> <p>Does the distribution of citations comply with Bradford's Law?</p> <p>What are the most researched topics/concepts?</p> <p>What is the increase/decrease trend in the number of papers?</p> <p>Selecting the database</p> <p>Initial search process: Identifying search terms</p> <p>Filtering: Determining and applying the inclusion or exclusion criteria.</p> <p>Downloading the dataset file</p> <p>A. Performance analysis (<i>overview of the field</i>)</p> <p>Classification of bibliometric items (<i>author, journal, concept, citation, etc.</i>) and measurement of scientific outputs</p> <p>Citation analysis</p> <p>B. Science Mapping</p> <p>- Relationship (network) among authors, institutions, and countries? (co-author analysis)</p> <p>- Relationship (network) between the most researched topics/ concepts? (co-word analysis)</p> <p>- Relationship (network) between the most cited and citing publications? (co-citation analysis and bibliographic coupling)</p>
Method	(2) Data collection	
	(3) Analysis and visualization	<p>B. Science Mapping (<i>different techniques and relationship networks</i>)</p> <p>Co-author analysis (<i>collaboration network</i>)</p> <p>Co-word analysis (<i>conceptual network</i>)</p> <p>Co-citation analysis and bibliographic coupling (<i>citation network</i>)</p>

Table 7 (continued)

Headings	Stages	Steps
Conclusion and/or Discussion	(4) Interpreting the findings and results	Three different paths can be followed, depending on the research focus, in interpreting findings and results of the research and presenting suggestions for future research: For research focusing on revealing the structure of the field... For research focusing on deriving an integrative framework of the field's current knowledge... For research focusing on revealing the evolutionary development of the field... For research focusing on a specific gap or bounded research questions in the field... For research focusing on outlining potential avenues for future research...

linkages) between the stages of research (Fisch and Block 2018). The coherence of the structure determines the level of success of the stages in bibliometric research and how these stages interrelate with one another (in communicating them to reviewers and readers). Thus, the article's structure is crucial for both systematically presenting the study and helping readers and reviewers better comprehend the research. Accordingly, it relates to how and under what headings the transactions that occur in the article are presented and guides both researchers and readers. Table 7 provides a detailed framework of the stages (and steps) in typical bibliometric research, along with the headings under which they will be covered in the article.

As a result, each research design must include a well-designed construct. Accordingly, it is necessary to establish a logical connection (i) between the reasons why the research will be performed (i.e., problem, objectives, and research questions) and the method employed to accomplish it; and (ii) between the method employed and the results acquired. In bibliometric research, it is also crucial to establish a consistent connection between the research objectives, the research questions, and the reasons behind employing bibliometric analysis to accomplish those objectives. Considering the limitations of bibliometric analysis, it is crucial to identify the relationship between bibliometric analysis and the results and interpret the findings based on this relationship to ensure the integrity of the research.

This study was designed to provide researchers with practical guidance. One of the most crucial steps in this procedure is that scholars decide on which journal is the most suitable for their bibliometric research. Selecting the wrong journals might prevent the study from reaching its full potential. Also, scholars often experience fatigue when they are unable to select the best publication outlet for their research. The journals that mostly accept well-done bibliometric research in the field of business and management include *Journal of Business Research*, *Review of Managerial Science*, *Technological Forecasting and Social Change*, *Benchmarking: An International Journal*, and *Technology Analysis & Strategic Management*. Also, some journals have just started to accept bibliometric papers, including *Journal of Management*, *International Marketing Review*, *Administrative Sciences*, *Journal of Business Venturing*, *Journal of Business Ethics*, *Academy of Management Journal*, *Strategic Management Journal*, *European Management Review*, *Management Decision*, and *Research Policy*. However, some highly ranked journals (e.g., *Academy of Management Review*) have not published any bibliometric research yet.

5 Conclusion

The current paper showed that bibliometric research is a significant scientific approach for both experienced and emerging scholars looking to delve deeper into a retrospective of broad and rich fields. The paper also demonstrated how the widespread availability and usefulness of bibliometric databases and tools, which make it easier to collect and analyze vast amounts of scientific data for any research field, have contributed to the bibliometric methodology's remarkable rise in popularity in recent years. With the rapid increase in the use of bibliometric analysis, some researchers offered step-by-step guidelines for how to perform the analysis. However, their contributions tend to be

more conceptual than practical. Thus, little is still known about the best ways to perform bibliometric research and what its best practices are. To fill this gap, the paper first described methodological stages and steps for how researchers can design bibliometric research. In this way, it presented the four main stages (definition of the research aim, data collection, analysis and visualization, and interpretation of findings and results) to demonstrate the typical pathways to be followed and details what steps a researcher would pursue at each stage. Then, more importantly, the paper offered a comprehensive framework of typical article structure for bibliometric research. By doing this, it provides guidelines for every decision, including tasks that help with sound choices to complete the research process and make significant contributions. By following these guidelines, many review papers may become more robust and rigorous, which enhances their contribution to the current body of knowledge. Moreover, by the pursuit of a collegial and pragmatic endeavor, the paper also offers a few practical tips and best-practice examples on issues that emerging scholars often find difficult to address in a manuscript, which frustrates editors, reviewers, readers, and authors alike. Accordingly, the paper clearly states that the decisions regarding every stage of the bibliometric research process are crucial since they influence the obtained results and the interferences drawn from the analysis. Through this endeavor, this paper encourages scholars to overcome their fear of dealing with large volumes of scientific data and to examine the retrospectives of any research field.

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Declarations

Conflict of interest The authors declare to have no conflict of interest.

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