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Diffusion of bibliometrics in global scientific publishing

1. Introduction

Bibliometric analysis has become one of the most widely used methods for examining the structure, dynamics, and performance of scientific research. Originally developed within the field of scientometrics, bibliometric techniques are now routinely applied across a broad range of disciplines to map research landscapes, identify influential publications, trace thematic evolution, and evaluate scientific impact (Donthu et al., 2021; Mingers & Leydesdorff, 2015). What once belonged primarily to a relatively small community of information science has increasingly become a standard research instrument in multiple domains.

The rise of bibliometric analysis reflects a broader transformation in the way science is studied. Over the past century, scientific literature has come to be seen not only as a repository of findings but also as a measurable communication system whose structure can be analyzed quantitatively. Early work focused on simple counts of publications, authors, and journals. Over time, however, bibliometric methods developed into sophisticated tools for reconstructing intellectual structures, measuring research performance, and supporting science policy (Moed, 2005; Van Raan, 2005). Its use has expanded rapidly across a wide range of disciplines. With large dataset from multiple databases, bibliometric studies have been rapidly used in the evolution of science, which includes international collaboration and global knowledge production, leading to macro-level transformation over an extended period of time. Thus, such studies are a scientific method rather than a single field of research (Kwiek, 2021).

This is also consistent with diffusion theory, which states that innovation spreads through communication channels among members of a system (Grübler, 2016; McMaster et al., 1997). A key assumption of this approach is that innovations propagate across multiple domains and disciplines. In this sense, bibliometric analysis has spread to a wide range of fields, including business, computer science, management, and medicine,

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among others (Ellegaard & Wallin, 2015). This perspective suggests that bibliometric analysis itself can be understood as a methodological innovation, as also noted by Fassin (2024), whose development and spread can be studied empirically.

Several studies have examined bibliometric and scientometric research using bibliometric methods themselves, thereby establishing bibliometrics as an object of analysis in its own right. Hood and Wilson (2001) provided a comprehensive account of the historical development, terminology, and conceptual foundations of bibliometrics, scientometrics, and informetrics, highlighting the long-term evolution of the field. Ellegaard and Wallin (2015) demonstrated the increasing role of bibliometric methods in research evaluation and documented their expansion beyond library and information science into a wide range of applied domains. More recent work by Sánchez Castillo et al. (2024) analyzed the evolution of bibliometric and scientometric research in Scopus, identifying sustained growth, increasing interdisciplinarity, and the need for further methodological development. In parallel, Fassin (2024) interpreted the development of bibliometrics through the lens of innovation and diffusion theory, emphasizing the role of institutions and individual actors in shaping their trajectory.

Taken together, these contributions show that bibliometric research has undergone substantial expansion, increased diversification, and growing institutional relevance. Building on these insights, the present study shifts the focus from the internal characteristics and development of the field to its position within the broader scientific system. Specifically, it examines how bibliometric analysis has diffused as a methodological practice across scientific disciplines by operationalizing its presence as a share of total scientific output and modeling its growth using diffusion frameworks. In doing so, the study extends existing meta-bibliometric research toward a system-level analysis of methodological diffusion in science.

Three main reasons underscore the relevance of this research. First, it offers a way to understand how methods are diffused through scientific communities. Second, it helps explain why bibliometric publications have proliferated so rapidly in recent years. Third, it raises the question of whether bibliometric research may eventually approach a point of methodological saturation, especially where multiple studies repeatedly analyze similar research areas using comparable workflows and overlapping datasets. This study addresses the first two questions.

Beyond addressing this gap, the present study is relevant for the research community because it provides insight into how scientific methods themselves evolve and become embedded within research practice. Methods do not merely support research; they also shape how knowledge is produced, organized, evaluated, and communicated. In this sense, the diffusion of bibliometric analysis reflects more than the growth of a single technique. It signals a broader transformation in which science increasingly incorporates formalized tools to observe and evaluate its own output. As bibliometric analysis becomes more widely adopted across disciplines, it also becomes part of the research infrastructure of science itself. Studying this shift is therefore important not only for understanding bibliometrics but also for understanding a system-level change in how scientific communities generate and structure knowledge.

This interpretation is also consistent with sociological and epistemological accounts of science that emphasize the collective and historically situated nature of knowledge production. In Fleckian terms, scientific thinking develops within "thought collectives" and "thought styles", meaning that methods do not diffuse merely as neutral tools, but become embedded in shared ways of seeing, classifying, and evaluating scientific work. As Sady (2026) notes in his discussion of Fleck, "thinking is a collective activity" and what scientists think and see depends on the thought collective to which they belong. This perspective strengthens the rationale for treating the diffusion of bibliometric analysis not only as a technical expansion, but also as a transformation in scientific practice.

The present study addresses these issues by combining two perspectives that are often treated separately. The first is historiographical: it reconstructs the evolution of bibliometrics from statistical bibliography and citation indexing to contemporary software-supported science mapping and responsible metrics. The second is quantitative: it estimates the annual share of bibliometric studies in global scientific output between 1980 and 2025 using publication counts from Scopus and Web of Science.

The central argument advanced here is that bibliometrics should be understood not only as a method for studying science but also as a methodological innovation that has undergone invention, specialist adoption, infrastructural expansion, levelling, and mass diffusion. By integrating historical reconstruction with empirical diffusion analysis, the article contributes to the body of bibliometrics, scientometrics, and meta-research.

2. Historical evolution of bibliometric methods

2.1. Proto-bibliometrics and statistical bibliography

The intellectual roots of bibliometrics predate the formal emergence of the term itself. Although bibliometrics is often associated with the 20th century, its origins can be traced much further back. Practices resembling citation analysis existed in earlier scholarly traditions, including the systematic referencing of legal precedents and the cross-referencing of religious texts, such as in Biblical and Talmudic scholarship (Hood & Wilson, 2001). These early forms of structured referencing indicate that the idea of linking documents through citations predates the formal emergence of bibliometric methods, even if it was not yet formalized or quantified. In this sense, bibliometric thinking can be understood as an extension of long-standing scholarly practices of organizing knowledge through textual linkage. In the late nineteenth and early twentieth centuries, scholars began using quantitative approaches to describe the growth and distribution of literature, often under the label "statistical bibliography" (Pritchard, 1969; Sengupta, 1992). The early development of the field was also characterized by overlapping and evolving terminology, particularly between bibliometrics, scientometrics, and informetrics, reflecting both conceptual ambiguity and the gradual consolidation of the domain (Hood & Wilson, 2001). These early efforts were linked both to practical library management and to broader attempts to understand the development of scientific knowledge through documentary traces. The purpose of this reconstruction is not merely descriptive. It establishes the developmental preconditions that made later large-scale diffusion possible, thereby providing the historical rationale for interpreting bibliometrics as a methodological innovation that subsequently spread through the scientific system.

Several early studies proved foundational. In 1896, Campbell published the first article, which pointed toward the need for literature indexation, due to the explosive growth of the (here: chemistry) literature. Although Campbell did not construct any specific method himself, he brought the attention of the scientific world to the problem. In 1917, Cole and Eales analyzed comparative anatomy literature and demonstrated that publication counts could be used to reconstruct the historical development of a scientific field (Pritchard, 1969; Sengupta, 1992). In 1923, Hulme used statistical methods to examine patents and scientific documents, explicitly naming the approach "statistical bibliography" and linking documentary growth to broader processes of social and technological development (Pritchard, 1969; Sengupta, 1992). Equally important was the discovery of regularities in scientific communication. In 1926, Lotka demonstrated that scientific productivity follows a highly skewed distribution, in which a small minority of authors produce a disproportionately large share of scientific publications. In 1934, Bradford demonstrated that literature on a subject tends to concentrate in a core group of journals, while in 1949 Zipf identified regularities in word-frequency distributions. These laws suggested that scientific communication is not random but patterned, and therefore measurable. These early contributions are often interpreted as precursors of bibliometric analysis, indicating that the quantitative study of scientific literature predates the formal introduction of the term "bibliometrics" (Hood & Wilson, 2001).

In retrospect, proto-bibliometrics transformed bibliography from a descriptive and historical practice into a nascent measurement technique. What remained missing, however, was a robust mechanism for tracing the intellectual relations between documents. That missing link would be provided by citation indexing.

2.2. The emergence of scientometrics: Garfield, Price, and citation indexing

A decisive transformation occurred in the mid-twentieth century with the work of Eugene Garfield and Derek de Solla Price. In 1955, Garfield proposed citation indexing as a means of linking scientific papers through their references. Rather than relying only on titles, subject headings, or keywords, citation indexing allowed publications to be connected through explicit acts of scholarly acknowledgement. This innovation ultimately led to the creation of the Science Citation Index and made large-scale citation analysis possible.

In parallel, in 1963 Price reconceptualized science as a measurable system. In Little Science, Big Science, he argued that scientific output grows exponentially and introduced concepts such as the "research front" and "invisible colleges," thereby moving beyond static counts of publications toward a systemic understanding of scientific communication. Price's work was foundational not only for scientometrics but also for the broader "science of science" tradition (Mingers & Leydesdorff, 2015; Furner, 2003).

The terminology of the field also became more clearly defined during this period. In 1969, Pritchard introduced the term bibliometrics as a replacement for the older label "statistical bibliography," while Nalimov and Mulchenko defined scientometrics as the quantitative study of science as an informational process (Mingers & Leydesdorff, 2015; Sengupta, 1992). Taking together, these developments transformed bibliometrics from a loose collection of descriptive techniques into an emerging methodology for studying science. This period also marks the institutionalization of bibliometrics, with the establishment of citation indexing systems, the development of specialized journals such as Scientometrics, and the emergence of dedicated research communities, which collectively contributed to its stabilization as a recognized scientific domain (Garfield, 1979; Hood & Wilson, 2001; Ellegaard & Wallin, 2015).

2.3. Structural bibliometrics and science mapping

During the 1970s and 1980s, bibliometric research shifted from counting units to analyzing relationships. This structural turn was enabled by relational methods that treated science as a network of linked documents, authors, and concepts. One of the most influential of these methods was co-citation analysis, developed independently by Small and Marshakova in 1973. Co-citation assumes that if two publications are frequently cited together, they are likely to share an intellectual or thematic connection.

Bibliographic coupling, originally proposed by Kessler in 1963, offered a complementary view by linking papers that cite the same references. Later, in 1981 White and Griffith extended co-citation analysis to authors, thereby enabling the mapping of intellectual traditions and schools of thought within disciplines. In 1983, Callon and colleagues added co-word analysis, which used keyword co-occurrence to reveal conceptual structures directly from the content of publications rather than from citation relations alone (Callon et al., 1991; Cobo et al., 2011).

These methods transformed bibliometrics into an instrument for science mapping. From then on, instead of producing only rankings or counts, bibliometric analyses gained the ability to visualize clusters, research fronts, and thematic relationships. Bibliometrics increasingly served as a way of reconstructing the architecture of knowledge itself. These developments expanded the analytical capacity of bibliometrics, but their broader diffusion remained limited until later infrastructural changes reduced the barriers to entry.

2.4. Conceptual consolidation and typological frameworks

By the late 1990s, bibliometrics had reached a level of conceptual maturity that caused systematic typologization. One influential distinction separated descriptive bibliometrics from evaluative bibliometrics, the former focusing on communication patterns and the latter on assessment and performance (Van Leeuwen, 2004). Another distinction separated performance analysis from science mapping, emphasizing the difference between measuring productivity and impact on the one hand and reconstructing knowledge structures on the other (Noyons et al., 1999; Donthu et al., 2021).

This conceptual consolidation had several effects. It clarified the aims of different bibliometric studies, distinguished indicator-based evaluation from relational mapping, and strengthened the methodological identity of the field. It also aligned bibliometrics more closely with research policy, since evaluative bibliometrics became increasingly important in the governance of scientific systems (Moed, 2005; Van Raan, 2005).

2.5. Operationalization, software, and methodological standardization

The mid-2000s brought a decisive process of operationalization. Bibliometric practice increasingly took the form of workflow-based analysis involving data collection and cleaning, clustering, visualization, and interpretation (Cobo et al., 2011). Simultaneously, the proliferation of digital citation databases, most notably the online expansion of Web of Science and the launch of Scopus in 2004, increased the accessibility of bibliographic data.

Software development proved especially impactful. Programs such as VOSviewer and CiteSpace, followed later by bibliometrix, automated many of the technical steps that had previously required substantial expertise in data handling and network analysis. These tools significantly reduced the methodological barrier to entry and facilitated the spread of bibliometric analysis into disciplines whose researchers were not trained in scientometrics itself (Van Eck & Waltman, 2014; Cobo et al., 2011).

This phase also brought indicator standardization and normalization debates, especially in evaluative contexts. The h-index, field-normalized citation indicators, and publication-level classification systems expanded the toolkit available for bibliometric analysis (Moed, 2005; Waltman & Van Eck, 2012). In effect, bibliometrics moved from a specialist methodology to an increasingly applicable research infrastructure.

2.6. Reflexive bibliometrics and responsible metrics

From roughly the mid-2010s onward, bibliometrics entered a more reflexive phase. The rapid spread of indicators in research evaluation generated increasing concern about the performative effects of metrics, the misuse of citation-based indicators, and the need for responsible assessment frameworks. These concerns were articulated in influential statements such as the Leiden Manifesto (Hicks et al., 2015) and The Metric Tide (Wilsdon et al., 2015). from 2015.

Taken together, these stages suggest that the development of bibliometric methodology has proceeded through a sequence of relatively distinct phases, each characterized by new conceptual frameworks, analytical techniques, and infrastructural conditions. Importantly, the duration of these phases appears to have shortened over time. Early developments–such as the emergence of statistical bibliography and the foundational laws of scientific communication–unfolded over several decades. By contrast, more recent phases associated with digital infrastructures, specialized software, and methodological standardization have emerged within much shorter time spans. As a result, contemporary developments in bibliometrics increasingly overlap and interact, rather than forming clearly separated historical epochs.

Recent studies have further emphasized the institutional embedding of bibliometric indicators within research governance and evaluation systems, highlighting their role not only as analytical tools but also as instruments shaping scientific practice (e.g., Blümel & Schniedermann, 2020). More recent work has emphasized bibliometrics as a boundary object linking researchers, evaluators, managers, and policymakers, while also drawing attention to reproducibility, reporting quality, and methodological transparency (Leydesdorff et al., 2016; Ng et al., 2025). Over time, bibliometric methods increasingly moved beyond their original analytical function and became embedded in systems of research evaluation, funding allocation, and institutional assessment, thereby reinforcing their role within the broader scientific infrastructure (Moed, 2005; Hicks et al., 2015; Ellegaard & Wallin, 2015; Blümel & Schniedermann, 2020). The question is no longer simply whether bibliometric techniques can be used, but how they should be used responsibly. This reflexive turn is crucial for interpreting the present study: the diffusion of bibliometrics is not merely a story of technical success but also one of institutional embedding and methodological self-critique.

3. Methods

The study adopts a longitudinal meta-scientific design in which bibliometric analysis is treated as a research method whose prevalence can be measured over time. Annual counts of bibliometric studies were compared with total scientific output between 1980 and 2025 to estimate the relative diffusion of bibliometric methods within the scientific literature.

The queries were made on the 9th of March 2026. Publication data were retrieved from both Scopus and Web of Science. Studies retrieved from these two databases are crucial as cross-database analysis provides a more robust analysis in longitudinal studies with large reducing potential biases (Kwiek et al., 2024). In both databases, the denominator (as later explained, for the diffusion index) consisted of all indexed articles and reviews published in a given year. The numerator consisted of records retrieved through keyword-based searches designed to capture bibliometric and scientometric studies. The search terms included bibliometric*, scientometric*, informetric*, "science mapping", "bibliometric analysis", "bibliometric review", "citation analysis", "co-citation analysis", "bibliographic coupling", "co-word analysis", "keyword co-occurrence", and names of major bibliometric software tools such as VOSviewer, CiteSpace, bibliometrix, HistCite, and SciMAT. In Scopus, a short exclusion block was additionally used to remove clearly unrelated uses of the term metrics (e.g., sports metrics, financial metrics, web analytics). The final queries are reproduced in Appendix A. Due to the broad scope of the study, the abstract screening has been omitted.

The selection of search terms was designed to operationalize bibliometric research as a measurable category by capturing it at multiple levels of expression. The query includes (i) standard terminology widely used within the field of bibliometrics and scientometrics for self-identification, (ii) specific analytical techniques characteristic of the method, (iii) commonly used workflow descriptors, and (iv) names of widely adopted software tools. This multi-layered approach was intended to increase recall while maintaining conceptual coherence with the methodological domain under study.

The main diffusion variable was the annual share of bibliometric studies in total scientific output, defined as

$$Share_t = \frac{B_t}{P_t} \tag{1}$$

where: B_t denotes the number of bibliometric studies in year t, and P_t denotes the total number of indexed articles and reviews in the same year.

This variable estimates the probability that a randomly selected scientific paper in year t is a bibliometric study. To facilitate interpretation, bibliometric intensity was calculated as the number of bibliometric studies per 100,000 indexed papers. This normalized measure also serves as a Method Diffusion Index (MDI*), allowing comparison of methodological prevalence across time and across databases.

To support interpretation, a set of heuristic thresholds was introduced to distinguish different stages of methodological diffusion. These thresholds do not represent fixed or theoretically derived boundaries but rather provide an approximate categorization of observed diffusion intensity. Values below 10 per 100,000 were interpreted as niche use, values between 10 and 50 as emerging adoption, values between 50 and 150 as expanding adoption, values between 150 and 400 as mass diffusion, and values above 400 as indicating possible early saturation conditions.

Growth dynamics were analyzed in several ways. First, compound annual growth rates (CAGR) were calculated for bibliometric publications, total scientific output, and bibliometric share. Second, normalized growth indices were used to compare the divergence between the growth of science and the growth of bibliometric research. Third, structural breakpoints were examined visually and substantively by assessing shifts in the slope of the time series, especially in the logarithmic growth of bibliometric output.

Exploratory diffusion modeling was performed on the Scopus share series using two standard sigmoidal models, the logistic and the Gompertz model, to explore possible diffusion trajectories. Because the observed series has not yet clearly entered a plateau, the models are interpreted as exploratory rather than definitive. Their purpose is not to estimate a final saturation level with precision, but to provide a structured representation of possible threshold crossings under historically grounded assumptions. Diffusion processes in scientific systems often exhibit nonlinear growth trajectories characterized by slow initial uptake, rapid expansion, and eventual stabilization, which are commonly modeled using sigmoidal functions.

Both the logistic and the Gompertz models represent diffusion processes with an upper asymptotic limit, but they differ in shape. The logistic model assumes a more symmetric trajectory around the inflection point, whereas the Gompertz model allows for asymmetric growth, with a more gradual approach to saturation. Given that methodological innovations may diffuse unevenly across scientific fields, the Gompertz model may offer a more flexible representation of bibliometric expansion. Both models are therefore used here as heuristic tools rather than deterministic forecasts. Both models are relevant for showing scientific growth processes which provides complementary projections of future diffusions which also provides theoretical justification of methodological diffusion (Tattershall et al., 2021).

The logistic model was specified as

$$Share_t = \frac{K}{1 + e^{-r\left(t - t_0\right)}} \tag{2}$$

where: K is the asymptotic ceiling (saturation level), r is the diffusion rate, and t_0 is the inflection point.

The Gompertz model was specified as:

$$Share_t = Ke^{-e^{-b(t-t_0)}} \tag{3}$$

where: K is the asymptotic ceiling (saturation level), b is the growth (diffusion) rate parameter, t_0 is the inflection point.

Logistic and Gompertz models capture these dynamics by representing diffusion processes with an upper asymptotic limit. While the logistic model assumes symmetric diffusion around the inflection point, the Gompertz model allows for asymmetric growth patterns frequently observed in technological and knowledge diffusion processes.

Model parameters were estimated in Microsoft Excel using the Solver add-in with nonlinear least-squares optimization. For each model, the asymptotic ceiling, growth parameter, and inflection point were fitted to the annual Scopus share series for 1980–2025 by minimizing the sum of squared errors between observed and predicted values. The fitted curves were then used to calculate goodness of fit and to generate exploratory threshold-crossing projections beyond the observed period. Because the empirical series has not yet reached a stable plateau, these projections should be interpreted as scenario-based extrapolations rather than as deterministic forecasts.

Finally, the historical narrative and the diffusion results were interpreted together. The historical section supplied a time-coded sequence of methodological phases, while the quantitative analysis assessed whether changes in bibliometric prevalence aligned with infrastructural and methodological innovations. The study, therefore, treats the diffusion of bibliometrics as both a historiographical and a measurable empirical process. Here, bibliometric analysis itself is the unit of analysis, providing methodological evolution, which is one of the features of scientific publishing (Kwiek, 2021).

4. Results

4.1. Growth of global scientific output

Between 1980 and 2025, total scientific output increased substantially in both databases. In Scopus, annual output grew from 581,070 publications in 1980 to 3,577,694 in 2025, corresponding to a growth factor of 6.16. In Web of Science, the comparable increase was from 445,654 to 3,061,219, or a factor of 6.87. The corresponding CAGR values were 4.1% in Scopus and 4.4% in Web of Science (Table 1).

These results are consistent with the long-run expansion of global scientific publishing documented in the scientometric literature (Price, 1963; Moed, 2005), which in fact gave way to establishing the bibliometric method. Overall, both databases reveal a steady and sustained growth of global scientific production over the past four decades.

Table 1. Annual publication counts used in the diffusion analysis.
Source: data obtained from Scopus and Web of Science databases

Year	Scopus bibliometric	Scopus total	WoS bibliometric	WoS total
1980	30	581,070	20	445,654
1985	52	691,048	36	533,324
1990	84	744,004	48	595,868
1995	133	861,179	87	690,841
2000	223	1,069,481	142	831,113
2005	389	1,296,744	255	1,045,674
2010	908	1,655,854	651	1,485,805
2015	1,622	2,123,311	1,341	1,917,435
2020	4,220	2,831,667	3,510	2,655,907
2025	15,082	3,577,694	11,472	3,061,219

Note: The complete dataset with yearly values was used for all calculations and modeling procedures.

4.2. Growth of bibliometric studies

The growth of bibliometric publications was far more pronounced. In Scopus, the number of bibliometric studies increased from 30 in 1980 to 15,082 in 2025, representing a multiplication factor of 502.7. In Web of Science, the number rose from 20 to 11,472, a factor of 573.6. The CAGR of bibliometric publications was 14.8% in Scopus and 15.2% in Web of Science. Bibliometric output thus grew far faster than science itself. To illustrate the difference in growth trajectories between overall scientific output and bibliometric studies, both series were normalized to their 1980 values and plotted on a logarithmic scale (Fig. 1).

Note: The divergence widens markedly after the mid-2000s and especially after 2016, indicating that bibliometric research has grown substantially faster than the literature it analyzes. Although bibliometric publications remain a small fraction of total scientific output, their growth rate has substantially exceeded the overall expansion of scientific literature.

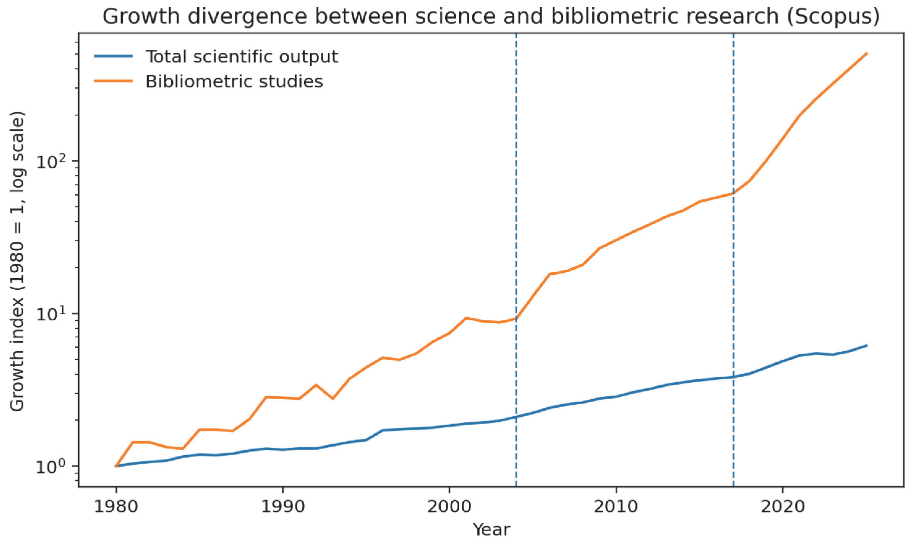

Fig. 1. Growth divergence between total scientific output and bibliometric studies in Scopus, normalized to 1980 = 1, and shown on a logarithmic scale

4.3. Relative diffusion of bibliometric methods

Normalization relative to total scientific output reveals the scale of methodological diffusion more clearly. In Scopus, the bibliometric share rose from 0.005% in 1980 to 0.422% in 2025. In Web of Science, it increased from 0.004% to 0.375% over the same period. The relative prevalence of bibliometric studies therefore increased approximately 81.7-fold in Scopus and 83.5-fold in Web of Science. Expressed as bibliometric intensity, the Scopus series rose from 5.2 bibliometric studies per 100,000 papers in 1980 to 421.6 in 2025, while the Web of Science series rose from 4.5 to 374.8. Despite notable differences in absolute numbers, both databases display similar proportional trajectories (Table 2).

Table 2. Benchmark values for bibliometric diffusion in Scopus and Web of Science

Year	Scopus			Web of Science		
	Bibliometric studies	Share (%)	Intensity	Bibliometric studies	Share (%)	Intensity
1980	30	0.005	5.2	20	0.004	4.5
1990	84	0.011	11.3	48	0.008	8.1
2000	223	0.021	20.9	142	0.017	17.1
2010	908	0.055	54.8	651	0.044	43.8
2020	4,220	0.149	149.0	3,510	0.132	132.2
2025	15,082	0.422	421.6	11,472	0.375	374.8

Source: own calculations, based on the data from Scopus and Web of Science databases

4.4. Diffusion phases and structural breakpoints

The time series suggests three main phases of methodological diffusion. The first phase, extending roughly from 1980 to 2000, is characterized by low prevalence and gradual growth. Bibliometric analysis remained largely concentrated within scientometrics, information science, and related specialist domains. The second phase, from approximately 2000 to 2015, shows steadier but still moderate expansion. This interval aligns with the broader digitalization of citation indexing, the online expansion of Web of Science, and the launch of Scopus in 2004. The third phase begins in the mid-2010s and is marked by pronounced acceleration, especially after 2016–2018. The timing closely matches the widespread adoption of dedicated bibliometric software, including VOSviewer, CiteSpace, and bibliometrix.

A simple comparison of pre- and post-2016 growth rates illustrate this shift. Between 2000 and 2015, the number of Scopus-indexed bibliometric studies increased from 223 to 1,622, a factor of 7.3. Between 2016 and 2025, however, the number increased from 1,724 to 15,082, a factor of 8.7 over a much shorter interval. In annual terms, the post-2016 growth was clearly steeper. This pattern strongly suggests a methodological shift associated with software-enabled levelling of bibliometric analysis (Fig. 2).

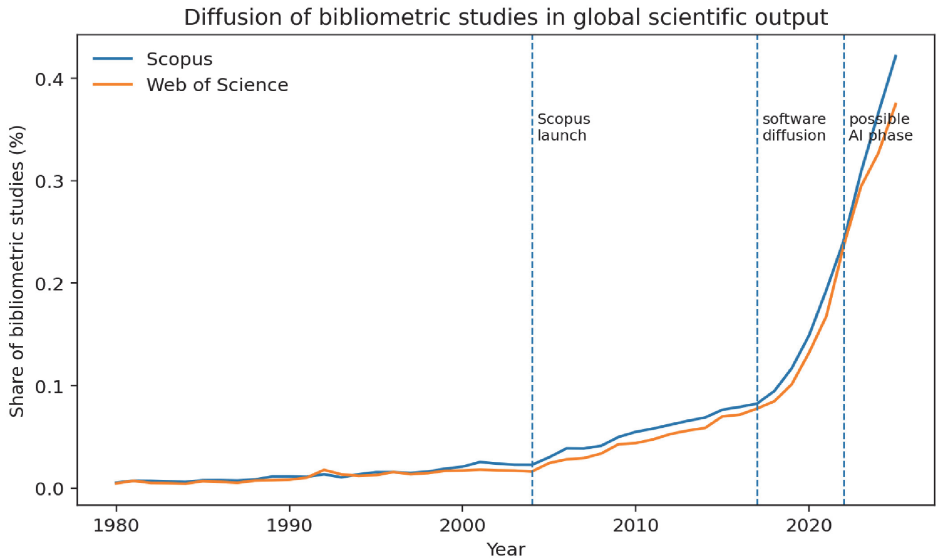

Fig. 2. Diffusion of bibliometric studies within global scientific output, 1980–2025

Note: The figure plots bibliometric share in Scopus and Web of Science. Vertical reference lines mark historically meaningful transition points associated with database expansion (2004), software diffusion (2017), and a tentative post-2022 AI-assisted phase.

4.5. Diffusion modeling and threshold forecasts

Exploratory model fitting indicates that the observed diffusion of bibliometric studies is consistent with a non-linear adoption process. Model fit was evaluated using the root mean squared error (RMSE), which measures the average deviation between observed values and model predictions; lower RMSE values indicate a better fit. The logistic model achieved an RMSE of 0.000157, while the Gompertz model achieved an RMSE of 0.000211.

Both models closely reproduce the historical share series through 2025 but diverge in longer-horizon projections because the observed data have not yet entered a stable plateau. The logistic model implies a higher eventual ceiling and faster late-stage growth, whereas the Gompertz model yields a more conservative trajectory.

Using the fitted models as exploratory scenario tools, the Scopus share series is projected to cross the 0.5% threshold around 2027 in both specifications. The 1.0% threshold is reached around 2031 in the logistic model and around 2034 in the Gompertz model. These results should not be interpreted as precise predictions of saturation, but rather as structured estimates of when bibliometric studies may transition from mass diffusion toward a more deeply embedded methodological position within the scientific literature (Fig. 3).

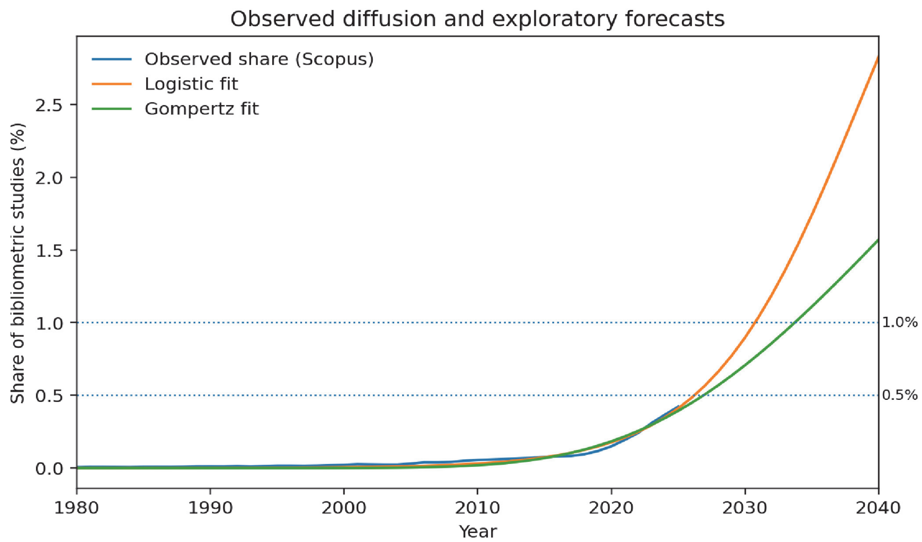

Fig. 3. Observed bibliometric share in Scopus (1980–2025) with exploratory logistic and Gompertz projections to 2040

Note: Model parameters were estimated in Microsoft Excel Solver by nonlinear least-squares fitting. Dotted horizontal lines indicate the 0.5% and 1.0% thresholds used in the discussion of diffusion stages.

4.6. Method Diffusion Index

The bibliometric intensity series can be interpreted as a Method Diffusion Index (MDI). For Scopus, the index moved from niche use in the 1980s (fewer than 10 studies per 100,000 papers), to emerging adoption in the 1990s, to expanding adoption by approximately 2010, and to mass diffusion after 2020. By 2025, the Scopus value exceeded 400 per 100,000, placing the method at the threshold of what may be termed possible early saturation conditions. The Web of Science series yields the same basic conclusion, though at a somewhat lower terminal value. Together, the two databases suggest that bibliometric analysis has already moved beyond specialist use and entered a broadly diffused methodological stage (Fig. 4).

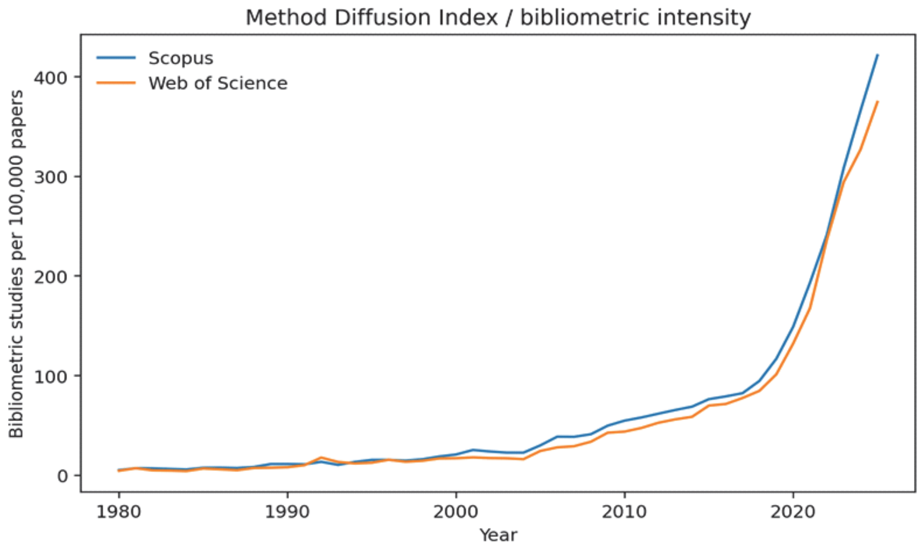

Fig. 4. Method Diffusion Index / bibliometric intensity, expressed as the number of bibliometric studies per 100,000 papers

Note: Both databases show closely parallel trajectories, despite considerable differences in their indexed volume.

4.7. Field-level diffusion of bibliometric methods

To complement the aggregate diffusion analysis, a preliminary field-level examination was conducted using subject categories, now from the Scopus database only. Six largest domains were selected – Social Sciences, Medicine, Computer Science, Business, Management and Accounting, Environmental Science, and Engineering – to assess how the adoption of bibliometric methods is distributed across disciplinary contexts (Fig. 5). The exact numbers are shown in Appendix B.

The data indicates that the diffusion of bibliometric methods is not only a process of overall growth but also one of structural redistribution. In 1980, bibliometric studies were highly concentrated within a small number of fields, with Social Sciences accounting for approximately 44% of the six-field total, followed by Computer Science and Engineering at roughly 22% each. Medicine represented less than 10%, while Business and Environmental Science were marginal.

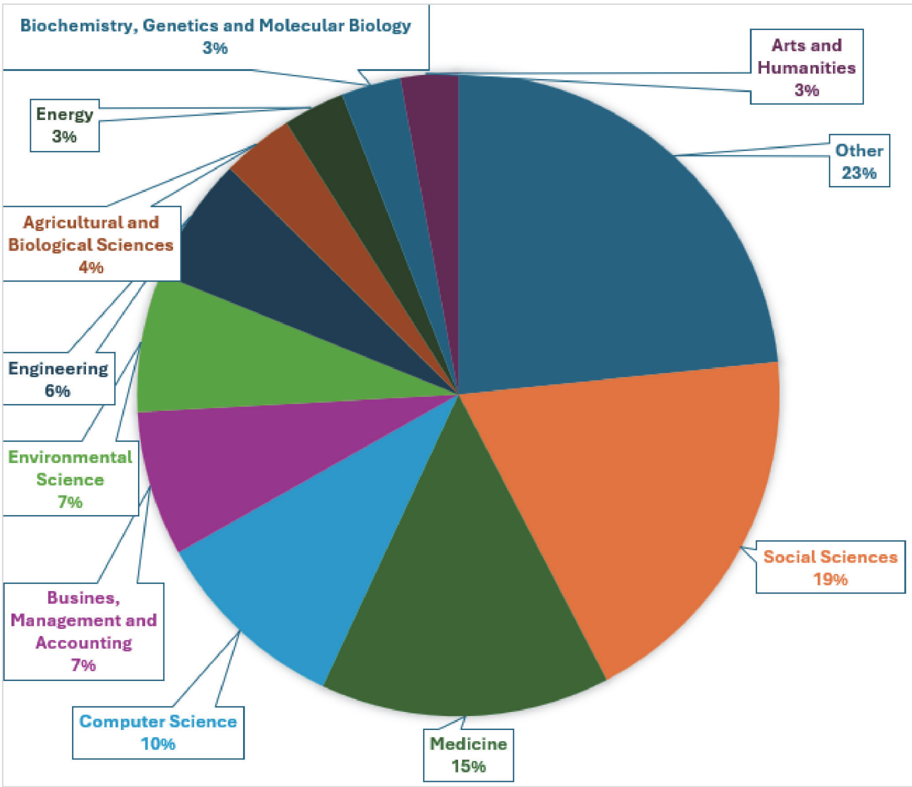

Fig. 5. Share of subject areas applying bibliometric methods. Source: Scopus

By 2025, this structure had changed substantially. Although Social Sciences remained the largest field in absolute terms, its share declined to approximately 27%. At the same time, other fields increased their relative presence, resulting in a more balanced distribution: Medicine accounted for roughly 22%, while Business, Engineering, and Environmental Science each contributed between 12% and 14%, and Computer Science approximately 11%. This shift suggests that bibliometric analysis has moved from a relatively concentrated disciplinary base toward a more generalized presence across the scientific system (Fig. 6).

The temporal patterns suggest that disciplines have played different roles in the diffusion process. Social Sciences and Computer Science appear as early adopting domains, with relatively high levels of bibliometric activity already visible in the 1980s and 1990s. In particular, Computer Science shows strong early prominence but a declining relative share over time, indicating that while bibliometric methods were adopted early in this field, their subsequent growth was less pronounced compared to other domains.

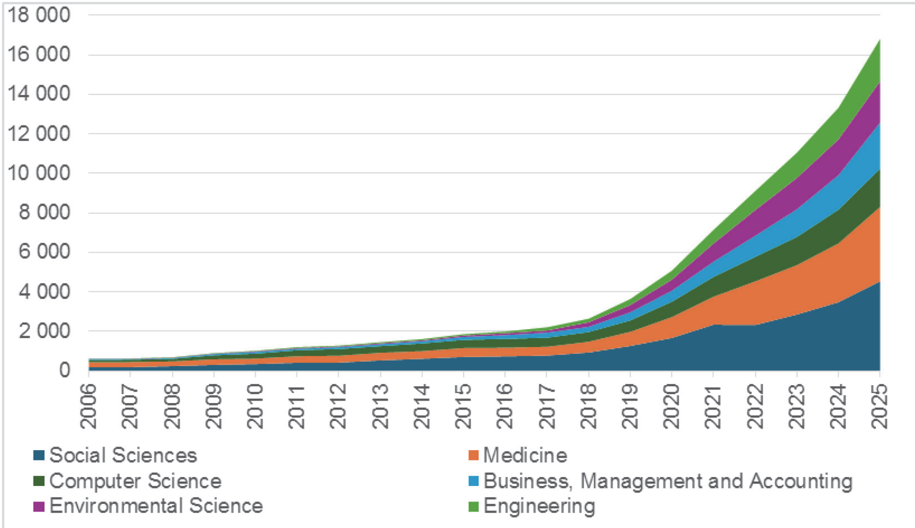

Fig. 6. Growth of the bibliometric method use in the largest subject categories, absolute numbers, 2006–2025. Source: own study, based on Scopus data

Medicine, by contrast, represents a case of sustained and accelerating adoption. From a relatively small base in 1980, bibliometric studies in Medicine increased dramatically over the study period, both in absolute terms and relative importance. This pattern suggests that bibliometric methods have become increasingly integrated into mainstream research practices in literature-intensive and evaluation-sensitive domains.

The most notable recent development is the rapid expansion of bibliometric studies in Business, Management and Accounting, Environmental Science, and Engineering. Between approximately 2015 and 2025, these fields exhibit the steepest growth trajectories, with increases on the order of one to two magnitudes within a relatively short period. This late-stage acceleration indicates that the current phase of diffusion is being driven less by the original methodological core and more by expansion into applied and policy-relevant research areas.

This pattern is consistent with the interpretation that bibliometric analysis has transitioned from a specialist or semi-specialist method to a broadly accessible analytical tool. Once methodological workflows became standardized and supported by dedicated software, barriers to entry decreased substantially, enabling rapid uptake in fields where bibliometric techniques had previously been less common.

A further observation is the temporal alignment of growth acceleration across multiple fields. Around the mid-2010s, most categories exhibit a visible increase in growth rates. The simultaneity of this shift across diverse disciplines suggests the presence of a common enabling factor rather than field-specific drivers alone. This supports the interpretation advanced earlier in the paper that infrastructural developments—particularly the availability of user-friendly bibliometric software and standardized analytical workflows—played a decisive role in facilitating diffusion.

The logarithmic representation reveals a transition from early volatility to later convergence across fields. The pronounced fluctuations in the early period reflect low absolute counts, whereas the more parallel trajectories observed after the mid-2010s indicate increasingly similar growth rates across disciplines (Fig. 7).

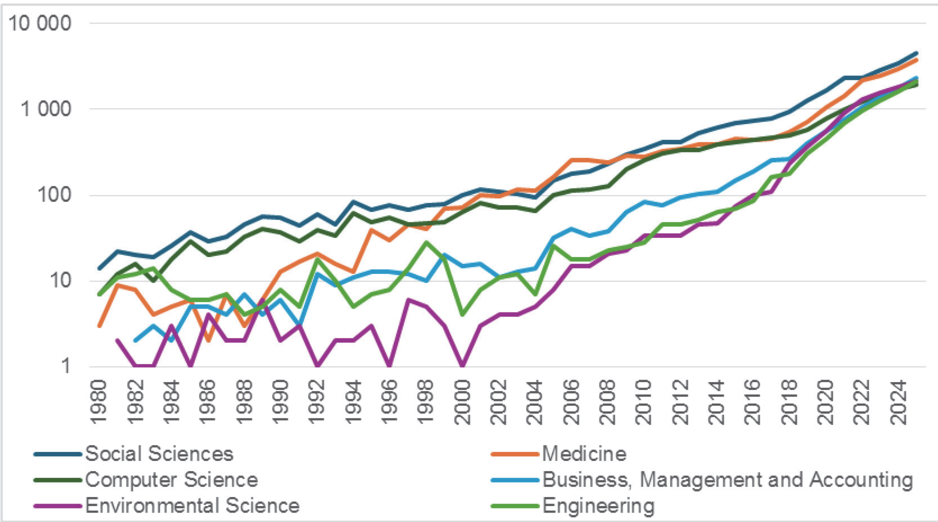

Fig. 7. Growth of the bibliometric method use in the largest subject categories, logarithmic scale, 1980–2025. Source: own study, based on Scopus data

Taken together, the field-level patterns suggest that bibliometric analysis has undergone a transition from disciplinary concentration to cross-disciplinary normalization. Early adoption was strongest in fields closely related to information processing and methodological reflection, while later diffusion has been characterized by rapid expansion into applied and interdisciplinary domains. As a result, bibliometric methods are no longer confined to their original disciplinary contexts but are increasingly embedded across a wide range of scientific fields. This redistribution is analytically significant because it indicates that the diffusion of bibliometric methods is not merely a matter of increasing frequency, but also a transformation in their role within the scientific system. The method appears to be moving toward a more generalized and routine position within research practice, consistent with the broader pattern of mass methodological diffusion identified in the aggregate analysis. This pattern indicates that bibliometric analysis has transitioned from domain-specific adoption to system-wide methodological normalization, reinforcing the interpretation of bibliometrics as a general-purpose research instrument rather than a field-specific technique.

5. Discussion

Bibliometric analysis has undergone a genuine process of methodological diffusion within the global scientific publishing environment. As shown in Section 4.2, bibliometric studies have grown substantially faster than overall scientific output. Between 1980 and 2025, total scientific output in Scopus increased by about a factor of six, while bibliometric studies increased by more than a factor of 500. In terms of relative prevalence, bibliometric research expanded roughly eightyfold. That is a transformation in the place of the method within science, not simply a by-product of larger publication volumes.

Bibliometric analysis has been growing throughout various fields. This is also in line with diffusion theory, which holds that communication among system members facilitates the spread of innovation (Grubler, 2016). The spread occurs through various channels and disciplines, which is one of the major postulates of diffusion theory (McMaster et al., 1997). As suggested by this theory, the spread of bibliometric analysis spans multiple disciplines, such as management, medicine, computer science, and business, to name a few (Ellegaard & Wallin, 2015).

This diffusion trajectory is best understood through a layered historical lens. The early period of bibliometrics was one of methodological invention: statistical bibliography, bibliometric laws, citation indexing, and network concepts were all established before widespread diffusion occurred (Garfield, 1955; Lotka, 1926; Price, 1963; Pritchard, 1969). The subsequent period was one of specialist adoption, in which scientometrics developed as an identifiable research community with its own conceptual vocabulary and analytical techniques (Mingers & Leydesdorff, 2015; Moed, 2005). Only later, as digital infrastructures expanded and bibliometric software became available, did the method move beyond specialist boundaries and become widely portable across disciplines.

The empirical diffusion curve closely mirrors this historical evolution. The low-share regime of 1980–2000 corresponds to the period in which bibliometrics remained concentrated in scientometrics, information science, and a relatively small set of research-evaluation contexts. The moderate-growth period of 2000–2015 aligns with the expansion of online citation databases and the broader digitization of scholarly infrastructures. The sharp acceleration after 2016–2018 corresponds to what may plausibly be termed software-enabled methodological levelling. Tools such as VOSviewer, CiteSpace, and bibliometrix lowered the practical barriers to entry so substantially that bibliometric analysis became available to researchers with limited formal training in scientometrics (Cobo et al., 2011; Van Eck & Waltman, 2014).

The software effect appears to be the most important single structural shift in the series. The uptake of bibliometric analysis does not seem to follow a smooth, uninterrupted curve but rather a punctuated one, in which new infrastructural conditions trigger further diffusion. In that sense, bibliometrics may resemble technology as much as methodology. Once the cost of implementing the method falls, adoption accelerates. However, such analyses need careful attention in database selection, transparency, and retrieval protocols (Kwiek et al., 2024).

The slope observed after 2022 may suggest the beginning of another transition, although the available evidence remains preliminary. One plausible explanation is the growing integration of artificial intelligence (AI) into research workflows, particularly in literature analysis and evidence synthesis. This interpretation is consistent with broader observations that generative AI tools are spreading into knowledge-related practices faster than robust evidence about their consequences is being produced. Kleiber makes a similar point in the context of education, noting that generative AI tools are moving into schools very rapidly, while solid research on the consequences of this trend develops much more slowly (Kleiber, 2026a). Recent studies indicate that large language models and AI-assisted tools can support tasks such as abstract screening, data extraction, text summarization, and even elements of systematic review production (Gartlehner et al., 2024; Khraisha et al., 2024; Ribeiro Junior et al., 2026).

From the perspective of methodological diffusion, this development may represent a further reduction in the practical and cognitive costs associated with conducting bibliometric studies. Just as dedicated software tools in the mid-2010s lowered technical barriers and enabled broader adoption, AI-based tools may now reduce the effort required for data processing, interpretation, and reporting. In this sense, AI does not introduce an entirely new methodological paradigm, but rather acts as an accelerant of existing workflows, potentially intensifying the ongoing diffusion of bibliometric analysis.

At the same time, this development raises important methodological and epistemic questions. These concerns also align with broader discussions on AI ethics, where transparency, responsibility, privacy, and human oversight are treated as central conditions for socially beneficial AI deployment (Kleiber, 2026b). Some studies suggest that AI-assisted processes may introduce risks related to reproducibility, transparency, and the reliability of synthesized evidence (e.g., Khraisha et al., 2024; Ribeiro Junior et al., 2026). Thus, while AI may facilitate further expansion of bibliometric research, it may also amplify concerns already present in the field, including standardization, redundancy, and the quality of analytical outputs.

At present, however, the time series remains too short to attribute a distinct structural phase to AI with confidence. The recent acceleration may still reflect the momentum of the software-driven expansion that began in the previous decade. Nevertheless, AI-assisted research practices are likely to become an increasingly important factor shaping the future trajectory of bibliometric diffusion.

The exploratory model fits likewise point to an important but carefully delimited conclusion. Both the logistic and Gompertz curves imply that bibliometric share may cross 0.5% in the near future and could reach 1.0% within roughly one to two decades, depending on the shape of later-stage diffusion. Yet these estimates should not be interpreted as forecasts of inevitable saturation. The series has not yet entered a clear plateau, and any inferred ceiling remains highly sensitive to the fitted model. The value of the modeling exercise lies less in precise long-term prediction than in demonstrating that bibliometric diffusion has reached a stage at which threshold analysis becomes meaningful. So far, these calculations can be taken more as a heuristic and possibilities, as shown in Fig. 8.

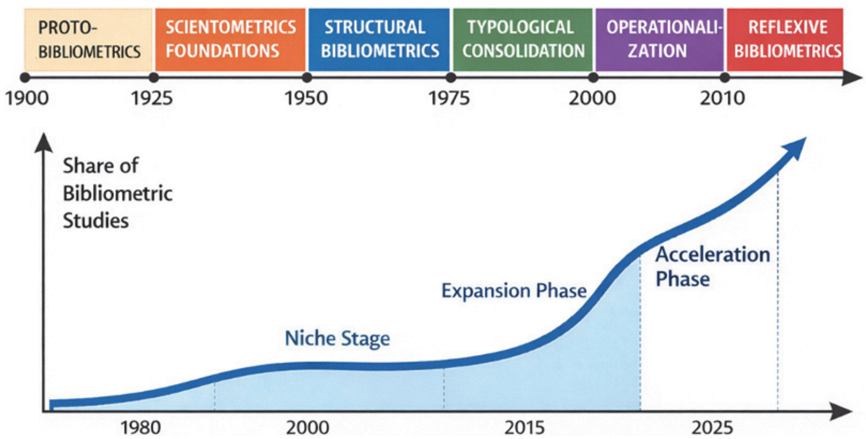

Fig. 8. Heuristic timeline integrating the historical evolution of bibliometric methodology with the empirical diffusion of bibliometric studies

Note: The upper timeline summarizes major methodological phases identified in the literature, while the lower curve represents the observed growth in the share of bibliometric studies. The figure is intended as a conceptual visualization rather than a precise chronological mapping.

This leads directly to the question of saturation. In strict diffusion theory, saturation implies that growth decelerates because a method has reached the practical limit of its adoption. The current data do not yet show that pattern. On the contrary, the share series remains steeply upward-sloping. Still, the idea of saturation remains analytically useful if it is treated as potential rather than actual. A method may approach functional saturation not only when its share stops growing, but also when its marginal contribution declines, i.e., when increasing numbers of studies repeatedly analyze the same or very similar topics. The present study could not measure topic redundancy directly, but the conceptual framework developed here suggests that future work should compare the growth of bibliometric studies with the growth of new topics, clusters, or keywords in science.

The broader implication is that bibliometrics has become part of the internal reflexivity of science. Scientific communities are no longer only producing knowledge; they are increasingly producing quantitative analyses of the production of knowledge itself. This point can also be read through Fleck's account of scientific knowledge as a collective process. Sady emphasizes that, in Fleck's view, scientific facts and ways of thinking change together: "new facts can be discovered only through new thinking" (Sady, 2026). From this perspective, the diffusion of bibliometric analysis is not simply a growth in the number of studies, but part of a broader change in how scientific communities observe, classify, and make sense of their own activity. In this sense, the rapid growth of bibliometric studies is part of a wider movement toward meta-scientific self-observation. That movement has obvious benefits: improved synthesis, greater visibility of knowledge structures, and more systematic evaluation. At the same time, it also carries risks, including methodological standardization without sufficient critical reflection, increasing redundancy, and the reification of indicators into ends in themselves (Hicks et al., 2015; Wilsdon et al., 2015).

The study also contributes conceptually by suggesting that bibliometrics can serve as a case study in the diffusion of scientific methods more generally. Its trajectory can be summarized as a sequence of invention, specialist adoption, infrastructural expansion, methodological levelling, and mass diffusion. Such a framework may be useful beyond bibliometrics, especially for the study of how computational and synthesis-oriented methods spread across scientific systems. Bibliometrics thus represents not only a method for studying the evolution of science, but also an instructive case of how scientific methods themselves emerge, spread, and potentially saturate.

6. Limitations and conclusion

Several limitations should be noted. First, the retrieval of bibliometric studies depends on keyword-based queries and therefore cannot be assumed to identify every relevant publication with perfect precision and recall. Second, database coverage changes over time, especially in relation to language, discipline, and source type. Although the similarity between Scopus and Web of Science trajectories increases confidence in the findings, the series still reflects database-specific indexing decisions. Third, the diffusion models are exploratory. Because the observed curve has not clearly plateaued, fitted saturation levels should be treated as scenario tools rather than definitive forecasts.

Within these limits, the study nevertheless makes three contributions. Empirically, it provides a long-run estimate of bibliometric studies as a share of global scientific output. Historically, it connects the diffusion curve to the conceptual and infrastructural evolution of bibliometric methodology. Theoretically, it proposes that bibliometrics can be interpreted as a scientific method that has undergone diffusion through the scientific system, which can help to provide empirical evidence from the historical evolution and diffusion (Kwiek, 2021).

Bibliometric studies increased from 30 papers in 1980 to 15,082 in 2025 in Scopus, while their share rose from 0.005% to 0.422%. Their intensity rose from 5.2 to 421.6 studies per 100,000 papers. Growth rates of bibliometric research substantially exceeded the overall expansion of scientific output, and the strongest structural acceleration occurred in the mid-2010s, consistent with the software-enabled levelling of bibliometric workflows. The current series suggests continued expansion rather than present saturation but also indicates that bibliometric analysis has entered a phase of mass methodological diffusion and may reach more deeply embedded levels of prevalence in the coming decade.

Bibliometrics, in short, has moved from a niche scientometric technique to an increasingly routine instrument of scientific self-analysis. Understanding that transformation is important not only for bibliometrics itself, but for the broader study of how research methods evolve, spread, and reshape scientific practice.

Appendix A

Search strategy summary

Scopus numerator query: TITLE-ABS-KEY (bibliometric* OR scientometric* OR informetric* OR “science mapping” OR “bibliometric analysis” OR “bibliometric review” OR “citation analysis” OR “co-citation” OR “co-citation analysis” OR “bibliographic coupling" OR "co-word analysis" OR "keyword co-occurrence" OR vosviewer OR citespace OR bibliometrix OR histcite OR scimat) AND DOCTYPE (ar OR re) AND PUBYEAR > 1979 AND NOT ("sports metrics" OR "financial metrics" OR "web analytics")

Scopus denominator query: DOCTYPE(ar OR re) AND PUBYEAR > 1979.
Web of Science numerator query: topic search using equivalent bibliometric and scientometric terms for articles and reviews across the 1980–2025 period. Web of Science denominator query: all indexed articles and reviews for the same period.

Appendix B

Studies mentioning bibliometric tools by field

Subject area	Count
Social Sciences	27,446
Medicine	21,150
Computer Science	14,225
Business, Management and Accounting	10,467
Environmental Science	10,065
Engineering	9,039
Agricultural and Biological Sciences	5,205
Energy	4,455
Biochemistry, Genetics and Molecular Biology	4,306

Source: Scopus

References

Blümel C.; Schniedermann, A. (2020). Studying review articles in scientometrics and beyond: a research agenda. *Scientometrics*, 124, 711–728. https://doi.org/10.1007/s11192-020-03431-7

Bradford S.C. (1934). Sources of information on specific subjects. *Engineering*, 137, 85–86.

Callon M.; Courtial J.-P.; Laville F. (1991). Co-word analysis as a tool for describing the network of interactions between basic and technological research: The case of polymer chemistry. *Scientometrics*, 22(1), 155–205. https://doi.org/10.1007/BF02019280

Cobo M.J.; López-Herrera A.G.; Herrera-Viedma E.; Herrera F. (2011). Science mapping software tools: Review, analysis, and cooperative study among tools. *Journal of the American Society for Information Science and Technology*, 62(7), 1382–1402. https://doi.org/10.1002/asi.21525

Cole F.J.; Eales N.B. (1917). The history of comparative anatomy. Part I. A statistical analysis of the literature. *Science Progress*, 11, 578–596.

Donthu N.; Kumar, S.; Mukherjee D.; Pandey N.; Lim W.M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

Ellegaard O.; Wallin J.A. (2015). The bibliometric analysis of scholarly production: How great is the impact? *Scientometrics*, 105(3), 1809–1831. https://doi.org/10.1007/s11192-015-1645-z

Fassin Y. (2024). Research on bibliometrics and the World's leading universities. *Scientometrics*, 129, 6693–6718. https://doi.org/10.1007/s11192-024-05141-w

Furner J. (2003). Little book, big book: Before and after Little Science, Big Science. Part I. *Journal of Librarianship and Information Science*, 35(2), 115–125. https://doi.org/10.1177/0961000603352006

Garfield E. (1955). Citation indexes for science. *Science*, 122(3159), 108–111.

Garfield E. (1979). *Citation indexing–Its theory and application in science, technology, and humanities*; John Wiley & Sons: New York, NY, USA.

Gartlehner G.; Kahwati L.; Hilscher R., et al. (2024). Data extraction for evidence synthesis using a large language model: A proof-of-concept study. *Research Synthesis Methods*, 15(4), 576-589. https://doi.org/10.1002/jrsm.1710

Grubler A. (2016). Introduction to diffusion theory. Computer Integrated Manufacturing, Springer: Cham, Switzerland, Volume 3. Models, Case Studies and Forecasts of Diffusion, 3–52.

Hicks D.; Wouters P.; Waltman L.; de Rijcke S.; Rafols I. (2015). Bibliometrics: The Leiden Manifesto for research metrics. *Nature*, 520, 429–431. https://doi.org/10.1038/520429a

Hood W.W.; Wilson C.S. (2001). The literature of bibliometrics, scientometrics, and informetrics. *Scientometrics*, 52(2), 291–314. https://doi.org/10.1023/A:1017919924342

Hulme E.W. (1923). *Statistical bibliography in relation to the growth of modern civilization*; Butler & Tanner: London, United Kingdom.

Kessler M.M. (1963). Bibliographic coupling between scientific papers. *American Documentation*, 14(1), 10–25.

Khraisha Q.; Put S.; Kappenberg J.; Warraitch A.; Hadfield K. (2024). Can large language models replace humans in systematic reviews? Evaluating GPT-4's efficacy in screening and extracting data from peer-reviewed and grey literature in multiple languages. *Research Synthesis Methods*,15(4), 616-626. https://doi.org/10.1002/jrsm.1715

Kleiber M. (2026a). AI w edukacji – zagrożenia i korzyści. *Nauka,* 1, 115–120. https://doi.org/10.24425/nauka.2026.158248

Kleiber M. (2026b). Etyka w sztucznej inteligencji – działania UNESCO. *Nauka,* 1, 109–114. https://doi.org/10.24425/nauka.2026.158247

Kwiek M. (2021). What large-scale publication and citation data tell us about international research collaboration in Europe: Changing national patterns in global contexts. *Studies in Higher Education*, 46(12), 2629–2649.

Kwiek M., Horta H., Powell J.J. (2024). Using large-scale bibliometric data in higher education research: Methodological implications from three studies. *Higher Education Quarterly*, 78(4), e12512

Leydesdorff L.; Wouters P.; Bornmann L. (2016). Professional and citizen bibliometrics: Complementarities and ambivalences in the development and use of indicators – a state-of-the-art report. *Scientometrics*, 109(3), 2129–2150. https://doi.org/10.1007/s11192-016-2150-8

Lotka A.J. (1926). The frequency distribution of scientific productivity. *Journal of the Washington Academy of Sciences*, 16(12), 317–323.

Marshakova I.V. (1973). Sistema svyazey mezhdu dokumentami, postroyennaya na osnove ssylok [System of Document Connections Based on References]. *Nauchno-Tekhnicheskaya Informatsiya, Seriya*, 2(6), 3–8.

McMaster T.; Vidgen R.T.; Wastell D.G. (1997). Technology transfer: diffusion or translation? In: *Facilitating technology transfer through partnership: learning from practice and research*; Springer US: Boston, MA, USA; pp. 64–75.

Mingers J.; Leydesdorff L. (2015). A review of theory and practice in scientometrics. *European Journal of Operational Research*, 246(1), 1–19. https://doi.org/10.1016/j.ejor.2015.04.002

Moed H.F. (2005). *Citation analysis in research evaluation*. Springer.

Ng J.Y.; Liu H.; Masood M.; Syed N.; Stephen D.; Ayala A.P.; Sabé M.; Solmi M.; Waltman L.; Haustein, S.; Moher, D. (2025). Guidance for the Reporting of Bibliometric Analyses: A Scoping Review. *Quantitative Science Studies*, 6, 988–1001. https://doi.org/10.1162/QSS.a.12

Noyons E.C.M.; Moed H.F.; van Raan A.F.J. (1999). Integrating research performance analysis and science mapping. *Scientometrics*, 46(3), 591–604. https://doi.org/10.1007/BF02459614

Price D.J. de S. (1963). *Little Science, Big Science*; Columbia University Press: New York, USA.

Pritchard, A. (1969). Statistical bibliography or bibliometrics? *Journal of Documentation*, 25(4), 348–349.

Ribeiro Junior H.L.; Nepomuceno F.W.A.B; do Ó Pessoa C.; da A. Gonçalves M.A. (2026). Systematic Reviews in the Age of AI: Are We Sacrificing Rigor for Volume? *Cochrane Evidence Synthesis and Methods*, 4, e70080. https://doi.org/10.1002/cesm.70080

Sady W. (2026). Inspiracja bez przypisów: Fleckowskie źródła filozofii nauki Kuhna. *Nauka,* 1, 7–20. https://doi.org/10.24425/nauka.2026.158242

Sánchez Castillo V.; Pérez Gamboa A.J.; Gómez Cano C.A. (2024). Trends and Evolution of Scientometric and Bibliometric Research in the Scopus Database. *Bibliotecas. Anales de Investigación*, 20(1), 1–22.

Sengupta I.N. (1992). Bibliometrics, informetrics, scientometrics and librametrics: An overview. *Libri*, 42(2), 75–98.

Small H. (1973). Co-citation in the scientific literature: A new measure of the relationship between two documents. *Journal of the American Society for Information Science*, 24(4), 265–269. https://doi.org/10.1002/asi.4630240406

Tattershall E., Nenadic G., Stevens R.D. (2021). Modelling trend life cycles in scientific research using the Logistic and Gompertz equations. Scientometrics, 126(11), 9113–9132.

Van Eck N.J.; Waltman L. (2014). Visualizing bibliometric networks. In *Measuring scholarly impact*, Ding Y., Rousseau R., Wolfram D., Eds.; Springer: Cham, Switzerland; pp. 285–320.

Van Leeuwen T.N. (2004). Descriptive versus evaluative bibliometrics. In *Handbook of quantitative science and technology research*, Moed H.F., Glänzel, W., Schmoch, U., Eds.; Springer: Dordrecht, the Netherlands; pp. 373–388.

Van Raan A.F.J. (2005). Measurement of central aspects of scientific research: Performance, interdisciplinarity, structure. *Measurement: Interdisciplinary Research and Perspectives*, 3(1), 1–19. https://doi.org/10.1207/s15366359mea0301_1

Waltman L.; Van Eck N.J. (2012). A new methodology for constructing a publication-level classification system of science. *Journal of the American Society for Information Science and Technology*, 63(12), 2378–2392. https://doi.org/10.1002/asi.22748

White H.D.; Griffith B.C. (1981). Author cocitation: A literature measure of intellectual structure. *Journal of the American Society for Information Science*, 32(3), 163–171. https://doi.org/10.1002/asi.4630320302

Wilsdon J.; Allen L.; Belfiore E.; Campbell P.; Curry S.; Hill S.; Jones R.; Kain R.; Kerridge S.; Thelwall M.; Tinkler J.; Viney I.; Wouters P.; Hill J.; Johnson B. (2015). *The Metric Tide:*

Report of the Independent Review of the Role of Metrics in Research Assessment and Management; Higher Education Funding Council for England.
Zipf G.K. (1949). *Human behavior and the principle of least effort*; Addison-Wesley: Cambridge, USA.

Diffusion of bibliometrics in global scientific publishing

Bibliometric analysis has evolved from a specialized scientometric technique into a widely used methodological approach across disciplines. The goal of this article was to investigate the diffusion of bibliometric analysis within the broader scientific system. Drawing on diffusion theory – widely applied in the social sciences, as e.g. economics – this study investigates its historical development, as well as empirical spread of bibliometric research between 1980 and 2025. Using publication data from Scopus and Web of Science, the annual share of studies using bibliometric techniques relative to total scientific output is estimated and interpreted as a methodological diffusion process. The results show that such studies in Scopus increased from 30 in 1980 to 15,082 in 2025, while their share rose from 0.005% to 0.422%. Over the same period, total scientific output grew approximately sixfold, whereas the spread of bibliometric methods expanded more than 500-fold. Both databases display closely aligned proportional trajectories. The time series indicates three main transition phases associated with digital databases, large indexing platforms, and software-enabled workflows. Exploratory logistic and Gompertz models suggest further growth but do not yet indicate clear saturation. The findings show that bibliometric analysis has entered a stage of mass methodological diffusion, highlighting its increasing role as a general research instrument and raising questions about methodological proliferation within science.

Key words: scientometrics, bibliometric analysis, method diffusion, diffusion theory, logistic model, Gompertz model

Dyfuzja bibliometrii w światowym piśmiennictwie naukowym

Analiza bibliometryczna ewoluowała od wyspecjalizowanej techniki scientometrycznej do szeroko stosowanych metod w różnych dyscyplinach. Celem niniejszego artykułu było zbadanie dyfuzji analizy bibliometrycznej w szerszym systemie naukowym. Opierając się na teorii dyfuzji – szeroko stosowanej w naukach społecznych, takich jak np. ekonomia – niniejsze badanie analizuje jej historyczny rozwój, a także rozpowszechnienie badań bibliometrycznych w latach 1980–2025. Na podstawie danych o publikacjach z baz Scopus i Web of Science oszacowano roczny udział badań wykorzystujących techniki bibliometryczne w stosunku do całkowitego dorobku naukowego i zinterpretowano go jako proces dyfuzji metodologicznej. Wyniki pokazują, że liczba takich badań w bazie Scopus wzrosła z 30 w 1980 r. do 15 082 w 2025 r., a ich udział wzrósł z 0,005% do 0,422%. W tym samym okresie całkowity dorobek naukowy wzrósł około sześciokrotnie, podczas gdy rozpowszechnienie metod bibliometrycznych zwiększyło się ponad 500-krotnie. Obie bazy danych wykazują ściśle powiązane proporcjonalne trajektorie.

Szereg czasowy wskazuje na trzy główne fazy przejściowe związane z cyfrowymi bazami danych, dużymi platformami indeksującymi oraz przepływami pracy opartymi na oprogramowaniu. Modele logistyczne i Gompertza sugerują dalszy wzrost, ale nie wskazują jeszcze na wyraźne nasycenie. Wyniki pokazują, że analiza bibliometryczna weszła w fazę masowej dyfuzji metodologicznej, podkreślając jej rosnącą rolę jako ogólnego narzędzia badawczego i stawiając pytania o proliferację metodologiczną w nauce.

Słowa kluczowe: scientometria, analiza bibliometryczna, dyfuzja metod, teoria dyfuzji, model logistyczny, model Gompertza