Advances in Digital Technology and Data-Driven Business Practices

The Data-Driven World of Academic Publications

Citations, Indexing and Impact Factors

Edited by

Tanuj Singh
Shakil Ahmad
Nripendra Singh

The Data-Driven World of Academic Publications

ADVANCES IN DIGITAL TECHNOLOGY AND DATA-DRIVEN BUSINESS PRACTICES

Series Editor: Nripendra Singh, Pennsylvania Western University, USA

Digital technology in marketing is dynamic and continually evolving, providing marketers with innovative tools and strategies to connect with audiences in an increasingly digital-centric world. Adopting and adapting to these technologies is essential for staying competitive and effectively reaching target audiences. Businesses that leverage digital marketing effectively are better positioned to connect with their audience, drive business growth and stay competitive in the digital age. Beyond the technical and ethical, Advances in Digital Technology and Data-driven Business Practices exhibits real-world applications of digital marketing and data-driven practices. Through compelling case studies, it demonstrates its efficacy in areas such as market research, competitor scrutiny and gleaning customer insights, traversing various channels, encompassing the likes of social media, e-commerce and email marketing.

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The Data-Driven World of Academic Publications: Citations, Indexing and Impact Factors

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INVESTOR IN PEOPLE

This work is humbly dedicated to God Almighty, *the source of all wisdom, strength, and inspiration, whose grace has guided us through every stage of this journey*.

To our family – *the family members of Dr Tanuj Singh, Dr Shakil Ahmad, and Dr Nripendra Singh (Editors) – whose unconditional love, sacrifices, and belief in the power of education laid the foundation for our achievements. Your legacy is woven in every page of this book*.

Finally, to our esteemed collaborators and authors, *whose collective expertise and dedication to the advancement of scholarly knowledge made this volume possible. This book is as much yours as it is ours*.

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Foreword

In the modern academic landscape, the adage 'publish or perish' has evolved into a far more complex reality. Today, a researcher's work is not only judged by its content but also by the digital footprint it leaves behind the citations it obtains, the databases that index it, and the impact factors and CiteScore of the journals that host it. As these metrics shape funding, tenure, and research directions, the need to clearly and critically understand this data-driven world is more urgent than ever.

This book, *The Data-Driven World of Academic Publications: Citations, Indexing and Impact Factors*, was born from a desire to demystify the mechanisms that underpin scholarly communication. Our goal is to move beyond the surface-level numbers and explore the heart of citation analysis as a form of academic conversation. We delve into the role of indexing services as the gatekeepers of visibility and critically examine the ubiquitous impact factor, weighing its utility against the controversies it stirs. Furthermore, we embrace the paradigm shift towards altmetrics, acknowledging the social and digital dimensions of research dissemination that traditional metrics often overlook. Through a comprehensive overview of bibliometric and scientometric methods, this volume provides the tools necessary for researchers, librarians, and administrators to navigate this environment with confidence.

This volume is the result of collective expertise, bringing together diverse perspectives to map the shifting sands of scholarly communication. It is our hope that these chapters do more than just define metrics. We hope they empower you to navigate your career and contributions with greater clarity. Whether you are an early-career researcher or a seasoned administrator, may this book serve as a reliable compass in the increasingly data-driven world.

Shakil Ahmad
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Chapter 1

The Quantifiable Craze: Informetrics as a New Research Methodology (Editorial)

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The set of informetric tools, such as scientometrics, bibliometrics, and webometrics, has completely and entirely shifted research methodology as a whole. This shift has changed research methodology from being a specialized sub-discipline of library and information science into a widely popular research methodology across every academic field. This shift isn't just popular, but it is gaining traction quickly. Publications are now using informetric tools as the method of research.

Data from published studies show a significant growth in articles centered around bibliometric or scientometric analysis. These studies also show the increasing annual output scores from the early 2000s to the early 2020s, showing an increase of thousands per year (Cheng et al., 2024; Liu & He, 2023). When analyzing this growth, it can be seen that the productivity is flexible in the way that informetrics is becoming a new research methodology with advancements in both pure sciences, for example, medicine and oncology, and social sciences, for example, economics and social policy (Carradore, 2024; Liu & He, 2023). The main goal in this process is to quickly design the area of study, identify the latest developments in the line of study, and secure publication (Carradore, 2024; Liu & He, 2023). This circumstance shows two sides to the story, showing the "Good" and the "Not-So-Good."

The Good: The increasing development and usage of informetrics is incredibly helpful in the way that it provides an objective, data-driven perspective in managing and synthesizing the magnitude of global research volume. Tools, such as VOSviewer and Bibliometrix, have been developed to help researchers quickly analyze thousands of papers while replacing subjective literature reviews with visual maps of networks, intellectual structures, and research hotspots (Litmaps, 2024). These tools can provide huge support to researchers to do substantial work, such as effectively identifying gaps, finding collaborators, and making decisions

The Data-Driven World of Academic Publications: Citations, Indexing and Impact Factors, 1–4
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on funding and policy, which can benefit the fast-emerging fields of study that are constantly evolving (Hoang, 2025).

The Not So Good: While there are various positives to informetrics and their future, intense transformation and evolution of such tools can also have some risks and issues. Trying to take the "easy way out" while publishing can lead to cutting corners with methodology as well as swayed or biased analyses. Many articles are centered around descriptive statistics, such as counting authors, countries, or publications, without providing a truly meaningful insight of the results. This can lead to the methodology becoming a formulaic exercise rather than an academic examination (Hoang, 2025), showing how easily bias can emerge. This can be seen in an influx of English-language journals or specific databases, such as Web of Science/Scopus. This can sway the actual number of global research outputs, especially in the fields of social sciences as well as humanities where books and local publications can and often do hold greater value (Science-Metrix, 2004). The quality of the publication is solely measured by the interpretation of the metrics, not on the creation level of the network maps created from the metrics.

The editors of this book formulated a small trial run to show the use of informetrics as a methodology in Scopus-indexed publications. A large-scale bibliometric query using all informetrics terms retrieved a whopping 76,933 documents. The following is a summary of key findings from the data retrieved:

- The data on open access (OA) patterns show that nearly half of the indexed scholarly output falls under the "All Open Access" umbrella. The documents under this umbrella total up to 37,203 papers. This demonstrates that the process of making knowledge and publications accessible to everyone is now incredibly popular among researchers and publishers alike. The landscape can be seen as almost overrun by gold OA, as it can be seen to have 28,397 documents. This is showing that accessible, open-peer journals have become incredibly important for sharing. However, hybrid gold models as well as bronze publishers' hosted content, 4,471 and 2,141 documents, respectively, showed shifting strategies. Green OA (18,083 records) plays a vital role, especially in the usage regarding storage, in satisfying global mandates. Green OA also ensures long-lasting as well as accessible files. With all of this information in mind, it can be understood just how important transparency alongside accessibility is, especially in the world of research and documentation.
- The data breakdown in terms of subject area shows that important and current theories and research areas can wind up showing varied results. Areas like social science (25,090), computer science (18,614), medicine (16.664), engineering (10,960), and business management and accounting (10,813) show an extreme number of research conducted using this methodology.
- The data from evaluating affiliation, funding, and geographic topics show the definition of networking, especially networking involving researchers. Common and frequent patterns show the importance of large universities that focus on open and accessible research. Similarly, strong and large research organizations that span across the world are incredibly vital. The funding landscape seen from studying these organizations and institutions paints the picture perfectly on the

major impact of national science foundations as well as major international programs. Some examples of these programs are the National Natural Science Foundation of China (5,753), Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (1,149), Conselho Nacional de Desenvolvimento Cientifico e Tecnológico (1,083), National Key Research and Development Program of China (1,032), and European Commission (896). All of these foundations and programs often showcase mission-oriented, transdisciplinary projects. This significant growth seen in specific Asian countries and European Union nations demonstrates a great change toward a more geographically diverse and scientifically globalized world.

- While analyzing the mechanics of knowledge circulation, it can be seen that the traditional scholarly article remains the bedrock (articles: 45,648). On the other hand, there are incredible uses of informetrics methodology in review papers (17,418) and conference papers (8,033).
- The significance of speed is also noticeable in the publication stage data. In the publication stage data, there is a share of research marked as "in-press," showing the rapid publisher workflows and the shift toward early-release models, such as "Online First."
- The dataset also showed the important source titles that included *Scientometrics*, *Sustainability*, *Library Philosophy and Practice*, and *Heliyon* journals.

For this editorial, we have provided a short analysis of the trend. We intentionally did not dive deeper into the specific analysis and discussion on the methodical and interpretation patterns of the retrieved articles. Though it could be an interesting area of research for beginner researchers.

The "way forward" for this trend: We propose that the use of informetrics as a publication tool requires a balanced strategy from both researchers and journal editors as well as academic institutions. In this way, fields of study are able to stay preserved while also keeping the satisfaction value in mind. In our opinion, the best approach is to be sure to not limit the trend but instead focus heavily on elevating methodical change and critical analysis and opinions. Researchers and editors can create stricter policies and standards to follow, which will advance the use of tools for in-depth analysis to further enhance the quality of academic and research work.

- *Setting up benchmarks for methodology:* It is important to understand the importance of benchmarking and setting up high standards for methodology and providing guidelines to the editors and peer reviewers so that they should check submissions for comprehensive discussion more than just tables and descriptive maps. For example, simply counting the authors, years, countries, and similar variables and looking at a large summary of data in a tabular form and colorful mapping may be assessed as having deeper analysis, even in the absence of thoughtful insights on what those tables and maps really convey, if anything substantial. Guidelines to reviewers and their training on properly reviewing the manuscripts are critical to include what and how the manuscripts should be assessed critically to provide constructive feedback to

the authors. Well-thought-out frameworks should be developed to analyze the form of data, whether visual, written, or tabular, and its assessment as per specific standards. Publishers should establish clear, publicly available "Minimum Reporting Standards for Bibliometric Studies," similar to what has been advocated by Hoang (2025) in his study on "Evaluating Bibliometrics Reviews: A Practical Guide for Peer Review and Critical Reading." These benchmarks on assessment methodology will force authors to remain focused and explain reasoning and thought processes behind the data presented, search strategies, and their analysis using informetric software.

- *Importance of emphasis on critical comparisons:* Many times, it is observed that authors use simply one or two techniques to write a paper for publication. This practice should not be promoted. Authors should be trained and required to use multiple informetric techniques, such as combining citation analysis with co-word analysis, and to intermix the findings with the literature reviews to provide deeper insights, which can have higher theoretical and practical implications of their work. Additionally, researchers should be required to explicitly state the scope, boundaries, and biases in their work to reflect precise and valuable information, such as in the case of global representation, etc. (Science-Metrix, 2004).
- *Training and promotion on informetric tools:* It is highly recommended and encouraged that universities and institutions should provide relevant training programs to promote the correct use of important informetric tools. Training programs can lead to further use of informetric tools to synthesize humongous data in the correct manner while also preventing the use of false or biased strategies for getting an "easy publication."

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Chapter 2

Altmetrics: An Evolving Metric

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Abstract

Altmetrics emerged as a response to the limitations of traditional citation metrics, offering a more sophisticated view of research impact by incorporating data from various online sources. This study is an attempt to investigate the development and current state of altmetrics; evaluate the advantages and limitations of altmetrics; explore the implications of altmetrics for researchers, librarians, and academic institutions; and consider the future trajectory of altmetrics and their role in research evaluation. A comprehensive review of existing literature on altmetrics was employed to assess the effectiveness and reliability of altmetrics in capturing research impact. For mapping of altmetric data, a comprehensive bibliometric study of 2,300 publications on altmetrics retrieved from the Dimensions database was carried out using VOSviewer. The findings reveal that the integration of altmetrics into research evaluation frameworks represents a significant advancement in measuring scholarly impact. While they offer a more immediate and diverse perspective compared to traditional citation metrics, the field is still maturing. The co-authorship analysis reveals a diverse collaboration network in altmetrics research, highlighting key contributors and their citation impacts. Organizations like Harvard and the University of Texas demonstrated strong visibility and engagement, while countries like the United States and the United Kingdom led in research output. The outcomes from the study emphasize the importance of collective research and the contribution of new researchers in broadening the exposure and visibility of scholarly articles. As altmetrics continue to evolve, there is a need for standardized methodologies and improved data quality.

Keywords: Altmetrics; scientometrics; altmetric donut; altmetric attention score; social media; traditional metrics; co-authorship; citation

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Introduction

In the modern academic climate, metrics play a pivotal role, especially in the era of technology proliferation and increasing academic competition. To grant-seeking researchers or career-bound faculty, metrics have become indispensable in showing impact and value. Just as research techniques have evolved alongside technological advancements, the metrics used to measure impact have also evolved. One of the significant developments in this front is altmetrics, a modern approach that harnesses the strengths of social media and online platforms to measure scholarly influence in ways that lie beyond the capacity of traditional metrics. As new channels for scholarly communication emerge, researchers find themselves needing more sophisticated means of tracking this impact. At the same time, institutions and funding agencies need tools that allow them to manage and analyze scholarly output effectively.

Historically, conventional metrics like citation counts and impact factors (IFs) have served this purpose. However, with the advent of social media, researchers can now reach broader audiences and initiate discussions of their research. Altmetrics bring new concepts and new methods of measuring and monitoring the impact of scholarly work in different non-academic communities (Fig. 2.1). The study of altmetrics is witnessing tremendous growth, with the aim of creating new methods of measuring the impact of research on social media. The discipline has witnessed increasing development in recent years, as researchers seek new methods of measuring the reach and impact of scholarly work in online settings (Erdt et al., 2018). Furthermore, in recognition of the increasing significance of social media-based metrics in conjunction with conventional bibliometric indicators for the assessment of scientific outputs, research has documented moderate correlations between altmetric attention scores (AASs) and citation counts and weak correlations encompassing journal IF, CiteScore, and citation counts.

The findings of these researches have implications that highlight the significant role played by social media-based indicators in the visibility and impact of scientific articles and thus emphasize the utility of such indicators as useful complementary measures to traditional citation indicators in evaluating research impact (Ahmadian et al., 2024). Thiagarajan et al. (2024) analyzed, in their study, the characteristics of research articles that gain much attention using alternative metrics such as social media tweets, newspaper cites, and altmetric scores. The findings

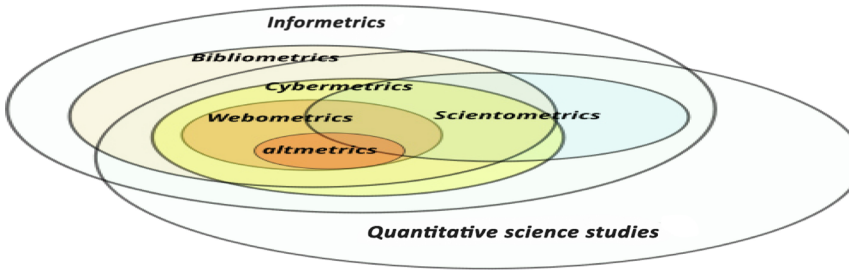


Fig. 2.1. Relationship Between Different Metrics (Doria, 2022).

on altmetrics in this study highlight certain striking features of the nature of research articles that gain much attention on alternative metric-focused platforms like the utility of alternative metrics, such as those provided by the Altmetric.com company and others, in measuring the broader impact and community outreach of scholarly research beyond what might be available through traditional citation metrics. Even though altmetrics have no universally accepted definition, at its core, it relies on tapping into the use of online and social media like tweets, Facebook likes and comments, blog posts, and bookmarking in order to measure the extent of reach and awareness of research products and their likely impact or influence. Priem (2014) characterizes altmetrics as the examination and utilization of measures of scholarly impact derived from online platforms and environments. In doing so, he highlights that altmetrics encompasses both the field of research and the metrics themselves. Shema et al. (2014) offer a similar characterization of altmetrics as "web-based metrics for the impact of scholarly material, with an emphasis on social media outlets as sources of data." Both these explanations suggest that if, for instance, a specific scientific article garners frequent mentions on X (formerly Twitter), receives numerous "likes" on Facebook, and is bookmarked by many users on Mendeley, one might infer that the article holds greater value, has a more significant impact, or, at the very least, attracts more attention than articles with lower visibility on social media. The Danish physicist Niels Bohr famously remarked that "prediction is very difficult, especially if it is about the future." Despite reservations about its accuracy, the term altmetrics has become established in scholarly discourse, reflecting a shift toward alternative perspectives on metrics.

Established Metrics and Outside Their Boundaries: A Journey

To understand the current status of altmetrics within scientometrics, it's vital to trace the origins of these ideas and explore future opportunities and challenges. With the rise of the internet, the informetric community recognized the web as a significant source of information. By then, bibliometrics and scientometrics had already formed a cohesive research field, supported by influential journals like the *Journal of the Association for Information Science and Technology* and *Scientometrics* (Kleinberg, 1999). The internet became integral to daily life, with academia embracing web technologies for communication, data transfer, and information sharing. Around 15 years after the web's inception, Web 2.0 emerged, enhancing user interaction and allowing content creation. This shift transformed how individuals, including academics, publish and connect online. The ease of creating web content from videos to blogs has opened numerous opportunities for the library and information science profession (Boxen, 2008). Blogs have become valuable for disseminating library news (Blair & Cranston, 2006), while video content has enhanced library services (Kroski, 2007). Additionally, platforms like Pageflakes and Netvibes have helped create customized library portals (Tattersall et al., 2011). However, the concept of Library 2.0 faced uneven acceptance due to organizational resistance and information technology challenges (Tattersall, 2011). This journey from traditional metrics to altmetrics represents a significant evolution in how we assess scholarly impact and research relevance. Initially grounded in

quantitative measures like citation counts and journal IFs, the landscape has transformed with the rise of digital platforms and social media. Altmetrics now provide a more holistic picture, including the different ways that research influences society beyond traditional scholarly circles. Over the past decade, open science and open access have been at the center of attention, with "altmetrics" emerging as a key evaluative tool. Altmetrics quantify the non-academic effects arising from social media and online behavior, thereby highlighting the social implications of academic scholarship (Priem & Hemminger, 2010). The development of Scientometrics 2.0 tries to quantify a wider array of research effects, such as "open science" and "social media metrics" as central elements. It also proposed a variety of sources for potential inclusion, such as bookmarking sites, recommendation systems, and social networking sites.

Mapping of Altmetrics as a Growing Field

A comprehensive bibliometric analysis was undertaken using data gathered from Dimensions.ai in Comma-Separated Values (CSV) format, based on 2,300 publications in the field of altmetrics (Dimensions, 2024). The analysis was performed on the basis of co-authorship and citation measures to demonstrate collaboration patterns and the impact of different authors in the subject. VOSviewer (Van Eck & Waltman, 2011) was employed to generate network and density visualizations of the author relationship and interconnectedness of their publications. The visualizations indicated the leading research clusters, impactful authors, and emerging trends in altmetrics, offering great insights into the impact of altmetrics in scholarly communication and assessment. The research adds to the interpretation of the collaborative nature, development, and impact of altmetrics in scholarly research (Fig. 2.2).

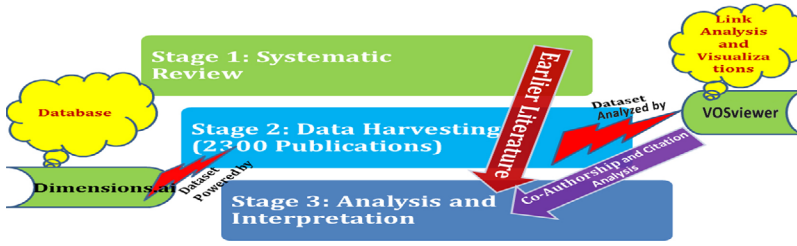


Fig. 2.2. Methodological Pathway.

Co-authorship Analysis

Authors' Visualization

Using co-authorship analysis, 136 significant authors were identified out of 4,973, with various clusters indicating different levels of collaboration. The use of full counting and total link strength normalization highlights the strength of connections between authors. Overall, this reflects a diverse network of collaboration