International Journal of Management, Public Policy and Research
International, Peer Reviewed journal
E-ISSN: 2583-3014

A BIBLIOMETRIC ANALYSIS OF RESEARCH TRENDS IN GREEN BANKING AND TECHNOLOGICAL ADVANCEMENTS

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ABSTRACT

This study undertakes a comprehensive bibliometric analysis of green banking literature and its technological evolution. Using Boolean search techniques, we examined 80 research documents from the Bibliometric data were extracted from Elsevier's Scopus index. spanning 2000 to 2025. The findings paint a compelling picture: publications have surged dramatically over the past decade, driven by growing global recognition of green banking's importance and its intersection with technological innovation. Both wealthier and developing economies are actively participating in this research wave, underscoring how technology has become essential to advancing sustainable banking practices worldwide. Several journals have established themselves as trusted platforms for high-quality research in this space. The International Journal of Asian Business and Information Management, Sustainability Switzerland, Reliability Theory and Applications, WIT Transactions on Ecology and the Environment, and Academy of Entrepreneurship Journal consistently publish impactful, influential studies that shape conversations around green banking and sustainability in finance.

Keywords: Green Banking, Technological Advancements, Sustainable Finance, Bibliometric Analysis.

INTRODUCTION

Green Banking took shape in the early 1990s as the world began prioritizing environmental sustainability and responsible finance. Rooted in sustainable development principles, the concept quickly expanded beyond theory to encompass banking practices that actively reduce environmental harm and channel capital toward green economic initiatives (Sharma & Kumar, 2021; Singh & Gupta, 2020). Over the past two decades, it has grown from a fringe idea into a cornerstone of sustainable finance, fundamentally reshaping how financial institutions approach decision-making and operations.

Today, banks worldwide recognize that sustainability isn't optional—it's essential. Green Banking has become the mechanism through which ecological principles integrate into financial systems. This happens through tangible products: loans for renewable energy projects, financing for eco-friendly technologies, and investments explicitly designed to support environmental goals (Agarwal & Soni, 2018). The benefits extend beyond environmental impact. Green Banking enables financial institutions to identify and manage climate-related risks before they threaten portfolios, while simultaneously strengthening their reputation and stakeholder trust (Singh & Gupta, 2020).

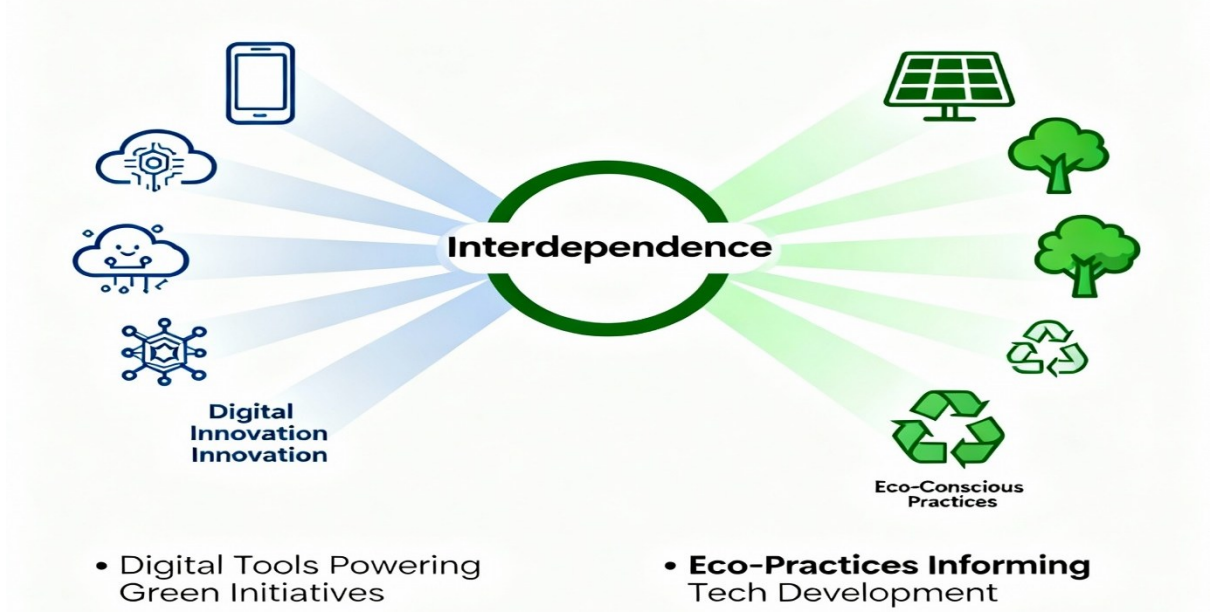
Technology has simultaneously transformed banking itself. Artificial intelligence, mobile banking, and other emerging innovations have reshaped how financial institutions operate and deliver sustainable services (Shah & Patel, 2022). Technology makes sustainability practical: paperless banking, e-statements, and online transactions slash carbon footprints and operational costs while boosting efficiency and transparency (Kumar & Mishra, 2021).

Yet despite rising interest in both green banking and technological innovation, few studies have examined where these two forces intersect. Earlier research typically addressed green banking conceptually or focused on specific

regions, rarely exploring the technology dimension that actually enables sustainability in finance (Rana & Verma, 2022). This study bridges that gap through a comprehensive bibliometric analysis linking green banking scholarship to technological advancement.

We analyzed 80 documents from the Bibliometric data were extracted from Elsevier's Scopus index. spanning 2000 to 2025, examining publication trends, growth patterns, key sources, research networks, and how the field's themes have evolved over time. By mapping the intellectual landscape and tracking how technology integrates into green banking research, this analysis offers actionable insights for researchers, industry practitioners, and policymakers working to build sustainable, tech-enabled banking systems (Mehta & Reddy, 2023).

Role of Green Banking in Technological Advancements and Environmental Sustainability



Green Banking connects technological innovation with environmental sustainability by channeling financial resources toward eco-friendly development. As banks embed sustainability into their core operations, technology becomes the essential mechanism—the practical enabler that transforms traditional banking into a responsible, efficient, and environmentally conscious enterprise (Sharma & Kumar, 2021).

Green Banking and technological advancement reinforce each other as engines of sustainable development. Green Banking charts the strategic course toward environmental responsibility, while technology supplies the means to execute, track, and expand these initiatives at scale. This partnership creates a banking system where financial success and environmental stewardship move together, ultimately building a global economy that balances profit with planetary health.

2. Measure and Methods

Bibliometrics allows researchers to systematically examine large volumes of scholarly sources rom peer-reviewed articles and conference papers to books and reviews. We sourced our data from the Bibliometric data were extracted from Elsevier's Scopus index., widely recognized as a comprehensive and reliable repository of peer-reviewed literature, particularly for social sciences research.

To identify relevant documents, we employed a Boolean search strategy combining our core concepts:

("Green Banking") AND ("Technological Advancements")

This targeted approach ensured we captured documents directly addressing the intersection of green banking practices and technological innovation, yielding a focused dataset for our analysis.

RESULTS AND DISCUSSION

3.1 General Characteristics and Research Trends in Green Banking Literature

We have extracted 80 documents from Bibliometric data were extracted from Elsevier's Scopus index. using the Boolean search. We retrieved documents from 2000 to 2025.

Table 1 The chart depicts the distribution of publication types in Green Banking literature between 2000 and 2025.

Articles represent the dominant research output with N=44 (55.0%), establishing peer-reviewed journal articles as the primary medium for scholarly dissemination of green banking knowledge and evidence-based findings. Book Chapters constitute the second-largest category with N=19 (23.75%), reflecting substantial contributions to comprehensive, integrated analyses of green banking practices and sustainability frameworks. Articles and Book Chapters together account for approximately 78.75% of all publications, demonstrating the scholarly community's strong preference for peer-reviewed and academically rigorous publication formats. Conference Papers contribute N=10 (12.5%), indicating active participation and knowledge exchange at international forums focused on sustainable finance and green banking strategies. Books represent N=4 (5.0%), providing consolidated knowledge on green banking practices and environmental sustainability in the financial sector. Specialized formats including Conference Reviews, Reviews, and Retracted publications each constitute N=1 (1.25%). This publication distribution reflects the multidisciplinary nature of green banking research, with overwhelming emphasis on peer-reviewed articles, supporting scholars, practitioners, and financial institutions in advancing evidence-based sustainable banking practices globally Figure 1 shows graphically types of publications in Green Banking literature.

Table 1: Types of publications of Green Banking literature between 2000 and 2025

Document type	Number	%
Article	44	55
Book Chapter	19	23.75
Conference Paper	10	12.5
Book	4	5
Conference Review	1	1.25
Review	1	1.25
Retracted	1	1.25

Data Source: Bibliometric data were extracted from Elsevier's Scopus index. (N = 80)

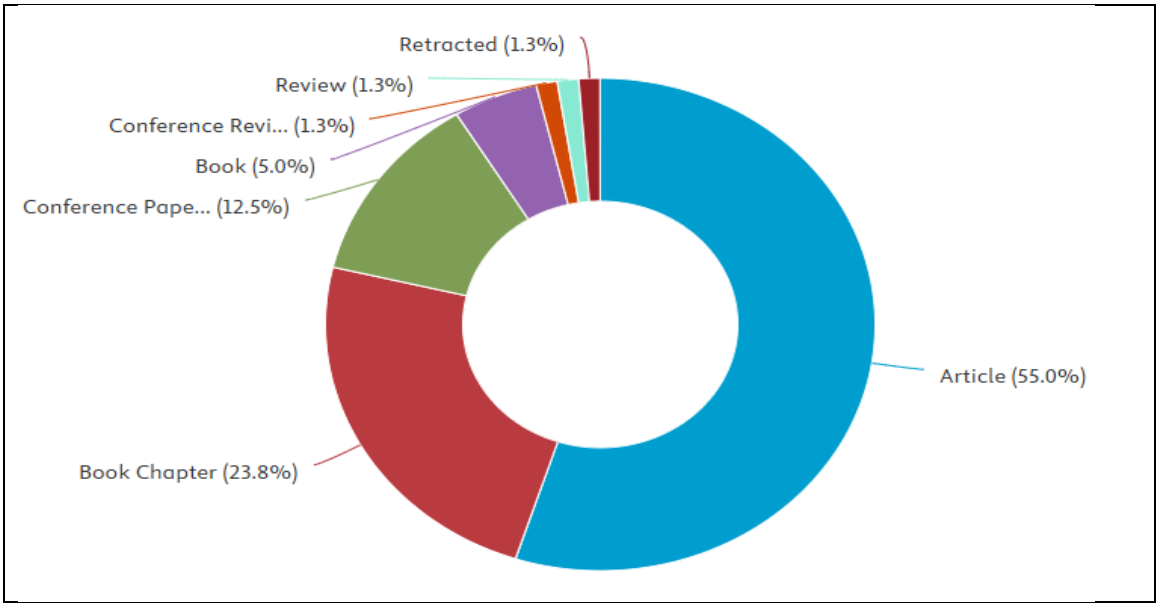


Figure 1: Distribution of Documents by Type..
Data Source: Bibliometric data were extracted from Elsevier's Scopus index.

3.2 Distribution of Publications in Green Banking Research

Green Banking literature reveals a striking transformation over the past quarter-century. Before 2012, scholarly work was sparse and scattered—a few isolated publications in 2012, 2013, and 2016 barely registered on the research landscape. Interest began building around 2018, then accelerated steadily through 2019–2022, with roughly 4–5 publications annually.

The real shift came after 2023. Publications exploded: 2023 brought 17 papers (21.25%), 2024 delivered 22 (27.5%), and 2025 has already contributed 20 (25%). Together, these three years account for nearly 74% of all research in the field—a stunning concentration that reflects how quickly green banking moved from academic curiosity to urgent priority.

This acceleration mirrors real-world pressures: intensifying climate change awareness, new regulatory requirements mandating environmental responsibility, and banks themselves recognizing that environmental

factors directly affect financial risk. What was once a specialized topic has become central to how the financial industry thinks about its role in a sustainable economy.

Table 2: Documents by year on Green Banking literature between 2000 and 2025

YEAR	Number	%
2025	20	25
2024	22	27.5
2023	17	21.25
2022	4	5
2021	4	5
2020	4	5
2019	4	5
2018	1	1.25
2017	0	0
2016	1	1.25
2015	0	0
2014	0	0
2013	2	2.5
2012	1	1.25

Source Data : Bibliometric data were extracted from Elsevier's Scopus index.

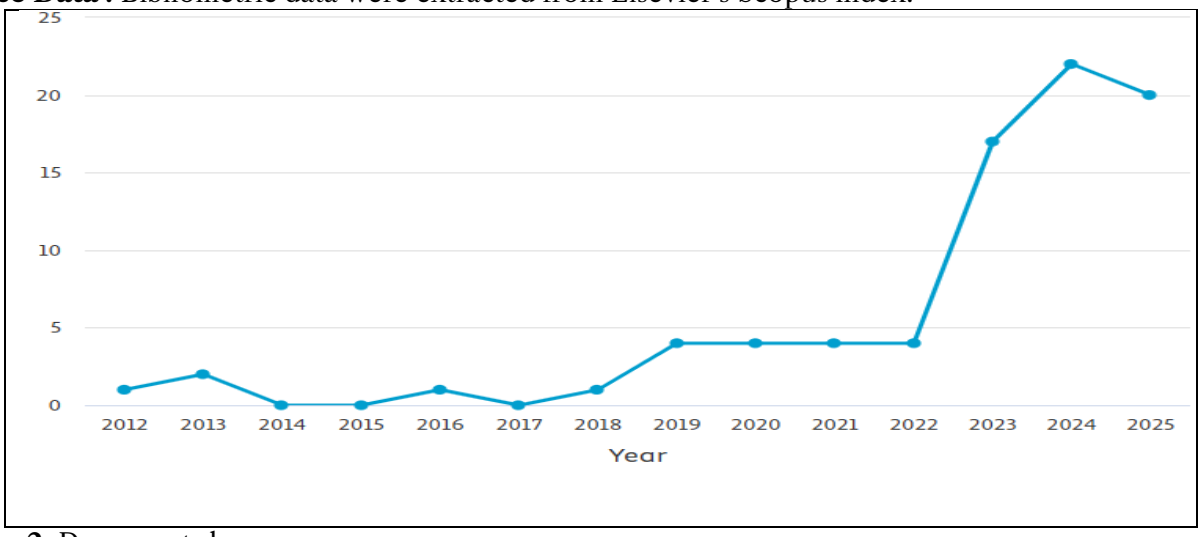


Figure 2: Documents by year.

Source: Bibliometric data were extracted from Elsevier's Scopus index..

3.3 Global Research Productivity

Table 3 Between 2000 and 2025, the top ten countries contributing to Green Banking research reveal a strong concentration of scholarly activity in Asian economies. India leads this field with 33 publications (41.25%), establishing itself as a global hub for Green Banking research. This dominance can be attributed to the Reserve Bank of India's sustainability directives and proactive green initiatives by major financial institutions. Both developed and developing nations recognize Green Banking as a vital component of sustainable finance, reflected in contributions from Malaysia (10%), Bangladesh (8.75%), and Indonesia (7.5%).

Collectively, South Asian countries—India, Bangladesh, and Pakistan—account for 57.5% of total publications, highlighting the region's growing commitment to sustainable banking practices, environmental risk management, and climate-resilient finance. Meanwhile, Indonesia and Pakistan (7.5% each), along with Saudi Arabia (6.25%),

showcase increasing participation from Southeast Asia and the Middle East. Kazakhstan, Turkey, and unspecified regions (5% each), and Oman (3.75%), further represent the emerging engagement of developing economies in this domain.

Overall, this geographic pattern emphasizes that developing countries are at the forefront of integrating Green Banking into national sustainability agendas, recognizing its crucial role in managing environmental risks, supporting climate-aligned investments, and advancing progress toward the Sustainable Development Goals (SDGs). Figure 3 illustrates the distribution of publications across the top ten contributing nations.

Table 3: The first ten countries according to the number of documents published in Green Banking literature between 2000 and 2025

Country	N	%
India	33	41.25
Malaysia	8	10
Bangladesh	7	8.75
Indonesia	6	7.5
Pakistan	6	7.5
Saudi Arabia	5	6.25
Kazakhstan	4	5
Turkey	4	5
Undefined	4	5
Oman	3	3.75

Notes: N=80.
Source: Bibliometric data were extracted from Elsevier's Scopus index..

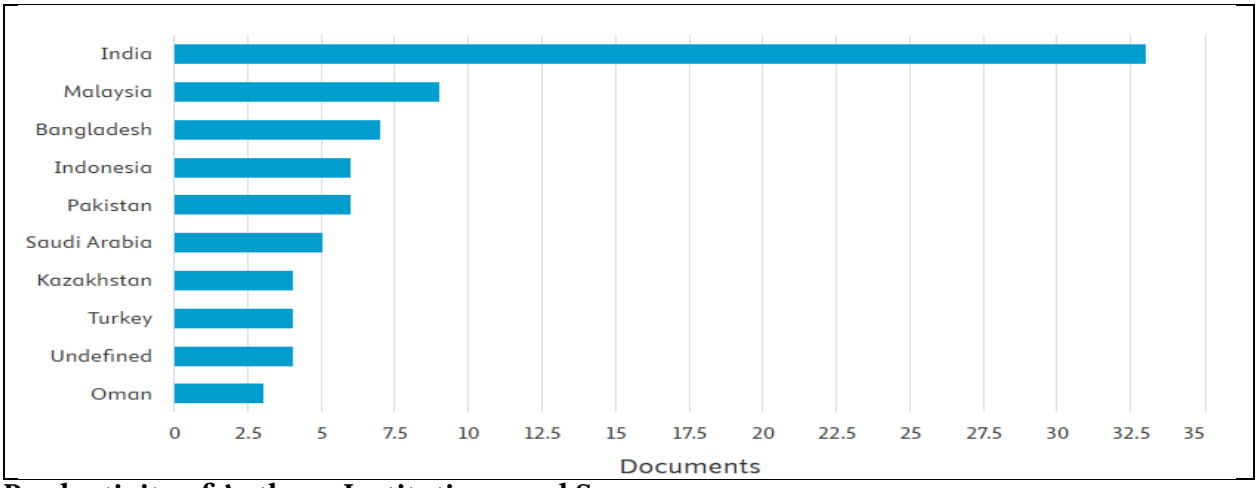


Figure 3: Documents by country.
Source: Bibliometric data were extracted from Elsevier's Scopus index..

3.4 Research Productivity of Authors, Institutions, and Sources

The productivity of authors in Green Banking literature reveals key scholarly contributors. Nisha, N. leads with N=5 (16.13%), followed by Bouteraa, M., Iqbal, M., and Rifat, A. each contributing N=4 (12.90%). Taneja, S. and Zainol, Z. each contribute N=3 (9.68%), while Bang, N.H., Dao, L.T., Hisham, R.R.I.R., and Kumar, P. each contribute N=2 (6.45%). These authors examine diverse aspects including green banking adoption, Islamic and Western theoretical frameworks, environmental risk management, and sustainability disclosure practices. The distributed authorship pattern demonstrates emerging collaborative scholarship across multiple researchers globally, reflecting green banking's growing importance in financial sector sustainability initiatives. (see **Table 4**).

Table 4 Productivity of authors, institutions and source titles

Authors Name	N	%
Nisha, N.	5	16.13
Bouteraa, M.	4	12.90

Iqbal, M.	4	12.90
Rifat, A.	4	12.90
Taneja, S.	3	9.68
Zainol, Z.	3	9.68
Bang, N.H.	2	6.45
Dao, L.T.	2	6.45
Hisham, R.R.I.R.	2	6.45
Kumar, P.	2	6.45

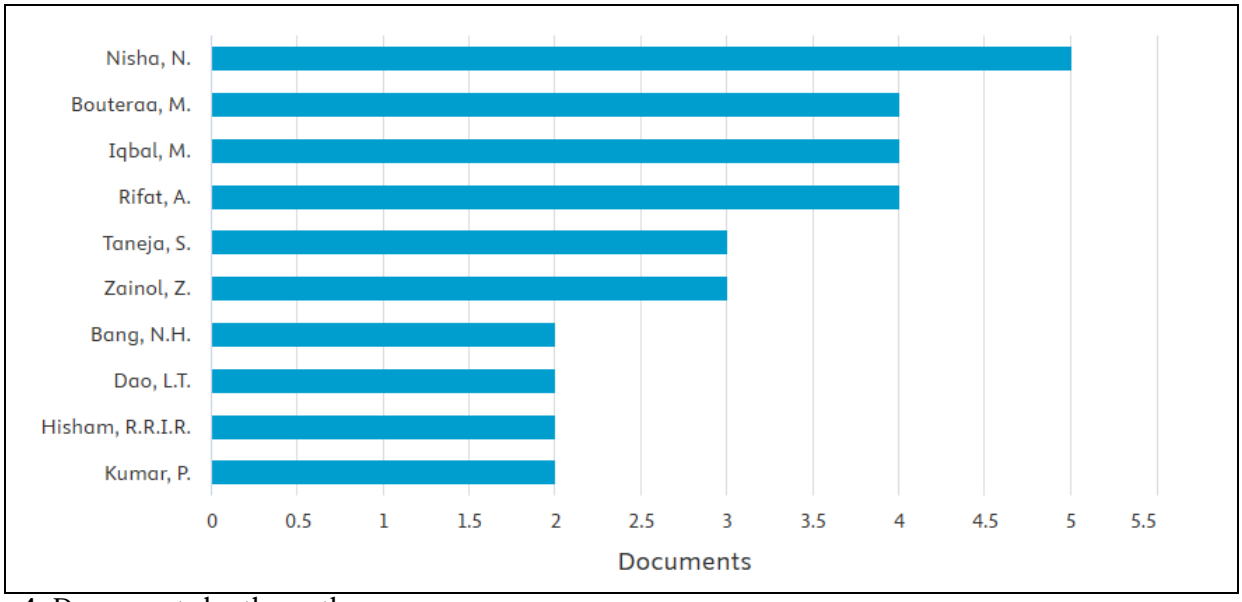


Figure 4: Documents by the author.
Source: Bibliometric data were extracted from Elsevier's Scopus index..

3.5 Institutional Research Productivity

Table 5 presents the first ten institutes in Green Banking research between 2000 and 2025 reflect institutional leadership in developing economies. North South University, Graphic Era Deemed to be University, and Chandigarh University lead with N=5 (15.63%) each. Universiti Utara Malaysia contributes N=4 (12.50%), while Universiti Malaysia Sabah contributes N=3 (9.38%). National Institute of Securities Markets, University of the Punjab, Amity University, Universitas Negeri Jakarta, and Moscow Witte University each contribute N=2 (6.25%). Indian and Malaysian universities dominate, driving green banking scholarship, environmental performance assessments, and sustainability initiatives in emerging markets **Figure 5** presents graphically the productivity of institutes in terms of publication in Green Banking literature between 2000 and 2025.

Table 5: The first ten institutes according to the number of published documents in Green Banking literature between 2000 and 2025

Institute	**N**	**%**
North South University	5	15.63
Graphic Era Deemed to be University	5	15.63
Chandigarh University	5	15.63
Universiti Utara Malaysia	4	12.50
Universiti Malaysia Sabah	3	9.38
National Institute of Securities Markets	2	6.25
University of the Punjab	2	6.25
Amity University	2	6.25

Universitas Negeri Jakarta	2	6.25
Moscow Witte University	2	6.25

Source: Bibliometric data were extracted from Elsevier's Scopus index.

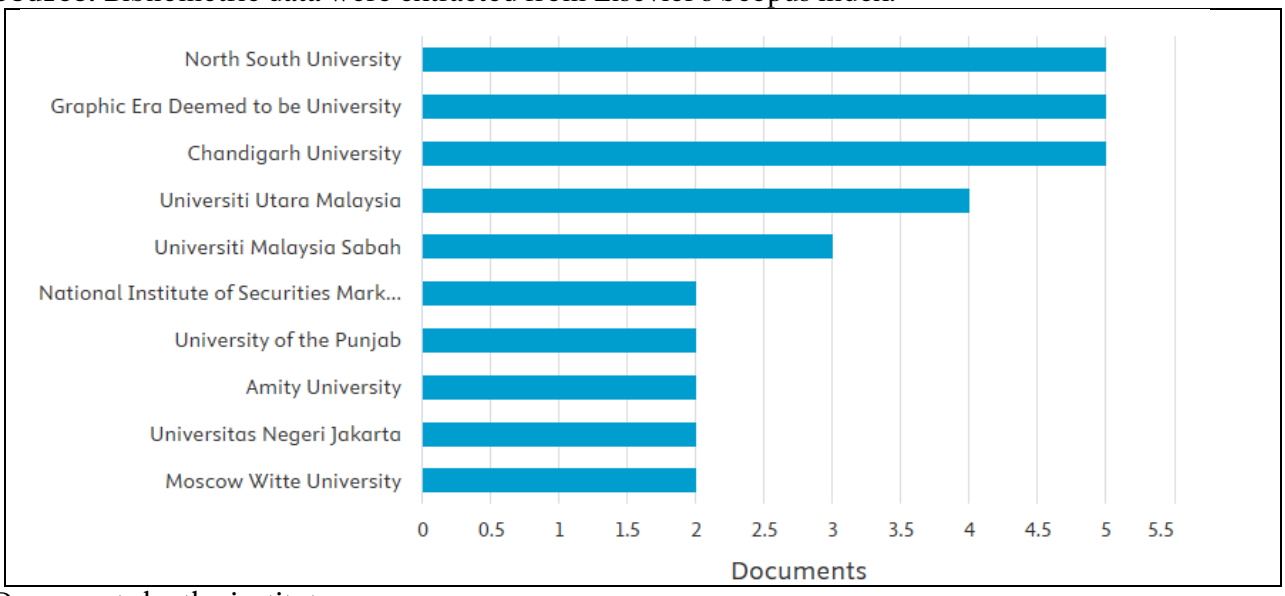


Figure 5: Documents by the institute.

Source: Bibliometric data were extracted from Elsevier's Scopus index..

3.6 Journal Publication Productivity

The first five sources according to the number of published documents in Green Banking literature between 2003 and 2025 demonstrate key publication venues. International Journal of Asian Business and Information Management and Sustainability Switzerland lead jointly with N=3 (27.27%) each, serving as primary platforms for green banking scholarship. Reliability Theory and Applications and Wit Transactions on Ecology and the Environment each contribute N=2 (18.18%), reflecting interdisciplinary engagement with environmental and reliability dimensions of green finance. Academy of Entrepreneurship Journal contributes N=1 (9.09%). These journals collectively disseminate green banking research on environmental performance, financial sustainability, green financing mechanisms, and banking sector initiatives addressing climate change and sustainable development goals. (see **Table 6**).

Table 6: The first five sources according to the number of published documents in Green Banking literature between 2003 and 2025

Journal	**N**	**%**
International Journal of Asian Business and Information Management	3	27.27
Sustainability Switzerland	3	27.27
Reliability Theory and Applications	2	18.18
Wit Transactions on Ecology and the Environment	2	18.18
Academy of Entrepreneurship Journal	1	9.09

Source: Bibliometric data were extracted from Elsevier's Scopus index.

Figure 6: Documents by source.
Source: Bibliometric data were extracted from Elsevier's Scopus index..

FINDINGS

This bibliometric analysis of Green Banking and Technological Advancements research, examining 80 documents extracted from the Bibliometric data were extracted from Elsevier's Scopus index. between 2000 and 2025, reveals significant patterns in scholarly development.

- **Exponential Publication Growth**: The research landscape has transformed dramatically, with over 73% of all publications appearing between 2023 and 2025. This surge reflects mounting pressure from climate change, new regulatory frameworks, and rapid technological innovation in financial services. Before 2020, green banking research was relatively sparse, but it has now shifted from a niche interest to a central academic concern.
- **Geographic Research** Leadership: India dominates scholarship production with over 41% of total publications, followed by Malaysia, Bangladesh, and Indonesia, establishing developing Asian economies as primary research centers. This geographic concentration reflects these nations' strategic prioritization of sustainable financial system development and environmental risk management.
- **Institutional Excellence:** Three institutions stand out: North South University, Graphic Era Deemed to be University, and Chandigarh University. Their prominence reflects sustained institutional investment in green banking research infrastructure and strong collaborative networks across India and Malaysia.
- **Peer-Reviewed Scholarship Dominance**: Journal articles represent 55% of publications, followed by book chapters at 23.75%, establishing peer-reviewed dissemination as the scholarly community's preferred knowledge-sharing mechanism for rigorous, evidence-based research. International Journal of Asian Business and Information Management and Sustainability Switzerland emerge as principal publication venues.
- **Multidisciplinary Research Leadership**: Researchers like Nisha N., Bouteraa M., Iqbal M., and Rifat A. bring different perspectives from adoption rates and environmental metrics to technology integration and sustainability reporting which enriches the overall body of knowledge.

SUGGESTIONS FOR FUTURE RESEARCH

To truly understand how organizations adopt green technology, researchers need to blend quantitative data with on-the-ground insights into the actual challenges companies face. Looking ahead, we should explore how fintech and digital platforms can democratize access to green finance—while also developing better ways to catch greenwashing before it spreads.

Comparing approaches across different countries reveals something crucial: how regulations, financial incentives, and policy frameworks genuinely shape which green banking technologies companies choose and whether they

actually deliver environmental results. This comparative lens shouldn't be overlooked. Several areas deserve urgent attention. We need to identify which green projects are genuinely viable for banks to fund, harness AI to validate environmental claims with real rigor, and use blockchain to create transparent, verifiable trails of sustainability impact.

CONCLUSION

The purpose of this study is to present a comprehensive bibliometric analysis of the existing literature on Green Banking. To conduct the analysis, a total of 80 documents were retrieved from the Bibliometric data were extracted from Elsevier's Scopus index. using Boolean search techniques covering the period from 2000 to 2025. Over the past two and a half decades, the concept of Green Banking has gained increasing recognition, reflected in the steady rise of research publications. The findings reveal that both developed and developing countries acknowledge the vital role of Green Banking in promoting environmental sustainability.

Notably, there has been exponential growth in publications since 2023, with India and Malaysia emerging as leading contributors in this domain. The predominance of peer-reviewed journal articles highlights the academic community's strong commitment to advancing research on sustainable banking practices and technological innovation. These findings suggest that Green Banking research has reached a crucial turning point. Theoretical frameworks now need to evolve into practical applications that enable banks to act as powerful socio-economic agents of change. Strengthening the connection between research and practice will be essential for driving the global transition toward environmentally responsible and climate-aligned financial systems.

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