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Bibliometric Analysis of Fake News in India: Study

REKHA RANI*
PINKI**

Fake news has recently turned out to be a widespread problem in the present modern society, thereby affecting public opinion, shaping political discussions, and influencing individual decision-making. The exponential growth of the unregulated information across various platforms has prompted scholars to investigate its authenticity and reach. For this study, a comprehensive analysis has been conducted on the literature on fake news published up to May 16, 2024, using the SCOPUS database. The findings bring into lime light on the key trends, patterns, and shifts within the landscape of fake news research, offering valuable insights into this evolving field. The analysis revealed a significant surge in fake news publications over the past decade, with a extraordinary increase in research output observed after the COVID-19 pandemic. The chronological distribution of publications highlighted a peak in the year 2023, indicating a intensified interest and relevance in the subject area during that period and a preference for conference papers as the principal mode of dissemination is observed, reflecting the dynamic and collaborative nature of research in this domain. As technology continues to evolve and misinformation proliferates, fostering critical thinking skills and promoting media literacy becomes imperative in combating the spread of fake news. Moreover, the findings emphasize the need for collaborative efforts among researchers, policymakers, and practitioners to develop effective strategies for mitigating the impact of fake news on society.

Keywords: *Fake News, Misinformation, Media literacy*

0 INTRODUCTION

With the prolific rise of digital social media platforms and instant messaging services, traditional journalism has transformed, incorporating sensationalism into news reporting. This evolution has clouded the lines between truth and

* Research Scholar, Department of Library and Information Science, Maharshi Dayanand University, Rohtak

** Assistant Professor, Department of Library and Information Science, University of Delhi.

misinformation, as some news and social media providers prioritize in gaining popularity over ethical information dissemination. Fake news, characterized by the intentional dissemination of false information presented as true, has resulted in a pressing issue, manipulating facts to deceive audiences[1-4]. The COVID-19 pandemic, a subject of widespread study in 2020, has contributed marginally to the proliferation of fake information[5-6]. Consequently, there has been a notable increase in enquiries into the sphere of fake news, misinformation, disinformation, and post-truth, collectively known as the broader spectrum of information disorder, over the past decade[7-8].However, these areas of study remain relatively new and are continuously evolving alongside developments in politics, health, and technology[7]. While fake news, along with related terms, such as, misinformation and disinformation, have become widespread and debated in academic and non-academic circles, the term "fake news" lacks a concrete autonomous meaning and depends on pre-defined terms for its existence. Fake news is considered a byproduct of information disorder, a routine practice among malicious communicators aimed at disseminating inaccurate information[9].

Understanding fake news in the domain of generative Artificial Intelligence (AI) is vital, as sophisticated AI algorithms are more frequently utilized to produce and identify misleading information. Investigating the potential of generative AI to craft persuasive false narratives is critical for devising effective countermeasures and evaluating the ethical considerations linked to AI-driven misinformation[8].

This challenge underscores the importance of understanding the core concept of information disorder and the responsibility of communication professionals to counter it by providing accurate information from reliable sources.

1 LITERATURE REVIEW

Historically, the propagation of false information dates back to early human communication, with the term "fake news" having identifiable origins in the seventeenth century during the English Civil War. During the earlier period, print media, radio, and television accelerated the spread of fake news in the twentieth century, yet it was the advent of the internet and social media that exponentially increased its reach and impact[10].

It was during the 2016 US presidential election that brought the fake news to the forefront of public discourse, emphasizing its role in shaping political narratives and influencing policy decisions[11].This phenomenon has become particularly pronounced during the COVID-19 pandemic, with politicians, pundits, journalists, and trusted information sources all contributing to its spread. Moreover, the rise of fake news on COVID-19 has been exacerbated

by its rapid dissemination through invitation-only discussion forums on social media platforms, where falsehoods can be amplified within closed networks and echo chambers[12-13].

However, defining fake news poses several challenges, as it encompasses various forms of false or misleading information, including satire, sensational headlines, and manipulated statistics. In response to the proliferation of fake news, scholars have begun to explore their various dimensions, which include its historical roots, its impact on public discourse, and its implications for strategic communication[14-15]. Efforts to combat fake news include initiatives to promote media literacy and critical thinking skills among the public. Organizations, such as, the International Federation of Library Associations and Institutions have amplified resources to help individuals identify fake news and evaluate the veracity of information sources[7]. However, as fake news continues to evolve and adapt to new communication technologies, researchers and practitioners must remain vigilant in understanding its dynamics and developing effective strategies to counter its influence.

Overall, the rise of fake news poses significant challenges for society, requiring a multi-faceted approach that focuses on its historical roots, the impact on communication, and its implications for public discourse. By comprehending the complications of fake news and its various manifestations, researchers and practitioners can develop more effective strategies to combat its spread and alleviate its negative consequences.

2 OBJECTIVES

Exploring the emerging landscape of fake news, research requires a total and comprehensive analysis to better understand its surge and significance. This approach will help identify key shifts and focal points within this dynamic field. In view of the above, this study is conducted with the following objectives:

i. To discover the year when research on fake news started in India
ii. To identify the trends and patterns of research output on fake news in India
iii. To analyze the growth and distribution of fake news publications across different academic disciplines in India
iv. To assess the collaboration networks among researchers, institutions, and regions involved in fake news research in India
v. To investigate the extent of international collaboration in fake news research involving Indian scholars
vi. To identify key authors and institutions contributing to fake news research in India and their respective contributions
vii. To find out the most prolific source of publication.

3 SCOPE AND METHODOLOGY

This study has been conducted to conduct an wide spread exploration of the literature on fake news available in SCOPUS database. The detailed search strategies implemented for data gathering are meticulously outlined in Figure-1 below:

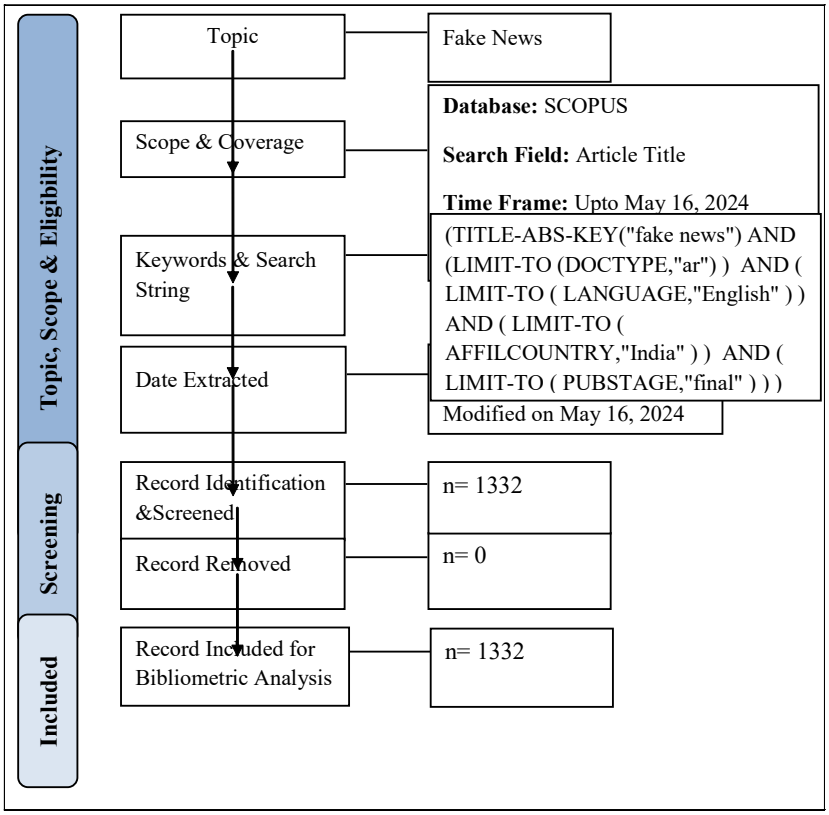

Fig. 1: Flow Diagram of the Search Strategy - Source: Zakaria10 et al. (2021)

The data retrieval process commenced with an initial search on April 13, 2024, targeting articles, where the phrase "fake news" appeared anywhere in the title, abstract and keywords. A subsequent search was conducted on May 16, 2024, to update and refine the dataset. This comprehensive dataset encompassed articles published up to May 16, 2024. The research focused exclusively on fully published articles in English to ensure consistency and ease of analysis. To process and analyze the total of 1,332 documents gathered, MS-Excel was employed for data tabulation, while VOS viewer software was used for creating visual representations and network visualizations, particularly for co-authorship and keyword co-occurrence analysis.

4 ANALYSIS AND DISCUSSION

Data analysis and interpretation of the received dataset is presented in this section under various headings.

41 CHRONOLOGICAL DISTRIBUTION OF PUBLICATIONS

TABLE-1

51 Chronological Distribution of Publications

Year	Documents	Percentage (%)
2024	126	9.46
2023	404	30.33
2022	332	24.92
2021	243	18.24
2020	123	9.23
2019	70	5.26
2018	27	2.03
2017	5	0.38
2015	1	0.08
2013	1	0.08
Total	**1332**	**100**

The data presented in the above table outlines the chronological distribution of publications over a decade, from 2013 to 2024. The total number of documents published during this period is 1,332. The distribution demonstrates a significant increase in publications over time, with the majority being published in recent years. The peak publication year is 2023, with 404 documents, accounting for 30.33% of the total. This is followed by 2022 and 2021, with 332 (24.92%) and 243 (18.24%) documents, respectively. The early years (2013 to 2017) saw minimal activity, with publications gradually increasing from a single document in 2013 and 2015, to five in 2017. A notable rise starts in 2018, indicating a growing interest or focus in the subject area. The consistent increase from 2018 onwards, particularly the sharp rise from 2019 to 2023, suggests an outburst in research output and possibly a heightened relevance or emergence of new research opportunities in recent years. The slight drop in 2024 with 126 publications (9.46%) might indicate the beginning of a new trend or an anomaly in data collection for that year.

4.2 DOCUMENT TYPE WISE DISTRIBUTION OF PUBLICATIONS

TABLE-2

42 Document Type-wise Distribution of Publications

Document Type	Document Counts	Percentage (%)
Conference Paper	784	58.86
Article	413	31.01
Book Chapter	94	7.06
Review	19	1.43
Book	8	0.60
Letter	4	0.30
Editorial	3	0.23
Note	3	0.23
Retracted	2	0.15
Erratum	1	0.08
Short Survey	1	0.08
Total	1332	100

The data analysis on Table-2 represents the distribution of publications by document type among a total of 1,332 documents. The most common type are conference papers, which account for 784 publications, representing a substantial 58.86% of the total. This dominance suggests a strong preference for disseminating research findings at conferences, which are most likely due to the immediacy and collaborative opportunities they offer. Articles are the second most frequent document type, with 413 publications, making up 31.01% of the total, indicating that a significant portion of research is also being published in journals. Book chapters constitute 94 documents (7.06%), reflecting a moderate engagement in contributing to comprehensive scholarly volumes. Reviews, with 19 publications (1.43%), and books, with 8 publications (0.60%), show lesser yet still are relevant contributions to literature syntheses and comprehensive treatment of subjects. The remaining categories, including letters, editorials, notes, retracted publications, errata, and short surveys, each constitute less than 1% of the total. This distribution underscores a primary reliance on conference presentations and journal articles for research dissemination, with other formats playing a minor role in the overall scholarly communication landscape.

4.3 AUTHOR-WISE DISTRIBUTION OF PUBLICATIONS

TABLE-3
43 Author-wise Distribution of Publications

Author Name	Documents out of 1332	Percentage
Chakraborty, T.	31	2.33
Sharma, D.K.	25	1.88
Meel, P.	19	1.43
Ekbal, A.	18	1.35
Kaliyar, R.K.	16	1.20
Vishwakarma, D.K.	16	1.20
Goswami, A.	15	1.13
Long, C.	15	1.13
G, S.K.	14	1.05
P, D.	14	1.05

The data in Table-3 presents the author-wise distribution of publications, highlighting the top ten contributors among a total of 1,332 documents. Chakraborty, T. leads with 31 publications, accounting for 2.33% of the total output, indicating a highly active role in research within this dataset. Sharma, D.K. follows with 25 publications (1.88%), and Meel, P. with 19 publications (1.43%). Ekbal, A. has 18 publications (1.35%), while both Kaliyar, R.K. and Vishwakarma, D.K. each contributed 16 publications, representing 1.20% individually. Goswami, A. and Long, C. both have 15 publications (1.13% each). Authors G, S.K. and P, D. each have 14 publications, making up 1.05% of the total. This distribution indicates that a relatively small number of authors have contributed a significant portion of the publications, reflecting a concentration of research activity among these key individuals. The leading authors have played crucial roles in the research landscape, possibly influencing the direction and focus of studies in their respective fields. The presence of multiple authors with similar publication counts also suggests a collaborative environment where several researchers are consistently contributing to the body of work.

4.4 SOURCE WISE DISTRIBUTION OF PUBLICATION

TABLE-4

44 Source wise distribution of publication

Source Title	Documents out of 1332 & Percentage
Lecture Notes In Networks And Systems	84
Ceur Workshop Proceedings	36
Communications In Computer And Information Science	36
Lecture Notes In Electrical Engineering	31
ACM International Conference Proceeding Series	23
Smart Innovation Systems And Technologies	22
Lecture Notes In Computer Science Including Subseries Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics	21
AIP Conference Proceedings	20
International Journal Of Intelligent Systems And Applications In Engineering	19
Multimedia Tools And Applications	19

The analysis of the Table-4 reveals the source-wise distribution of publications among the top ten sources out of a total of 1,332 documents. "Lecture Notes in Networks and Systems" is the most inexhaustible source, with 84 publications, reflecting a significant 6.31% of the total.

This indicates a strong preference for this source, possibly due to its relevance and reach within the field. Both "Ceur Workshop Proceedings" and "Communications in Computer and Information Science" are tied for the second most utilized sources, each contributing 36 publications, which is 2.70% of the total. "Lecture Notes in Electrical Engineering" follows with 31 publications (2.33%), and the "ACM International Conference Proceeding Series" has 23 publications (1.73%). "Smart Innovation Systems and Technologies" is close behind with 22 publications (1.65%).

"Lecture Notes in Computer Science," including its subseries in Artificial Intelligence and Bioinformatics, accounts for 21 publications (1.58%), showcasing its importance in computer science research. "AIP Conference Proceedings" has 20 publications (1.50%), while both the "International Journal of Intelligent Systems and Applications in Engineering" and "Multimedia Tools and Applications" have 19 publications each, representing 1.43% of the total.

This distribution highlights a concentration of publications in a few key sources, with "Lecture Notes" series across various fields being particularly prominent. The prominence of conference proceedings and specialized journals

indicates a strong engagement with both academic conferences and peer-reviewed journals, reflecting the dynamic nature of research dissemination in these fields.

The diversity of sources also suggests a wide-ranging interest in multiple areas of study, spanning from networks and systems to artificial intelligence and multimedia applications.

4.5 KEYWORD-WISE DISTRIBUTION OF PUBLICATIONS (TOP 10 KEYWORDS)

TABLE-5

45 Keyword-wise Distribution of Publications (Top 10 Keywords)

Keywords	**Numbers out of 1332**	**Percentage (%)**
Fake Detection	578	43.39
Fake News	534	40.09
Social Networking (online)	479	35.96
Social Media	470	35.29
Machine Learning	345	25.90
Deep Learning	299	22.45
Fake News Detection	233	17.49
Machine-learning	212	15.92
Classification (of Information)	196	14.71
Learning Systems	186	13.96

The keyword-wise distribution of publications in Table-5 reveals the focal points of research within the field of fake news, highlighting the prominence of various themes and methodologies. “Fake Detection” emerges as the most prevalent keyword, appearing in 578 out of 1332 publications, which constitutes 43.39% of the total. This indicates a strong emphasis on the mechanisms and technologies developed to identify fake news. “Fake News” itself is the second most common keyword, featured in 534 publications (40.09%), reflecting the centrality of this phenomenon in the literature.

“Social Networking (online)” and “Social Media” are also significant keywords, found in 479 (35.96%) and 470 (35.29%) publications, respectively. This suggests a considerable amount of research was focused on how fake news spreads and impacts users on these platforms. The prominence of “Machine Learning” (345 publications, 25.90%) and “Deep Learning” (299 publications, 22.45%) highlights the reliance on advanced computational techniques to tackle the issue of fake news.

“Fake News Detection” is explicitly mentioned in 233 publications (17.49%), which further emphasizes the importance of developing and refining

detection methodologies. The term "Machine-learning" appears in 212 publications (15.92%), indicating frequent discussion and application of these algorithms in the context of fake news. The keyword "Classification (of Information)" is present in 196 publications (14.71%), highlighting efforts to categorize information accurately to combat misinformation. Lastly, "Learning Systems," appearing in 186 publications (13.96%), points to the progressive development of intelligent systems capable of learning and adapting to new types of fake news.

Overall, the keyword distribution reveals a robust interdisciplinary effort, with a strong focus on technological solutions, social media dynamics, and the continuous improvement of machine learning and deep learning models to effectively identify and mitigate the spread of fake news.

4.6 AFFILIATION-WISE DISTRIBUTION OF PUBLICATIONS (TOP 10 INSTITUTIONS)

TABLE-6

46 Affiliation-wise Distribution of Publications (Top 10 Institutions)

Name of the Institution	Numbers out of 1332	Percentage (%)
Delhi Technological University	64	4.80
Indraprastha Institute of Information Technology, Delhi	42	3.15
GLA University, Mathura	36	2.70
Bennett University	28	2.10
Vellore Institute of Technology	27	2.03
SRM Institute of Science and Technology	25	1.88
Symbiosis International Deemed University	25	1.88
Amity University	24	1.80
K L Deemed to be University	24	1.80
Saveetha Institute of Medical and Technical Sciences	24	1.80

The affiliation-wise distribution of publications in Table-6 highlights the leading institutions contributing to fake news research, with Delhi Technological University (DTU) at the forefront, accounting for 64 publications, or 4.80% of the total 1332 documents. This prominence indicates DTU's significant investment and expertise in this field. Following DTU, the Indraprastha Institute of Information Technology, Delhi (IIIT-Delhi) has made notable contributions with 42 publications, representing 3.15% of the total, further establishing Delhi as a central hub for fake news research in India.

GLA University in Mathura stands third with 36 publications (2.70%),

showcasing its active participation in the research landscape. Bennett University, Vellore Institute of Technology (VIT), and SRM Institute of Science and Technology also made substantial contributions, with 28 (2.10%), 27 (2.03%), and 25 (1.88%) publications respectively, reflecting their growing influence in this area of study.

Symbiosis International Deemed University, Amity University, K L Deemed to be University, and Saveetha Institute of Medical and Technical Sciences each contribute 24 publications (1.80% each), indicating a wide-ranging base of institutions engaging in fake news research across diverse geographical locations and academic focuses.

This distribution underscores the collaborative and inter-disciplinary nature of fake news research, with multiple institutions actively exploring various facets of the phenomenon. The data suggests a robust and geographically dispersed interest in tackling the challenges posed by fake news, emphasizing the need for continued collaboration and knowledge sharing among these leading institutions.

4.7 CITATION-WISE DISTRIBUTION OF PUBLICATIONS

TABLE-7

47 Citation-wise Distribution of Publications

Author		Year	Citation	Rank
Gupta A.; Lamba H.; Kumaraguru P.; Joshi A.	'Faking sandy: Characterizing and identifying fake images on twitter during hurricane sandy'	2013	446	1
Khattar D.; Gupta M.; Goud J.S.; Varma V.	'MvaE: Multimodal variational autoencoder for fake news detection'	2019	385	2
Kaliyar R.K.; Goswami A.; Narang P.	'FakeBERT: Fake news detection in social media with a BERT-based deep learning approach'	2021	315	3
Talwar S.; Dhir A.; Kaur P.; Zafar N.; Alrasheedy M.	'Why do people share fake news? Associations between the dark side of social media use and fake news sharing behavior'	2019	309	4
Meel P.; Vishwakarma D.K.	'Fake news, rumor, information pollution in social media and web: A contemporary survey of state-of-the-arts, challenges and opportunities'	2020	288	5

Singhal S.; Shah R.R.; Chakraborty T.; Kumaraguru P.; Satoh S.	'SpotFake: A multi-modal framework for fake news detection'	2019	263	6
Sahoo S.R.; Gupta B.B.	'Multiple features based approach for automatic fake news detection on social networks using deep learning'	2021	253	7
Kaliyar R.K.; Goswami A.; Narang P.; Sinha S.	'FNDNet – A deep convolutional neural network for fake news detection'	2020	250	8
Hakak S.; Alazab M.; Khan S.; Gadekallu T.R.; Maddikunta P.K.R.; Khan W.Z.	'An ensemble machine learning approach through effective feature extraction to classify fake news'	2021	235	9
Tschiatschek S.; Singla A.; Gomez Rodriguez M.; Merchant A.; Krause A.	'Fake News Detection in Social Networks via Crowd Signals'	2018	173	10

The data presented in Table-7 illustrates the citation-wise distribution of publications related to fake news research. The top-ranked publication, "Faking Sandy: Characterizing and Identifying Fake Images on Twitter During Hurricane Sandy" by Gupta et al. (2013), stands out with 446 citations, reflecting its significant impact and early contribution to the field. Following this, Khattar et al.'s (2019) work on "MVAE: Multimodal Variational Autoencoder for Fake News Detection" has garnered 385 citations, highlighting its relevance in leveraging advanced machine learning techniques for fake news detection. Kaliyar et al.'s (2021) "FakeBERT: Fake News Detection in Social Media with a BERT-based Deep Learning Approach" also shows substantial influence with 315 citations, indicating the importance of deep learning models in this domain.

The fourth-ranked study by Talwar et al. (2019), which explores the psychological aspects of fake news sharing, has 309 citations, emphasizing the multi-faceted nature of fake news research that includes behavioral analysis. Meel and Vishwakarma's (2020) comprehensive survey on fake news and information pollution, ranking fifth with 288 citations, underscores the necessity of understanding the broader context and challenges in fake news research.

The remaining publications also contribute significantly, with citation counts ranging from 263 to 173. These include works focusing on multi-modal

frameworks (Singhal et al., 2019), deep learning approaches (Sahoo and Gupta, 2021; Kaliyar et al., 2020), and ensemble machine learning methods (Hakak et al., 2021). The diversity of approaches, from psychological analyses to advanced computational methods, reflects the interdisciplinary nature of fake news research and the various strategies employed to tackle this pervasive issue.

5 FINDINGS

Some of the key findings on the basis of data analysis are presented below:

i. The chronological distribution shows a significant increase in fake news publications over the years, peaking in 2023 with 404 documents.
ii. Conference papers dominate the document types, accounting for 58.86% of the total publications, indicating a preference for presenting research findings at conferences.
iii. Delhi Technological University leads in institutional contributions with 64 publications, representing 4.80% of the total.
iv. Chakraborty, T. is the most prolific author with 31 publications, contributing 2.33% of the total documents.
v. "Lecture Notes in Networks and Systems" is the most frequent source of publications, comprising 6.31% of the total.
vi. "Fake Detection" is the most common keyword, appearing in 43.39% of the publications, emphasizing the focus on identification mechanisms.
vii. Machine learning and deep learning are significant methodologies, highlighted by keywords in 25.90% and 22.45% of the documents, respectively.
viii. The study "Faking Sandy" (Gupta et al., 2013) is the most cited publication with 446 citations, reflecting its major impact in the field.
ix. Psychological and behavioral aspects of fake news, as explored by Talwar et al. (2019), also garner significant attention with 309 citations.
x. Research on fake news has seen consistent growth since 2018, suggesting a heightened interest and emerging research opportunities in recent years.

6 CONCLUSION

The proliferation of fake news presents a significant threat to societal stability and progress, compromising public trust and hindering efforts towards achieving sustainable development goals. As such, there is a pressing need for inter-disciplinary collaboration and innovative research approaches to effectively combat the spread of fake news and promote information integrity. The study contributes valuable insights into the evolving landscape of research on fake news, emphasizing the need for continued vigilance and concerted efforts to

address this pressing issue. By fostering collaboration among researchers, practitioners, and policymakers, we can develop effective strategies and interventions to assuage the impact of fake news and safeguard the integrity of information in the digital age.

The findings of this study underscore the importance of media literacy and critical thinking skills in navigating the challenges posed by fake news. Through media literacy education, awareness-raising, and technological advancements, we can empower individuals to critically evaluate information sources and make informed decisions, thereby strengthening resilience against the harmful effects of fake news.

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