

VR/AR in Customer Experience: A Bibliometric Review

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Article Info

Article history:

Received June, 2026

Revised June, 2026

Accepted June, 2026

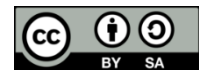
Keywords:

Virtual Reality (VR)
Augmented Reality (AR)
Customer Experience
Bibliometric Analysis
VOSviewer

ABSTRACT

The current study offers a bibliometric analysis of academic research on VR/AR in customer experience, whose objectives include exploring the intellectual structure, thematic trends, and global patterns of cooperation within the research area. Data for the analysis were collected from a scientific database and analyzed via bibliometric methods such as co-word analysis, co-authorship mapping, density visualization, and citation analysis in VOSviewer software. The findings show that VR and AR represent the main research constructs which have close relationships with user experience, e-commerce, digital marketing, and human-computer interaction. Thematic trend analysis shows a transformation from basic research on the usability and immersivity of the interface towards more applied studies focused on e-commerce, tourism, and metaverse customer experiences. Citation analysis highlights a number of highly impactful publications that have contributed significantly to the theoretical and methodological development of the field, in particular, to experiential marketing and technology-driven customer experience. Network analysis also highlights the global, although uneven, nature of collaboration networks and certain hub countries in international cooperation.

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1. INTRODUCTION

The swift development of digital technologies has changed the way organizations communicate with their customers and resulted in the introduction of new immersive technologies like Virtual Reality (VR) and Augmented Reality (AR), which can be used strategically to improve customer experience. In VR, users are submerged in the fully virtual environment created by the computer, while AR involves the addition of digital elements to the physical world [1]–[3]. The use of immersive

technologies has shifted from specific fields such as gaming and entertainment to various sectors including retail, tourism, health care, education, real estate, and manufacturing. The need for creative means of engaging customers has made VR and AR an integral part of digital transformation efforts aimed at designing unique customer experiences [4].

The customer experience has become an important factor affecting the success of organizations in today's marketplace. Instead of concentrating only on product quality and the service process, companies have started stressing the importance of the complete

experience that their customers go through while interacting with the brand [5], [6]. As suggested in the Experiential Economy concept by [7], consumers are becoming more interested in experiencing something interesting rather than getting some functional utility from the product. Virtual reality and augmented reality provide amazing chances for improving the customer experience by creating a possibility for immersive visualization of the product, try-ons, storytelling, and experiential marketing campaigns.

Customer experience has become one of the crucial factors influencing the performance of organizations in the contemporary market environment. While earlier organizations focused their attention solely on the quality of the product and the service process, nowadays, they have realized that it is crucial to focus on the entire customer experience which is being created by them during the interaction with the brand [8]. In line with the Experiential Economy principle put forward by [9], nowadays, consumers are more interested in obtaining a memorable experience associated with something interesting rather than obtaining any practical benefits from the product. VR and AR technologies offer incredible opportunities for enhancing the customer experience through visualizing the product, try-ons, storytelling, etc.

The growing number of publications on VR/AR in customer experience is a clear indication of the interdisciplinary nature of research in this area. Researchers from multiple fields, such as marketing, management, computer science, psychology, tourism, and human-computer interaction, have helped in shaping knowledge in this area. Moreover, with the emergence of such trends as AI, the metaverse, digital commerce, and omnichannel retailing, along with the integration of immersive technologies in these trends, research in this area has been growing rapidly [10]. Hence, it is no surprise that the literature in this field is becoming increasingly fragmented, covering multiple theoretical frameworks, methodological perspectives, and applications.

Bibliometrics has been used as an effective methodology that can help to evaluate the development of scientific knowledge in a certain research area. In contrast to conventional literature reviews, bibliometrics utilizes a set of quantitative analysis methods to examine publication, citation, co-authorship, and keywords networks, thus offering a full picture of the field of studies' intellectual space [11]. With the help of visualization software like VOSviewer and Biblioshiny, one can easily detect the leading authors, institutions, countries, research clusters, and the development of themes. Taking into account the fast development and multidimensionality of VR/AR researches in the field of customers' experiences, the application of bibliometrics can be useful in systematization of the existing knowledge, identification of research gaps, and setting directions for further researches.

In spite of the considerable increase in scientific research in the field of VR/AR applications for customer experience, existing literature is still fragmented into several sciences and practical areas. Earlier investigations were mostly concentrated on a particular industry, technology, or behavioral outcome, which prevents one from achieving a general idea of the intellectual structure and evolution of the field. Besides, not much is known about key publications, prominent authors, collaboration patterns, topical groups, and new directions of VR/AR customer experience research. Lack of bibliometric review leads to a lack of understanding of the changes that occurred over time in scientific attention to various issues and identifies which directions require further investigation. For that reason, a systematic bibliometric study should be carried out to understand the structure of the body of knowledge, key topics, and future research directions in VR/AR customer experience. This study aims to systematically examine the intellectual landscape and development of research on VR and AR in customer experience through a bibliometric review of publications indexed in a major scientific database.

2. METHODS

In this work, a bibliometric analysis approach is used for systematic evaluation of the research developments of virtual reality (VR) and augmented reality (AR) in the context of customer experience. The term “bibliometric analysis” refers to a quantitative analysis approach which evaluates scientific papers in order to find trends, patterns and intellectual structures of a research area [11]. The analysis was done using VOSviewer which is an extensively used bibliometric mapping and visualization software developed by [12]. This tool was used to construct and visualize bibliometric networks such as keyword, author, citation and bibliographic coupling networks. By doing so, it is possible to find dominant research topics, influential authors and collaborators, as well as new trends in the VR/AR customer experience literature. Furthermore, temporal overlay and density visualizations were used for finding the evolution and concentration of research topics within the field.

The bibliographic data were collected from the Scopus database, which is recognized as one of the largest and most comprehensive sources of peer-reviewed scholarly publications. Scopus was selected due to its extensive coverage of high-quality journals across multiple disciplines relevant to VR/AR and customer experience research. The data retrieval process was conducted using a search query containing keywords related to “virtual reality,” “augmented reality,” and “customer experience” within article titles, abstracts, and keywords. Only English-language journal articles, conference papers, and review articles indexed in Scopus were included in the dataset. After the screening and refinement process, the bibliographic records were exported in CSV format and subsequently analyzed using VOSviewer.

3. RESULTS AND DISCUSSION

3.1 Keyword Co-Occurrence Network

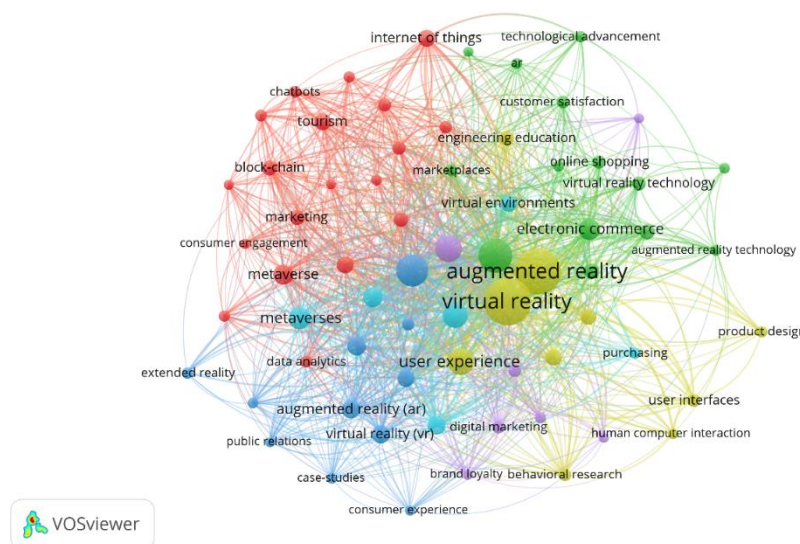


Figure 1. Network Visualization

Source: Data Analysis Result, 2026

The map in Figure 1 reveals the conceptual and thematic network of AR and VR research related to customer experience and other related fields. In the middle of the map, the two dominating nodes “augmented reality” and “virtual reality” are depicted

with the highest density and greatest strength of linkages, showing the fact that both AR and VR technologies serve as central anchoring concepts in this literature domain. The centrality of these two concepts arises from

the fact that this research is mainly driven by technologies.

The first important theme group (colored red) includes themes like marketing, consumers engagement, tourism, metaverse, blockchain, and chatbots. The first theme group implies a highly commercialized approach to digital transformation through the study of VR/AR technology as a means to improve the process of creating better engagement and interactive marketing techniques. The existence of the concepts "tourism" and "metaverse" implies that there is an area of experience-based industry and virtual environment as an application sphere for the use of VR/AR technology.

Another notable cluster (green) revolves around electronic commerce, e-commerce, virtual environment, and customer satisfaction. This demonstrates the practical application of VR/AR in transactional and service delivery situations. It should be noted that the connection between AR/VR and customer satisfaction implies that many of the existing studies measure the success of AR/VR in terms of usability and post-implementation satisfaction. Thus, the high dependence of this field on consumer behavior and information systems theories is evident.

The third group (blue and yellow) includes studies related to user experience, human computer interaction, design of products, interfaces, and behavioral outcomes. This is due to the fact that there is a more design-driven approach to studying VR/AR technologies in which they are studied with the emphasis on usability, optimization of interfaces, and cognitive or behavioral responses. The presence of such terms as "data analytics," "consumer experience," and "digital marketing" proves a higher level of methodological proficiency.

The map demonstrates a field that is highly interdisciplinary but still anchored in technology-centric paradigms, with three dominant orientations: (1) marketing and engagement systems, (2) e-commerce and consumer satisfaction, and (3) human-computer interaction and UX design. Emerging concepts such as metaverse, blockchain, and IoT appear at the periphery, suggesting they are still developing but increasingly integrated into VR/AR discourse. The structure indicates that future research is likely to shift toward more integrated ecosystems where immersive technologies are embedded within broader digital economy and intelligent system architectures.

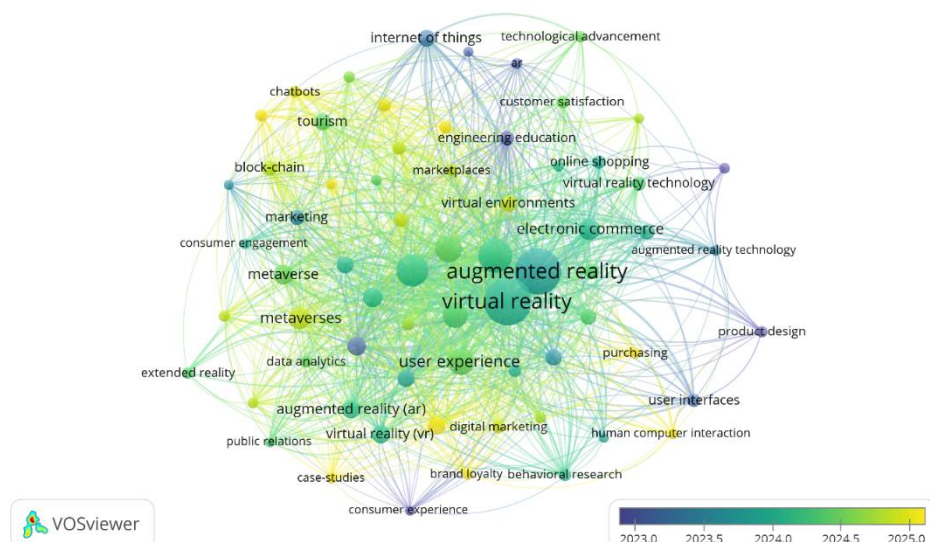


Figure 2. Overlay Visualization

Source: Data Analysis Result, 2026

This is reflected in Figure 2 which depicts the evolution of AR and VR research in relation to customer experience and related fields in terms of time and theme. The key concepts “augmented reality” and “virtual reality,” which form the central nodes of this knowledge structure, continue to be the most dominant and most densely linked keywords, thus supporting the conclusion about their centrality in the body of knowledge under study. The network density testifies to the stable interest in these terms on the part of academia.

The color gradient (from blue to green to yellow, where blue denotes older articles and yellow newer ones – the years range between 2023 and 2025) demonstrates the obvious change in the focus of the research from old to new topics. Older articles are

mostly concerned with basic concepts such as “user experience,” “human-computer interaction,” “consumer experience,” and design of “virtual reality (VR)” systems. The latter indicate that the initial period of research was focused on issues related to usability, interface design, and the adoption of immersive technologies.

Recent clusters (yellow circles) have witnessed an increasing trend towards research based on applications and digital economies ecosystems especially in relation to “electronic commerce”, “shopping online”, “metaverse”, “blockchain”, “chatbot” and “tourism”. This indicates that there has been a shift from AR/VR usability-based research to research involving digital economy ecosystems where immersive technologies facilitate customer engagement.

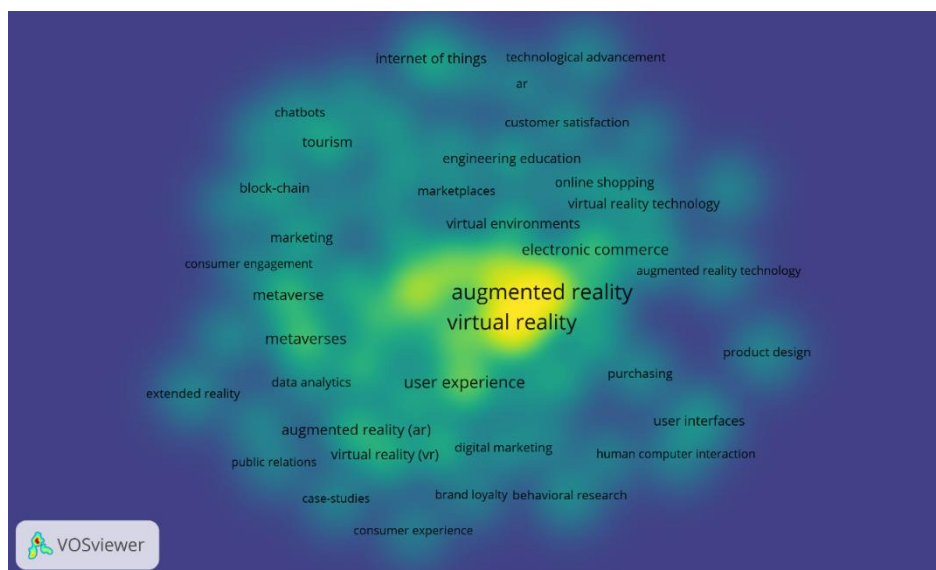


Figure 3. Density Visualization

Source: Data Analysis Result, 2026

This density map illustrates the concentration of research in the area of VR/AR in customer experience. The area that shines the most brightly is highly concentrated on the terms “augmented reality” and “virtual reality.” It indicates that these two concepts are dominating in the field, in terms of frequency and strength of co-occurrence. Moreover, the zone of high density around the terms “user experience,” “electronic commerce,” and “virtual environments” implies that this field is focused mainly on

user experiences and practical applications of these technologies in such context.

Secondary research on marketing, digital marketing, customer engagement, metaverse, and online shopping in the medium-density network demonstrates an incorporation of VR/AR into the realms of business and strategic communications. The fact that blockchain, chatbots, and Internet of Things appear among the terms in the outer but still connected part of the network indicates that the technological environment

in which immersive technology exists and is incorporated expands.

3.2 Co-Authorship Analysis

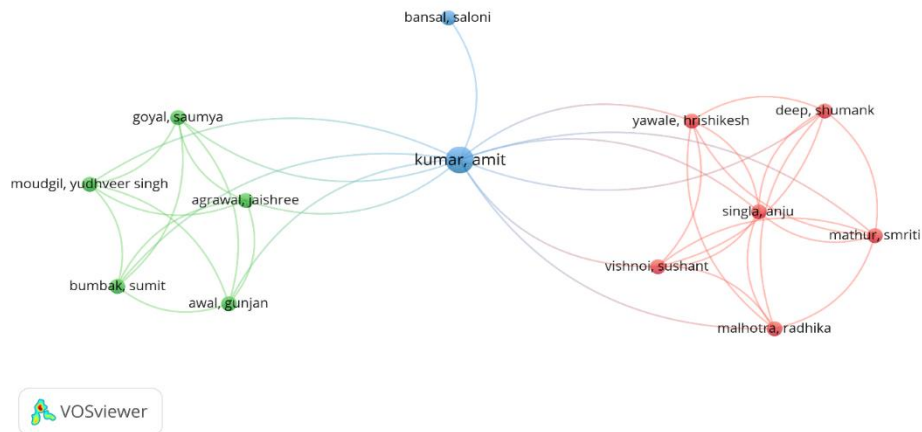


Figure 4. Author Visualization

Source: Data Analysis Result, 2026

Figure 4 shows a graph of co-authorship, where the fragmentation is clearly structured on clusters via a central bridging author. The node "kumar, amit" is in an important position at the center of the network and has high betweenness centrality, meaning that he acts as the connecting link between different research groups. This means that Amit Kumar is an active collaborator between the scholars in other research clusters.

Clustered on the left side, the green cluster (for example, Goyal, Saumya; Agrawal, Jaishree; Awal, Gunjan; Bumbak, Sumit) is an internally cohesive group,

representing strong internal co-authorships but poor connections outside the group. On the other hand, on the right side, the red cluster (for example, Deep, Shumank; Singla, Anju; Mathur, Smriti; Malhotra, Radhika; Vishnoi, Sushant) is another internally cohesive group representing a parallel placement within the group but poor integration outside the group. The presence of smaller peripheral nodes such as "bansal, saloni" and "yawale, hrishikesh" linked more weakly to the central node reinforces a hub-and-spoke structure rather than a fully integrated collaborative network.

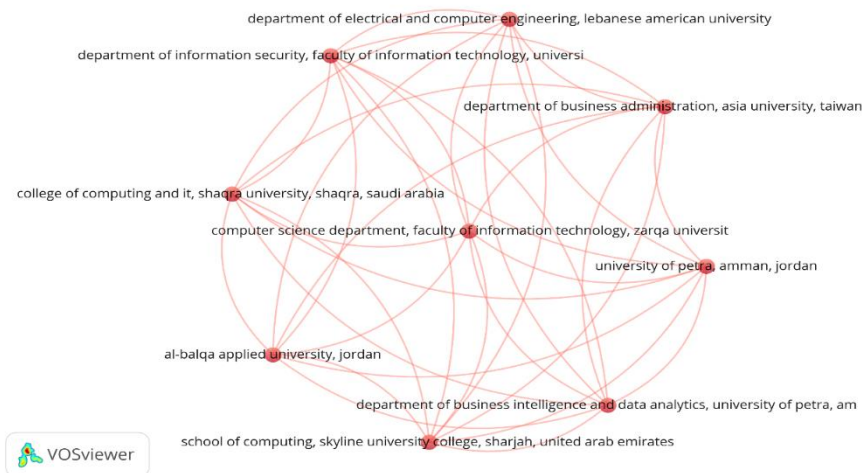


Figure 5. Institution Visualization

Source: Data Analysis Result, 2026

The figure 5 network is one that portrays an institutional collaboration network where the research process takes place in different universities and departments, mostly within information technology, computer sciences, and business analysis. The network is very well connected, showing how international collaboration is quite dense and not limited within institutional silos. The central positioning of this network is held by institutions such as the Faculty of Information Technology, Zarqa University, which serves as a key intermediate node among many regional clusters.

The collaboration pattern has been seen to be largely prevalent among the institutes in the Middle East and Asia, which include University of Petra (Jordan), Al-Balqa

Applied University (Jordan), Shaqra University (Saudi Arabia), Skyline University College (UAE), and Asia University (Taiwan). It can thus be noted that the nodes form a highly interconnected network in the region, showing high levels of intra-regional collaboration in academia, especially in applied computing, business intelligence, and information systems domains. Nonetheless, the existence of organizations like the Lebanese American University and other organizations linked together by more than one link means that there is some degree of cross-network integration even though the whole network is relatively regionally concentrated rather than being dispersed globally. The lack of any one global center means that collaboration is fairly decentralized.

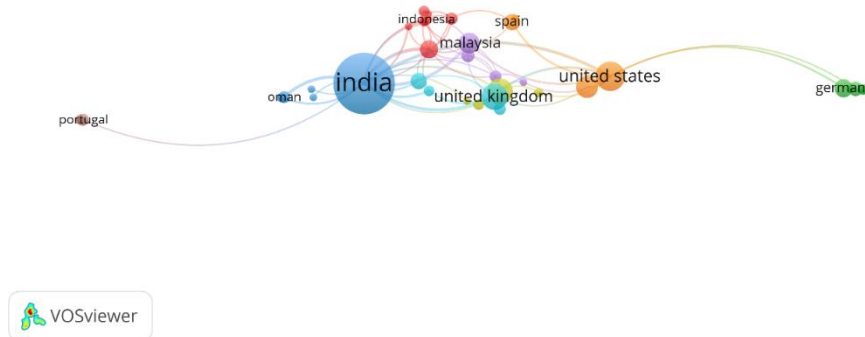


Figure 6. Country Visualization

Source: Data Analysis Result, 2026

Figure 6 depicts collaboration among different countries, with India standing out as the dominant central node in the network. India can be seen as the largest and the most connected node, meaning that it is the country with the greatest amount of research and collaboration intensity in the data set. India acts as a link between various countries, especially the United States, the United Kingdom, Malaysia, Indonesia, and Oman.

The United States and United Kingdom form a secondary collaborative core with strong interconnections to India and other countries such as Spain and Malaysia. This reflects their continued influence as established research hubs, particularly in

technology-driven and interdisciplinary fields. Meanwhile, countries like Malaysia, Indonesia, and Spain occupy intermediate positions, indicating active but regionally concentrated collaboration patterns, often mediated through partnerships with India or Western countries.

At the periphery, countries such as Germany and Portugal show weaker and more isolated connections, suggesting limited integration into the broader collaboration network. Germany, despite its strong global research reputation, appears minimally connected in this dataset, which may reflect topic-specific engagement rather than overall research capacity.

3.3 Citation Analysis

Table 1. Top Cited Research

Citations	Authors and year	Title
875	[13]	Transforming the Customer Experience Through New Technologies
456	[14]	Virtual and augmented reality: Advancing research in consumer marketing
209	[15]	VR is on the edge: How to deliver 360- videos in mobile networks
170	[16]	Enhancing the customer experience with virtual and augmented reality: The impact of content and device type
141	[17]	How to strategically choose or combine augmented and virtual reality for improved online experiential retailing
97	[18]	Retraction:The rise of 3D E-Commerce: the online shopping gets real with virtual reality and augmented reality during COVID-19
91	[19]	Proposing a metaverse engagement model for brand development

Citations	Authors and year	Title
68	[20]	The realm of metaverse: A survey
57	[21]	Extended reality for mental health: Current trends and future challenges
53	[22]	The Palgrave Handbook of Interactive Marketing

Source: Scopus, 2026

From Table 1, it is evident that the knowledge base of VR/AR in relation to customer experience and digital marketing is rather concentrated, meaning that only a few publications play a significant role in defining the research direction in this area. The most referenced publication is [13], having been referenced 875 times, highlighting the importance of this paper in understanding how technological innovations affect customer experience. Next comes [14], which further strengthens the theoretical and empirical underpinnings of VR/AR in consumer marketing research.

A secondary level of relevant studies consists of [15] and [16]. These papers turn the attention towards technical infrastructures and experiential performance, specifically, the provision of immersive content (such as 360-degree video streaming), and the way content and device features influence the results of customer experience. These papers show that there is a move from conceptual to applied technological experiments.

Some more recent influential works like those of [17], [19], and [20] demonstrate the increasing importance of research related to metaverses and extended reality technologies. Another sign that VR/AR e-commerce-related research raises methodological concerns is the presence of a retracted study [18].

4. CONCLUSION

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This bibliometric study provides a comprehensive mapping of the intellectual structure, thematic evolution, and global research dynamics of virtual reality (VR) and augmented reality (AR) in customer experience. The findings demonstrate that the field is anchored by a highly influential knowledge base, with seminal works such as [13] and [14] establishing the theoretical foundation for technology-driven customer experience and experiential marketing. The co-occurrence and density analyses further reveal that the research domain is structured around three dominant streams: immersive user experience and human-computer interaction, application of VR/AR in electronic commerce and digital marketing, and the emerging integration of immersive technologies within broader ecosystems such as the metaverse, blockchain, and extended reality.

The evolution patterns indicate a clear transition from early conceptual and usability-focused studies toward more application-oriented and ecosystem-driven research. Recent literature increasingly emphasizes metaverse-based engagement, online shopping experiences, and strategic branding applications, reflecting the growing commercialization of immersive technologies. Additionally, the collaboration networks at both author and country levels reveal a fragmented yet progressively interconnected global research landscape, with India and several Western countries serving as key contributors and knowledge brokers.

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