

Supply Chain Transparency Research: A Bibliometric Analysis

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ABSTRACT

Supply chain transparency has become one of the key topics in recent years due to the increasing emphasis on sustainability, traceability, digital transformation, and accountability in global supply networks. The widespread application of advanced technologies including blockchain, Internet of Things (IoT), and smart contracts has led to a growing body of literature on studying the benefits of supply chain transparency and its role in enhancing performance and resilience. This paper aims at revealing the intellectual structure, evolution, collaboration pattern, and future directions of supply chain transparency research by employing bibliometrics. Data was obtained from Scopus databases and then analyzed with the help of bibliometric methods supplemented by VOSviewer. Publication analysis, authorship analysis, institutional collaboration, country collaboration, citation analysis, keyword analysis, overlay visualization, and density visualization will be employed in the process of data analysis. It can be found that the most dominating themes among supply chain transparency literature include blockchain, supply chain management, sustainability, traceability, and digital transformation. India and China became major players in the network of international collaboration, while some institutions functioned as knowledge hubs. Most citations were achieved by papers discussing blockchain-based sustainable supply chains and frameworks for implementing transparency. Keyword evolution further demonstrates a shift from operational visibility toward integrated digital ecosystems emphasizing sustainability, circular economy, food safety, and intelligent supply chain governance.

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1. INTRODUCTION

The complexity in global supply chain management has resulted in the development of a different perspective in organizational production, distribution, and relationship management [1]. Contemporary global supply chains have ceased to be limited only within the country where they operate,

and have become interdependent networks of suppliers, manufacturers, distributors, retailers, and consumers that operate in many nations. Despite the efficiency associated with globalization, some concerns have developed, including the problem of visibility, accountability, and ethicality of organizational actions. The issue of supply chain transparency has therefore become an

important topic in academic and business discussions. Supply chain transparency means the degree of visibility in supply chain activities, supplier selection, working environment, and impact on the environment and society [2], [3]. It means that more and more companies should present relevant information related to their supplier selection policy and other aspects of environmental and social responsibility. The increased need for supply chain transparency comes from consumers, governments, non-governmental organizations, and investors [4].

Transparency in supply chains has grown in prominence after certain global events that highlighted problems with labor abuse, environmental degradation, counterfeit goods, and interruptions to logistics systems. Issues such as dangerous working conditions, improper sourcing procedures, and environmentally damaging manufacturing methods have served to highlight how secretive supply chains could negatively impact a company's image and its credibility [5]. To combat the potential for negative publicity, government agencies and other international bodies have made efforts to introduce stricter laws regarding corporate disclosures and sustainable supply chains. In addition to these regulatory pressures, there has been a proliferation of new digital technologies that have contributed greatly to transparency in supply chains. These advancements include blockchain technology, artificial intelligence, big data analysis, and the Internet of Things. These technologies allow supply chains to be monitored and tracked in real time, leading organizations to focus on improving communication throughout the supply chain process [6], [7].

In terms of academic research, there has been significant growth in the body of literature on supply chain transparency over the last decade. Researchers from areas like operations management, sustainability, logistics, information systems, and business ethics have studied transparency using different theoretical perspectives. Some researches concentrate on technological advances in traceability systems, whereas

others pay attention to the topic in terms of sustainability reporting, stakeholder communication, risk management, and collaborative work of suppliers [8]. Moreover, the role of transparency in organizational performance and consumption behaviors and sustainable development has been studied as well. All these theoretical perspectives show that supply chain transparency is an interdisciplinary field with diverse academic applications. Nevertheless, the growing number of publications raises the problem of literature fragmentation. Because of different terminologies, approaches, and methodologies applied by researchers, it becomes rather problematic to define the overall intellectual structure of the discussed field.

The use of bibliometrics has been widely adopted as a tool for assessing the growth of scientific knowledge in various research fields. With the use of bibliometric techniques, scholars can examine publication trends, citation links, influential authors, institutional contribution, and thematic progression in a particular area of interest [9]. Unlike conventional literature reviews, bibliometric studies offer a more in-depth and unbiased assessment of research impact and intellectual connections. The application of bibliometric tools like co-citation analysis, co-word analysis, and bibliographic coupling enables one to identify prevailing themes, collaboration networks, and potential avenues for future research. For instance, bibliometric analysis is quite significant in the study of supply chain transparency research, which is a multi-disciplinary area of inquiry and characterized by rapid advancements in technology.

Even though more studies have been done on supply chain transparency over time, relatively little bibliometric research on this specific topic has been undertaken. The existing literature tends to concentrate more on broader topics, including sustainable supply chain management, digital transformation, and corporate social responsibility, instead of analyzing transparency as an independent area of study. Therefore, it is necessary to gain more insight

into the most significant contributions, clusters of research, countries, institutions, and emerging issues related to supply chain transparency research. In addition, recent trends, such as increased sustainability concerns and innovation resulting from the COVID-19 pandemic, have certainly had an impact on the focus of research in this area. Consequently, the need to conduct a bibliometric analysis has emerged in order to understand the intellectual evolution of supply chain transparency research and its main trends at present.

While there has been tremendous growth in the academic literature exploring issues of supply chain transparency, the available literature base is scattered and does not have a proper compilation that discusses the intellectual structure, prevailing trends, key contributors, and evolution of topics within the area. Past research efforts have been largely focused on individual aspects including sustainability, traceability technologies, ethical sourcing, or supplier management without an overview of the overall progress in supply chain transparency research. Thus, researchers and practitioners find it hard to identify major research trends, collaborative activities, technological innovations, and potential areas for further investigation. On the other hand, developments related to digital technology and sustainability concerns are creating novel dynamics in research that have yet to be fully explored using bibliometric methods. This indicates the need for a bibliometric analysis of the academic literature on supply chain transparency. The objective of this study is to explore the evolution of research on supply chain transparency using bibliometric analysis.

2. METHODS

In the current research, a bibliometric analysis approach will be used to investigate the evolution of research literature on the topic of supply chain transparency. Bibliometric analysis refers to a type of quantitative methodology used to assess scientific publications using statistical and

mapping methods. The purpose of bibliometric analysis is to evaluate scientific publications in terms of trends in publication, influential authors, collaboration patterns, and thematic evolution. The use of a bibliometric analysis approach is suitable for the current study because the topic of supply chain transparency has evolved into a multidisciplinary subject incorporating concepts in supply chain management, sustainability, information systems, logistics, and business ethics.

The data used for this research is sourced from a trustworthy scientific database like Scopus and Web of Science because of their vast content on peer-reviewed international literature. Sources containing data on supply chain transparency can be easily detected by employing relevant keywords like "supply chain transparency," "supply chain visibility," "traceability," and "sustainable supply chain disclosure." For this purpose, the search is confined only to journal articles, conference papers, and review articles that are available in the English language within a certain timeframe. In the next step, after collecting the required data, any duplicates or irrelevant sources are filtered out. The selected data is exported in suitable formats to conduct bibliometric analysis using VOSviewer.

3. RESULTS AND DISCUSSION

3.1 Co-Authorship Analysis

Figure 1 presents the co-authorship network visualization generated using VOSviewer for the study on Supply Chain Transparency Research. The map illustrates collaboration patterns among authors, where each node represents an author, node size indicates relative publication influence or collaboration intensity, connecting lines indicate co-authorship relationships, and colors represent distinct collaboration clusters. The network demonstrates that research in supply chain transparency is organized into several interconnected author groups rather than a single highly centralized collaboration structure.

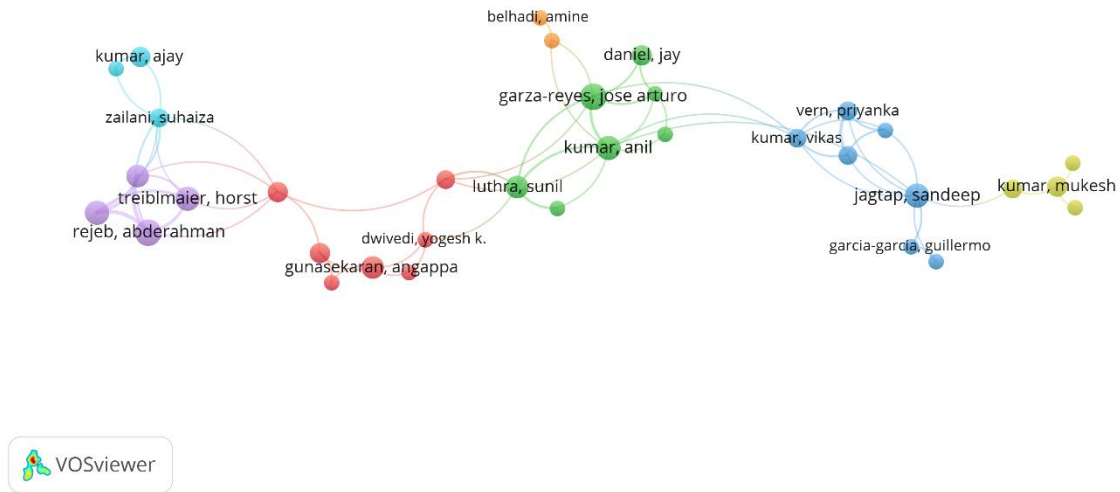


Figure 1. Author Visualization

Source: Data Analysis

Multiple collaboration clusters with varying connectivity have been identified. The blue cluster, comprising authors like Jagtap, Sandeep, Kumar, Vikas, Vern, Priyanka, and Garcia-Garcia, Guillermo, seems to form a highly connected cluster of collaboration, implying that this is a strong community in terms of active collaboration. The green cluster consisting of Garza-Reyes, Jose Arturo, Kumar, Anil, Daniel, Jay, and Luthra, Sunil, plays the significant role of bridging adjacent clusters, thereby showing the contribution of this cluster toward the integration of different streams of research on supply chain transparency. On the other hand, there is a small cluster of collaboration in red, while a further small cluster of

collaboration in purple-cyan color can be seen.

Figure 2 presents the organizational co-authorship (affiliation collaboration) network generated using VOSviewer for the study on Supply Chain Transparency Research. In this visualization, each node represents an institutional affiliation, node size reflects the relative contribution or collaboration intensity of the institution, connecting lines indicate collaborative relationships, and different colors represent distinct institutional clusters. The network demonstrates that research activity in supply chain transparency is concentrated within several interconnected academic institutions rather than being evenly distributed across organizations.

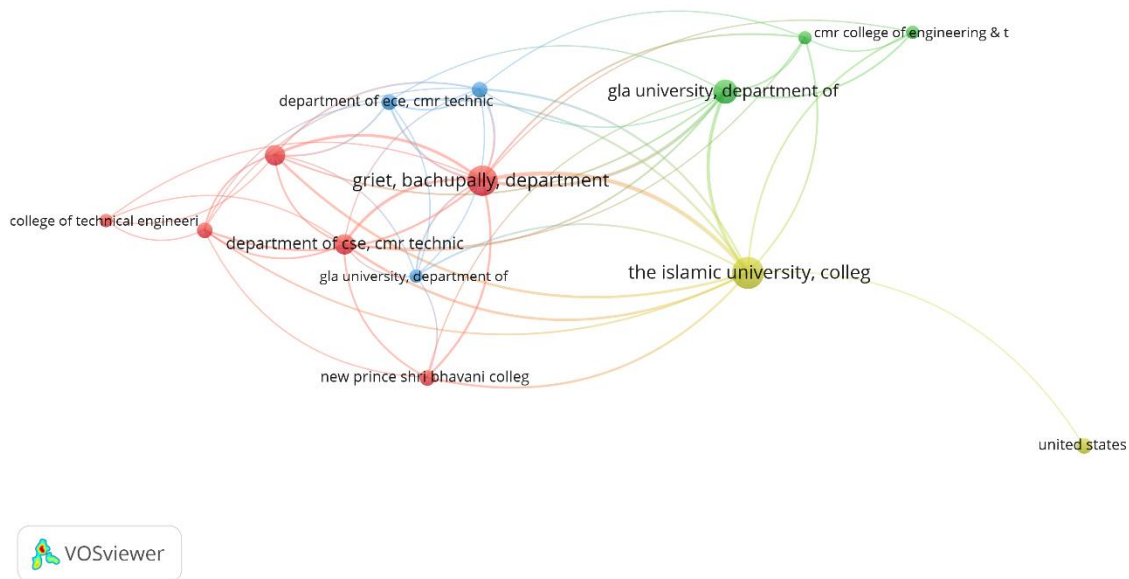


Figure 2. Institution Visualization

Source: Data Analysis

From the map, The Islamic University, College is seen to occupy the central role as well as being more influential in the collaborative network because of its big size and many interconnections between different institutional clusters. The institution acts as a hub for connecting researchers that would be separate without the institution. Other important institutions in the network include GLA University (Department of...) and GRIET, Bachupally (Department...). These institutions connect strongly with each other in terms of collaboration. In addition, the red and blue clusters depict institutions whose technical and engineering departments collaborate closely. On the other hand, the green cluster is made up of another set of collaborating institutions in the area including GLA University and engineering institutions.

The link towards United States seems to be an isolated one.

Figure 3 presents the country collaboration network (co-authorship by country) generated using VOSviewer for the study on Supply Chain Transparency Research. In this visualization, each node represents a country, node size reflects the relative research contribution and collaboration intensity, connecting lines indicate international co-authorship relationships, and different colors represent clusters of countries that frequently collaborate. The network demonstrates that supply chain transparency research has developed through extensive international cooperation, although contributions remain concentrated in several dominant countries that serve as global knowledge hubs.

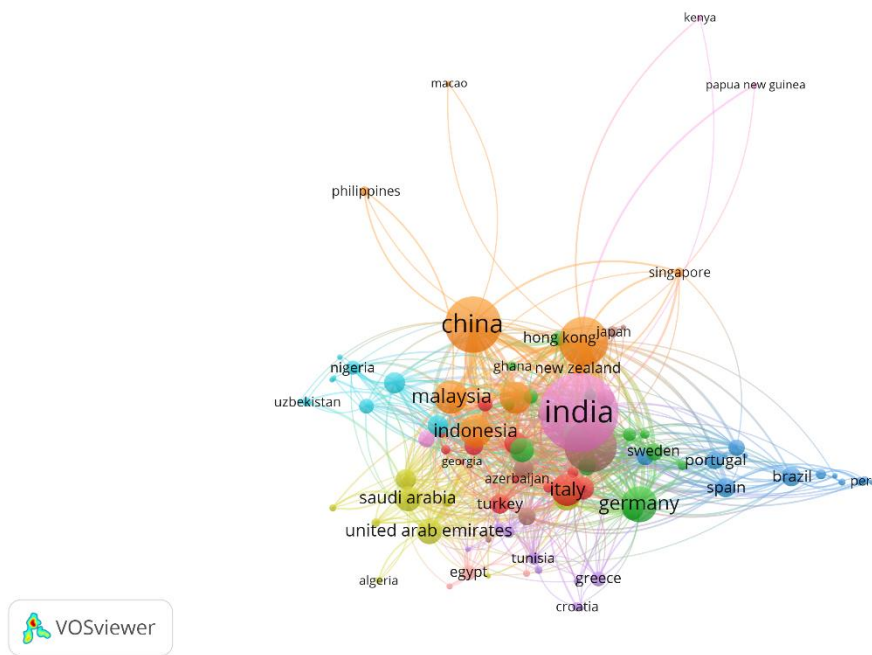


Figure 3. Country Visualization

Source: Data Analysis

According to the visualization, India is depicted as the most significant and central contributor due to its large size and high degree of collaborative interactions with many other nations in various clusters. Thus, India can be considered a key international connection point in the investigated sphere, mainly connecting the collaboration among countries on an Asian, European, and developing nation level. China is another significant country that is depicted as being at the center due to high degrees of cross-national relations with many nations including Singapore, Hong Kong, the Philippines, and New Zealand. Other countries of influence in the investigated sphere include Germany, Italy, Malaysia, and Spain.

3.2 Keyword Co-Occurrence Analysis

Figure 4 presents the keyword co-occurrence network visualization generated using VOSviewer for the study on Supply Chain Transparency Research. In this map, each node represents a keyword, node size reflects the frequency of occurrence, connecting lines indicate the strength of relationships between keywords, and colors represent thematic clusters that form distinct streams of research. The visualization reveals that supply chain transparency has evolved into a multidisciplinary domain integrating supply chain operations, digital technologies, sustainability, governance, and emerging analytical approaches.

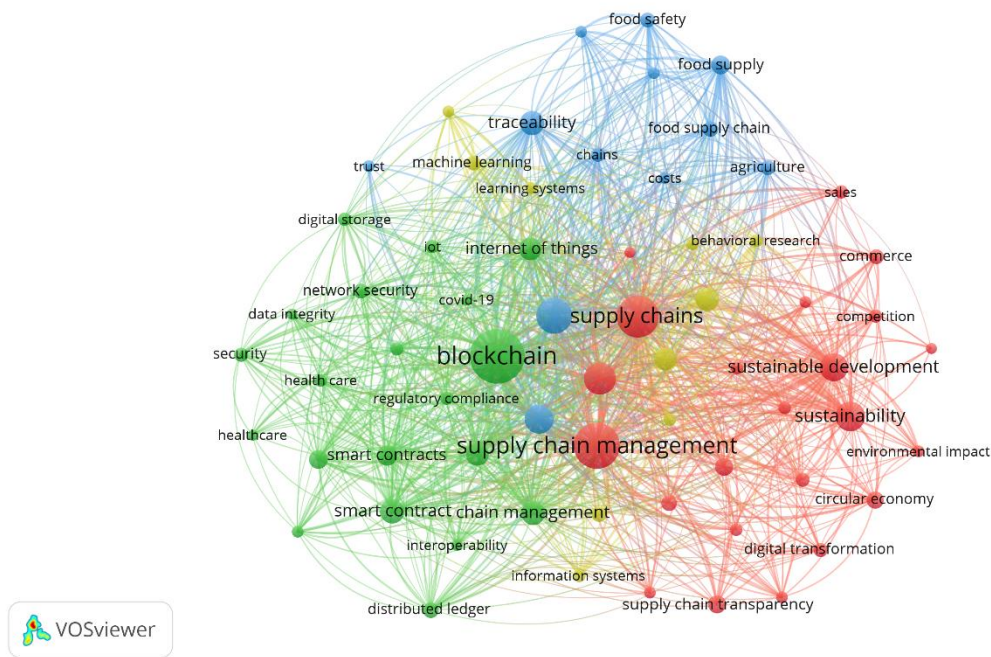


Figure 4. Network Visualization

Source: Data Analysis

Red cluster seems to be related to the sustainability and managerial transformation dimension of research on supply chain transparency. These keywords are clustered around the terms such as supply chain management, sustainability, sustainable development, digital transformation, circular economy, and supply chain transparency. Such clustering of the terms reveals that supply chain transparency is more than just information sharing because it is being considered a way to promote sustainability, environmentalism, and value generation. It can be seen that there is a strong connection between supply chain transparency and digital transformation as well. Green color-coded group reflects the technological angle in this domain, as well as the approach based on blockchain. Such dominant terms as blockchain, smart contract, distributed ledger, interoperability, network security, regulation compliance, Internet of Things (IoT), and data integrity can be found in this category. Thus, we can state that digital infrastructure is becoming one of the key trends when it comes to researching supply chain transparency issues. Blockchain technologies can be viewed as the tools that help create tamper-proof

records, improve transparency, minimize information asymmetry, and build trust among members of the chain.

The blue cluster focuses on the aspect of traceability and visibility, specifically in relation to supply chain management and food. The presence of keywords such as traceability, food safety, food supply, food supply chain, agriculture, and cost highlights the fact that the studies conducted in relation to supply chain transparency have a very strong application base, especially when it comes to industries that need to verify the sources of their products as well as maintain a high level of quality. This is evidenced by the fact that most of the focus is on food and agriculture-based industries. The strong interconnectedness between all the clusters implies that the topic of supply chain transparency has begun to shift from being an operational issue to an interdisciplinary approach incorporating technology adoption, sustainability goals, governance structures, and data analysis. The key terms such as supply chain, blockchain, and supply chain management can serve as thematic connections.

the research network. Areas shown in yellow represent the highest research density and strongest conceptual concentration, while green and blue areas indicate moderate to lower research intensity. The map

demonstrates that the field is structured around several dominant concepts that function as the intellectual core of supply chain transparency studies.

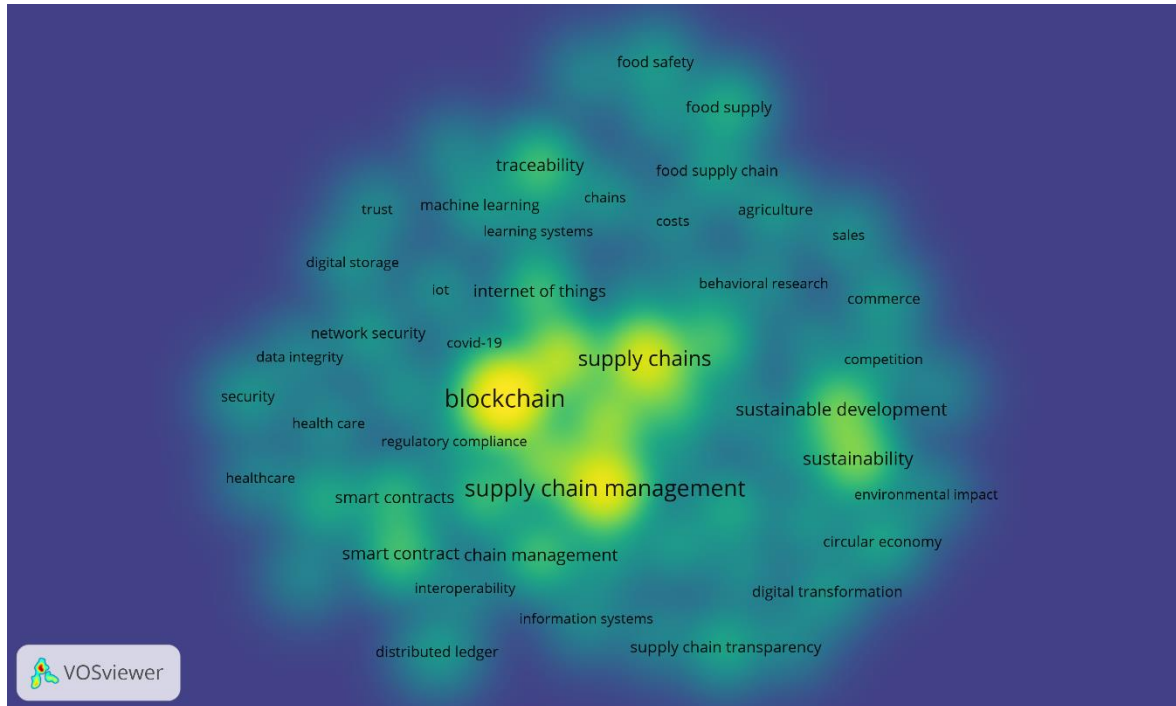


Figure 6. Density Visualization

Source: Data Analysis

From the visualization, one can identify that the areas that generate high-density connections in research are supply chain management, supply chains, and blockchain, as illustrated in the bright yellow spot in the middle of the map. From this, it is evident that most studies revolve around the application of digital technologies in governance and visibility in supply chains. Areas surrounding those three themes include sustainable development,

sustainability, Internet of Things (IoT), traceability, smart contracts, and supply chain transparency. These illustrate how the study area is broadening towards more sustainable and tech-enabled ecosystems. Food safety, distributed ledger, interoperability, digital transformation, environment, and healthcare, among others, depict lower density in the field and hence present emerging trends that are yet to be explored in-depth.

3.3 Citation Analysis

Table 1. Top Cited Literature

Citations	Authors and Year	Title
3339	[10]	Blockchain technology and its relationships to sustainable supply chain management
1378	[11]	Blockchain technology in supply chain operations: Applications, challenges and research opportunities
1219	[12]	Blockchain technology and the sustainable supply chain: Theoretically exploring adoption barriers

1027	[13]	Understanding blockchain technology for future supply chains: a systematic literature review and research agenda
830	[14]	Understanding the Blockchain technology adoption in supply chains-Indian context
786	[15]	Blockchain-based traceability in Agri-Food supply chain management: A practical implementation
735	[16]	Blockchain applications in supply chains, transport and logistics: a systematic review of the literature
681	[17]	A Survey of Blockchain Technology Applied to Smart Cities: Research Issues and Challenges
597	[18]	A supply chain transparency and sustainability technology appraisal model for blockchain technology
591	[19]	Blockchain technology for enhancing swift-trust, collaboration and resilience within a humanitarian supply chain setting

Source: Scopus 2026

The most cited works in the realm of Supply Chain Transparency Research are provided in Table 1 below. They reveal important intellectual backgrounds and research directions prevailing in the current academic community. It can be concluded that the main body of knowledge generated by researchers is heavily concentrated on studies related to blockchain and sustainable supply chain management, thereby proving the prevalence of technological approaches to transparency among academics. The highest-cited source is [10] with 3,339 citations; it introduced the idea of linking blockchain implementation and sustainable supply chain management. It looks like this source acted as an important base for further studies on transparency and sustainability in the supply chain domain. Another set of highly cited articles are those by [20], [10], and [13], exploring various blockchain applications, challenges, and future research directions in relation to transparency in supply chains. A more detailed review of the highly cited research also reveals that the focus is not only on the technology adoption but also its implementation and organizational results. Research works like [21], who focused on using the blockchain technology for traceability in agri-food systems, and [16], who reviewed the use of blockchain in logistics and transport, can be considered relevant to the theme under study. On the

other hand, [18] discussed transparency technologies in terms of their impact on sustainability performance, and [19] examined the role of blockchain in fostering trust, collaboration, and resilience within humanitarian supply chains.

4. CONCLUSION

This study demonstrates that transparency in the context of supply chains has evolved into an interdisciplinary subject characterized by collaboration between authors, institutions, and even countries, with themes including supply chain management, blockchain technology, traceability, sustainability, and digitalization being particularly salient. Bibliometric results confirm the importance of India and China in terms of their presence in the global networks of scientific research, whereas collaboration between institutions is still characterized by limited involvement of only a few organizations. The keyword analysis has revealed that the focus of the research has shifted from the traditional theme of supply chain visibility towards technology-based transparency using blockchain, the Internet of Things, smart contracts, and data integrity, whereas current research tends to link transparency with sustainable development, circular economy, food safety, and environmental sustainability.

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