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# THE USE OF BLOCKCHAIN IN THE INSURANCE INDUSTRY: A BIBLIOMETRIC ANALYSIS

## Abstract

Blockchain technology has surfaced as a formidable catalyst, capable of reshaping the operational dynamics of conventional businesses. The integration of blockchain technology within the insurance industry has prompted a need for comprehensive understanding and assessment. This study aims to elucidate the relevance of blockchain in the insurance sector, identify key trends, influential research, and the overarching goals motivating the incorporation of blockchain in insurance practices. The study employed a systematic review to collect 125 research articles published between 2017 and 2023 focused on blockchain in insurance from the Web of Science database. This study used Biblioshiny. The analysis encompasses a wide range of parameters, including publication trends, influential authors, thematic clusters, and the geographic distribution of research. IEEE Access emerges as a prominent platform, hosting 11 articles dedicated to this topic. The results of keyword co-occurrence highlighted two keywords: blockchain and insurance. The results of the country collaboration map highlighted particular shortcomings, such as the concentration of research in countries like China, the USA, India, KSA, Malaysia, and Australia. A lack of research in developing and underdeveloped countries and insufficient knowledge sharing among researchers highlights a research gap. In conclusion, the analysis offers valuable insights into the evolving landscape of blockchain within the insurance industry.

## Keywords

blockchain, insurance practices, Web of Science  
database, transparency, security, efficiency

## JEL Classification

G22, I13

## INTRODUCTION

The dynamic landscape of the insurance industry, characterized by perpetual evolution and sustained growth, and its pivotal role in fostering economic prosperity cannot be overstated. Central to this role is the industry's commitment to providing risk management, financial security, and support for commercial operations. This commitment underscores its vital contributions to long-term economic development. However, the effective management of confidential data related to individuals, assets, and sensitive information is paramount, and the insurance sector recognizes the critical importance of maintaining information quality. This recognition guides present interactions and is a foundational principle for formulating future strategies.

Despite its crucial contributions, the insurance industry faces multifaceted challenges, including trust, inappropriate record utilization, pricing, competition, regulatory compliance, conflicts of interest, settlement disputes, and transparency. As an integral component of the global economy, the insurance sector is unwavering in pursuing innovative solutions to enhance efficiency, security, and transparency. Blockchain technology has emerged as a disruptive force that could reshape traditional business models. Operating as a decentralized and distributed ledger, blockchain offers a secure and transparent platform



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for transactions, effectively addressing challenges such as fraud prevention, streamlined claims processing, and enhanced data management within the insurance sector. Utilizing a consensus mechanism ensures the trustworthiness and integrity of stored information, further fortifying the technology's appeal.

The transformative impact of blockchain on insurance operations is significant, with the potential to optimize processes, reduce risk, improve automation, and secure decentralized transactions throughout the insurance value chain, thereby lowering operational costs. Blockchain enhances transparency, security, and efficiency in policy administration, claims processing, and fraud detection within the insurance sector. Acting as a uniform and dependable source of information, blockchain facilitates secure value transfers without the need for a central authority – a traditional intermediary that typically imposes additional insurance costs. In this context, the platform is a consolidated and trustworthy information source, enabling the seamless digital transfer of value within the insurance ecosystem.

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## 1. LITERATURE REVIEW

Over the past few decades, the insurance business has seen significant transformations. The exponential magnitude of data to be processed is a determining factor. Henceforth, technologies with sophisticated processing capabilities, such as machine learning and artificial intelligence, have garnered significance (Ellili et al., 2023).

The insurance industry, subject to strict regulations and known for its cautious approach, has expanded into several sectors, including real estate, automobile, and healthcare, resulting in a market worth billions of dollars. Insurers, reinsurers, brokers, agents, trade groups, regulators, and Insurers, reinsurers, brokers, agents, trade groups, regulators, and financial technology firms exercise the most influence in the insurance sector (Inyang et al., 2021).

Insurance is a dependable and trustworthy mechanism in modern cultures. Nevertheless, the industry encounters substantial challenges due to emerging economies' economic, social, and political systems. The sector faces hurdles associated with trust, improper use of records, pricing, competition, regulatory compliance, conflicts of interest, settlement disputes, and a dearth of transparency (Nicholson, 2019). The service industry relies significantly on information and communication technology (ICT) due to its information-centric nature (Inyang et al., 2021). The adoption of standardized criteria and the resulting reduction in insurers' profit margins has resulted in intensified competition within the insurance sector. The growing demand for easily accessible and depend-

able data and thorough data analysis has become apparent. The incorporation of Industry 4.0 and the widespread integration of digital technology have enhanced the accessibility of insurance companies.

Nevertheless, extending this phenomenon presents novel challenges and potential hazards (Srivastava et al., 2022).

The insurance and reinsurance markets are currently experiencing a period of instability due to the use of novel technology and concepts. Further, the insurance sector relies on multiple processes involving transacting parties to effectively initiate, handle, and conclude different policies. Key concerns encompass prolonged transaction processing durations, delayed payment resolutions, and inadequate safeguarding of sensitive data during process execution (Raikwar et al., 2018).

Blockchain technology has surfaced as a potent catalyst capable of substantially altering the operational landscape of insurance organizations. Its application in the insurance industry improves transparency, security, and efficiency across several domains, encompassing policy administration, claims processing, and fraud detection (Sayegh & Desoky, 2019). Blockchain, characterized as a distributed ledger, securely records data in blocks. This decentralized system ensures the permanent and verifiable recording of transactions. Utilizing cryptographic techniques, blockchain technology safeguards data coupled with a consensus mechanism to assure the integrity and reliability of the recorded information (Flovik et al., 2021).

Financial technology businesses need to possess a thorough comprehension of their primary operational procedures in order to utilize blockchain technology effectively. Smart contracts streamline the interactions between blockchain and conventional transaction platforms. Financial technology businesses must thoroughly comprehend their fundamental operational procedures to utilize blockchain technology effectively. Smart contracts facilitate the automation of interactions between blockchain and conventional transaction platforms (Nizamuddin & Abugabah, 2021).

Blockchain-enabled smart contracts are crucial in verifying insurance coverage, policy details, and financial transactions. This technology allows insurance companies to swiftly confirm claimant details and make payout decisions based on securely stored data within the blockchain. Smart contracts enhance confidence and transparency in transactions by immediately notifying all network participants in case of a fraudulent claim or if the insurance company hesitates to make a payment (Nizamuddin & Abugabah, 2021). Beyond this, blockchain technology holds the potential to strengthen collaboration between insurance companies and medical institutions, facilitating integration and improving information accessibility for insurance organizations. Blockchain and smart contract technology can address online underwriting challenges, supporting Internet insurance expansion. Additionally, it provides enhanced oversight, aids in risk management, and contributes to efforts in combating money laundering (Chen et al., 2021). Recognizing the potential advantages, the insurance industry has initiated the implementation of blockchain technology in specific instances, such as fraud prevention and risk assessment (Trivedi & Malik, 2022).

The insurance industry has the opportunity to optimize internal operations by adopting blockchain technology, particularly in areas like claim processing, fraud detection, and prevention. Implementing blockchain has the potential to create new insurance brands and elevate the performance of existing ones. Challenges identified in blockchain adoption include concerns related to scalability, security, privacy, taxation, and regulation. Despite the potential, the insurance sector has not fully realized the benefits of blockchain

3.0, and current initiatives are in their early stages. Further research is necessary to expand the academic literature on the practical applications of blockchain in the insurance domain (Amponsah et al., 2021).

Multiple academic studies highlight a growing interest in integrating blockchain into the insurance industry. However, there is a noticeable lack of efforts to synthesize existing literature, which could benefit researchers and industry professionals. This literature review has significant potential to assist researchers, offering valuable insights. It emphasizes the need to promote blockchain adoption in insurance through international collaboration among researchers, promoting knowledge exchange and sharing of concepts across borders. As blockchain is a relatively new technology, a thorough review provides an opportunity to address existing gaps.

The study aims to assess the current state of blockchain literature in insurance, identifying research gaps for future exploration.

## 2. METHODOLOGY

This study performs a bibliometric analysis to consolidate the existing literature on integrating blockchain technology in insurance research. It offers insights into potential future avenues for exploration. The bibliometric analysis is suitable for assessing the present state of a specific field by considering various indicators, including publications, scholars, journals, academic institutions, and countries. Researchers can also analyze collaborative research efforts among scholars, institutions, and nations through bibliometrics.

This study conducted a comprehensive investigation across a leading database, Web of Science, to ensure broad coverage of interdisciplinary research related to blockchain technology and the insurance sector. The search query intended to capture relevant literature by combining keywords related to “blockchain” and “insurance.” The study utilized the terms TITLE-ABS-KEY that are specifically associated with the application of blockchain technology in the insurance industry. The study excluded papers without these keywords and publications in

languages other than English. The inclusion criteria focused on scholarly articles and conference papers published up to the current date in the English language. Also, articles discussing the application of blockchain technology in the insurance industry. The assembly phase comprises filtering out and removing unrelated articles. The process resulted in a sample dataset of 125 journal articles published between 2017 and 2023. The limited sample size may stem from the fact that blockchain application in the insurance sector is an emerging field requiring further investigation.

This study used Biblioshiny, a Java software developed by Massimo Aria, a researcher at the University of Naples Federico. Biblioshiny tailors itself specifically for bibliometrics, seamlessly integrating the bibliometrics package into a user-friendly web interface by utilizing the Shiny package environment within the R programming language. The Bibliometric software was employed to execute bibliographic tasks, such as “co-citation,” “coupling,” “scientific collaboration analysis,” and “co-word analysis,” and generate a data matrix. Additionally, the study observes the continuous emergence of new data at the intersections of structural and temporal advancements in fields such as “network analysis,” “factorial analysis,” and “thematic mapping” (Sreenivasan & Suresh, 2022).

### 3. RESULTS AND DISCUSSION

#### 3.1. Descriptive analysis

Incorporating blockchain technology into the literature of the insurance business has witnessed a consistent and notable rise from 2017 to 2023. This analysis encompasses 125 publications featuring contributions from 456 individual authors affiliated with 90 distinct sources, as depicted in Figure 1.

Examining the annual progression, the initial phase in 2017 saw a modest representation, with only two publications addressing blockchain in the insurance domain. However, the subsequent years witnessed a significant increase in scholarly output. Notably, by 2021, the number of published articles experienced a significant upsurge, reaching a peak of 31 publications, as visually represented in Figure 2. This surge indicates a growing interest and engagement within the academic community regarding the integration and impact of blockchain technology in the insurance sector. The increasing number of publications suggests a maturing discourse and a heightened awareness of the relevance and implications of blockchain within the insurance business literature.

Table 1 provides a comprehensive overview of the most significant sources contributing to the literature on the use of blockchain in the insurance industry. Notably, IEEE Access emerges as a prominent platform, hosting 11 articles dedicated to this topic. Furthermore, the Sustainability Journal has played a significant role, with six publications focusing on the intersection of sustainability and blockchain in insurance. The Journal of Advanced Computer Science and Applications also stands out, featuring four publications that delve into the advanced applications of blockchain within the insurance sector. Beyond these primary sources, additional outlets have made noteworthy contributions, although they exhibit a more limited number of publications, each hosting three or fewer articles. This diversity in sources reflects the richness and interdisciplinary nature of research on blockchain in insurance. The varied representation across different journals and publications underscores the abundance of perspectives and approaches researchers take, highlighting the multifaceted aspects of utilizing blockchain technology in the insurance industry. This diversity

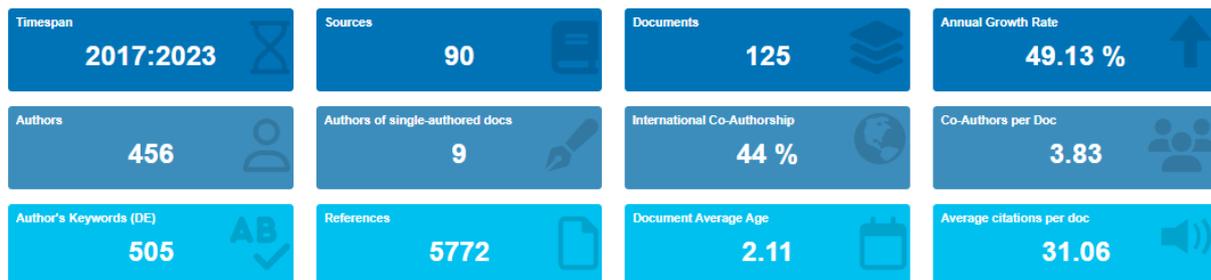
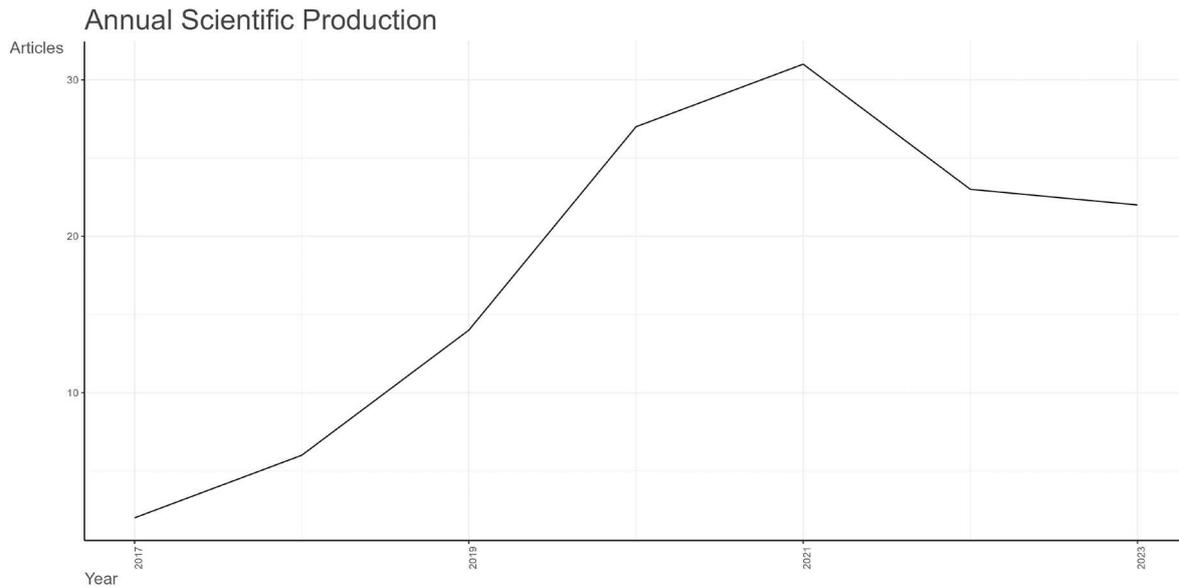


Figure 1. Descriptive analysis



**Figure 2.** Annual number of publications from 2017 to 2023

contributes to a more comprehensive understanding of the subject matter, encompassing various dimensions and facilitating a holistic exploration of the potential impacts and challenges of integrating blockchain in insurance.

**Table 1.** Top 10 relevant sources

Sources	Number of Publications
IEEE Access	11
Sustainability	6
International Journal of Advanced Computer Science and Applications	4
Applied Sciences-Basel	3
Frontiers in Blockchain	3
JMIR Medical Informatics	3
Journal of Medical Internet Research	3
Sensors	3
Blockchain-Research and Applications	2
IEEE Communications Magazine	2

Table 2 highlights institutions that have notably produced scholarly articles on implementing blockchain technology within the insurance sector. Among these institutions, Asia University, Hong Kong Polytech University, and King Abdul-Aziz University are leading contributors, each having published six papers on the subject. Particularly noteworthy is the representation of four institutions in developing countries within this list. This inclusion reflects a significant aspect of the research landscape – the collaboration between researchers from developing and developed

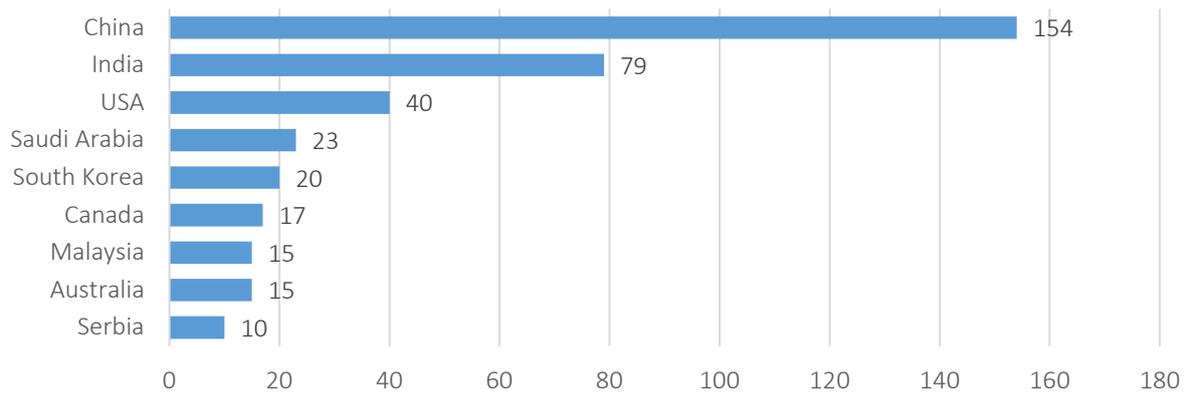
countries. The international research collaboration has resulted in meaningful contributions from institutions in developing regions, emphasizing the global nature of the inquiry into blockchain application in the insurance industry. This collaborative effort fosters diverse perspectives and insights, enriching the discourse and contributing to a more comprehensive understanding of the challenges and opportunities of integrating blockchain technology into the insurance sector.

**Table 2.** Institutions with more than five publications

Institution	Number of Publications
Asia University	6
Hong Kong Polytech University	6
King Abdulaziz University	6
Florida International University	5
Guangzhou University	5
Islamic University Madinah	5
Khalifa University of Science, Technology and Research	5
King Saud University	5
University Texas San Antonio	5

### 3.2. Statistics for author and country

China is the leading contributor, with the most significant publications totaling 154 documents. Following closely, India has a substantial presence in the academic literature, with 79 documents.



**Figure 3.** Documents by country

The United States also holds a noteworthy position, contributing 40 documents to the body of research.

Despite the global interest in the topic, a significant concentration of academic research output is evident in industrialized nations. The Web of Science database, serving as a reflection of this trend, highlights a notable emphasis on contributions from developed countries. This concentration may indicate the research infrastructure, funding, and academic resources available in these nations, emphasizing the need for continued efforts to promote a more inclusive and globally representative research landscape in exploring blockchain applications in the insurance sector (Figure 3).

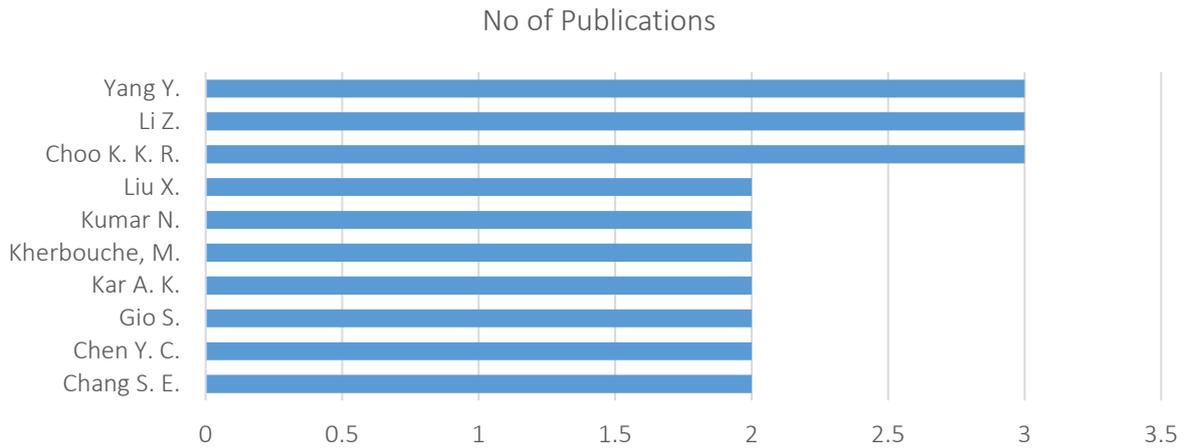
In Figure 4, the authors Choo KKR, LIZ, and Yang Y emerge as the most prolific contributors, collectively publishing three documents on blockchain applications in the insurance industry. This information is sourced from the Web of Science database and is arranged based on the frequency of their publications in well-established journals. These authors' contributions are significant in their consistent output and likely expertise in the field. They have significantly influenced the existing body of knowledge by publishing multiple documents, providing insights and perspectives that contribute to the scholarly discourse on integrating blockchain technology within the insurance sector. The emphasis on renowned journals further underscores the credibility and visibility of their work within the academic community, indicating the significance of their research contributions to the broader literature on this subject.

### 3.3. Statistics of keywords

In Figure 5, the visualization presents the top 10 most commonly occurring keywords in the literature on the use of blockchain in the insurance industry. Notably, the keyword “blockchain” stands out as the most frequently used term. This underscores the central focus and prevalence of discussions related to blockchain technology within the realm of insurance research.

The prominence of “blockchain” as the primary keyword suggests a widespread interest in exploring the applications, challenges, and implications of incorporating blockchain in the insurance sector. Moreover, the appearance of “smart contracts” among the top keywords indicates a specific and related area of focus. This emphasizes the recognition of the synergies between blockchain and smart contracts in the insurance and healthcare domains, highlighting the potential for enhancing security and privacy through integrating these technologies. The emphasis on these keywords points to a common thread in the literature, reflecting the ongoing exploration of blockchain and its associated technologies as transformative tools in the insurance industry.

In Figure 6, the word cloud visually represents the frequently used terms in publications on utilizing blockchain technology. The terms “blockchain,” “insurance,” “smart contracts,” and “internet of things” emerge as the most commonly employed keywords in the literature. The word cloud employs a disorganized arrangement, where the size of each word corresponds to its frequency of occurrence, and the most crucial terms are posi-

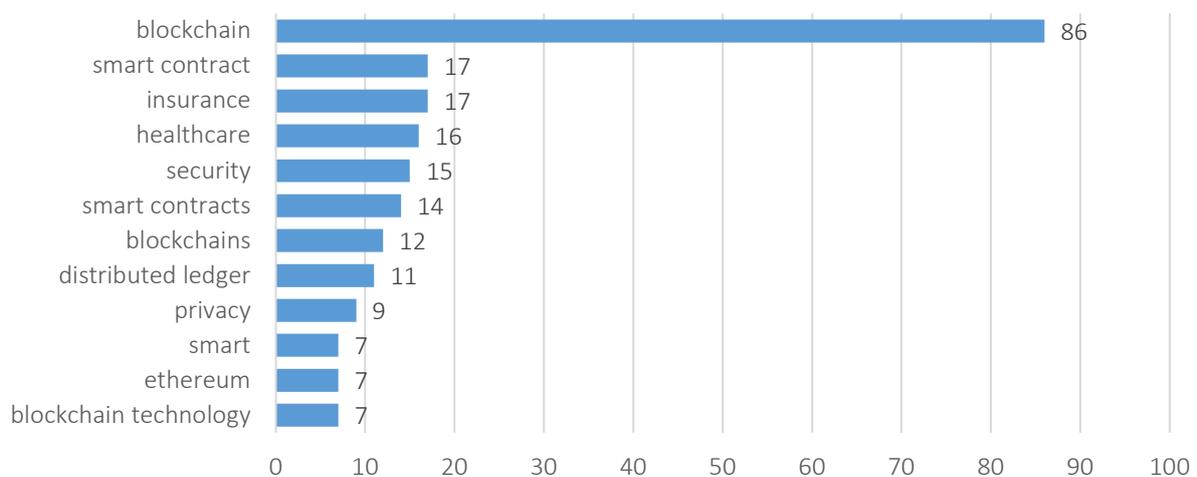


**Figure 4.** Documents by author

tioned in the middle to enhance their visibility due to their substantial dimensions. The intentional disorganization of the word cloud allows for a visual representation that emphasizes the relative importance of individual terms based on their size and central positioning. This form of representation provides a quick and intuitive overview of the key thematic elements prevalent in the literature. In this context, the word cloud underscores the overarching themes of blockchain, insurance, smart contracts, and the Internet of Things, serving as a visual summary of the most prevalent concepts and topics within the body of research on utilizing blockchain technology.

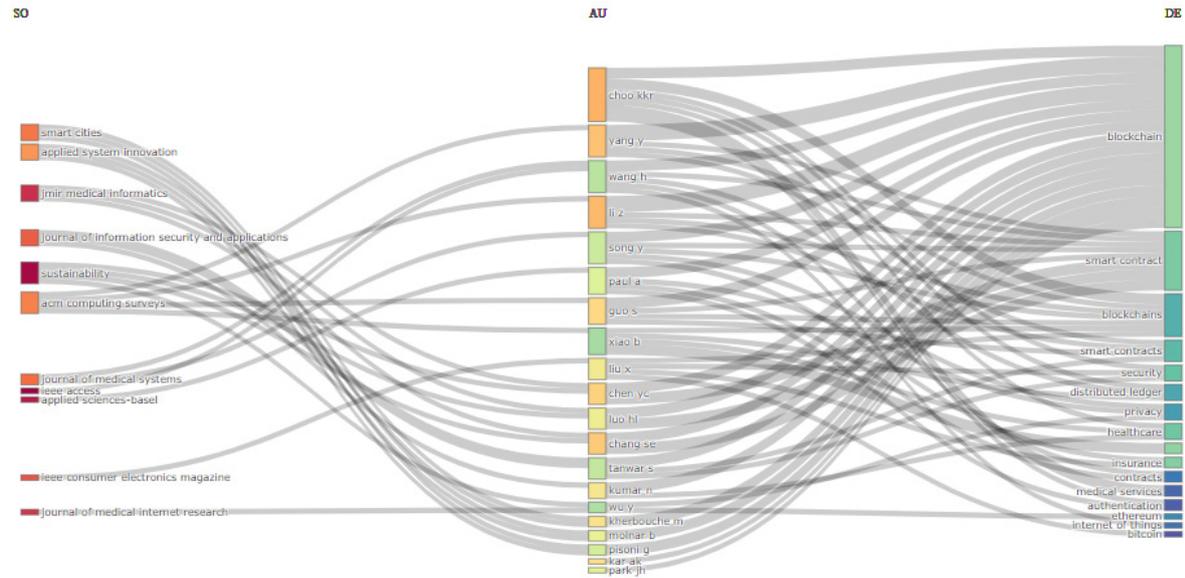
In Figure 7, the keyword co-occurrence network serves as an illuminating tool, offering researchers valuable insights into the essential content of the literature and visualizing the structure of a spe-

cific field, specifically the utilization of blockchain technology. Each node within the network represents a keyword, and the size of each node is directly tied to the frequency of co-occurrence with other keywords. Notably, in this network, “blockchain” and “insurance” have the largest node sizes, indicating their central and frequent presence in the literature. The prominence of these larger nodes underscores the significance and recurrent exploration of blockchain and insurance within the research field. Additionally, other keywords such as “technology,” “security,” “data,” and “applications” also exhibit notable node sizes, reflecting their substantial presence and relevance in the literature. The density of connections between nodes illustrates the proximity and strength of associations between different keywords on the diagram. Higher density results in a shorter distance between nodes, indicating a closer relationship or



**Figure 5.** Top 12 keywords in the application of blockchain in insurance

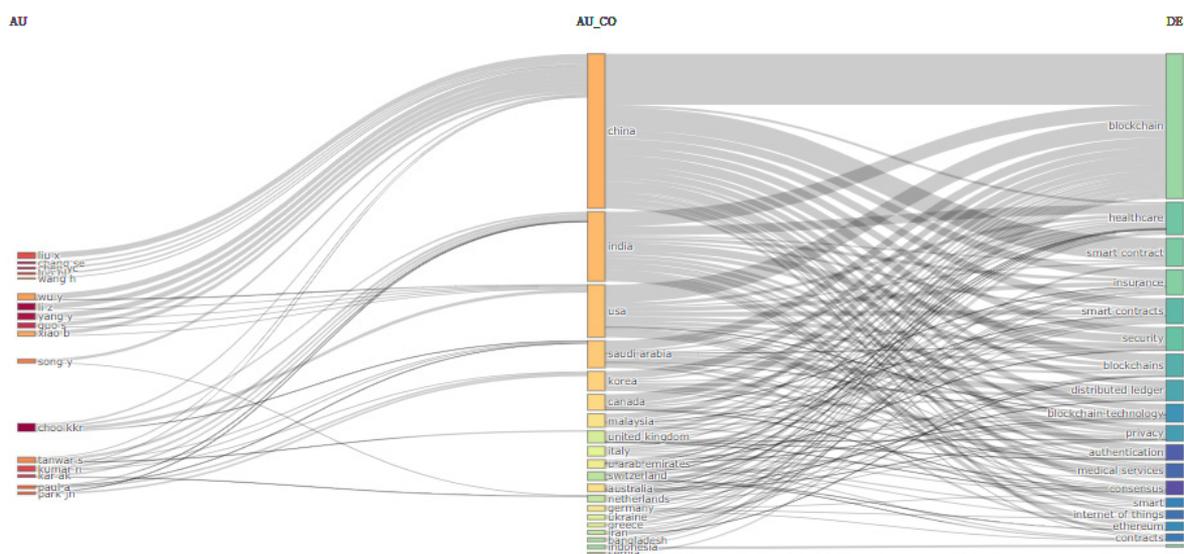




**Figure 8.** Three-field plot with sources, authors, and keywords

insights into the thematic focus of their research. One can observe a prominent connection between most authors and the keywords “blockchain” and “smart contracts,” suggesting a prevalent concentration on these crucial elements within the literature. This three-field plot offers a comprehensive and visually intuitive representation, allowing researchers to discern the relationships between sources, authors, and keywords in the context of blockchain applications in the insurance industry. The connections formed in the gray plot provide a cohesive overview, facilitating a better understanding of the interplay between these three vital components within the research landscape.

In Figure 9, the three-field plot presents an insightful visualization with three interconnected components: authors, countries, and keywords, unified by a gray plot for coherence. The first field focuses on authors, highlighting key contributors to the literature. Each author is paired with their respective country, forming connections between the individuals and their geographical affiliations. The gray plot visually depicts the connections that unify the three fields. The second field emphasizes countries, showing the global distribution of authors involved in research on blockchain applications in the insurance sector. The size of the rectangle associated with each country illustrates



**Figure 9.** Three-field plot with authors, countries, and keywords

the collaborative efforts of authors across various nations. The visualization indicates that most authors are from China, India, and the USA. The third field underscores keywords, revealing the central concepts routinely investigated by authors. A connection between each author and a compilation of keywords, offering insights into the thematic focus of their research. The figure suggests a prominent concentration of authors from China with a primary focus on blockchain technology in the context of insurance. Overall, this three-field plot provides a visually intuitive representation, offering researchers valuable insights into the interconnections between authors, countries, and keywords in the domain of blockchain applications in the insurance industry.

### 3.4. Statistics of citation

Table 3 presents a ranking of the top fifteen papers based on the number of citations they have received. According to Google Scholar, the paper authored by Dorri in 2017 has accrued the highest number of citations, totaling 417. Following closely, the paper authored by McGhin in 2019 has garnered 311 citations. The table is a valuable resource for understanding the influence and impact of individual works within the field of study. Identifying the papers with the highest citation counts provides researchers with insights into the seminal contributions that have significantly shaped the literature on blockchain applications

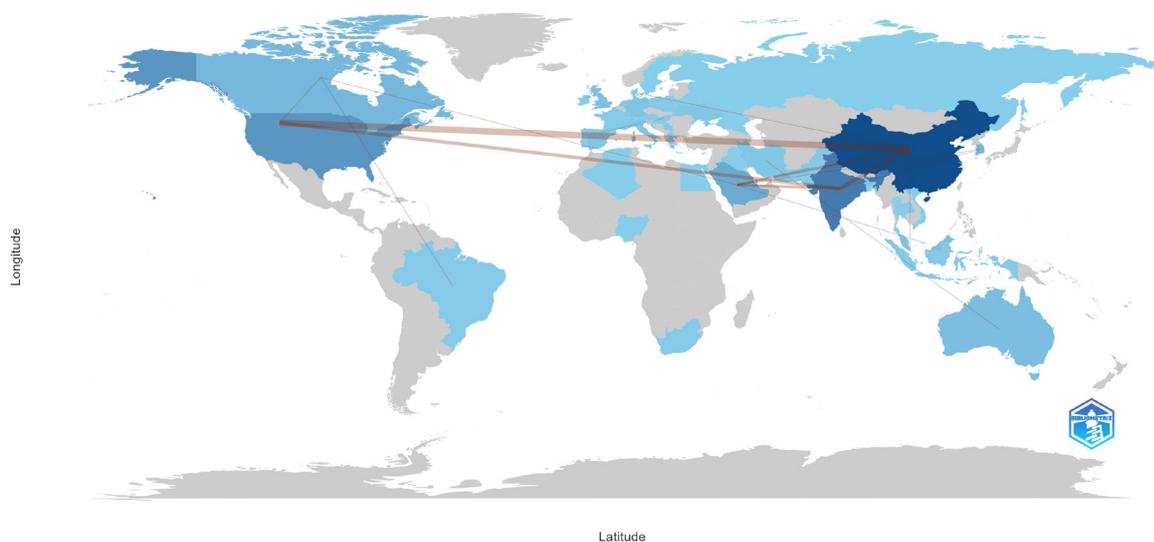
in the insurance industry. This information is instrumental in guiding scholars to comprehend the primary works that have left a lasting imprint on the subject, helping assess the overall influence and trajectory of research in this field.

**Table 3.** Top 10 cited documents

Paper	Total citations
Dorri et al. (2017)	417
McGhin et al. (2019)	311
Tanwar et al. (2020)	303
Dai and Vasarhelyi (2017)	268
Wang and Song (2018)	164
Gatteschi et al. (2018)	163
Cebe et al. (2018)	143
Minoli and Occhiogrosso (2018)	139
Lao Laphou et al. (2020)	133
Lin et al. (2018)	133

In Figure 10, the illustration focuses on international partnerships, utilizing a color-coded map where blue signifies collaboration in international research. The pink border acts as a demarcation, indicating the extent of collaboration among authors across different states or countries. The visualization captures the evolving landscape of these collaborations among nations with substantial publications in the field. Notably, China, India, the USA, Saudi Arabia, Malaysia, and Australia have participated in significant partnerships with geographically distant nations. This dynamic pattern of col-

Country Collaboration Map



**Figure 10.** Country collaboration map

laboration can facilitate the exchange of policies, promote market cooperation, and foster a cross-cultural exchange of ideas and expertise. The use of color coding helps to easily identify the extent of international collaboration, contributing to a visual representation that aids researchers in understanding the global nature of partnerships in blockchain research within the insurance industry.

Scholars seeking to deepen their understanding of the application of blockchain technology in the insurance industry are strongly encouraged to review the referenced articles. Delving into the highlighted publications in this literature review offers a comprehensive insight into blockchain technology's practical implementations and implications in the insurance sector. Becoming acquainted with influential papers and their authors serves not only to initiate further advancements in the field but also promotes collaboration in co-authorship, contributing to the overall quality and depth of future research endeavors. Exploring the co-occurrence network significantly reveals the intricate organization and patterns of subjects and issues within blockchain applications in insurance. This

exploration fosters a deeper understanding of the current state of research and has profound implications for shaping future directions. By understanding the relationships and interconnections between various topics, scholars can make informed decisions on areas deserving more attention, enabling them to contribute meaningfully to the ongoing discourse. This aspect of the study is particularly impactful as it guides researchers in identifying gaps and opportunities for further exploration and innovation in the dynamic intersection of blockchain and the insurance industry.

Future research endeavors would expand the scope of this assessment by acquiring additional data from reputable scientific sources such as Scopus, PubMed, and EBSCOhost, thereby enhancing the robustness of the study's conclusions. To garner more profound insights, subsequent bibliometric analyses may explore additional significant knowledge sources, including books and book chapters. Utilizing advanced strategies such as clustering research themes through bibliographic coupling or article co-citation holds promise for enhancing the effectiveness and depth of forthcoming bibliometric investigations.

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## CONCLUSION

This study aims to conduct a thorough and structured assessment of the utilization of blockchain technology in the insurance sector through a bibliometric analysis. The investigation involves analyzing articles on this specific topic sourced from the Web of Science database, resulting in a curated selection of 125 documents. The aim is to provide valuable insights for scholars interested in initiating new projects related to applying blockchain technology in insurance. The study reveals several significant observations. Firstly, there has been a rapid growth in the number of publications, starting at two in 2017 and reaching 31 in 2021. IEEE Access and Sustainability journals are predominant sources, highlighting these publications' influential role in promoting and establishing robust traditions in blockchain and insurance literature. Regarding productivity, Choo KKR, LIZ, and Yang Y emerge as the most productive authors, while the top-performing institutions are Asia University and the Hong Kong Polytechnic University. Particularly, all academically productive institutions are exclusively located in industrialized nations. Regarding national contributions, there is a significant prevalence of papers from China, India, and the USA, where respected universities actively promote research. The citation analysis identifies papers that have exerted the most impact on the subject, helping researchers understand the primary contributions to the literature. In conclusion, this study provides a comprehensive understanding of the landscape of blockchain technology in the insurance sector, highlighting the growth in publications, influential journals, prolific authors, top-performing institutions, and national contributions. These findings can guide future research initiatives and contribute to the continued development of literature in this field.

## AUTHOR CONTRIBUTIONS

Conceptualization: Shorouq Fathi Eletter.  
 Data curation: Shorouq Fathi Eletter.  
 Formal analysis: Shorouq Fathi Eletter.  
 Funding acquisition: Shorouq Fathi Eletter.  
 Investigation: Shorouq Fathi Eletter.  
 Methodology: Shorouq Fathi Eletter.  
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 Supervision: Shorouq Fathi Eletter.  
 Validation: Shorouq Fathi Eletter.  
 Visualization: Shorouq Fathi Eletter.  
 Writing – original draft: Shorouq Fathi Eletter.  
 Writing – review & editing: Shorouq Fathi Eletter.

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