









“Insurance market transparency research trends: Bibliometric analysis”

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INSURANCE MARKET TRANSPARENCY RESEARCH TRENDS: BIBLIOMETRIC ANALYSIS

Abstract

Transparency is a fundamental necessity for the insurance market in the modern fast-changing and digital world. The study aims to establish, based on bibliometric analysis, the research trends and subject areas of the insurance market transparency, including the impact of digital technologies, regulatory initiatives, and the internal policies of insurance companies. A bibliometric analysis of papers published in the journals indexed by the Scopus database for the years 1988–2023 was conducted to achieve this goal. Five clusters have been identified based on the analysis of the shared use of keywords, demonstrating the multidisciplinary nature of the research subject. They cover government regulation and risk management; ethics; technological innovations in increasing transparency; transparency of prices and costs in health insurance; and state medical insurance transparency. The analysis of insurance market transparency trends has allowed identifying four key stages of development: post-crisis regulatory mechanisms (2013–2016), Solvency II regulation effectiveness (2017–2019), transparency during the pandemic (2020–2021), and the impact of digital innovations since 2021. Spatial clustering made it possible to identify five groups of countries whose representatives are co-authors of research on insurance market transparency. The leading countries in research on insurance market transparency are the USA, the UK, and Germany.

Keywords transparency, insurance market, insurance, health insurance, blockchain, security, Solvency II

JEL Classification G22, O33

INTRODUCTION

Today, as the complexity and scale of insurance markets have sharply increased (Plastun et al., 2023; Babenko-Levada, 2021), transparency has become a key element of fair and efficient market operations (Mursalov et al., 2023; Kolomiets et al., 2023; Bozhenko et al., 2023; Didenko et al., 2023; Vasilyeva et al., 2022). The insurance market is inherently characterized by asymmetric information (Wein, 1998) and complex financial products, making transparency not just a regulatory requirement but a fundamental necessity for consumer protection and market stability (Lyeonov et al., 2021; Bhandari, 2023; Njegovanović, 2023). Transparency in insurance covers a wide range of aspects, including clear communication of policies and insurance terms, transparency in premium setting and risk assessment, openness of financial statements and company performance, and accessibility of information on claims handling and payment procedures (Rakotoarisoa & Mapp, 2023; Awojobi & Adeniji, 2023). It also means ensuring clarity in reserve management, adherence to ethical standards in operations, and openness to regulatory oversight and control (Vasilyeva et al., 2019; Marano & Noussia, 2019, 2021; Gentsoudi, 2023).

Despite the differences in the insurance markets of different countries and their regulatory systems, the issue of transparency is fundamental to all insurance markets, especially in today's fast-paced and digital world. For example, for the US insurance market, the relevance of research on insurance market transparency takes on new dimensions in light of the regulatory priorities announced in 2023 by the National Association of Insurance Commissioners (NAIC) (NAIC, 2023). The U.S. insurance market, which has always been characterized by dynamic development, is facing challenges that cast doubt on the transparency and openness of processes in this industry.

According to the recent regulatory initiatives of the NAIC, the importance of transparency is reinforced by the need to adapt to a changing climate, the growing use of artificial intelligence and cybersecurity, and the focus on financial supervision and transparency (NAIC, 2023). There are even discussions about adapting insurance regulatory norms in the USA to European Solvency II standards, which will require increased transparency and accountability in the activities of insurance companies (Berlau, 2023).

As for the European insurance market, it also faces similar challenges in the modern fast-changing world, so transparency issues are always the focus of the European Insurance and Occupational Pensions Authority (EIOPA). The importance of transparency is emphasized both by regulators' efforts to protect market integrity and by consumers' growing demand for clarity and fairness.

However, the implementation of principles and procedures to ensure the insurance market transparency is accompanied by significant challenges, such as the inherent complexity of insurance products, diverse and sometimes conflicting interests of stakeholders, as well as rapid advances in technology and data analysis. Therefore, there is a need to inquire more deeply into the various aspects of the insurance market transparency.

1. LITERATURE REVIEW

A bibliometric analysis of trends in the use of big data in insurance (Ellili et al., 2023; Mall et al., 2023; Shamsuddin et al., 2023; Saadi et al., 2023; Gonzalez-Samaniego et al., 2023) shows that the implementation of machine learning and artificial intelligence technologies contributes to increased transparency in the insurance sector. This ensures more efficient processing and analysis of large volumes of data, which is important for increasing the transparency of insurance products and services. Continuing the analysis, it is important to note that studies focused on blockchain technology in the insurance sector (Goel et al., 2023) also confirm the big data usage trends in insurance. According to Goel et al. (2023), blockchain has proven to be a key technology in solving insurance industry problems. It contributes to increasing trust and consumer protection, similar to the impact of machine learning and artificial intelligence technologies. Nayak et al. (2023), analyzing the health insurance industry trends, found that despite the increase in publication activity, there is a lack of research on transparency of insurance products and policies in health insurance.

Transparency and public disclosure have become crucial in ensuring financial stability and restoring consumer confidence after the 2008 financial crisis, which exposed weaknesses in risk management and regulatory transparency in the financial sector (Vasilyeva et al., 2013; Vasilyeva et al., 2014). In the insurance market, effective public disclosure provides investors and policyholders with a better understanding of the financial condition and risk profile of insurance companies, thus contributing to overall market transparency, improving the competitive environment, and facilitating more effective regulation and supervision (Cherkasova et al., 2020; Lyeonov et al., 2023). This, in turn, helps protect the interests of policyholders and contributes to overall financial stability.

The understanding of the need for transparency and openness in the insurance industry contributed to the introduction of the Solvency II regulatory regime in the European Union in 2016, which adopted a more comprehensive and risk-oriented approach compared to Solvency I. In particular, Pillar III of Solvency II, which focuses on supervisory reporting and public disclosure, is of utmost

importance. It requires insurance companies to regularly publish detailed information about their financial performance, risks, capital, and risk management strategies (Solvency II). Thus, Pillar III of Solvency II promotes greater transparency in the insurance market by improving information availability for policyholders, investors, and regulators, which helps in making informed decisions and ensuring the stability of the financial system as a whole.

Alberto Floreani, analyzing Pillar III of Solvency II (Floreani, 2017), identifies its advantages as a market discipline and the ability to compare public information on the insurers' solvency in the European Union. At the same time, the author points to possible risks, such as potential window-dressing practices and difficulties in comparing solvency with financial reporting under International Financial Reporting Standards (IFRS). The author suggests that to identify and address the side effects, EIOPA, and national authorities should monitor and propose regulatory improvements. Additionally, the author recommends that insurance companies introduce an integrated reporting system to make solvency and financial information more understandable and comparable for all stakeholders, avoiding double costs and inconsistencies in the reporting system.

Siopi et al. (2023), analyzing data from 29 insurance groups operating in the European Union from 2016 to 2020, also confirmed the positive impact of the Solvency II Directive on the solvency and transparency of insurance companies in Europe.

Transparency in the insurance market during the COVID-19 pandemic has become particularly important to ensure openness and fairness in the relationship between insurers and customers. During this period, when consumers have faced significant financial challenges, transparent disclosure of information on insurance terms, benefits, and coverage has become critical to maintaining trust and confidence in the insurance sector (Polinkevych et al., 2021; Paminto et al., 2023; Kuzior et al., 2022a; Koibichuk et al., 2023).

In the context of ever-increasing demands for transparency in insurance products and process-

es, the issue of legal regulation ensuring open and transparent practices in the insurance market is of particular importance. Therefore, it is worth paying attention to the study by Keglević Steffek (2022), which examines the principles of transparency in the context of English and German law, as well as European Union law and the Principles of European Insurance Contract Law (PEICL). The study also checks whether the current legal regulation ensures high standards of transparency and whether it provides adequate consumer protection. The author pays special attention to the analysis of common and distinctive features in the regulating transparency requirements in these jurisdictions, especially regarding consumer insurance contracts.

Noteworthy are the works of Marano and Noussia (2019, 2021) containing 56 studies of insurance regulation transparency and financial supervision across countries in 2019–2021. These studies examine the multifaceted transparency concept in insurance regulation and supervision in different countries, emphasizing its critical role in maintaining trust and fairness in the industry. The Dutch practice (Van den Hurk, 2021) identifies transparency as a core financial regulation principle, especially after the financial crisis, emphasizing its application in areas such as prudential reporting, market conduct, and supervisory transparency. The chapter on Italian insurance regulation (Marano & Siri, 2021) discusses the importance of transparency for both regulatory authorities and supervised institutions.

The digitization and new technological possibilities, including blockchain technology, on the one hand, help to increase transparency, while on the other hand, they require a balance between transparency and confidentiality. An insurance company's adaptation to evolving customer needs and the advanced technology implementation play a crucial role in ensuring effective electronic interaction (Abu-elezz et al., 2020; Dubyna et al., 2018; Zakharkin et al., 2022; Burlaka et al., 2019; Kuzior et al., 2022b; Belhadi et al., 2023; Prokopchuk et al., 2022; Hrytsenko et al., 2022).

Thus, the literature review shows a significant need for further investigating the tools, mechanisms, and strategies for enhancing the insurance market

transparency. Therefore, this study aims to establish, based on bibliometric analysis, the research trends and subject areas of the insurance market transparency, including the impact of digital technologies, regulatory initiatives, and the internal policies of insurance companies.

2. METHODOLOGY

To generalize and synthesize existing knowledge, identify the main trends, and forecast future research directions in insurance market transparency, this study conducts a bibliometric analysis. To ensure the research objectivity, data from the Scopus database, which is known for its high standards of indexed works, are used. The VOSviewer 1.6.19 software is used as a tool for bibliometric analysis and network visualization.

To ensure the high quality and objectivity of the bibliometric analysis, special attention is paid to the source selection. The sources were searched using the search query “transparency” AND “insurance”. That way, 1,694 scientific papers were selected. These sources were then filtered using the built-in filters of the Scopus database. First, the publications were limited by the “published only in English” filter for comparability of sources; then journal articles, books, book chapters, and reviews were chosen using the “Document type” filter. The next step was to analyze the articles for relevance to the subject. This analysis was based on the titles of the sources and the content of the abstracts. As a result, sources not related to the research subject were removed, leaving 1,121 scientific works from 1988 to 2023. This selection allowed for the data representativeness and a reflection of the current state in insurance market transparency research.

The chosen research methodology allows us to identify various concepts related to insurance market transparency and their interrelationships, key studies, and authors with significant contributions to the subject development; to cover the historical perspective of studying the insurance market transparency.

3. RESULTS AND DISCUSSION

The first work on the insurance market transparency dates back to 1988 (Berz, 1988). It emphasizes

the increasing frequency of major natural disasters and the importance of preventing and accurately managing losses, which impose additional requirements on insurers and reinsurers. This study underscores the importance of understanding and adapting to changes in climate and natural disasters in the context of insurance activities. It also highlights the critical role of risk transparency for the insurance sector stability and reliability. We can see that the 1988 study remains relevant in 2023 and directly correlates with the 2023 NAIC regulatory priorities (NAIC, 2023).

Citation analysis plays a critical role in bibliometric research as it allows for the evaluation of the impact and significance of scientific works in a specific field. The results (see Table 1) show that the most cited work is that of Iglesias et al. (2018). This article explores the relationship between corporate social responsibility (CSR), consumer trust, and customer loyalty in the digital environment. The authors analyze data from a survey of 1,101 customers of health insurance brands in Spain. The results show that the CSR of insurance companies has a significant impact on customer loyalty. This means that companies that actively implement CSR principles can expect to see an increase in customer loyalty, with consumer trust being a key factor in strengthening loyalty.

The next most cited work is that of Abu-elezz et al. (2020). This study analyzes the blockchain’s potential to increase data transparency and security. The authors consider both the benefits and threats of using blockchain in healthcare, focusing on improving information exchange and healthcare data management. This is especially relevant for the insurance market, as blockchain promotes greater transparency and efficiency in managing insurance data and customer information. At the same time, the authors point to technical and organizational challenges, in particular the scalability and cost of implementing blockchain technology.

The next most cited work is that of Vishwanath (2001), in which the author argues that transparency is indispensable for the entire financial sector and describes its desirable characteristics, such as accessibility, timeliness, relevance, and quality of information. The author argues for the institutional development and standardization of ac-

counting practices. They have a direct impact on the business activities of all financial market participants, including insurance companies, as unified standards allow for more efficient information exchange, increase the transparency of financial transactions, and help prevent financial abuse.

The study by Kaffash et al. (2020) examines the application of Data Envelopment Analysis (DEA) in the insurance industry and identifies a lack of researchers' attention to changes in the industry, such as Insurtechs and market transparency.

The results (Table 1) indicate that higher citation levels are associated with either older articles (Kane, 1995; Powell et al., 2008; Schwarcz, 2014) or, conversely, new articles addressing

current issues of insurance transparency: digitization and blockchain technology implementation (Baker, 2018; Yang et al., 2019; Pal et al., 2021).

The result of the bibliometric analysis of the relationship between the “transparency” AND “insurance” concepts and other categories of the relevant sample is a network visualization (Figure 1) and a key terms density map (Figure 2).

The network visualization (Figure 1) groups various concepts related to insurance market transparency into 5 clusters, each of which represents a group of interrelated topics or keywords. These five clusters aggregate groups of interrelated topics that demonstrate the multidisciplinary nature

Table 1. Top 10 most cited publications

Source: Built according to the Scopus database (Scopus).

No.	Author	Article title	Institution	Citations
1	Iglesias et al. (2018)	Co-creation: A Key Link Between Corporate Social Responsibility, Customer Trust, and Customer Loyalty	Universitat Ramon Llull, Spain; Copenhagen Business School, Denmark; NEOMA Business School, France; EADA Business School, Spain	196
2	Abu-elezz et al. (2020)	The benefits and threats of blockchain technology in healthcare: A scoping review	College of Science and Engineering, Hamad Bin Khalifa University, Qatar	167
3	Vishwanath, T. (2001)	New Approaches and Their Application to Financial Markets.	World Bank Institute, Washington, United States	81
4	Kaffash et al. (2020)	A survey of data envelopment analysis applications in the insurance industry 1993–2018	Sawyer Business School, Suffolk University, United States; Dep. of Mathematics, Karaj Branch, Islamic Azad University, Iran; Manning School of Business, University of Massachusetts Lowell, United States; College of Auditing and Evaluation, Nanjing Audit University, China	77
5	Kane (1995)	Three paradigms for the role of capitalization requirements in insured financial institutions	Finance Department, Boston College, United States	64
6	Baker and Dellaert (2018)	Regulating robo advice across the financial services industry	University of Pennsylvania Law School, United States; Erasmus University Rotterdam, Netherlands	63
7	Yang et al. (2019)	Proof-of-Familiarity: A Privacy-Preserved Blockchain Scheme for Collaborative Medical Decision-Making	Dep. of Healthcare and IT, Inje University, South Korea; Dep. of Computer Engineering, Inje University, South Korea; Dep. of Applied Mathematics, Inje University, South Korea; School of Science, Edith Cowan University, Australia	54
8	Powell et al. (2008)	The Role of Internal Capital Markets in Financial Intermediaries: Evidence From Insurer Groups	College of Business, University of Arkansas, United States; Bill Greehey School of Business, St. Mary's University; Terry College of Business, University of GEO, United States	43
9	Pal et al. (2021).	Blockchain technology in financial services: a comprehensive review of the literature	Faculty of Management, Symbiosis Centre for Management Studies, NOIDA, Symbiosis International University, India; Department of Management, Jagannath Institute of Management School, India	34
10	Schwarcz (2014)	Transparently opaque: Understanding the lack of transparency in insurance consumer protection	University of Minnesota Law School, United States	32

Source: Based on data from Scopus using the VOSviewer tool.

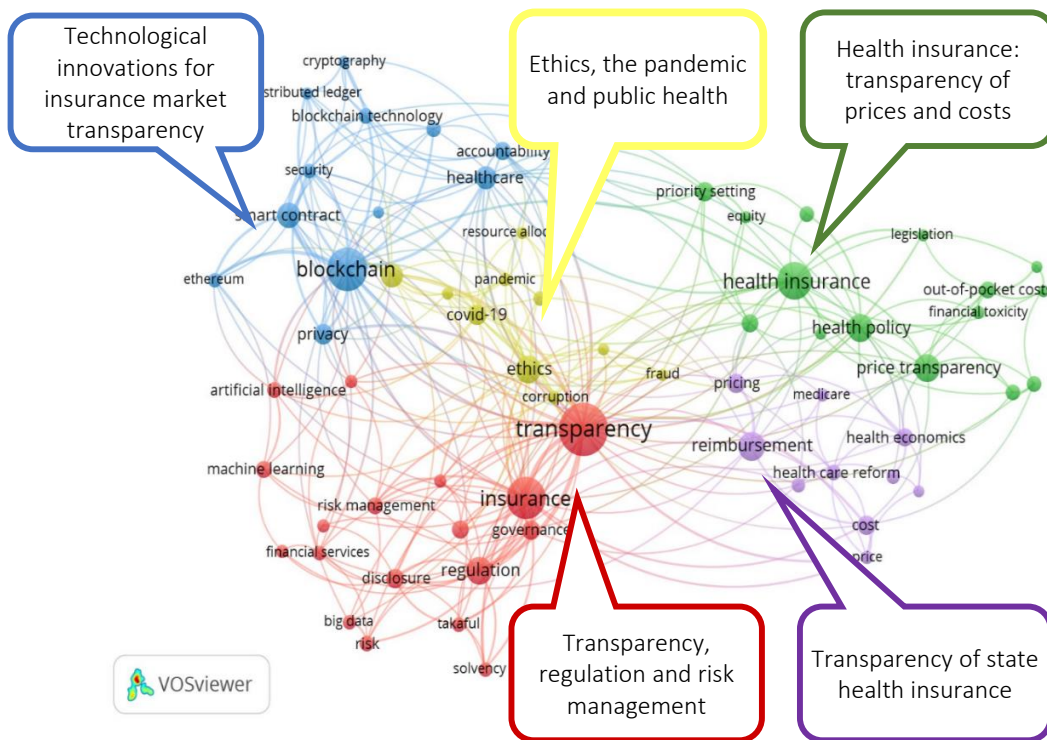


Figure 1. Visualization of the thematic areas for “transparency AND insurance” for 1988–2023

of the field. They cover aspects such as government regulation and risk management, ethics, technological innovations for increasing transparency, transparency of prices and costs in health insurance, and state medical insurance transparency.

The key terms density map (Figure 2) provides a visual representation of the data that reveals the connections between various terms related to insurance market transparency. The terms that are more frequently associated with each other are depicted closer and in larger font, emphasizing the frequency of their co-occurrence in scientific papers.

Source: Based on data from Scopus using the VOSviewer tool.

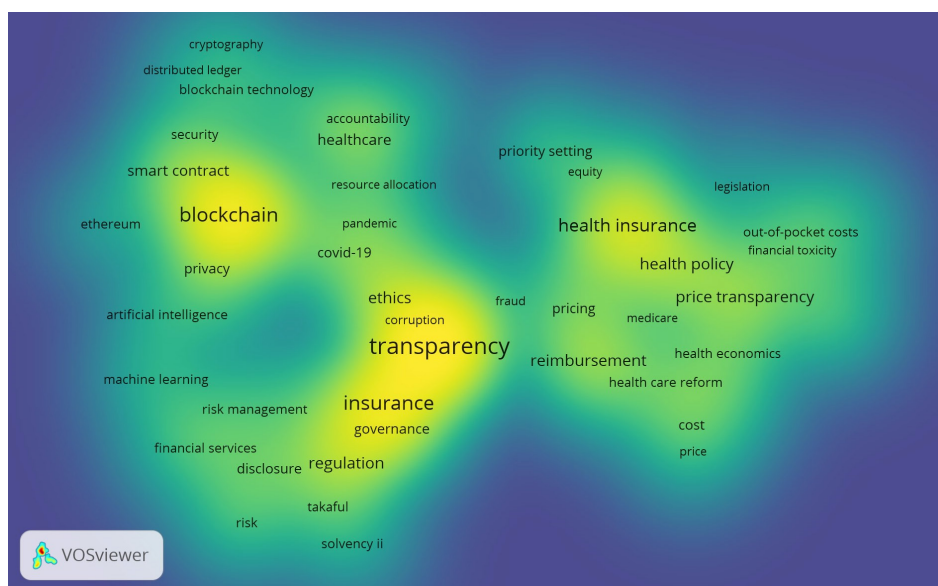


Figure 2. The key terms density map for “transparency AND insurance” for 1988–2023

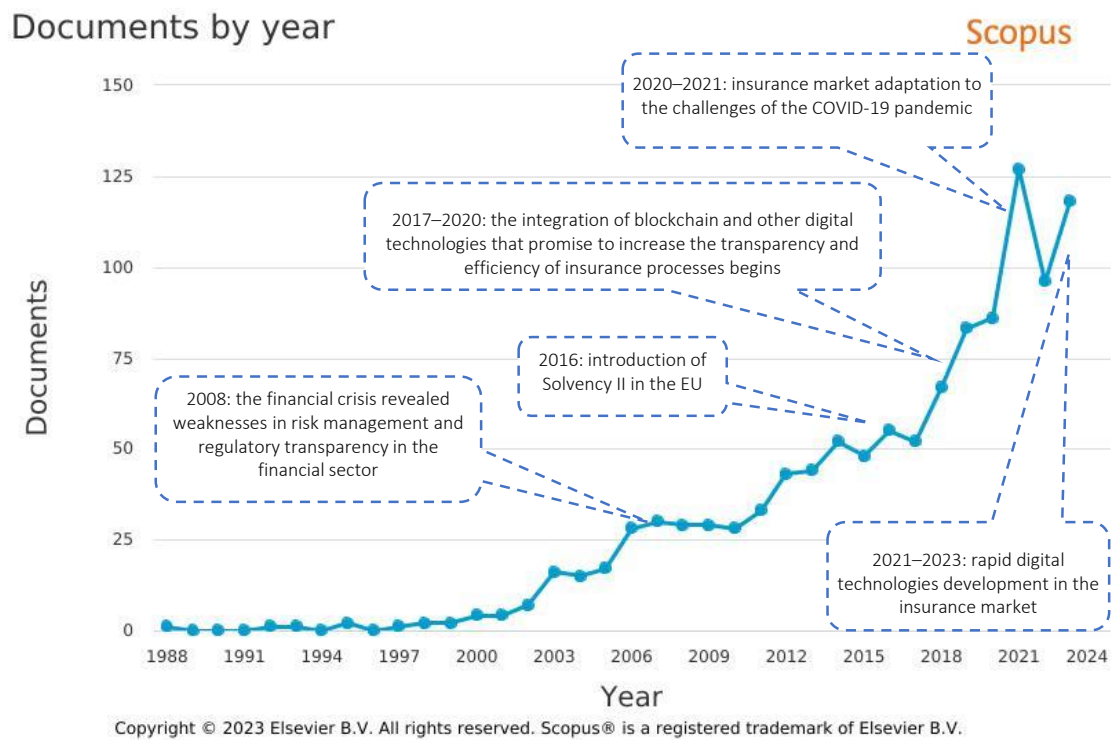


Figure 3. Chronological publication trend for “transparency AND insurance” for 1988–2023

The result of the analysis of research tendencies on insurance market transparency is a chronological publication trend in “transparency AND insurance” for 1988–2023 (Figure 3).

The bibliometric analysis result of evolutionary trends in insurance market transparency is a time-context map. This map illustrates how the dynamics and focus of research have changed over the past decade, from 2014 to 2023 (Figure 4). The color gradation from blue to yellow serves as a chronological sequence indicator. The dark blue marks the earliest work, and the yellow denotes the most recent research, reflecting current discussions and research directions in the field. This map allows us to trace the scientific interest development, with the emphasis shifting from traditional insurance issues to regulatory and the latest technological challenges, based on the color differentiation in the visualization.

Studying the spatial distribution of research is also important. The spatial clustering results have identified five groups of countries whose representatives are co-authors of research on the insurance market transparency (Figure 5). This

analysis allowed us to identify the countries where researchers are the most active in studying this subject. It has revealed geographical regions where leading research groups are concentrated and make a significant contribution to the study of this issue. Thus, it was possible not only to identify leaders in this area but also to understand the global distribution of research efforts on this subject.

The analysis results presented in Figure 5 show that the largest number of publications presented in the Scopus database are co-authored by scientists from the USA, some countries in Asia and the Pacific region, and European countries. These findings support the ranking of countries by the number of publications on insurance market transparency issues in Scopus-indexed journals, as presented in Table 2. The highest number of scientific papers during the period of 2013–2022 were published by scientists from the USA (293 papers), the United Kingdom (65 papers), Germany (48 papers), India (46 papers), the Netherlands (44 papers), and Australia (40 papers). Most of these works were published in collaboration with scientists from different countries.

Source: Built on data from Scopus using the VOSviewer tool.

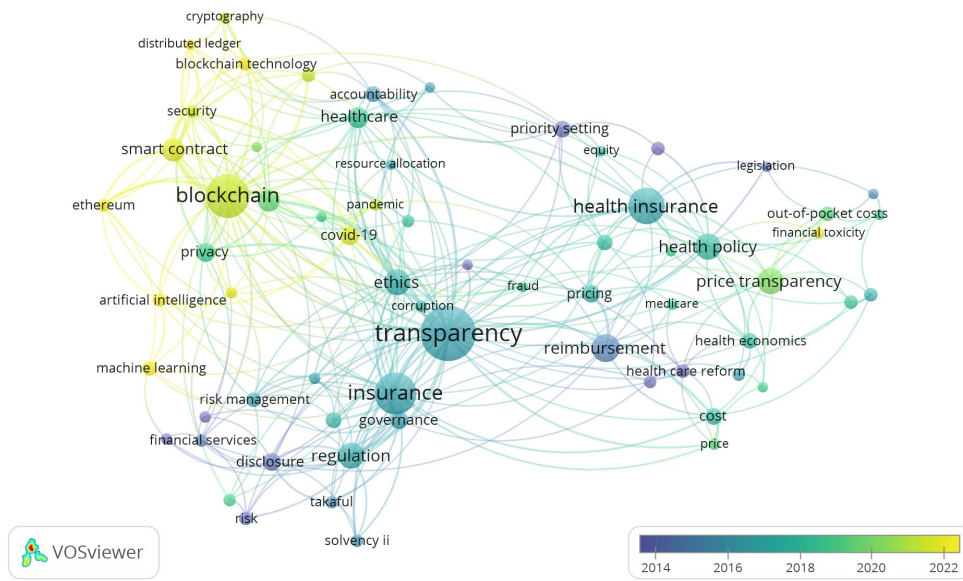


Figure 4. Time-context map indicating research focus shift for “transparency AND insurance”

Source: Built using the VOSviewer tool.

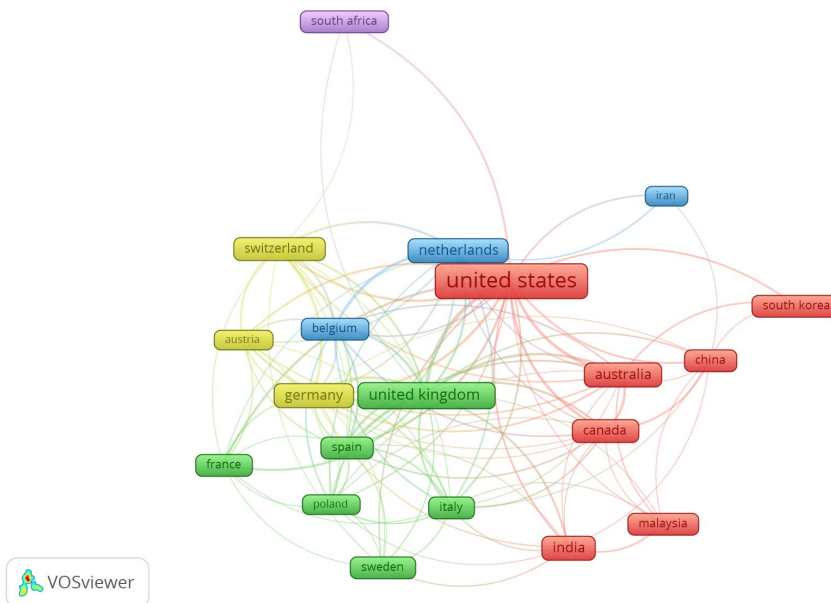


Figure 5. Visualization map of co-authorship (the criterion is the country specified in the affiliation) of joint publications on insurance market transparency that are indexed by the Scopus scientometric database

The results of the academic environment analysis presented in Table 3 include 15 academic institutions whose employees had been most active in researching the insurance market transparency in 2013–2022.

The analysis results of scientific journals that published scientific papers on the transparency of the insurance market in 2013–2022 are presented in Table 4 and include 15 scientific journals. Overall, most of the studies were published in high-rank-

Table 2. Ranking of countries by the number of publications on insurance market transparency in journals indexed by the Scopus database for 2013–2022

Source: Own processing according to the Scopus database (Scopus) using SciVal.

No.	Countries/Regions	Scholarly Output	Views	Citations	Citations per Publication	Field-Weighted Citation Impact
1	United States	293	8,065	4,715	16.1	1.26
2	United Kingdom	65	1,837	1,048	16.1	1.28
3	Germany	48	1,471	449	9.4	0.70
4	India	46	2,565	388	8.4	1.16
5	Netherlands	44	1,430	677	15.4	1.44
6	Australia	40	1,706	702	17.6	1.52
7	Canada	35	1,077	529	15.1	1.11
8	Switzerland	32	1,564	512	16.0	1.17
9	Italy	21	498	117	5.6	0.78
10	France	19	464	306	16.1	1.04
11	Spain	19	582	153	8.1	0.80
12	China	14	761	366	26.1	2.45
13	Iran	13	962	220	16.9	1.66
14	Malaysia	13	945	74	5.7	1.06
15	Belgium	12	348	190	15.8	1.21
16	South Korea	12	406	104	8.7	0.70
17	Austria	11	520	323	29.4	1.80
18	South Africa	11	138	42	3.8	0.49
19	Sweden	11	413	231	21.0	1.19
20	Poland	10	188	54	5.4	1.09

Table 3. Top-15 institutions that most actively participated in insurance market transparency research in 2013–2022

Source: Own processing according to the Scopus database (Scopus) using SciVal.

No.	Institution	Countries/Regions	Scholarly Output	Views	Citations	Citations per Publication	Field-Weighted Citation Impact
1	Harvard University	United States	33	745	631	19.1	1.67
2	Johns Hopkins University	United States	16	457	292	18.2	1.47
3	University of Michigan, Ann Arbor	United States	15	288	291	19.4	1.32
4	Erasmus University Rotterdam	Netherlands	14	460	271	19.4	1.85
5	Duke University	United States	13	192	173	13.3	1.22
6	University of Basel	Switzerland	12	941	134	11.2	0.89
7	University of Pennsylvania	United States	11	369	128	11.6	1.99
8	University of Exeter	United Kingdom	9	9	1	0.1	0.26
9	The London School of Economics and Political Science	United Kingdom	8	528	232	29.0	1.82
10	Georgetown University	United States	8	137	52	6.5	0.60
11	Stanford University	United States	8	208	249	31.1	1.92
12	University of Amsterdam	Netherlands	8	355	123	15.4	1.29
13	University of California at San Francisco	United States	8	76	141	17.6	0.69
14	University of Minnesota Twin Cities	United States	8	130	222	27.8	2.36
15	University of Toronto	Canada	8	254	88	11.0	0.83

Table 4. Top 15 journals in which scientific works on insurance market transparency were published

Source: Own processing according to the Scopus database (Scopus) using SciVal.

No.	Source	Scholarly Output	Views	Citations	Citations per Publication	Field-Weighted Citation Impact	SNIP 2022	CiteScore 2022	SCImago (SJR) magazine rating	Quartile
1	PLoS ONE	23	558	477	20.7	0.60	1.253	6.0	0.885	Q1
2	BMC Health Services Research	16	386	167	10.4	0.88	1.347	4.0	0.964	Q1
3	Geneva Papers on Risk and Insurance: Issues and Practice	14	1,113	238	17.0	1.50	0.914	3.1	0.402	Q2
4	Sustainability	14	841	167	11.9	1.24	1.198	5.8	0.664	Q2
5	IEEE Access	9	411	149	16.6	1.57	1.422	9.0	0.926	Q1
6	Journal of Risk and Insurance	9	470	138	15.3	1.14	1.511	3.1	0.786	Q2
7	Insurance: Mathematics and Economics	8	235	103	12.9	0.98	1.578	3.0	0.921	Q2
8	Social Science and Medicine	8	303	135	16.9	2.05	1.962	7.9	1.978	Q1
9	Risks	7	201	39	5.6	0.85	1.040	3.1	0.439	Q2
10	Journal of Business Ethics	6	618	144	24.0	3.08	2.976	12.0	2.590	Q1
11	International Review of Financial Analysis	5	191	40	8.0	0.55	2.373	9.1	1.881	Q1
12	Journal of Risk Finance	5	118	31	6.2	0.46	0.787	3.5	0.432	Q2
13	ASTIN Bulletin	4	117	95	23.8	2.11	1.664	3.3	1.237	Q1
14	International Review of Economics and Finance	4	344	79	19.8	1.67	1.551	5.7	0.929	Q1
15	Journal of Financial Economics	4	164	56	14.0	0.89	5.138	11.3	10.601	Q1

ing journals, characterized by a significant level of citations, a high SNIP index, and SCImago rating. The most cited publications have over 14 citations per publication, indicating significant interest from the global community in the obtained results.

Based on the bibliometric analysis results (Figure 1), five clusters were identified, each reflecting a separate thematic area of research on transparency in the insurance market.

The Red Cluster is central and can be called “Transparency, Regulation, and Risk Management”. It contains 18 terms. The focus of this cluster is “transparency”, which indicates the significance

of transparency in ensuring trust and accountability in the insurance sector. “Transparency” is closely related to “regulation”, “governance”, and “risk management”, emphasizing the importance of regulatory interaction and effective risk management. The presence of the term “Solvency II”, a European regulatory standard, underscores the importance of regulation that contributes to greater transparency in the insurance market. There is also the term “takaful”, which refers to the Islamic insurance model based on mutual support principles.

Further away from the cluster center are the concepts of “machine learning”, “big data”, and “artificial intelligence” (AI). Their presence reflects the

technological development when big data is used to analyze and predict risks, optimize pricing, and personalize policies, which contributes to process transparency. “Artificial intelligence” helps insurance companies automate processes such as customer service and claim processing. It can also be used to detect fraud and improve risk management, which in turn contributes to transparency. Thus, the combination of technological elements with the core concepts of regulation and transparency demonstrates how innovation can enhance traditional methods, making the insurance market more efficient, transparent, and reliable.

The Green Cluster can be called “Health Insurance: Price and Cost Transparency”. It contains 15 terms. Keywords such as “health insurance”, “health policy”, and “Medicaid” focus on health insurance. *Medicaid is an assistance program in the United States of America that provides health insurance to people with limited financial means (low-income people and certain categories of citizens, such as pregnant women, children, the elderly, and people with disabilities). The program is jointly funded by federal and state governments and is managed at the state level, each of which may have its own eligibility criteria and coverage.* The terms “price transparency”, “out-of-pocket costs”, and “cost-sharing” reflect public pressure on insurance companies to be more open in pricing and transparent in their cost distribution.

The Blue Cluster can be briefly called “Technological Innovations for Insurance Market Transparency”. It contains 13 terms. Important elements of this cluster are technologies such as “blockchain” and “smart contracts”, indicating the potential for innovation in the insurance sector. There is a clear connection with the Red Cluster, in particular with “machine learning” and “artificial intelligence”. The growing digital technology use in insurance creates opportunities for improved and transparent risk calculation and personalized offers to customers. However, this also raises ethical and fairness issues in determining tariffs and choosing policies. This can be seen through the connection with the “ethics” concept from the Yellow Cluster.

The Blue Cluster also contains the concepts of “security” and “privacy”, and the “trust” concept is very close to the “blockchain” concept. This clus-

tering shows that research on insurance market transparency is increasingly focusing on blockchain use. The latter is viewed as a way to create more transparent and reliable systems that can automatically execute contracts (via smart contracts) and ensure data security and trust between the parties. Cybersecurity and data protection are also integral parts of risk management research for insurance companies. In this context, transparency in disclosing information about cyber incidents and cybersecurity strategies is essential for building trust and openness in relationships with clients and regulators.

The Yellow Cluster can be summarized as “Ethics, Pandemic, and Public Health”. It contains 10 terms. The terms “ethics”, “COVID-19”, and “pandemic” highlight the COVID-19 pandemic’s impact on the insurance market and the changes it brings to insurance products and services. “Public health” and “health policy” indicate the integration of the insurance industry with broader healthcare and government policy issues. At the same time, attention is being drawn to ethical and transparent/non-transparent resource allocation for public health in the context of the COVID-19 pandemic, as evidenced by the presence of the terms “corruption” and “fraud” in this class.

The Purple Cluster can be briefly referred to as “State Medical Insurance Transparency”. It also includes 10 terms and is located very closely to the Green Cluster. The terms “healthcare”, “health economics”, and “reimbursement” reflect the focus on transparency in state healthcare financial aspects. “Cost sharing” and “managed care” may indicate strategies for cost control and patient care optimization. The “Medicare” concept focuses on government-funded health insurance. *Medicare is a federal health insurance program in the United States that provides coverage to people aged 65 and older, as well as some younger individuals with disabilities and those with chronic conditions. Established in 1965, the program helps reduce medical costs for its participants, although it does not cover all types of medical expenses and typically requires participants to pay a portion of the costs through co-payments and deductibles.*

The connections between the clusters on the bibliometric map (Figure 1) demonstrate the com-

plexity of transparency in the insurance market. Transparency is not limited to information disclosure but also includes blockchain and other digital technologies to ensure the security and integrity of insurance records. This further strengthens trust and openness. Regulatory frameworks play a crucial role in creating a transparent environment for fair competition and consumer protection, while financial clarity helps consumers understand the cost and terms of insurance products. Ethical standards are key to maintaining accountability in all aspects of insurance activity.

Thus, an interdisciplinary approach to insurance market transparency requires a collaborative interaction among experts in insurance law, insurance analytics, financial regulation, risk management, and information technology to ensure effective insurance market management. This applies both to insurers and reinsurers as well as regulators, legislators, consumers, and the public. Insurance markets developed on these principles can address transparency challenges and provide a more stable and reliable environment for all stakeholders.

The key terms density map of insurance market transparency for 1988–2023 (Figure 2) is a data visualization that illustrates the interconnections between concepts related to insurance market transparency. Visually, words with closer associations are closer to each other and have a larger size, indicating a higher frequency of their co-occurrence in the studies. “Transparency” is a central concept intersecting with “blockchain” but also linked to “corruption”, and “governance”. This shows the role of blockchain in ensuring transparency and combating corruption, especially in insurance market management and regulation. “Blockchain” is another key concept emphasizing the importance of this technology in modern research on insurance market transparency.

The terms “ethereum”, “smart contract”, “privacy”, and “security” appear side by side, indicating their close connection to blockchain. This reflects the increasing interest in using blockchain to protect privacy and security in insurance contracts. “Health insurance” is close to “health policy” and “price transparency,” which proves the importance of price transparency in health insurance policies.

The map in Figure 2 confirms the visualization results about the complexity of insurance market transparency studied by researchers.

The detailed analysis of the time perspective in insurance market transparency research (Figures 3 and 4) allowed identifying four key stages of scientific interest development. In the first stage, in 2013–2016, the researchers focused on identifying and analyzing the insurance market weaknesses exposed during the 2008 financial crisis. The emphasis was on studying risks and developing effective management tools, as well as improving regulatory mechanisms for insurance market transparency.

The next stage, in 2017–2019, was marked by a growing interest in assessing the effectiveness of regulatory implementation, especially in the context of Solvency II, which raised questions about the effectiveness of new risk management and transparency standards.

In 2020–2021, research efforts were focused on analyzing the issues related to health insurance sector transparency during the COVID-19 pandemic. This period highlighted the importance of adapting insurance products and services to rapidly changing circumstances and emphasized the role of transparency in crisis management.

Since 2021, researchers have shifted their attention to studying the digital innovation impact, in particular blockchain technologies and machine learning, on the transparency of insurance processes. This proves a growing interest in using these technologies to enhance the transparency, efficiency, and reliability of insurance services, as well as the search for new approaches to risk management in the insurance industry.

Studying publications chronologically has shown a research focus shift from more traditional and general issues of regulation and management towards more specific topics. The initial focus on ethical aspects and market transparency during the COVID-19 pandemic changed to researching the role of blockchain technologies and machine learning in insurance market transparency.

The results of the publication spatial clustering allow identifying five groups of countries whose

researchers have joint publications on insurance market transparency. The first cluster is intercontinental (the USA, Canada, Australia, China, South Korea, Malaysia, and India). The second cluster contains European countries (UK, France, Spain, Italy, Poland, and Sweden). The third cluster is of Central European countries (Germany, Austria, and Switzerland). The fourth cluster contains Northwest European countries (Belgium, Netherlands) and Iran. The fifth one is for Africa (the South African Republic).

Thus, the analysis has shown that insurance market transparency researchers are connected mainly by geographical proximity, while two clusters bring together representatives of the scientific community from different continents or parts of the world. It is noteworthy that among all the works in the Scopus database on the given issue for 2013–2022, the highest number of works have affiliation in the USA (293 scientific papers), the United Kingdom (65), Germany (48), India (46), the Netherlands (44), Australia (40), Canada (35), Switzerland (32), Italy (21), France (19), Spain (19), China (14), Iran (13), Malaysia (13), Belgium (12), South Korea (12), Austria (11), South African Republic (11), Sweden (11), and Poland (10). In other countries, the number of publications for the analyzed period did not exceed 10.

The identification of countries with a higher number of studies shows the insurance market development in these regions, their active regulation, and a high research interest in the insurance market transparency. Thus, the results reflect the dominant role of the United States in this area. This is due to the decentralized approach to regulating the US insurance market, with each state having its own rules and regulations, although the NAIC coordinates regulation at the national level. Therefore, researchers have a unique field for study and can analyze and compare how differ-

ent regulatory approaches affect the transparency and efficiency of insurance markets in different states (Choi, 2019). The large number of publications is also explained by research in public and private health insurance, which is quite developed in the United States. Co-authorship with researchers from countries in the Asia-Pacific, such as India, Australia, Malaysia, and South Korea, indicates the development of their insurance markets. European countries, such as Germany, Austria, and Switzerland, have strong ties, reflecting cooperation in the development of insurance sector standardization.

The top 15 institutions by the number of scientific papers indexed in the Scopus database (Table 3) include universities from the United States, Netherlands, Switzerland, the United Kingdom, and Canada. Harvard University, which tops the list, demonstrates a high scientific impact, with 33 publications averaging 19.1 citations per publication and a weighted citation index of 1.67. The highest citation rates per publication are found at the London School of Economics and Political Science and the University of Minnesota Twin Cities. Noteworthy is that all 15 institutions (Table 3) actively publish high-quality research, which is confirmed by high citation rates. The top 15 journals publishing scientific works on insurance market transparency (Table 4) in 2013–2022 include influential scientific editions such as PLoS ONE, Geneva Papers on Risk and Insurance: Issues and Practice, Journal of Business Ethics, ASTIN Bulletin, International Review of Economics and Finance, Insurance: Mathematics and Economics. These journals stand out by having a large number of peer-reviewed scientific papers and a high level of citations per publication. They play a key role in knowledge development and dissemination in this area. This indicates the growing interest of the international scientific community in studying insurance market transparency problems.

CONCLUSIONS

This study aimed to establish, based on the bibliometric analysis, the research trends and subject areas of the insurance market transparency, including the digital technology impact, regulatory initiatives, and internal policies of insurance companies. The analysis proved that transparency is a fundamental necessity for the insurance market in the modern fast-changing and digital world. The research results emphasize the importance of transparency in ensuring trust and accountability in the insurance sector.

Regulatory initiatives such as Solvency II in the European Union and the US NAIC priorities demonstrate global attention to transparency and the need to adapt to new regulatory standards.

Based on the analysis, five clusters have been identified, demonstrating the multidisciplinary nature of the research subject, and emphasizing the complexity and interdependence of various aspects of transparency in the insurance market. The analysis of insurance market transparency trends has allowed us to identify four key stages of development: post-crisis regulatory mechanisms (2013–2016), Solvency II regulation effectiveness (2017–2019), transparency during the pandemic (2020–2021), and the impact of digital innovations since 2021. The geographic analysis showed a significant contribution from the United States, European countries, some countries in Asia, the Pacific, and South Africa. Spatial clustering identified five groups of leading countries in the research. The analysis of the top 15 scientific institutions and journals emphasized the importance of this topic in academic research, with a high level of activity and citation.

Overall, the bibliometric analysis results show a wide range of approaches and aspects discussed in the context of insurance market transparency, from regulatory strategies to technological innovations, emphasizing the importance of a comprehensive and multifaceted approach to this topic.

Further research will focus on the development of effective strategies and tools that allow insurance companies to increase transparency while ensuring the protection of consumer data and privacy.

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