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AI and Greenwashing: Digital Transformation in Reducing Information Asymmetry

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Artificial Intelligence, Greenwashing, Information Asymmetry, ESG, Digital Transformation, Sustainability Reporting.

Abstract

This research is motivated by the increasing practice of greenwashing amid the increasing demands for transparency in sustainability and ESG reporting. The high asymmetry of information between companies and stakeholders causes environmental claims to often not match the company's actual performance, thereby lowering the credibility of sustainability reporting systems. This study aims to analyze the role of Artificial Intelligence (AI) as a digital transformation mechanism in reducing information asymmetry and suppressing greenwashing practices. The method used is Systematic Literature Review (SLR) with a PRISMA approach to reputable scientific articles obtained from the Scopus database, Web of Science, ScienceDirect, Emerald Insight, IEEE Xplore, and Google Scholar in the period 2010–2025. The analysis process is carried out through thematic synthesis to identify patterns, mechanisms, and conceptual relationships between researches. The results show that AI plays a significant role in increasing the transparency of ESG reporting through real-time data analysis, anomaly detection, machine learning, large language models, and the integration of big data based on the Internet and IoT. AI has also been proven to be able to improve operational efficiency, strengthen corporate governance, and narrow the opportunities for environmental information manipulation. In addition, the development of digital technologies such as blockchain, cloud computing, and the Internet of Things strengthens the effectiveness of AI in creating a more accurate and transparent sustainability monitoring system. This study concludes that AI is an effective digital governance mechanism in reducing information asymmetry and greenwashing, although its implementation still requires regulatory support, good data quality, and adequate digital infrastructure.

INTRODUCTION

In recent years, global attention to sustainability has encouraged companies to increasingly display an environmentally friendly image through ESG reports, sustainability reports, and various other green claims. However, this increase in the need for transparency is accompanied by an increase in greenwashing practices, namely the delivery of environmental information that is exaggerated, misleading, or inconsistent with the company's actual performance. Greenwashing clouds stakeholder judgment, leads to misallocation of green financing, and ultimately damages the credibility of environmental information systems. Various studies show that this practice occurs due to the high asymmetry of information between companies and external parties, weak supervisory mechanisms, and the existence of short-term reputational incentives for managers to display green performance that does not match reality

Cases of greenwashing in various industries show how serious this problem is. One example that is often cited is Tesla, which was praised as a pioneer of electric vehicles and even gained the status of a "green factory". But in 2022, Tesla was removed from the S&P 500 ESG Index due to

issues related to its low-carbon strategy and reporting transparency. While the company earns substantial revenue from the sale of carbon credits, its ESG performance is considered to be inconsistent with the sustainability claims it submits. This case shows how even companies with a strong green image can be entangled in greenwashing when environmental claims are not in line with factual data. This phenomenon shows the urgency to find new approaches in minimizing the chances of information manipulation.

In the midst of these challenges, Artificial Intelligence (AI) is emerging as a key technology that has the potential to reduce the space for greenwashing behavior. AI is capable of performing text analysis, anomaly detection, real-time monitoring, and consistency evaluation between company statements and actual environmental data. An LLM-based (large language model) empirical study found that higher rates of AI adoption significantly lower greenwashing, primarily through increased operational efficiency, improved human capital structures, and encouraging green innovation. Similarly, other studies that use industrial robot data as a proxy for AI adoption show that AI suppresses greenwashing through increased productivity, reduced costs, as well as reduced information asymmetry between companies and outsiders. In fact, AI has also been shown to increase the effectiveness of external oversight, strengthen governance, and reduce the chances of manipulation of ESG reports

The role of AI in mitigating greenwashing cannot be separated from the development of the Internet and digital technology. The success of AI in data detection, semantic analysis, and environmental surveillance is highly dependent on the availability of big data built through the Internet, IoT, and other digital infrastructure. As illustrated in various studies, the integration of AI, Internet, and IoT-based sensors allows for real-time collection of environmental data, making the practice of information manipulation increasingly difficult. Internet-based surveillance also allows third parties—including regulators, investors, and the media—to access and verify information more quickly, thereby strengthening the effect of market discipline. In other words, AI strengthens the Internet as an information medium, and the Internet provides data and connectivity that allows AI to work optimally.

The development of a new generation of the Internet (broadband Internet, IoT, cloud computing) has also changed the way companies manage ESG reporting. Digital regulations, data-driven carbon footprint systems, and online disclosure platforms are creating an ecosystem of transparency driven by the speed at which information flows. Studies show that digitalization—both at the government and corporate levels—has helped narrow the space for greenwashing by improving data quality, lowering monitoring costs, and strengthening internal controls. This development is the foundation for AI to function not only as an analytical tool, but as a digital governance mechanism capable of structurally reducing information asymmetry.

With the increasing capabilities of AI and the widespread penetration of the Internet, an increasingly important question is how these two technologies can reinforce each other to build a more transparent environmental disclosure system. Although many studies have shown that AI is capable of suppressing greenwashing, they have not systematically integrated cross-research findings regarding the mechanisms, heterogeneity, and AI–Internet relationship in the context of reducing information asymmetry. Therefore, this Systematic Literature Review aims to map empirical evidence related to the role of AI in reducing information asymmetry and greenwashing, identify core mechanisms, and highlight research gaps that are still open.

METHODS

This study uses the Systematic Literature Review (SLR) method to comprehensively examine the role of Artificial Intelligence (AI) in reducing information asymmetry and greenwashing. The SLR method was chosen because it is able to produce a systematic, structured, transparent, and free synthesis of knowledge from selection bias, as recommended by Tranfield et al. (2003), Kitchenham (2004), and the PRISMA guidelines (Moher et al., 2009). The research process began with the formulation of research questions that focused on three main aspects: how AI affects the level of information asymmetry in ESG reporting, how AI suppresses greenwashing practices, and what mechanisms and moderation factors explain the relationship. After the research question was formulated, the researcher conducted a systematic literature search through several reputable scientific databases, namely Scopus, Web of Science, ScienceDirect, Emerald Insight, IEEE Xplore, and Google Scholar as a complement. The search was conducted using a combination of keywords such as "Artificial Intelligence", "Machine Learning", "Greenwashing", "ESG Manipulation", and "Information Asymmetry", combined with Boolean operators to ensure a broad and relevant literature coverage.

All articles found then go through a selection process based on the PRISMA guidelines, which include the identification stage, screening of titles and abstracts, full-text evaluation, and final selection. In the early stages, searches yielded hundreds of articles, but after the removal of duplication and initial screening, only a fraction met the criteria for further study. The inclusion criteria include journal articles published in the 2010 to 2025 range, available in full text, in English, and having direct relevance to the themes of AI, greenwashing, ESG disclosure, or asymmetric information. Meanwhile, articles that are opinionated, editorial, duplicative, not available in full form, or do not discuss the relationship between AI and sustainability governance are excluded from the analysis. This process results in about thirty main articles that form the basis of the synthesis in this research, including the empirical articles you upload.

After the selected studies are determined, the researcher conducts a systematic data extraction process by recording the research context, the operational definition of the AI used (e.g. patent-based AI, industrial robot, keyword-based, or LLM model), greenwashing measurements, mechanisms of AI influence, moderation and mediation variables, empirical methods, and key findings. The data that has been extracted is then analyzed using a thematic synthesis approach, which identifies patterns, themes, and conceptual relationships that appear consistently in various studies. The analysis process includes open coding to identify initial concepts, axial coding to group concepts into thematic themes such as the role of AI in transparency, internal governance, operational efficiency, green innovation, and reduced information asymmetry, as well as selective

coding to build a conceptual framework that explains the relationship between AI and greenwashing as a whole.

To improve the reliability and validity of the research, the entire literature search and selection process is carried out repeatedly and carefully, including the use of quality appraisal through the CASP checklist to assess the methodological quality of each study. Potential conflicts in selection and interpretation are resolved through discussion and consensus building. Although this SLR is very systematic, this study has some limitations, such as publication bias because it only includes English-language articles and journal articles, as well as the dominance of studies from the Chinese context so that it may influence global generalizations. Nevertheless, with a rigorous and comprehensive SLR approach, this study is still able to provide a comprehensive picture of how AI can function as an effective digital governance mechanism in lowering information asymmetry and reducing greenwashing behavior.

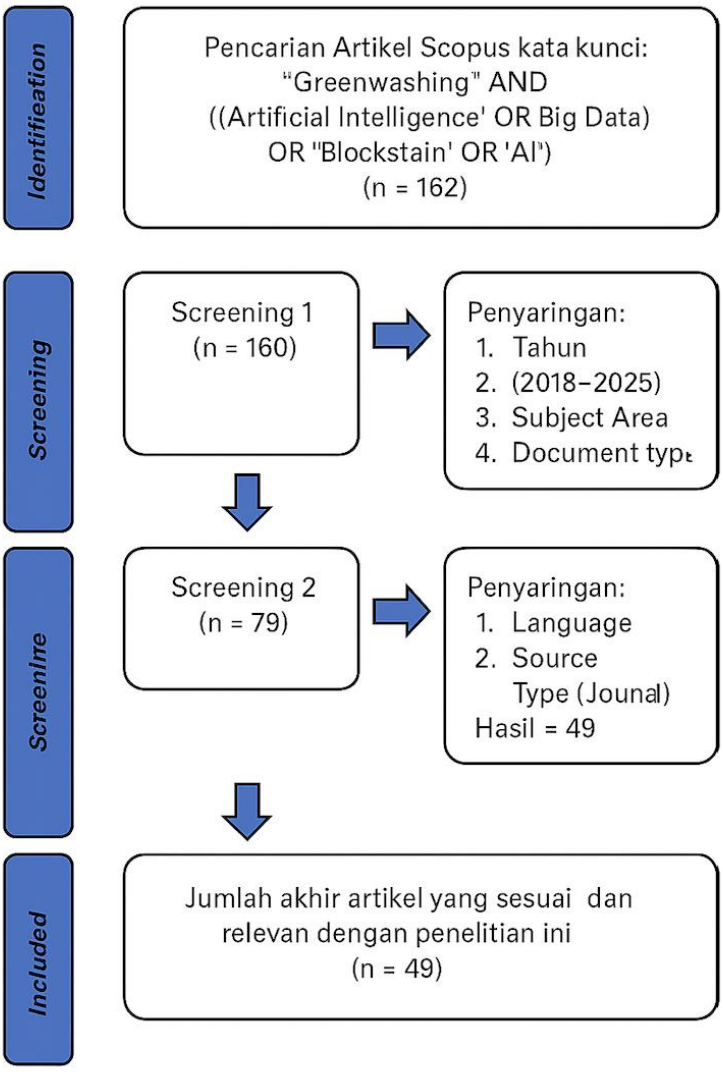


Figure 1. PRISMA Flow Diagram

RESULTS AND DISCUSSION

Publication Trends

Analysis of publication trends in the Scopus database during the period 2020 to 2025 shows a significant increase in the number of studies discussing greenwashing and Artificial Intelligence (AI). In 2020, there was only one publication, followed by no publication in 2021. The lack of research in this early phase reflects that the integration of the topic of greenwashing with digital technologies such as AI is still in its embryonic stage and has not yet become a major focus in the sustainability literature. Entering 2022, the number of publications has again increased to one article, marking the beginning of growing academic interest in line with increasing global awareness of ESG transparency issues. A more visible increase occurred in 2023, namely to four publications, which can be attributed to the emergence of generative AI technology and the increasing adoption of AI in companies, thus opening up new research space related to greenwashing analysis using intelligent data and algorithms.

A significant surge occurred in 2024 with a total of eleven publications. This increase reflects the growing attention to the role of AI in detecting and reducing greenwashing, especially after various cases of greenwashing in the energy, fashion, and automotive sectors were revealed globally. In addition, these years were also marked by the strengthening of international ESG regulations and the implementation of stricter reporting standards, thus encouraging researchers to explore how digital technologies can improve corporate transparency. The peak of publication occurs in 2025 with the number reaching twenty-seven articles, or more than half of the total publications in a five-year period. This exponential surge shows that the discourse on greenwashing and AI has transformed into an emerging hot topic in the sustainability, corporate governance, and digital technology literature. This growth also shows that AI is now seen as a critical mechanism in reducing information asymmetry, improving the quality of ESG reporting, and strengthening environmental monitoring systems in real-time through integration with the Internet, IoT, and big data.

Overall, the trend of publications shows an exponential growth pattern that reflects the increasing urgency and relevance of research at the intersection between greenwashing and artificial intelligence. The peak publication in 2025 confirms that the topic is at the highest research intensity point and is expected to continue to increase as AI-based analytics technologies develop as well as increasing regulatory pressures and the need for environmental accountability around the world.

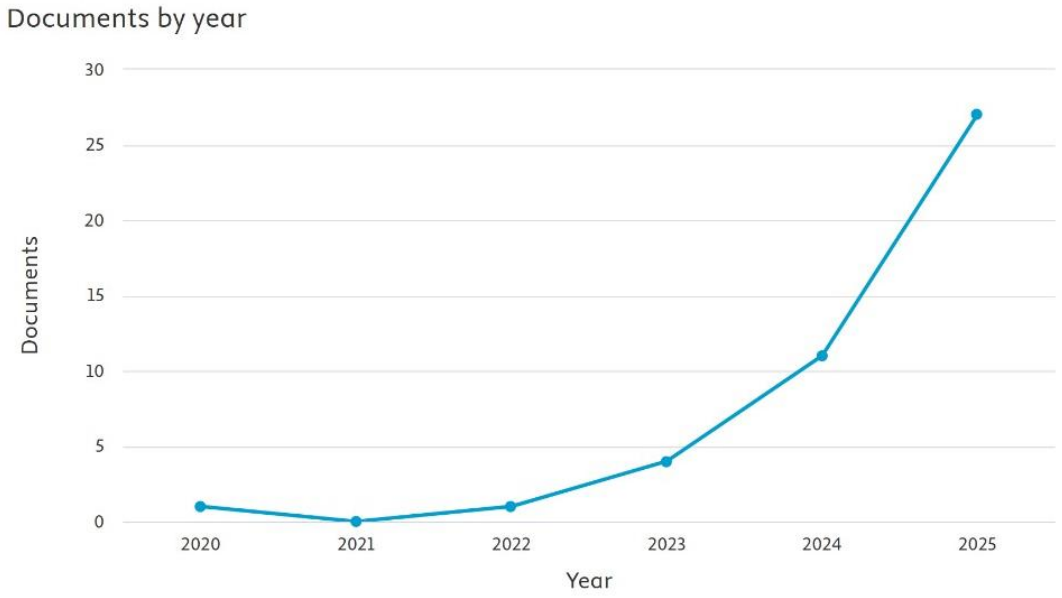


Figure 2. Documents By Year

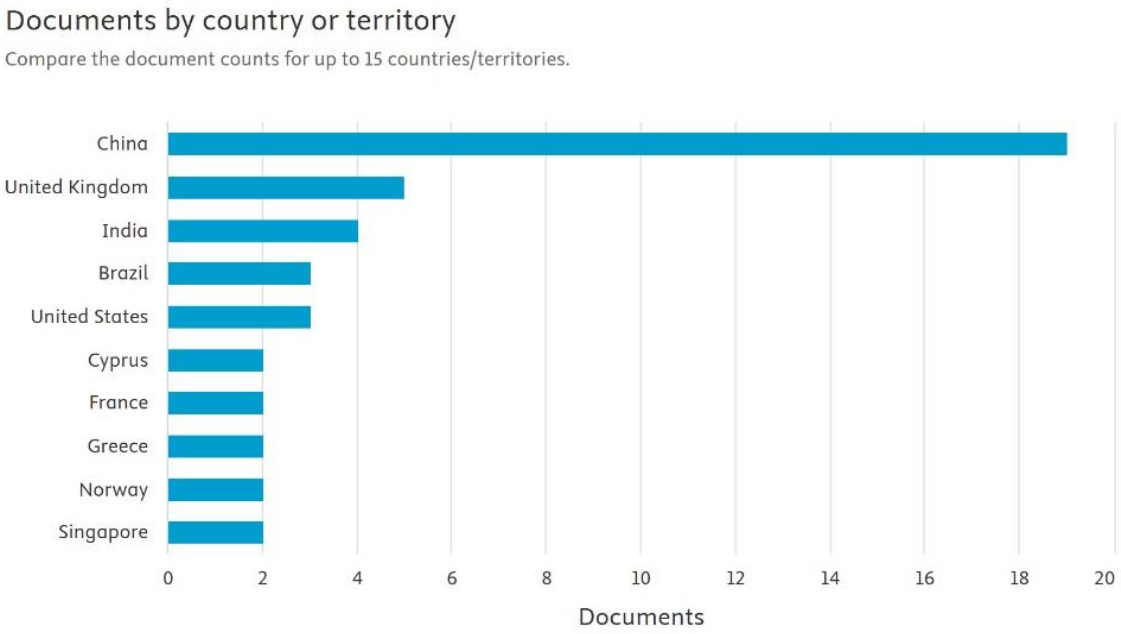


Figure 3. Top 10 Documents By Countries

Figure 3 shows that research on greenwashing and Artificial Intelligence (AI) is dominated by China with the highest number of publications, namely 19 documents during the 2020–2025 period. China's dominance is understandable because the country has a strong research ecosystem, rapid growth of the digital industry, and high regulatory pressure on companies' sustainability practices. In addition, a lot of empirical research on greenwashing and the use of AI to improve

the quality of ESG reporting uses data from Chinese public companies, which have richer and more standardized data availability. The second position is occupied by the United Kingdom with 5 publications, followed by India with 4 publications. This suggests that countries with a great deal of concern for environmental governance and strict capital market regulation tend to actively examine the link between AI and greenwashing. Meanwhile, countries such as Brazil, the United States, Cyprus, France, Greece, Norway, and Singapore each produced 2–3 publications, which shows that this topic has attracted global attention, although the intensity still varies. The difference in the number of publications between countries also reflects the level of digital readiness, maturity of ESG regulations, and different access to company data. Overall, this pattern indicates that research on the role of AI in greenwashing mitigation is growing rapidly, especially in countries with strong sustainability policies and advanced technology ecosystems.

Country	Number of Articles
China	19
United Kingdom	5
India	4
United States	4
Brazil	3
Cyprus	2
France	2
Greece	2
Norway	2
Singapore	2

The table shows the distribution of publications related to greenwashing and Artificial Intelligence (AI) by country during the period 2020–2025. The results confirm the findings in Figure 3 in the document, namely that research on the relationship between AI and greenwashing is highly concentrated in a few specific countries, with a very strong dominance of China. China produced 19 articles, making it the country with the largest research contributions. This dominance is consistent with the characteristics of China's strong research ecosystem, the government's large support for sustainability research and digital technologies, and the abundant availability of corporate data that allows many empirical studies to be conducted in the country.

The next position is occupied by the United Kingdom with 5 articles, followed by India and the United States, with 4 articles each. These countries' contributions show that the issue of greenwashing and the use of AI in ESG reporting is also an important concern in countries with advanced capital market regulations and strong corporate governance research traditions. Meanwhile, countries such as Brazil (3 articles), as well as Cyprus, France, Greece, Norway, and Singapore, which each contributed 2 articles, show that although this topic is global, the intensity of research still varies greatly between countries.

This distribution pattern indicates that research development centers related to the role of AI in reducing greenwashing and information asymmetry are still concentrated in countries with advanced digital research capacity, strong funding support, and higher ESG regulatory maturity. Overall, the table confirms that China is not only a major research center, but also the largest source of empirical data for the studies analyzed, while the contributions of other countries remain significant despite the relatively smaller number.

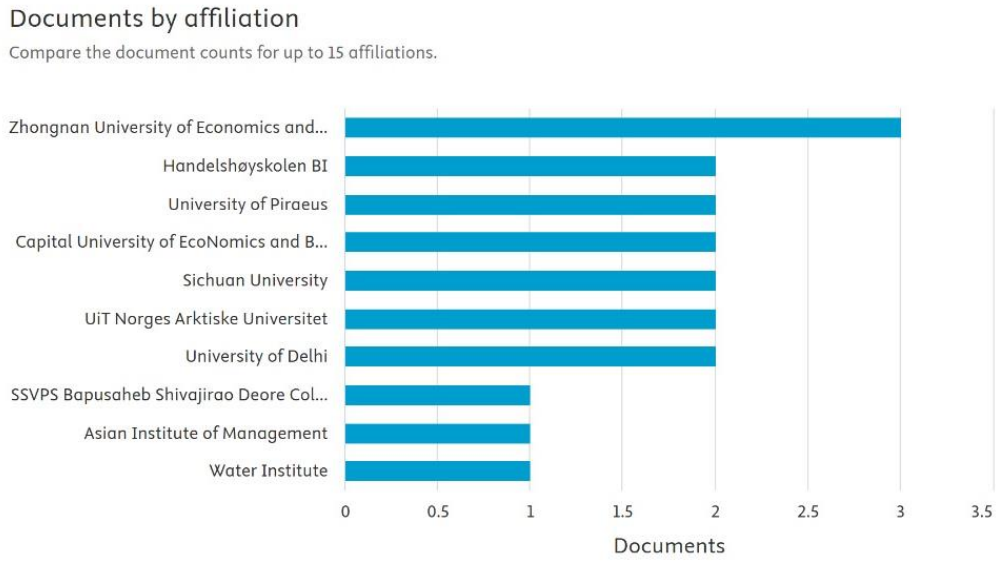


Figure 4 Top 10 Documents By Institution

Figure 4 Analysis of the distribution of publications by affiliation shows that research on greenwashing and Artificial Intelligence (AI) is still concentrated in a number of institutions that have strong research capacity and relevant research focus. Zhongnan University of Economics and Law is the institution with the most significant contributions, namely three publications, which indicates the dominance of higher education institutions in China in the development of research related to corporate governance, ESG, and digital technology. In addition, several other universities such as Handelshøyskolen BI (Norway), University of Piraeus (Greece), Capital University of Economics and Business (China), Sichuan University (China), UiT Norges Arktiske Universitet (Norway), and University of Delhi (India) contributed two publications each. This distribution pattern reflects that research at the intersection of greenwashing, sustainability, and AI issues is increasingly globalized, but with contributions that tend to be concentrated in institutions that have better access to data, funding support, and digital research ecosystems.

The centrality of publications to a particular institution is closely related to the source of funding that drives research in that field. Based on the Documents by Funding Sponsor chart, it can be seen that the most dominant funding institution is the National Natural Science Foundation of China (NSFC) which sponsors ten publications, far surpassing other funding institutions. NSFC's dominance shows the Chinese government's strong support for ESG research, digital technology, and AI applications in corporate governance. Other institutions such as the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (Brazil), the Fundamental Research Funds for the Central Universities, and the Natural Science Foundation of Jiangsu Province each funded two publications. Meanwhile, funding from international research institutions such as the Australian Research Council, China Postdoctoral Science Foundation, Durham University, and the Conselho Nacional de Desenvolvimento Científica e Tecnológico (Brazil) contributed only one publication. The combination of China's concentrated funding and the strength of its academic institutions suggests that the country is becoming a major center for research on greenwashing and AI.

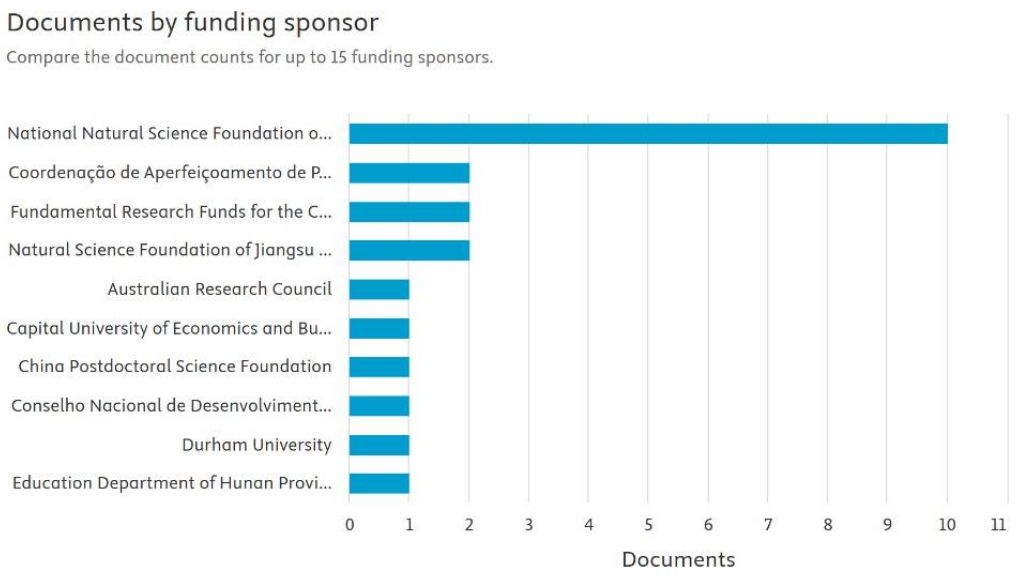


Figure 5 Top 10 Documents By Companies (Funding Sponsor)

Journal Analysis

Analysis of journals based on publication sources displayed in the table and visualization of Documents by Source shows that research on greenwashing and Artificial Intelligence (AI) is distributed across reputable journals that focus on finance, sustainability, management, and technology. The table identifies some of the journals with the highest number of publications, which at the same time illustrates the direction of scientific concentration on this topic.

The journals with the largest contributions are Finance Research Letters, Environment Development and Sustainability, and Energy Economics, each with 4 articles. The dominance of the three journals shows that the issue of greenwashing and the role of AI is not only seen as a sustainability issue, but also closely related to corporate finance, energy policy, and global economic dynamics. Finance Research Letters, for example, is known as a journal that publishes a lot of empirical research based on quantitative data in finance and capital markets, so the penetration of the topic of AI and greenwashing in this journal signals increased attention to the risk of manipulation of ESG information on investor behavior. Meanwhile, Environment, Development and Sustainability is an important forum for discussing the implications of sustainability and environmental governance, especially when greenwashing emerges as a major challenge in the sustainable development agenda.

Under the three journals, IEEE Transactions on Engineering Management, Business Strategy and the Environment, and Journal of Cleaner Production contributed 2 articles each, demonstrating the role of technology engineering, sustainability strategy, and green production in examining the implementation of AI as a tool to reduce environmental reporting manipulation. The involvement of technology-based journals such as IEEE Transactions confirms that the development of AI, machine learning, and data-driven systems has become an important approach in greenwashing detection, particularly through text analytics automation, anomaly detection, and cross-data integration.

Several other journals that contribute a single publication—such as AMS Review, Business Strategy and Development, Cogent Business and Management, and Corporate Social

Responsibility and Environmental Management—show that while not as large as the main journals, these topics are also raised in areas of science such as sustainable marketing, business strategy, corporate management, and social responsibility. This distribution indicates that research related to AI and greenwashing is multidisciplinary, covering the perspectives of technology, sustainability, finance, organizational behavior, and governance.

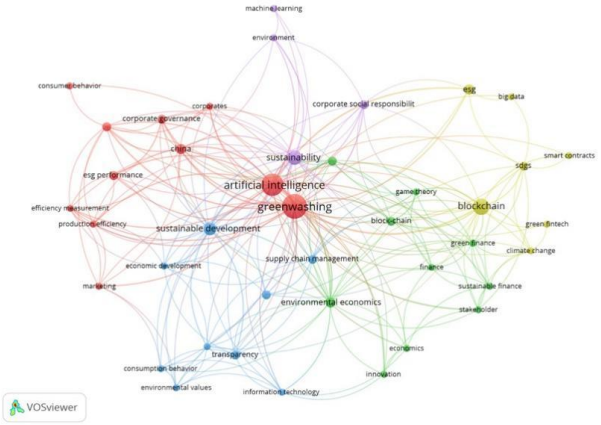
Overall, the "Documents by Source" pattern confirms that greenwashing and AI adoption are a rapidly growing topic in a variety of cross-field journals. The journal of finance and sustainability is central to publications, but contributions from technology and strategic management journals show that the integration of AI in greenwashing mitigation is seen as a multidisciplinary issue involving aspects of digitalization, information transparency, and stronger governance. This pattern also shows that research on AI and greenwashing is not concentrated in just one field of science, but is spread across various academic domains that complement each other in understanding the complexity of ESG information manipulation in the digital age.

Country	Number of Articles
Finance Research Letters	4
Environment Development and Sustainabilty	4
Energy Econmics	4
IEEE Transaction on Engineering Management	2
Business Strategy and the Environment	2
Journal of Cleaner Production	2
Ams Review	1
Business Strategy and Development	1
Cogent Business and Management	1
Corporate Scocial Responsibility and Environmental Management	1

Keywords Co-Occurrence

The VOS viewer keyword co-occurrence map shows that "artificial intelligence" and "greenwashing" are the two keywords with the largest node size, indicating that the two terms are the main focus in the research network, as well as being the point of integration between various other topics spread across several clusters. The red cluster shows a strong link between greenwashing, corporate governance, ESG performance, sustainable development, production efficiency, and the context of countries such as China. This suggests that the dominant research focuses on how AI is used to improve corporate governance, operational efficiency, and ESG performance, particularly in the context of emerging economies. Meanwhile, the green cluster connects blockchain, green finance, smart contracts, SDGs, and sustainable finance, reflecting the growing research interest in the integration of blockchain technology to improve transparency and sustainability accountability, including as a mechanism to reduce greenwashing in the supply chain and ESG reporting.

The purple and light blue clusters that include keywords such as machine learning, environment, corporate social responsibility, and supply chain management show that AI and data-driven technologies are seen as important tools in environmental performance measurement, reporting automation, and sustainability risk mitigation. Meanwhile, the blue cluster at the bottom—which links transparency, environmental economics, innovation, and consumption behavior—confirms that the research also focuses on understanding how digital technologies affect consumer behavior and increasing public trust through increased information transparency. The dense and cross-cluster relationship between keywords indicates that research related to greenwashing is no longer limited to communication or marketing issues, but has moved towards a multidisciplinary approach that includes advanced technologies, environmental economics, sustainable finance, and corporate governance. Overall, the map shows that the integration of AI, blockchain, and big data is becoming a central theme in the contemporary literature to address greenwashing practices and strengthen corporate sustainability across various sectors.



The density visualization map shown shows that "artificial intelligence" and "greenwashing" are the highest density centers (bright yellow), indicating that these two terms appear most frequently and have the greatest frequency of interconnection in the literature. The high density around these two keywords shows that research related to greenwashing is increasingly integrated with the use of AI technology, especially in the context of manipulation detection, increased transparency, and strengthening corporate governance. The light green areas surrounding the center, such as "sustainability", "sustainable development", "corporate governance", and "ESG

performance", show that these themes are important supporting topics that are often associated with the role of AI in mitigating greenwashing. In other words, the scientific literature has highlighted a lot about how AI helps strengthen sustainability, improve ESG disclosures, and improve governance.

On the other hand, the green cluster located on the right—with keywords such as "blockchain", "green finance", "smart contracts", "SDGs", and "big data"—suggests that other technologies besides AI, especially blockchain and big data, are also developing research areas in the context of combating greenwashing. Blockchain, in particular, is emerging as an important technology due to its ability to ensure transparency, data security, and traceability in supply chains and sustainability reporting. Meanwhile, smaller light green areas such as "machine learning", "corporate social responsibility", and "environmental economics" describe topics that have moderate relevance but remain connected in the research network. Lower density in blue areas indicates topics that rarely appear or have only peripheral relationships, such as "consumption behavior", "marketing", and "economic development".

Overall, this density map indicates that research on greenwashing is increasingly leading to a technology-based interdisciplinary approach, where AI takes center stage, followed by blockchain and big data as complementary technologies. This reflects the transformation of the research paradigm from a conventional approach to a digital and analytical approach in understanding and reducing greenwashing in various industrial sectors.

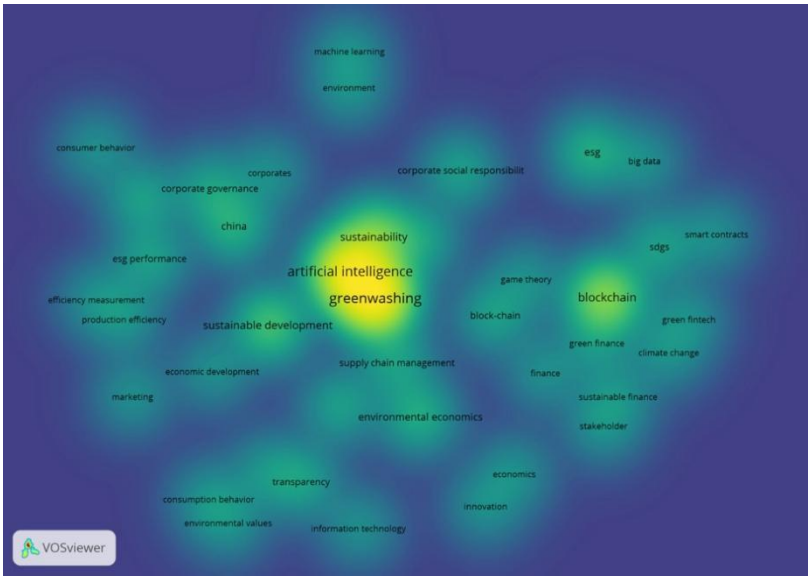


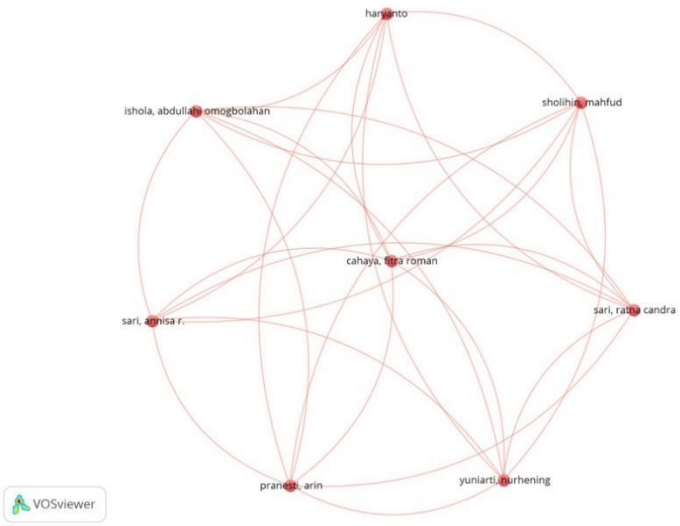
Table 5 shows that most of the research on the topic of greenwashing and Artificial Intelligence centered on the keyword "greenwashing", which has the highest frequency of occurrences and the largest total link strength. This confirms that the issue of environmental information manipulation is the main focus in all publications. In addition, the keywords "artificial intelligence", "blockchain", and "big data" also appear quite frequently and have strong relationships with other keywords. The dominance of these technology-based keywords shows that digital approaches are increasingly becoming a key strategy in detecting, monitoring, and reducing greenwashing.

Most of the other frequently used keywords—such as "sustainable development", "sustainability", "ESG performance", and "green finance"—illustrate that research on greenwashing is always placed in the context of sustainable development and corporate

environmental governance. Meanwhile, the emergence of keywords such as "transparency", "traceability", "supply chain", and "supply chain management" shows that greenwashing does not only occur in the realm of ESG reporting, but also throughout the company's supply chain and operational processes. The presence of "environmental economics" and "economic development" indicates that most studies also link greenwashing to economic impacts, market efficiency, and development dynamics.

Table 5. 15 Most Used Keywords

Keywords	Occurrences	Total Link Strength
Greenwashing	12	28
Sustainable development	4	19
Artificial Intelligence	5	17
Sustainability	3	14
Blockchain	5	13
Transparency	3	13
Environmental Economics	3	12
Economic Development	2	11
Traceability	2	11
Supply Chain	2	10
Supply Chain Management	2	10
Information Technology	2	8
Block Chain	2	7
ESG Performance	2	7
Green Finance	2	7
SDGs	2	5
Big Data	2	2



The co-authorship analysis based on the VOSviewer visualization shows that there are research groups that form a very strong and interconnected research collaboration network. On

the network map, writers such as Haryanto, Sholihin Mahfud, Cahaya Fitra Roman, Sari Ratna Candra, Sari Annisa R., Yuniarti Nurhening, Pranesti Arin, and Ishola Abdullahi Omogbolahan appear as nodes that are interconnected through a tight connecting line. This density of connections suggests that the authors often work together on the same research project or are part of a scientific community that has similar research themes. The centered node like Cahaya Fitra Roman serves as the central connector in the network, indicating its role as the most active researcher collaborating with other members. The same thing can be seen in Haryanto and Sholihin Mahfud who have an equal co-author relationship with almost all members of the cluster.

The density visualization further confirms this. All authors appear as yellow dots with almost the same level of density, indicating that they have a relatively balanced contribution weight and frequency of collaboration. The absence of a dimmer blue or green dot indicates that no author is isolated or on the edge of the network. Thus, the cluster reflects a cohesive research community, where collaboration is carried out in a structured and repetitive manner, creating a stable and productive pattern of cooperation. These characteristics generally appear in research groups at the same institution, collective grant projects, or very specific research themes that result in long-term collaboration.

Overall, the results of the analysis show that research in this cluster develops through intensive collaboration, rather than individual efforts. This contributes to the better quality and quantity of publications, as well as strengthens the position of this group of researchers in the literature. This pattern is important because strong collaboration usually correlates with high scientific productivity, rapid dissemination of knowledge, and increased relevance of the research theme being developed.

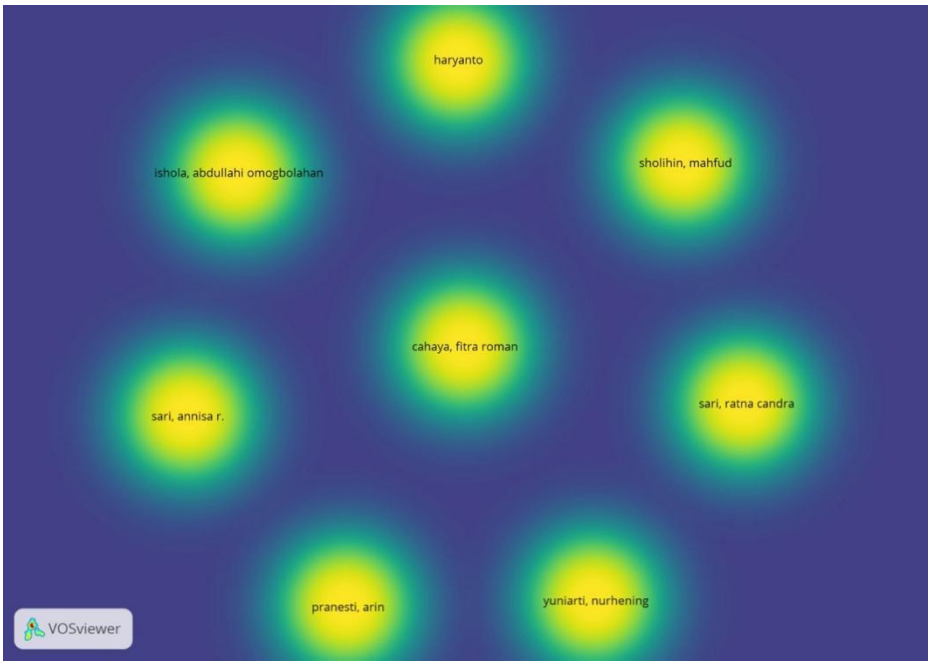


Table 6 shows that although each author produced only one publication, the level of occurrences and total link strength reflected differences in influence within the research network. Authors such as Dong Ciwei, Huang Qianzhi, Liu Renjun, Ng Chito To Daniel, and Pan Yuqing occupy the top positions with the highest number of occurrences (60) and the greatest link strength, indicating that they are most frequently involved and most strongly connected in a network of scientific collaboration. Meanwhile, several other authors such as Arakelian Veni, Chatzichristofis Savvas, Chen Riuxuan, and Chen Xiangfeng have moderate levels of connectivity,

but still play an active role in the same research cluster. Overall, this table shows that the productivity of authors in the field of greenwashing and AI is more determined by the intensity of collaboration and position in scientific networks, rather than just the number of publications, so that authors with high link strength become key actors in the development of research in this field.

Table 6. 15 Most Productive Author

Author	Documents	Occurrences	Total Link Strength
Dong, Ciwei	1	60	4
Huang, Qianzhi	1	60	4
Liu, Renjun	1	60	4
Ng, Chito to Daniel	1	60	4
Pan, Yuqing	1	60	4
Arakelian, Veni	1	10	3
Chatzichristofis, savvas	1	19	3
Chen, riuxuan	1	44	3
Chen, xiangfeng	1	44	3
Chondrokoukis, Gregory P.	1	10	3
Christodoulou, Panayiotis n	1	19	3
By the way, Thomas K.	1	10	3
Huo, Chunhui	1	18	3
Jiao, Anqi	1	22	3
Khan, Muhammad Kaleem	1	18	3
Li, Shanliang	1	44	3
Li, Zonghuo	1	44	3
Lu, Juntai	1	22	3

CONCLUSION

The results of this Systematic Literature Review show that Artificial Intelligence (AI) has a strategic role in reducing information asymmetry and suppressing greenwashing practices in various corporate contexts. Various empirical studies analyzed confirm that the adoption of AI through machine learning, large language models, robotic technology, and big data-based analytics consistently improves the quality of ESG disclosures, strengthens transparency, and reduces opportunities for environmental information manipulation. AI works through several core mechanisms: improving operational efficiency, integrating and consistency of cross-functional data, real-time monitoring, anomaly detection, and strengthening internal governance that directly or indirectly suppresses managerial opportunistic behavior.

The findings also confirm that the role of AI is inseparable from the development of the broader digital ecosystem, including the use of the Internet, IoT, cloud computing, and blockchain. The digital infrastructure provides a large, fast, and verifiable flow of data, allowing AI to function optimally as a digital governance mechanism. The integration between AI and other digital

technologies further narrows the greenwashing space by creating environmental monitoring systems that are more accurate, traceable, and open to external stakeholders.

Bibliometric analysis shows a rapid increase in research on the topic of AI and greenwashing in the last five years, especially in 2024–2025. China is emerging as a dominant center of research, supported by the power of academic institutions and large sources of national funding. The distribution of keywords and the authors' collaboration patterns indicate that the literature is evolving towards a multidisciplinary approach that combines sustainability, digital technology, environmental economics, supply chain management, and corporate governance. This reflects the transformation of the research paradigm from traditional reporting approaches to data-driven intelligent surveillance.

Despite this, current research still faces some limitations. The dominance of studies from one country (China), variations in AI adoption measurements, and the lack of integration between AI and Internet dimensions as moderation factors indicate the need for more geographically and methodologically diverse follow-up research. In addition, potential AI risks such as black-box algorithms, optimization of symbolic narratives that do not reflect real performance, and reliance on data quality remain challenges that must be addressed in the implementation of AI for sustainability purposes.

Overall, this SLR concludes that AI is a powerful and effective digital governance mechanism in reducing information asymmetry and greenwashing. However, such effectiveness can only be achieved if AI is integrated with adequate digital infrastructure, supported by strong regulations, and implemented in an organizational culture that is oriented towards transparency and accountability. Future research needs to take a deeper look at the interactions between AI, the Internet, big data, as well as cross-border institutional factors to understand the limitations and full potential of smart technologies in shaping a more reliable ESG reporting ecosystem.

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