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The Current Status, Hot Topics and Trends of Environmental, Social and Governance (ESG) Research in East Asian Countries: A Bibliometric Analysis

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Abstract

East Asian countries are experiencing rapid development in environmental, social, and governance (ESG) practices. As an effective measure for green and sustainable development, ESG is widely implemented within enterprises and has a profound impact on socio-economic development. This article employs CiteSpace visualisation software to analyse 3,279 documents related to ESG published from 2004 to 2024, as indexed in the Web of Science (WOS) database. The analysis focuses on publication timelines, countries, authors, highly cited literature, and keyword clustering to explore the hotspots and trends in ESG research among East Asian countries. The findings indicate a significant increase in ESG publications in recent years, with research hotspots and trends primarily centred around sustainable development, corporate social responsibility, sustainability reporting, environmental regulation, and ESG performance. Although there is considerable collaboration among countries, the overall research remains in its early stages, with few high-output and high-impact authors, resulting in a dispersed research effort. This article serves as a reference for researchers to quickly grasp the current state of ESG development in East Asian countries and to identify research hotspots and trends.

Keywords: *Environmental, Social and Governance (ESG); East Asian Countries; Bibliometric Analysis; Citespace; Web of Science (WOS) Database.*

Introduction

Environmental, Social, and Corporate Governance (ESG) represents a sustainable development concept and values (Li et al., 2021). The origins of ESG can be traced back to ethical investing and socially responsible investing (Michelson et al., 2004). The concept was first recognised in a United Nations report in 2004 (Gillan et al., 2021). Over the past two decades, as awareness of environmental protection, corporate social responsibility, and sustainable investment has increased, there has been growing attention to related concepts in the ESG field. ESG information disclosure has become a comprehensive indicator for stakeholders to evaluate companies and is also a key element in promoting social green sustainable development (Wan, Dawod, et al., 2023).

As a hot research topic, ESG covers a wide range of topics from different perspectives. (1) From a macro perspective, some scholars have investigated the interaction between ESG in social environment, economic environment, industry development, etc. For example, Chopra et al. (2024) explored the specific impact and challenges of ESG reporting on social sustainable development. (Işık et al., 2024) studied the impact of ESG factors on energy efficiency in the Group of Seven countries as defined by the International Monetary Fund. (2) From a meso-level perspective, the application of ESG concepts in the investment field has made investment decisions no longer focus solely on financial performance, but also take into account non-financial indicators such as environmental, social and governance factors (van Duuren et al., 2016). In terms of policy formulation and implementation, the ESG evaluation system provides a reference standard for policy formulation. Mooneeapen et al. (2022)found that a company's ESG performance is affected by the level of democracy, political stability and regulatory quality. In addition, the ESG concept helps to optimise the market mechanism and promote efficient allocation of resources(Zhou & Liu, 2023). (Hu et al. (2023) found that the ESG concept can improve the efficiency of regional green economy. (3) From a micro perspective, some researchers have explored the impact of ESG at the corporate level. For

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example, Dmuchowski et al. (2023) studied the relationship between ESG factors and corporate financial performance. He believes that ESG can improve corporate financial performance. Aydoğmuş et al. (2022)studied the relationship between ESG factors and corporate value and profitability. Other researchers analysed the risks and returns of ESG investments from the perspective of investors (Cornell, 2020). These studies have further promoted research and development in the field of ESG.

The ESG concept was first actively developed in theory and applied in developed countries such as the United States and Europe(Li et al., 2021). Some index compilation companies or commercial and financial information supply companies in developed countries, such as MSCI, Thomson Reuters, and Bloomberg, have built ESG rating systems to evaluate companies' environmental impact, social contributions, and the quality of their corporate governance structures through specific indicators. With the development and maturity of the ESG concept in the European and American markets, countries in East Asia have gradually begun to study and practice the ESG concept. However, East Asian countries started to study ESG relatively late, and the evidence in some emerging markets is not clear(Páldi, 2020). In addition, current research focuses on the discussion of certain independent fields and does not reflect the current status and trends of ESG research in East Asian countries. Research scholars may easily overlook other important aspects of ESG. Therefore, it is necessary to summarize the current status, research hotspots, and trends in the ESG field in East Asia. Through the analysis of relevant literature, on the basis of a comprehensive understanding of the overall status and characteristics of ESG, it provides a reference for researchers to choose appropriate research directions.

This article utilises CiteSpace visualisation software to conduct a bibliometric analysis of the ESG field in East Asian countries from various perspectives. Specifically, it examines the distribution of literature from East Asian countries from 2004 to 2024, analyses author publication and collaboration networks, assesses country article citations and collaboration networks, and conducts an analysis of highly cited literature to illustrate the current state of research in the ESG field. Subsequently, the article analyses the current research hotspots in this field through keyword mapping, presents the knowledge evolution in the field using a keyword timeline, and conducts a trend analysis of the development of the ESG field through keyword clustering.

The contributions of this study are as follows: (1) Existing bibliometric analyses in the ESG field have not addressed the situation in East Asian countries. This article fills that research gap by analysing the current state and development trends of ESG in East Asian countries. (2) From a bibliometric analysis perspective, this study examines the research progress of ESG in East Asian countries from 2004 to 2024, providing a reference for researchers studying ESG-related fields in these countries. (3) This article emphasises the understanding of research hotspots and trends in the field, such as the relationships between ESG and sustainable development, corporate social responsibility, sustainability reporting, environmental regulation, and the understanding of ESG performance.

Methodology and Data

Methodology

This article employs the CiteSpace 6.3.R3 bibliometric analysis tool to analyse the research status, hotspots, and trends in the field of ESG information disclosure in East Asia from various aspects, including publication volume, authors, countries, citations, and keywords. CiteSpace is a software developed by Professor Chen Chaomei based on citation analysis theory, using the Java programming language (Ding & Yang, 2022). Its core functionality lies in transforming large volumes of scientific literature data into visual representations (knowledge maps), thereby assisting researchers in better understanding the hotspots and development trends within their research fields.

The time frame explored in this study spans from January 2004 to December 2024, with literature categorised by year. By statistically analysing the number of published articles, author contributions, and country analyses, a comparative study of ESG research in East Asian countries is conducted. Additionally, co-occurrence keyword analysis is employed to examine hot topics and research themes, while keyword

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clustering analysis is utilised to explore the research hotspots and trends in the ESG field, thereby providing a more comprehensive and in-depth understanding of ESG research in East Asian countries.

Data Source

The Web of Science (WOS) database is regarded as one of the most comprehensive and integrated academic information repositories (Pranckutė, 2021). It encompasses multiple citation databases and citation indexes for scientific conference literature, providing researchers with a comprehensive and efficient platform for academic resource retrieval and analysis. This article selects ESG-related literature from the WOS database as the data foundation and employs CiteSpace visualisation software to create knowledge maps. Additionally, the article summarises findings using charts generated in Excel, reflecting the development status of ESG-related research outcomes in East Asian countries.

Referring to Wan, Dawod, et al. (2023) and Zhao et al. (2023), this paper conducts a literature search in the WOS database. This paper defines the search subject keywords as 'ESG' OR 'environmental, social and governance' OR 'environmental, social and corporate governance'. Referring to Chen (2017), the document types selected in this paper are article and review article. Because the concept of ESG was formally proposed in 2004, the time range of this paper is selected as 2004 to 2024, and the language is selected as English. The research area of this paper is East Asian countries and regions. Because the WOS database only provides literature on China, South Korea, Japan, and Taiwan, this study only covers data from these four countries (regions). The research scope in the field of ESG is quite broad (Li et al., 2021). Referring to the relevant studies of Mroueh (2024), Wan et al. (2023) and Zeng et al. (2024), this article manually excluded unrelated disciplines such as toxicology, paediatrics, family studies, art, and acoustics. Instead, it focused on fields such as economics, management, sociology, and international relations, including areas like 'Environmental Science Ecology', 'Business Economics', 'Public Administration', 'Government Law', 'Water Resources', 'International Relations', 'Urban Studies', 'Energy Fuels', 'Area Studies', and 'Social Issues'. Figure 1 provides a detailed illustration of the four steps involved in the literature selection process for this study. After the selection process, a total of 3279 articles were selected.

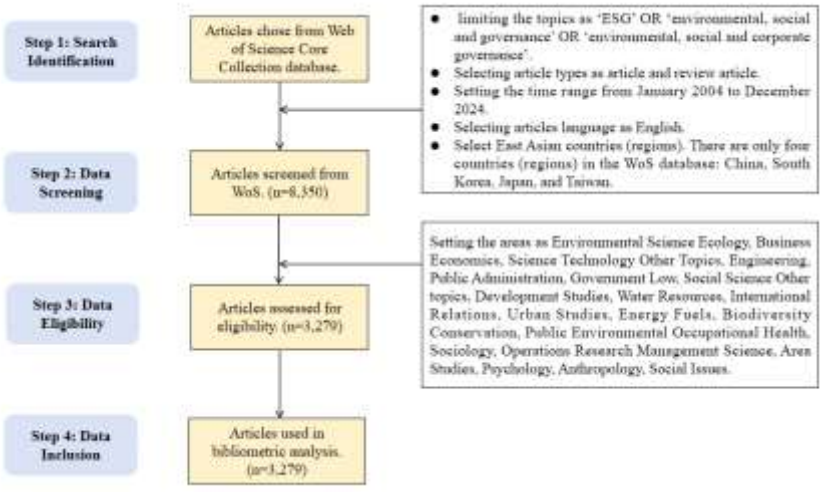

Figure 1. The Literature Selection Process

Current Status of ESG Research

Distribution of Literature

The volume of publications in a particular academic field over a designated timeframe typically indicates the level of interest it has garnered, as well as highlighting the research priorities and the policy context

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relevant to that period. This paper counts the selected literature by publication time. Figure 2 shows the distribution of papers published in the ESG research field in East Asian countries from 2004 to 2024.

As shown in Figure 2, research related to ESG in East Asian countries started relatively late. It was not until 2019 that there was a noticeable increase in the publication of core journal articles in the ESG field. The year 2024 saw a record high in publication volume, reaching as many as 1,141 articles. This indicates that an increasing number of scholars are beginning to focus on the content of ESG research. The gradual rise in the number of articles published on ESG research topics reflects a growing attention to the ESG field in East Asian countries, suggesting that research in this area is gradually maturing. The reason may be that people are paying more and more attention to environmental and social issues (Truant et al., 2023). At the same time, stakeholders are also beginning to pay attention to the ESG indicators of companies as a means of supervision or investment and advice (Khamisu et al., 2024). Pressure from multiple parties has led to the flourishing of ESG research.

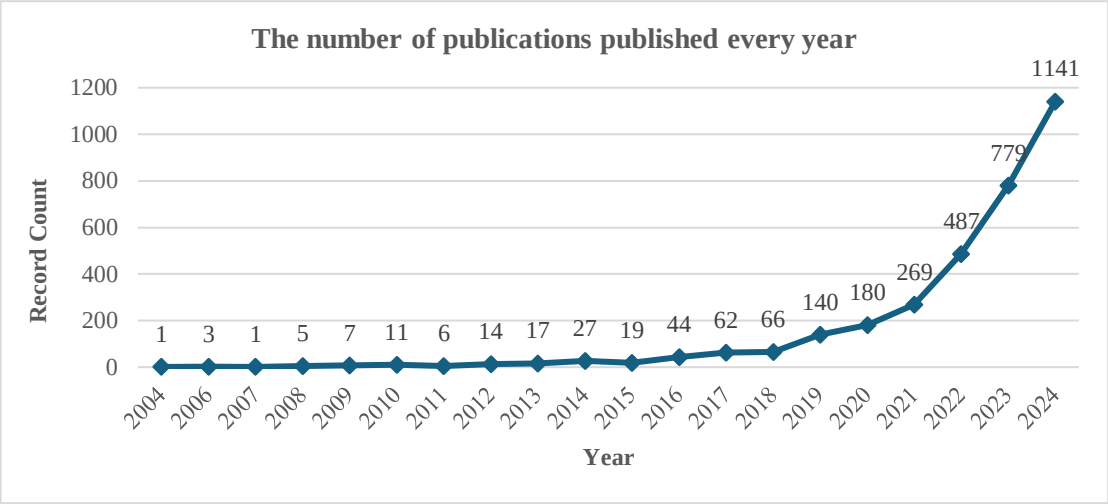

Figure 2. Number Of Publications in The Field of ESG Research in East Asian Countries From 2004 To 2024.

Analysis of Author and Collaboration Networks

Table 1 provides an analysis of the contributions of the most influential authors in the field of ESG research in East Asia, based on metrics such as total publication volume, total citation count, citations per paper (C/P), and H-index. The H-index serves to measure a scholar's academic reputation and impact (Aditya et al., 2024). A higher H-index indicates a greater influence of the author's publications.

Zhang, Dongyang emerges as the most prolific author, with a total of 11 publications. His works have amassed a total of 453 citations, yielding an average of 41.18 citations per paper and an H-index of 8. As a distinguished expert in the ESG research domain, Zhang primarily investigates the impact of ESG behaviours on companies. He asserts that a company's environmental, social, and governance (ESG) performance has a positive effect on firm performance (Zhang & Lucey, 2022) and on the quality of firm products (Zhang, 2022). Additionally, Zhang has conducted research on corporate "greenwashing" practices and associated ESG risks (Zhang, 2023).

Liu, Yang, Sun, Ziyuan, and Chen, Lifeng are tied for second place, each having published 10 papers, with their total citation counts exceeding 100. The research of Liu, Yang and Sun, Ziyuan primarily centres on the factors influencing ESG performance. For instance, Liu et al. (2024) found that CEOs with international experience are beneficial for enhancing corporate ESG performance. Table 1 also highlights several authors with high total citation counts, such as Managi, Shunsuke, Tsang, Albert, and Zahid, R M Ammar, indicating their significant influence and contributions to the advancement of the ESG framework.

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Table 1. Author Publication Citations

Rank	Author	Total papers	Total citations	Citations per paper (C/P)	H-index
2022	Zhang, Dongyang	11	453	41.18	8
2023	Liu, Yang	10	166	16.60	5
2023	Sun, Ziyuan	10	152	15.20	5
2022	Chen, Lifeng	10	134	13.40	5
2023	Lu, Wen-Min	9	62	6.89	4
2019	Managi, Shunsuke	8	134	16.75	4
2023	Yan, Jingzhou	8	48	6.00	4
2023	Tsang, Albert	8	235	29.38	4
2023	Zahid, R M Ammar	8	182	22.75	6
2024	Bagh, Tanveer	7	38	5.43	4
2024	Zhu, Naiping	7	22	3.14	2
2023	Maqsood, Umer Sahil	7	92	13.14	3
2022	Zhang, Lin	7	60	8.57	2
2023	Li, Qiang	7	87	12.43	4

The author collaboration network, as illustrated, aids in analysing the influential scholars within the ESG research domain and their collaborative patterns. Figure 3 presents the knowledge map of the author collaboration network in the ESG research field, comprising 564 nodes and 584 connecting lines, with a network density of 0.0037. The lines represent the degree of collaboration among authors.

From the analysis of Figure 2, it is evident that the connections between nodes are sparse and primarily concentrated among a few authors, exhibiting a distinct dispersed characteristic. This suggests that, despite the considerable number of scholars engaged in ESG research internationally, collaboration among most researchers is limited, resulting in weak academic ties and a lack of a cohesive research community. The size of the circles in the diagram corresponds to the volume of publications. The larger the circle, the greater the number of publications. Some researchers with a high publication count, such as Zhang, Dongyang, have not engaged in collaboration with their peers. Furthermore, the similarity in the colours of the connecting lines indicates that collaborations are relatively concentrated within a specific timeframe, lacking long-term partnerships. The colour of the nodes also reveals that most collaborative efforts among ESG researchers have occurred after 2019.

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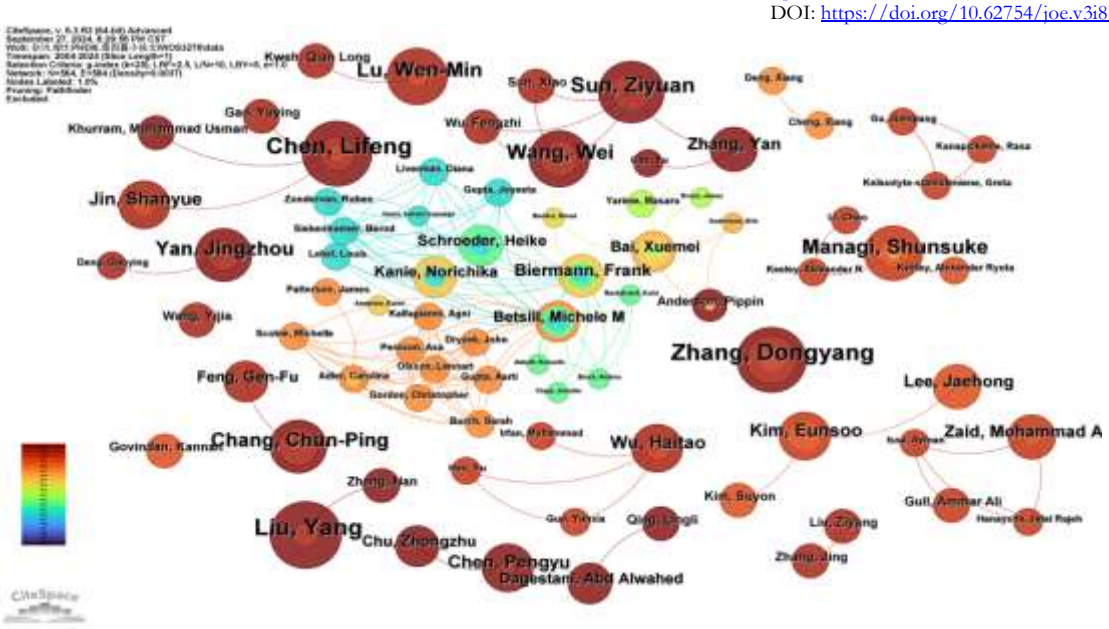

Figure 3. Author Collaboration Network

Analysis of Country/Regional and Collaboration Networks Analysis

Table 2 presents the distribution of citations among the top 10 countries. As indicated in Table 2, China leads with the highest citation count, amassing a total of 2,674 citations, which is nearly nine times that of South Korea, the second-ranked country. The United States ranks third with 286 citations, followed by England in fourth place with 223 citations. Japan and Taiwan are tied for fifth place, with subsequent rankings going to Australia, Canada, and other countries.

Among the ten countries listed, Canada exhibits the highest centrality score of 0.11, indicating that its publications have a relatively significant impact within the ESG field. Overall, China has emerged as a crucial research force in the international ESG landscape in recent years, actively promoting the development of ESG-related concepts and practices, particularly within East Asia.

Table 2. Distribution of the Top 10 Countries by Citation Count

Rank	Citation Counts	Centrality	Year	Countries
1	2674	0.02	2006	PEOPLES R CHINA
2	306	0	2008	SOUTH KOREA
3	286	0.03	2006	USA
4	223	0.04	2009	ENGLAND
5	215	0.05	2004	JAPAN
6	215	0	2009	TAIWAN
7	160	0.02	2009	AUSTRALIA
8	83	0.11	2011	CANADA
9	72	0.04	2016	PAKISTAN
10	66	0.05	2016	MALAYSIA

Figure 4 shows the cross-border cooperation research in the field of ESG. There are 117 nodes in the map, 1037 connections, and a network density of 0.1528, indicating that the cooperation between countries is relatively close. In this research field, the more active countries and regions include China, the United States, England, Australia, South Korea, Taiwan, Japan and so on. The number of countries that have established cooperative relations with these countries is more than 10. China is identified as

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the most central country within the international collaboration network of the ESG field. It maintains cooperative relationships not only with East Asian countries but also with nations such as the United States, the United Kingdom, and Australia. This centrality underscores China's significant role in fostering international collaboration and advancing research in ESG topics across various regions.

It can also be seen from the figure that the nodes of Canada, France, Switzerland, Sweden, and South Africa have purple outer circles, indicating that these countries have a high degree of intermediary centrality. These countries are on the bridge path of the cooperation network of different countries and have strong information control capabilities, that is, they have a more critical influence in the publication of articles in the ESG field.

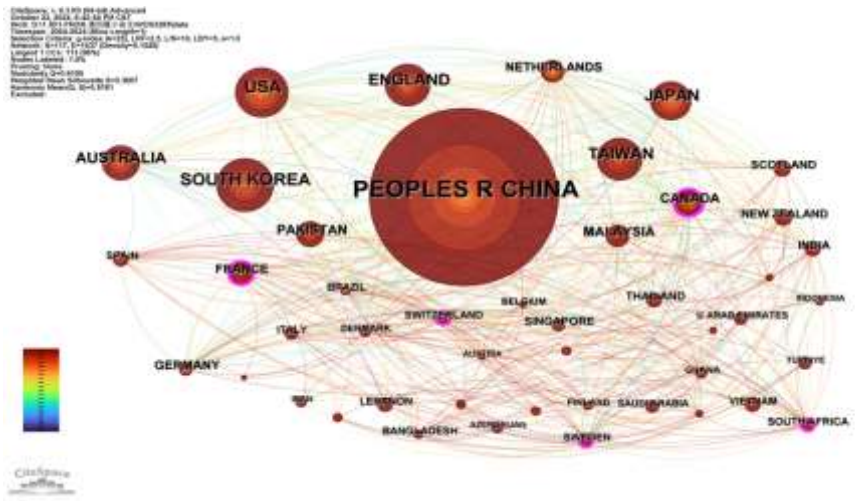

Figure 4. Country/Regional Collaboration Network

Analysis of Literature Co-Citation

The high citation rate of a document indicates that the document is highly authoritative in the ESG field and serves as a research cornerstone (Wan et al., 2023). According to bibliographic co-citation analysis, Table 3 summarises the top 10 most cited papers from 2004 to 2024, including their authors, publication years, citation frequencies, and centrality measures. These papers cover a wide range of research topics, such as the relationship between ESG performance and corporate social responsibility (CSR), corporate financial performance, enterprise risk, and corporate green innovation.

Specifically, the most cited paper is by Gillan et al.(2021), which provides a comprehensive literature review on the relationship between ESG and CSR in the context of corporate finance, making it a significant reference in the field. The second most cited paper is by Broadstock et al.(2021), which demonstrates that ESG performance can effectively reduce financial risk for companies during the financial crisis triggered by COVID-19, providing empirical support for ESG strategies in crisis management. Additionally, Drempetic et al. (2020) found that corporate ESG ratings positively impact corporate sustainability performance, further emphasising the importance of ESG in corporate strategy. These highly cited works not only offer crucial theoretical support for research in the ESG field but also provide empirical evidence for policymakers and corporate managers when formulating relevant strategies, thereby advancing the development of this area.

Table 3. Top 10 Articles Ranked Based on the Citation Counts

Rank	Title	Author and Year	DOI	Citation Counts	Centrality

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1	Firms and social responsibility: A review of ESG and CSR research in corporate finance	Gillan et al., (2021)	10.1016/j.jcorpfin.2021.101889	264	0.01
2	The role of ESG performance during time of financial crisis: evidence from COVID-19 in China	Broadstock et al., (2021)	10.1016/j.frl.2020.101716	212	0.01
3	The Influence of Firm Size on the ESG Score: Corporate Sustainability Ratings Under Review	Drempetic et al., (2020)	10.1007/s10551-019-04164-1	162	0.02
4	Corporate Social Responsibility and Firm Risk: Theory and Empirical Evidence	Albuquerque et al., (2019)	10.1287/mnsc.2018.3043	154	0.04
5	Responsible investing: The ESG-efficient frontier?	Pedersen et al., (2021)	10.1016/j.jfineco.2020.11.001	150	0
6	Do institutional investors drive corporate social responsibility? International evidence	Dyck et al., (2019)	10.1016/j.jfineco.2018.08.013	137	0.02
7	The effect of ESG rating events on corporate green innovation in China: The mediating role of financial constraints and managers' environmental awareness	Tan & Zhu, (2022)	10.1016/j.techsoc.2022.101906	134	0.02
7	Do environmental, social, and governance activities improve corporate financial performance?	Xie et al., (2019)	10.1002/bse.2224	127	0.01
9	ESG disclosure and financial performance: Moderating role of ESG investors	Chen & Xie, (2022)	10.1016/j.irfa.2022.102291	126	0.01
10	Sustainable investing with ESG rating uncertainty	Avramov et al., (2022)	10.1016/j.jfineco.2021.09.009	125	0.01

Analysis of Research Hotspots and Trends in The ESG Field

Analysis of Research Hotspots

Keywords are the core summary of a paper, carrying the most important and core information. Keyword collinearity map analysis can extract research hotspots in the ESG field, and the intensity of field hotspots can be judged by the frequency of occurrence and centrality. The size of the node represents the frequency of keyword occurrence. The larger the node, the higher the keyword frequency. If the annual ring of the node is filled with different colours, it means that there is a sudden change in the keyword. The results of the keyword network map analysis are shown in Figure 1. A total of 735 nodes, 4418 lines, and a network density of 0.0164 are obtained. The lines connected in series between these nodes show the period distribution of the co-occurrence of keywords. The lines between the nodes are very dense and complex, indicating that the ESG research field involves a wide range of research topics and has strong ductility. The larger the node, the more frequent the research. The node of the keyword 'governance' is the largest, and the research frequency in this field is the highest, ranking first. The field of 'corporate social responsibility' ranks second, and the field of 'impact' ranks third. From the colour of the node, most of the keyword research time is nearly five years.

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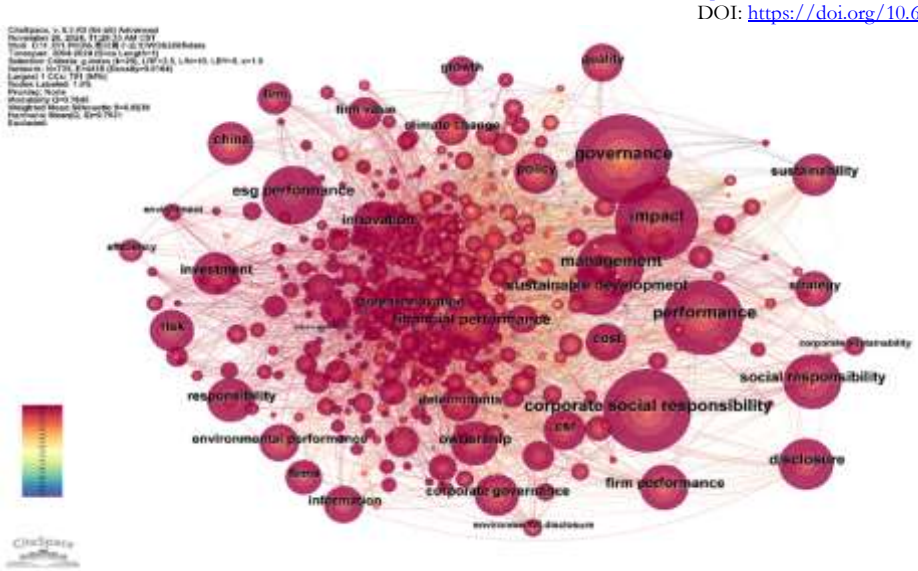

Figure 5. Keywords Collinear Network

Table 4 shows the top 10 keywords in terms of frequency and intermediary centrality. In addition to the top three keywords mentioned above, keywords such as 'performance', 'management', 'social responsibility', and 'financial performance' appear frequently and are hot words in the ESG field, indicating that East Asian countries have conducted more research in these fields. From the perspective of intermediary centrality, the keywords 'performance' and 'community' have the highest centrality, both 0.08, indicating the core position of performance research and community research in the ESG field. In addition, the keywords 'climate change' (0.06), 'management' (0.05), and 'participation' (0.05) have relatively high intermediary centrality.

Table 4. Top 10 Keywords Ranked by Citation Count and Intermediary Centrality

Rank	Citation Counts	Node Name	Rank	Centrality	Node Name
1	771	governance	1	0.08	performance
2	632	corporate social responsibility	2	0.08	community
3	569	impact	3	0.06	climate change
4	530	performance	4	0.05	management
5	406	management	5	0.05	participation
6	292	social responsibility	6	0.04	impact
7	290	financial performance	7	0.04	governance
8	277	ESG performance	8	0.04	implementation
9	258	disclosure	9	0.04	impacts
10	248	sustainable development	10	0.04	environmental governance

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Trend Analysis

CiteSpace provides modularity values (Q-values), and average silhouette coefficients of clusters (S-values) based on network structure and cluster clarity. The Q value exceeding 0.3 means that the group construct of the cluster is significant. The silhouette metric is used to evaluate the homogeneity of a cluster (Widziewicz-Rzońca & Tytla, 2020). When the S value is greater than 0.5, the clustering is reasonable; when the value exceeds 0.7, it indicates that the obtained clustering results are more reliable (Zeng et al., 2024). This article uses the Latent Semantic Indexing (LSI) algorithm to perform cluster analysis on keywords. In Figure 6, the Q value is 0.4251, which means that the community structure of the cluster is significant; the S value is 0.7021, which means that the clustering results have greater credibility.

The cluster labels in Figure 6 can objectively reflect the core issues in the ESG research field, and based on this, the development trend of research in this field can be judged. The clustering labels formed a total of 5 clusters, and the sizes of these five clusters are all above 80. From this, it can be determined that the research hotspots in the field of ESG in East Asian countries (regions) are mainly concentrated in the following five aspects, namely, 'Sustainable development', 'Corporate social responsibility', 'Sustainability reporting', 'Environmental regulation' and 'ESG performance'.

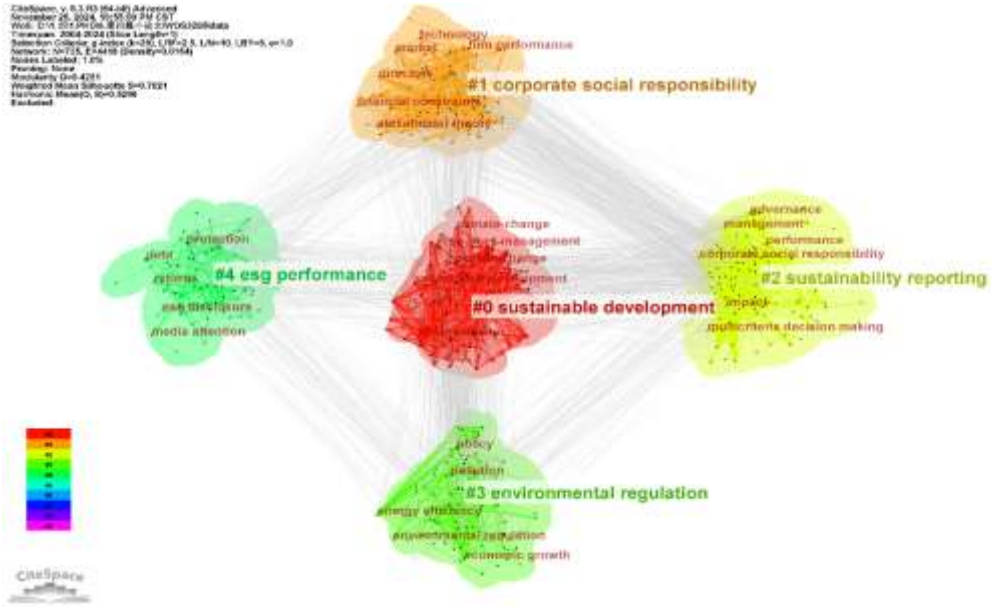

Figure 6. The Keywords Clustering Network

Table 5 shows the size, silhouette and top terms of different keyword clusters. "Size" indicates the number of cited documents in a cluster. The silhouette value of each of the five clusters in this paper exceeds 0.5, indicating that the results are reasonable and meaningful. The last column of Table 5 shows the most popular keywords in different clusters, which helps researchers to understand hot topics more deeply.

Table 5. The Keywords Cluster Analysis

Cluster ID	Cluster Name	Size	Silhouette	Top Terms (LSI)
0	Sustainable development	169	0.742	sustainable development; transformative governance; integrated approach; nexus framework; nexus thinking; environmental governance; framework; accountability; legitimacy; transparency

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1	Corporate social responsibility	114	0.587	corporate social responsibility; machine learning; predictive model; upper echelons perspective; foreign experience; corporate governance; environmental performance; board monitoring; co-opted independent directors; critical mass
2	Sustainability reporting	111	0.778	corporate social responsibility; sustainability reporting; content analysis; global reporting initiative; questionnaire survey; ESG performance; corporate culture; market reaction; quality sustainability reporting; GRI reporting guidelines
3	Environmental regulation	101	0.605	environmental regulation; carbon emission trading policy; internal control level; d investment; water environment pollution; green innovation; short-sighted management; collective decision; corporate green investment; ecological governance
4	ESG performance	84	0.606	ESG performance; ESG information disclosure; ESG consistency; earnings pressure; investor attention; ESG disclosure; internal control; economic policy uncertainty; ESG evaluation; sustainable investment

Figure 7 shows the timeline visualisation of clusters. This paper combines the results of the ESG keyword co-collinear network, the ESG keyword clustering network, and the ESG keyword clustering timeline diagram to elaborate on the five major clusters in this paper. The research content provides a reference for the development trend research in the ESG field of East Asian countries (regions).

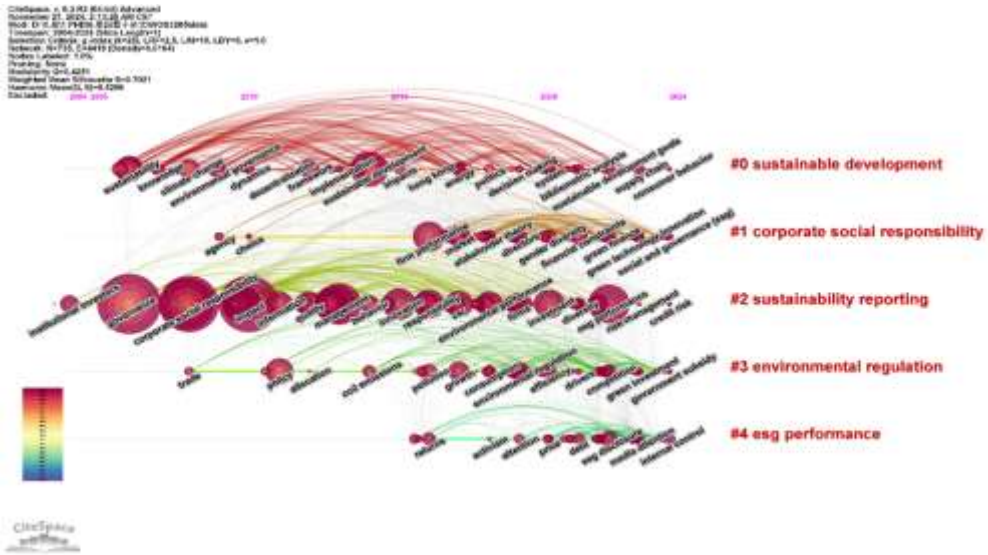

Figure 7. The Keywords Clustering Timeline Map

ESG and Sustainable Development

In the research on ESG in East Asian countries, sustainable development is the largest cluster (Cluster #0). According to the time series chart in Figure 4, the concept of 'Sustainability' in East Asian countries emerged in 2005. This concept has gradually gained attention as it has been recognised that the negative impacts of urbanisation in East Asian countries, including environmental pollution, climate change, and

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overexploitation of resources, pose challenges to human sustainable development (Li et al., 2012). ESG serves as an analytical framework for sustainable development (Wan et al., 2023). Clément et al. (2023) point out that an increasing number of scholars and managers are using ESG ratings to analyse the sustainability levels of organisations, although this measurement may not be sufficient (Escrig-Olmedo et al., 2019). By 2024, with the rapid growth of socially responsible investment and global industrial operations, awareness of climate change, environmental governance, and transitional governance has been steadily increasing. The research on sustainable development goals will remain a hot topic and trend in the ESG field.

ESG and Corporate Social Responsibility

Corporate social responsibility (CSR) (Cluster #1) is the second largest cluster in terms of research size, encompassing 'firm performance', 'upper echelons perspective', 'corporate governance', 'market', 'stakeholder theory', 'directors', 'agency, and green technology innovation'. The concept of CSR is believed to have first appeared in the 1950s (Passas, 2024), initially referring to a voluntary moral behaviour of companies towards society (Bowen, 2013). ESG originates from CSR but embodies an investment philosophy (Nugroho et al., 2024). As shown in Figure 4, discussions regarding corporate social responsibility in East Asian countries surged after 2015, with research on the theme of firm performance being a hotspot from 2016 to 2024. The research in this cluster is closely related to studies on sustainable development.

ESG and Sustainability Reporting

The earliest keyword in Sustainability Reporting (Cluster #2) is 'institutional investors', which appeared in the same year as the ESG concept, 2004. Lopez-de-Silanes et al. (2024) found that institutional investors tend to add high-quality ESG companies to their portfolios. This non-financial information is conveyed to investors through corporate social responsibility reports, ESG information disclosure reports, or quality sustainability reporting, gradually becoming an important reference for investors' decisions (Tsang et al., 2023). Keywords in sustainability reporting also include questionnaire surveys, ESG performance, corporate culture, market reactions, and GRI reporting guidelines. Currently, the Global Reporting Initiative (GRI) is the main global standard for sustainability reporting (Luo & Tang, 2023), aimed at improving the quality, rigour, and practicality of sustainability reports, providing guidelines for companies' ESG information disclosure.

ESG and Environmental Regulation

Environmental regulation (Cluster #3) reflects a series of studies in East Asian countries aimed at regulating various behaviours that pollute the public environment for the purpose of environmental protection. Environmental regulation is an important aspect of social regulation (Zhao et al., 2024) primarily encompassing the management of air pollution, water pollution, the use of toxic substances, hazardous waste disposal, and noise pollution. Keywords in this cluster include carbon emission trading policy, internal control level, water environment pollution, green innovation, collective decision, corporate green investment, and ecological governance. Some scholars argue that environmental regulations can promote corporate environmental investment (Han & Cai, 2024), such as increasing technological innovation to enhance resource utilisation efficiency, which helps improve corporate ESG performance (Hong et al., 2024; Lu & Cheng, 2023). However, there are opposing views. Yan et al. (2023) found that China's environmental regulation policy, leading to an officials' accountability audit of natural resources (AANR), is negatively correlated with corporate ESG performance, indicating that this environmental regulation is detrimental to corporate ESG performance. The inconsistency of research conclusions means that this topic still has value and trend to be further studied.

ESG Performance

ESG performance (Cluster #4) includes keywords such as 'ESG information disclosure', 'ESG consistency', 'earnings pressure', 'ESG evaluation' and 'sustainable investment'. Research on ESG performance encompasses two aspects: on the one hand, the functional study of ESG performance, such as its impact

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on company value (Nekhili et al., 2021), financial performance (Chen & Xie, 2022), corporate profitability (Yin et al., 2019), and environmental performance (Long & Feng, 2024). On the other hand, studies on the driving factors of ESG performance have concluded through empirical analysis that corporate green innovation benefits corporate ESG performance (Liu et al., 2024), media coverage has a positive impact on corporate ESG ratings (Ge, 2024), and corporate culture can further enhance ESG performance through the channel of promoting green innovation (Bai et al., 2024). The timeline also indicates that research on ESG performance emerged later than the other four clusters, roughly appearing after 2015. Since 2019, research related to ESG performance has become increasingly dense, becoming one of the mainstream research trends among scholars.

Conclusion

This article selects 3,279 core documents from East Asian countries published in the WOS database between 2004 and 2024 as the subjects for text analysis. Using the CiteSpace visualisation tool, a knowledge map analysis is conducted to comprehensively present the current state, hotspots, and development trends in the field of ESG research in East Asian countries. The specific research conclusions are as follows:

Firstly, ESG research in East Asian countries has started relatively late. It is not until 2019 that there is a notable rise in the number of publications from these countries. The number of publications from 2019 to 2024 accounts for 91% of the total research output in the ESG field over the 21-year study period. This indicates a growing interest in ESG-related research, which is currently in a phase of rapid development. Furthermore, based on publication trends, the quantity of such research is expected to continue to rise.

Secondly, an analysis of author publication frequency and collaboration maps reveals that there are few high-output, high-impact authors in the ESG research field in East Asian countries, and collaboration among scholars is limited. Some researchers with a high number of publications have not even collaborated with their peers. The scattered nature of collaboration among scholars can lead to issues such as insufficient theoretical depth and weak practical relevance. However, there has been a noticeable increase in collaboration among scholars over the past five years.

Thirdly, an analysis of article citations and national collaboration maps shows that China has the highest number of citations for its publications, indicating that it provides significant analytical support for research in the ESG field. Additionally, countries such as China, the United States, England, Australia, South Korea, Taiwan, and Japan have close research collaborations with other nations. In contrast, countries like Canada, France, Switzerland, and Sweden have a relatively critical influence in ESG publications.

Fourthly, keyword co-occurrence analysis indicates that East Asian countries have a high level of attention towards governance, corporate social responsibility, performance, and the impacts of ESG, which are considered research hotspots. Through keyword clustering, the research hotspots can be categorised into five main areas: 'Sustainable Development', 'Corporate Social Responsibility', 'Sustainability Reporting', 'Environmental Regulation' and 'ESG Performance'. Analysis of keyword co-occurrence, clustering, and timeline graphs suggests that 'sustainable development', 'corporate performance', and 'corporate social responsibility' will continue to be prominent directions and objectives for future research.

The limitations of this study are mainly threefold: Firstly, this article only collects literature from four East Asian countries (regions) using the WOS database, and relevant literature from other East Asian countries is not included. Although these four countries (regions) may have the largest volume of publications in East Asia, the analysis of the related literature does not fully represent the overall landscape of ESG research in East Asian countries (regions). Secondly, the literature database analysed using the CiteSpace tool, WOS, only includes English core literature, which may overlook some valuable documents not indexed in WOS. Thirdly, the selection of research literature is limited to fields such as economics, management, sociology, and international relations, potentially missing out on research on ESG from other disciplines. Future research should expand the sources of literature and conduct comparative analyses with Western countries, where ESG research has been established for a longer time, to provide more valuable

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references for the development of ESG research.

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