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Review

Resolving environmental, social, and governance challenges: A bibliometric review of ethical supply chain management

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Abstract: This review article examined how ethical supply chain management (ESCM) strikes a complex balance between business, corporate social responsibility (CSR), and environmental governance. In ethical supply chain management, resolving the challenges of environmental, social, and governance (ESG) issues have become the standard matter of research. This bibliometric review represents a paradigm shift toward corporate sustainability. The article offers a comprehensive strategy for navigating the challenges that make use of technology and innovation, best practices, and compliance with laws and regulations. This lens highlights how crucial ethical factors are to improve corporate sustainability and competitiveness. This work analyzed the multidisciplinary and diversified nature of ethical supply chain management in the face of ESG. In ESCM, implementing an ESG strategy improves a company's ability to innovate, its ability to create value, and its financial performance. Overall, the social and environmental performance showed a strongly positive correlation with business sustainability, suggesting a mutually reinforcing relationship between the commercial economies and generating value for society.The review's description of the literature is useful for future investigations into the ESG elements that affect corporate investments and sustainability in ESCM. This paper explained the growing interest in ESCM's CSR concerns in more detail than just a bibliometric examination. Numerous sociological and ethical considerations can account for this interest, and a number of empirical studies show how the dynamics of financial practices and CSR activities can work in concert to good effect.

Keywords: Environmental, social, and governance (ESG); ethical supply chain management (ESCM); sustainability; corporate social responsibility (CSR); systematic literature review

1. Introduction

The concept of ethical supply chain management (ESCM) is a model for business operations that integrates moral values throughout the lifecycle of a supply chain. This strategy places a strong emphasis on social responsibility, environmental care, and economic efficiency as moral requirements. The idea of ESCM was born out of a growing understanding of the wider effects of economic activity among both consumers and enterprises. This awareness encompasses the social and environmental effects of production processes, the ethical implications of labor practices and sourcing, and the effects on communities and workers along the supply chain [1]. It is imperative to incorporate ethical practices into supply chain operations for numerous reasons.

The United Nations ”Who Cares Wins” study from 2004 states that environmental, social, and governance (ESG) factors ought to be considered as standards when assessing businesses. The United Nations Principles for Responsible Investments (PRI) report from 2006 introduced the idea of ESG criteria and placed special emphasis on incorporating them into financial evaluations [2]. Furthermore, ESG ratings which represent a company’s dedication to environmental, social, and governance issues have emerged as crucial determinants of its sustainability. Governments and investors’ growing focus on ESG concerns have forced firms to respond, making ESG essential to a company’s operational growth. Investment in initiatives to reduce greenhouse gas emissions and the use of renewable energy sources has become more important since 195 states signed the Paris Agreement in 2015 [3]. Upon closer examination, it is seen that these issues are strongly tied to individuals. Future scholarly debates should focus on how to attain sustainability through human activity [4].

Investors typically view ESG data as a standard that can offer more thorough and convincing proof of how your company makes a beneficial impact on the global playtform [5]. In terms of sustainable business investments, ESG policy influences total business success [6]. ESG disclosure can be in line with national interest [7, 8] and bring in more money for companies [9]. A prior study examined the quantity and caliber of ESG disclosures made by businesses using its three fundamental components. Environmental problems like greenhouse gas emissions, overuse of natural resources, and global warming are increasingly being linked to a number of international enterprises [10, 11]. These industrial operations endanger not just the long-term existence of living things but also their natural habitats, biodiversity, and health. Due to excessive waste output, environmental pollution and global warming are currently occurring at an alarming rate. The only source of greenhouse gasses that poses a threat to the environment is food waste. Previous research focuses on waste reduction in a single supply chain and closed-loop supply chains [12, 13]. In light of these difficulties, metrics known as key ESG performance indicators (KPIs) have been developed as a way to evaluate and share industry sustainability practices [14]. They offer a thorough understanding of a business’s non-financial performance, encompassing elements like social interactions, corporate governance, and environmental effects. The major objective of ESG is to direct investors toward more socially conscious and sustainable investment decisions.

A survey of the pertinent literature can help identify research trends and developments in a topic. Bibliometric studies have been widely used to analyze changes in a variety of research areas, including the practice and transfer perspective of enterprise. Organizations’ adaptability and long-term adaptation to climate change [15], the achievement of socially and environmentally viable economic growth through sustainable smart city ecosystems [16], and trends in ESGM in the finance industry [17] are also some very important areas of research. Bibliometric research is used in many related topics to predict future trends [18, 19]. Still, no bibliometric analysis of ESGM has been done.

Striking an ethical balance in supply chain management is a difficult and sometimes contentious endeavor. The fundamental conflict in the matter is that profit maximization and morality need large sums of money to be spent on community development, fair labor practices, and environmental preservation [20]. The enforcement and monitoring of ethical practices in supply chains can be difficult due to their extensive networks that span various countries and cultural contexts [21, 22]. Furthermore, businesses are frequently under pressure to reduce expenses and streamline operations at the expense of ethical issues due to the competitive nature of the global market.

This research has two goals: First, it maps the current significance of ESG and ESCM in the literature; and second, it provides an economic viewpoint that explains why ESG practices are becoming more and more popular [23, 24]. To achieve this, we first look at scholarly publications that discuss industry-wide ethical supply chain management (ESCM) techniques. Using this method provides us with a variety of databases spanning from 2004 to 2024 that have the terms "Environmental, Social, and Governance" and "Ethical supply chain" in the abstract or title. We will be able to spot a pattern in the possibly increasing importance of ESG in supply chain management with the help of such a study. The first contribution of this essay will be to determine whether or not this topic is becoming more and more significant in the literature in a setting where environmental sustainability has become a buzzword [25–27].

Blockchains also play a critical role in ethical supply chain management as they protect data, automate reporting, and provide more detailed information on environmental effect. This increases the transparency of a company's operations for investors, managers, and customers. By combining measurement, reporting, and verification with ESG, blockchain technology is completely changing the field of ESG practices. Data integrity depends on verification, compliance standards need reporting, and measurement is essential for data aggregation [28, 29]. By automating the reporting of comprehensive and disparate data points like carbon emissions and credits, as well as tracking products and labor conditions along the supply chain, its inherent transparency and traceability are revolutionizing ESG reporting. Additionally, these data can be evaluated and benchmarked against the objectives established by the regulator and the company [30, 31].

The rest of the paper is structured as follows. The concept and definitions of ESG in supply chains are summarized in this section. It is important to note that this article uses a systematic evaluation of documents and works as a methodology to identify a trend and offer possible explanations for it, rather than reviewing the literature on ESG in ethical supply chain management. After that, we go over our process in detail before talking about our ethical supply chain and its metrics. The next sections discuss the novelty of this study and analyze the integration of business sustainability with ESG and ESCM, respectively. The following section describes the methodology of this review procedure. The next section addresses the limitations of this study. The final section provides a strong rationale for the increased attention that ESG challenges in ethical supply chain management are receiving. To achieve this, we present a conceptual framework that shows how ESG practices affect ESCM [32, 33].

2. Novelty of the study

Our study provides both theoretical and practical contributions to the literature. From a theoretical perspective, we provide a structured research agenda that could provide future researchers with an overview of the stream while suggesting areas that could benefit from further attention from scholars. In addition to our systematic review of existing literature, we provide a novel framework of ESG and ethical supply chain management, highlighting their complex structure, how they can be used to evaluate how sustainable a supply chain is, and the factors that help monitorthem. Past studies have demonstrated that the ESG protocol can offer robust contributions from both practical and theoretical perspectives, which goes beyond the mere descriptive synthesis of a field, and instead sets a structured agenda for future contributions, thus aiding in the development and enrichment of a specific field. In other words, the ESG approach grants us versatility in synthesizing extant literature and provides an extensive and updated state-of-the-art method in the field while simultaneously exploring knowledge gaps through a critical analysis.

Furthermore, our contribution also provides practitioners with valuable practical insight, highlighting the value in using ESG scores to evaluate their sustainable supply chains and how better ESG measures can be incorporated into their performance measurement systems to capture sustainability performance.luate their sustainable supply chains and how better ESG measures can be incorporated into their performance measurement systems to capture sustainability performance.

The necessity for a thorough assessment that gets around restrictions in certain contexts, databases, and time frames is one of the study gaps in the ESG literature. Relevant papers have been excluded since previous assessments have concentrated on small databases, contexts, and sources. The inclusion of recent literature, a variety of sources, and in-depth investigations have been hampered by thematic analysis methodologies. The reach has also been further limited by the focus on particular publications and the existence of social desirability bias. A bibliometric analysis that tackles these constraints is conspicuously lacking, underscoring the necessity of a more thorough and up-to-date comprehension of supply chain sustainability across all disciplines and situations.

The motivation for the study is compelling. However, let us develop further to establish why this research is necessary. There is strong justification for the investigation. This section will motivate the study of ESG in supply chains. It is significant to note that, rather than examining the literature on ESG within the literature on ethical supply chain management, this study uses a methodical evaluation of documents and works to detect a pattern and provide potential causes for it. There are several strategies to boost ESG research's potential influence. First, we demand additional studies to investigate the effects of ESG on society and the environment in a measurable manner. We know that the CSR [34] and ESG are very closely connected. Therefore the business case for CSR and how it might enhance firm-level outcomes including financial performance, reputation, and competitive advantage has dominated ESG studies recently. We therefore know the most about CSR and its advantages for businesses, but the least about how CSR impacts the main societal challenges of ESG. The cause-and-effect links between CSR activities and societal outcomes including worker health, equality and inclusion, biodiversity and the resilience of the natural environment, labor conditions, and sustainable sourcing in global supply chains should be explored in quantitative CSR research. Beyond a short-term focus, it is critical to consider the long-term, complex, and perhaps contradictory effects of CSR on the environment and society. A method for quantitative CSR research that is socially conscious will have a greater impact and add social, ecological, and ethical arguments to the mainstream business case logic [35]. In this paper, this missing link is addressed [36, 37].

To fill the existing gap and contribute to the imminent literature on exploring ties between CSR and ESG in the knowledge-management research field, this study seeks to measure and analyze the effects of ESCM on ESG performance. Specifically, we hypothesize that a diversified culture can positively impact ESG performance, and that ESCM affects ESG behavior only when accompanied by cultural diversification. This study investigates ESG behavior in the function of ESCM. It does not address the quality of sustainable reports, even if external reporting highlights the companies' attitude, transparency, and sensitivity toward society and the environment [38].

3. Objective of this study

ESG considerations are becoming fundamental building blocks of successful supply chain management in today's quickly changing corporate environment. Many businesses find it difficult to turn their aspirations for ESG into operationally applicable measures, even in spite of the general recognition of their importance. ESG leaders in supply chains may foster innovation, drive sustainability, manage risks, assure compliance, and advance moral business conduct. In an everchanging corporate context, this all-encompassing strategy contributes to the creation of profitable, accountable, and resilient supply chains. Apart from all these factors, there are some gaps in studying ESG in the light of ESCM.

We will be addressing the following two basic research questions in this study:

1. What should be the useful strategy for balancing ESG in ESCM?
2. How can we integrate business sustainability with ESG and ESCM?

3.1. Practical implication in business

The term ESG, or environmental, social, and governance factors, was coined by the Global Compact in 2004. Due to its huge practical implication in business development, ESG has received wide attention from the researchers worldwide. In recent years, investors have become more aware of the importance of ESG criteria in their investment decisions. As a result, many businesses have begun to integrate ESG into their operations and business strategies. ESG functions as a valuation technique that takes into account environmental, social, and governance issues. ESG in the private sector is a set of criteria used to evaluate a company's risks and practices. The ESG framework helps identify, organize, analyze, prioritize and accordingly guide decisions on various business risks. These risks, if left unaddressed can prove costly to the functioning and sustenance of businesses.

The significance of practical implications of ESG is impactful and falls into different categories.

- **Manages risk:** Potential hazards that conventional financial analysis could miss can be found with the use of ESG data. For instance, a business that has inadequate environmental policies may be subject to fines from the government.

- **Enhances financial performance:** ESG not only makes a business favorable to investors, but it can also improve the overall financial performance of a business. Even small efforts toward sustainability such as going paperless, recycling, or making energy-efficient upgrades can improve a business's bottom line and return on investment.

- **Creates sustainable operations:** Companies investing in ESG initiatives can sustain and adapt to an ever-changing landscape. For example, businesses that properly integrate ESG principles into their core operations are better able to identify cost-saving opportunities and enjoy lower energy consumption, reduced resource waste, and an overall reduction in operational costs.

4. Materials and methods

Dissecting academic productivity in the research area of ethical supply chain management in the face of environmental, social, and governance by nation and journal, bibliometrics offers insight into all significant elements of the scientific macro-research dimension. The material of this review work can be compiled and examined at the national level or by the academic structure of certain disciplines. Recognizing the impact and collaboration of different nations, journals and scholars in ESG and ESCM study and provide a broader overview of the state and trends of academic advancement in numerous fields of the topic. Keyword research was utilized in this piece to examine the suitable material database and contents. A scientific paper's keywords are its primary ideas. In this section, we will give a closer look into the material and methodology of this work.

This article employs a systematic review process to synthesize the findings of 127 peer-reviewed studies published between 2000 and mid-2024. These studies represent the current body of knowledge from the intersection of ESG and ESCM with high levels of relevance and scientific rigor, as only publications from journals ranked 3 and above in the Academic Journal Guide by the Chartered Association of Business Schools (CABS 2021) are included in this review. The latter differentiates the foci of the reviewed studies in terms of ESCM subsystems and ESG dimensions. The findings indicate that researchers have primarily focused on identifying determinants of ESG performance. However, less attention has been paid to the heterogeneity among the actual measurement of ESCM goals, and ESG performance outcomes. These gaps present numerous opportunities for future research.

4.1. Systematic reviews and bibliometric analysis

Systematic reviews and bibliometric analysis are useful techniques for examining the field of ESG research. Bibliometric analysis identifies important authors, journals, and research topics by analyzing publications using quantitative methods. With an emphasis on the calibre and applicability of the included studies, systematic reviews rigorously, openly, and reproducibly synthesize the body of available knowledge.

- **Motivation:** In order to synthesize and thoroughly analyze the field's changing trajectory and new research streams, this study attempts to present a systematic literature review (SLR) on ESG research in a comprehensive manner, triangulated using bibliometric analysis.
- **Methodology/approach:** This study conducted a retrospective quantitative bibliometric analysis using R-studio software, encompassing 7659 publications on ESG research published in the Scopus and ”Web of Science” databases between 2004 and 2024, through performance analysis, scientific mapping, and network analysis.
- **Findings:** While scientific mapping uses co-words and topic analysis, performance analysis shows trends in publications, significant journals and publications, authors, and nations. Similarly, four distinct clusters were produced by co-occurrence analysis, which represented the connections between ESG research and other management domains as well as important findings from co-citation network analysis. Regarding commonly and newly employed theories, contexts, characteristics, and methodologies in ESG research, the theory–context–characteristics–methods (TCCM) framework has also produced insightful findings.

- **Research limitations:** By recognizing the innate structure and development of research themes, the results of this study's thorough bibliometric analysis in conjunction with SLR revealed a solid road map for additional research in ESG. In addition to highlighting the common shortcomings in identifying research objectives, this evaluation offers insights that have not yet been recorded and assessed on this subject.

4.2. Concept of ESG: Dimensions and drivers

Let us first define ESG: ESG stands for environmental, social, and governance, and it is a framework used to evaluate a company's performance and impact across these three key areas. It is often used in the context of investing, but also applies to a broader range of stakeholders including customers, suppliers, and employees. ESG has grown in popularity in addition to social impact and conventional financial investments due to several developments. Over the past ten years, there has been an exponential increase in the number of assets under management that involve some sort of ESG analysis and decision-making. It is critical to comprehend why ESG elements may impact a company's success [39,40]. According to the literature, to assess risk management and enhance risk-adjusted returns, seasoned investors and asset managers should concentrate on ESG policies. Research indicates that while 25% of investors actively consider sustainable investment criteria, 70% of investors base their decisions on it [41,42]. ESG policy growth has outpaced other business policy strategies, with investments estimated to be worth several trillions of dollars over the next few years. The many factors that influence the inclusion of ESG in business decision-making are displayed in Figure 1.

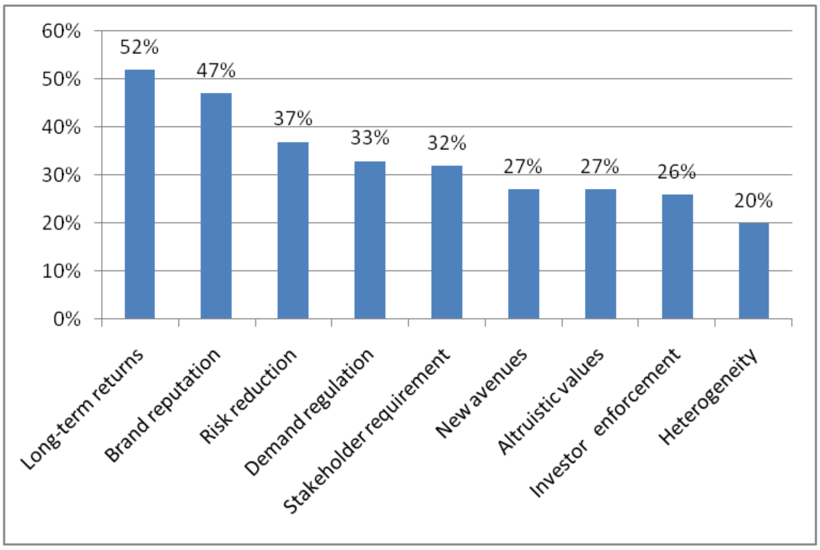

Figure 1. Drivers of ESG business decision-making.

ESG tools that may be used to monitor and benchmark these practices are becoming increasingly in demand due to the social desire for higher ethical standards of economic growth through finance and business operations. The UN Global Compact is a crucial source of standards for ESG, especially the Social pillar. It outlines 10 ethical norms about labor, human rights, anti-corruption, and the environment. Despite these positive developments, the rapid expansion of ESG investing has increased the number of stakeholders who have an impact on the development of disclosure standards, ESG metrics, rating systems, and products ranging from funds to indexes [43]. Different goals and a lack of clarity regarding the precise investment types that use ESG metrics and methodologies may contribute to the emergence of challenges related to consistency and comparability as ESG investing continues to grow and proliferate. This could jeopardize the meaningfulness and integrity of ESG investing. A useful way to overcome this could be by learning the ESG criteria and its major index providers. The study of ESG criteria along with its major index providers are studied in the next section.

4.2.1. ESG criteria - Major index providers

The first step in index scoring approaches is to further clarify the drivers by taking into account pertinent criteria within each of the E, S, and G components given in Table 1. Pollution, energy efficiency, natural resource use, carbon emissions, and sustainability initiatives are a few examples of environmental factors. In addition to more general societal issues like data privacy, human rights, and community involvement, social elements can also be workforce-related (health, diversity, training). Weak corporate governance can encourage unethical pay practices, irregular accounting, and disclosure practices, and fraud. A company's poor environmental record could expose it to legal action or regulatory penalties. Poor worker treatment could result in high absenteeism, lower productivity, and strained client relations.

The aforementioned characteristics are then combined to provide a key measure, which typically identifies one of the components assisting the pillars (E, S, and G). These metrics are the outcome of combining various submetrics that gauge particular facets of an organization's resource utilization. Over 300 distinct ESG metrics that Thomson Reuters uses were reported in the literature; for this review, we concentrated over 150 metrics and categorized them into ten groups: emissions, human rights, community, innovation, resource use, workforce, shareholders, product responsibility, management and CSR approach [44].

By classifying sectors into lower, medium and higher environmental impact categories and only offering lower and higher social metrics at the same governance metric within each industrial sector, Bloomberg's environmental and social impact metrics provide unique ESG data.

Thomson Reuters serves the global finance community with cutting-edge index and index-related services that facilitate improved decision-making for investors. This index acts as a fair standard for evaluating a company's ESG performance because ethical investing is becoming increasingly important in the decision-making process for investors. A global provider of multi-asset research, climate change, and ESG indexes, Morgan Stanley Capital International (MSCI) is based in the United States. Table 2 displays significant index matrices as defined by Thomson Reuters, MSCI, and Bloomberg. It is challenging to select one of these three indices because they take distinct business-related aspects into account. Because it is challenging to apply the many indicators for company investment and sustainability, investors are now requesting uniform reporting measures.

Incorporating ESG regulations into significant organizational investment processes involves precise and methodical implementation opportunities and dangers. Because ESG elements are assessed based on asset selection, measurement, and risk management processes, ESG policy inclusion, in contrast to typical schemes, does not require peer group evaluation or leader obesity [45].

Table 1. ESG criteria.

Environmental factors	Social factors	Governance factors
Natural resource use	Workforce	Board independence
Carbon emissions	Human rights	Board diversity
Energy efficiency	Diversity	Shareholder rights
Pollution/waste	Supply chain	Management compensation

Table 2. ESG indices and metrices.

Major indices	Environmental factors	Social factors	Governance factors
Bloomberg	Renewable energy	Workforce	Board independence
	Carbon emissions	Human rights	Executive compensation
	Resource depletion	Gender diversity	Board diversity
	Pollution/waste	Political influence	Shareholder rights
	Climate change	Community relations	Staggered boards
Thomson Reuters	Carbon release	Employee	Corporate governance
	Resource usage	Basic rights	Corporate behavior
	Resource usage	Basic rights	Corporate behavior
	Invention	Public	CSR strategy
MSCI	Sustainability initiative	Product liability	Management
	Natural resources	Social opportunities	Shareholders

4.3. Concept of ESCM: Definition and criterion

Let us first define ESCM: Ethical supply chain management is the practice of ensuring that a company's entire supply chain, from raw material sourcing to product delivery, adheres to ethical and sustainable standards. This includes respecting human rights, adhering to fair labor practices, protecting the environment, and ensuring transparency throughout the supply chain. A few fundamental ideas serve as the cornerstone for comprehending and successfully implementing ethical principles in ethical supply chain management. In this context, ethics pertains to the moral precepts that guide an individual's or group's actions, especially when making choices that have an impact on other people [46, 47]. Under the CSR business model, organizations incorporate social and environmental issues into their daily operations and stakeholder relationships. It shows a business's dedication to sustainably conducting business on all fronts of economy, society and environment. The responsible use and preservation of the natural environment through conservation and sustainable practices is known as environmental stewardship. These ideas highlight the necessity for companies to think ethically in all aspects of their supply chain operations, in addition to profitability [48, 49]. Various theoretical frameworks are essential to comprehend moral decision-making in supply chain management. Stakeholder theory is one such concept that suggests businesses should generate value for all parties involved, not just shareholders. This entails taking into account the requirements and welfare of workers, clients, vendors, local communities, and the environment. Extending this, the triple bottom line notion proposes that businesses concentrate on three 'P's: profit, people, and planet. This method suggests gauging an organization's success not just in terms of its profit margin but also in terms of the good it does for the environment (the planet) and society (the people). The ethical supply chain management framework is a noteworthy paradigm that incorporates ethical considerations into supply chain management.

It is impossible to exaggerate the significance of ethics in supply chain management. There are various reasons why ethical considerations are important. They first defend workers' rights and welfare by encouraging ethical labor practices and secure working environments. Given the wide variations in labor standards found in global supply chains, this is especially crucial [50]. Second, responsible supply chain management contributes to environmental protection. Businesses may ensure that economic progress does not come at the expense of environmental deterioration by implementing sustainable practices, which help them decrease waste, conserve natural resources, and lower their carbon footprint [51] . Finally, moral business conduct improves a company's standing and brand equity. Customers are becoming more conscious of and worried about the moral ramifications of the products they buy.

4.3.1. ESCM criteria: Profit vs. ethics

One of the main obstacles to ethical supply chain management is the conflict between maximizing profit and upholding moral principles. Businesses frequently encounter conundrums that put their need for cost reduction and increased productivity against moral obligations. Purchasing products from inexpensive vendors, for instance, might increase profit margins. They might, nevertheless, also be in favor of labor laws that violate workers' rights or endanger the environment. Several important issues are brought up by this conflict, including the real cost of profitability and the moral consequences of business actions [52, 53]. A sophisticated strategy that incorporates ethical issues into the main business plan is needed to navigate this tension. Businesses can implement ethical sourcing practices that provide preference to vendors who adhere to specific ethical criteria, even if doing so temporarily results in higher prices. Establishing enduring connections with these providers can enhance the resilience and sustainability of the supply chain, ultimately resulting in increased profitability. Additionally, open communication about these initiatives can improve a company's reputation and draw in clients and investors that respect moral business conduct [54, 55].

It is imperative to acknowledge the significant impact that rules, regulations, and standards have in advancing ethical supply chain operations. Adherence to global labor laws, environmental protocols, and industry norms is the fundamental prerequisite for moral supply chain management. Leading businesses, however, frequently go above and beyond mere compliance, coordinating their activities with international norms like the Sustainable Development Goals (SDGs), the UN Global Compact, or sector-specific accreditations like the Rainforest Alliance or Fair Trade.

4.4. Strategies for balancing ESG in ESCM

Managing an ethical supply chain while maintaining profit as well as environmental, social, and governance calls for a complex strategy. Businesses need to use tactics that promote ethical integrity, compliance, and competitiveness while navigating these complicated realms. Achieving this balance requires using technology and innovation, following rules and regulations, and putting best practices into action. There are several ethical issues with the social components of ethical supply chain management, such as fair wages, working conditions, labor rights, and the effect on local communities. Workers in supply chains experience mistreatment, hazardous working conditions, and low pay in many regions of the world. The fact that underprivileged communities and children are frequently the most affected groups exacerbates these problems [56,57]. Businesses are in charge of making sure that there are no exploitative practices in their supplier chains. This entails putting in place stringent labor rules, carrying out extensive due diligence, and routinely checking vendors to confirm compliance.

There are several different environmental difficulties that supply chain operations must deal with, including waste management, pollution, and resource depletion [58]. Due to supply chains' global reach, activities may have a significant negative influence on the environment, ranging from carbon emissions and water pollution to deforestation and biodiversity loss. The long-term viability of ecosystems and enterprises is threatened by these environmental issues, raising ethical questions [59].

In order to address these issues, businesses must take a more comprehensive approach to assessing the environmental effect of their supply chains. These effects can be lessened by putting into practice sustainable measures such as cutting back on resource usage, streamlining logistics to cut emissions, and making investments in renewable energy.

It takes a number of best practices to successfully include ethical issues into supply chain management. Priority one should be given to building a solid ethical base and a transparent code of conduct for all partners and suppliers. This code needs to specify anticipated norms for ethical conduct, environmental preservation, and labor rights, acting as a guide for gauging compliance. Creating supply networks that are traceable and transparent is another recommended practice. Companies can spot possible hotspots for ethical dilemmas and take proactive measures to reduce them by charting out the whole supply chain. It is also critical to conduct routine audits and evaluations of suppliers to make sure they follow the company's ethical guidelines [60].

4.5. Integration of business sustainability with ESG and ESCM

An independent nonprofit organization called the Sustainability Accounting Standards Board (SASB) establishes guidelines for businesses to follow when providing investors with ESG data. Companies can disclose to the public consistently and comparably how they handle concerns about population increase, natural resource restrictions, climate change, and technological innovation by using SASB standards. Consequently, investors can have a deeper understanding of a company's impact on and impact from a changing world according to the SASB guidelines. Armed with this knowledge, investors can allocate their funds to businesses that are best managed over the long haul.

Figure 2 illustrates the Business Sustainability Flowchart, which outlines the environmental, governance, innovation, social, and workforce aspects as suggested by the Sustainability Accounting Standards Board (SASB). The business sector incorporates reporting frameworks for financial materiality and ethical standards as part of development [61].

The industry standard measurements are not well-understood by certain index producers and numerous attempts have been made to identify the most crucial characteristics and indications across a range of industries. Nevertheless, metric providers typically do not offer more financial guidance for industrial feasibility, even though they might supply guidance on how to declare construction resources and their kinds [62].

Because climate-related events can have a major impact on financial assets, expectations surrounding them are growing. To minimize the use of fossil fuels and other risks, industries are especially sensitive to underperforming resources [63]. Innovation has a similar impact on company sustainability such as improvements to supply chains, sourcing, business resilience, and life cycle assessments of products. While social media's immediate effects are not as significant, ongoing profits can strengthen

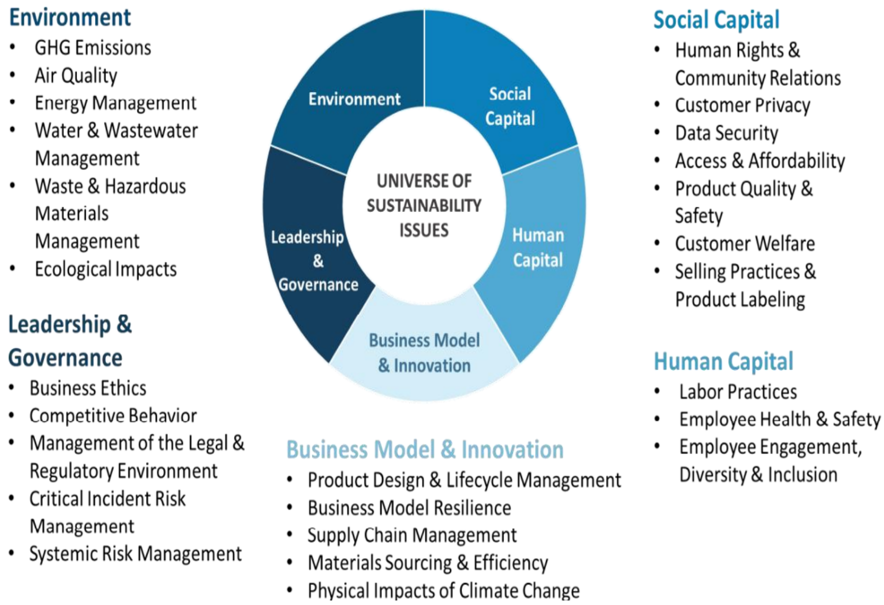

Figure 2. SASB material map. Source: SASB website, provided for illustrative purposes.

products, keep employees, and win over customers—all of which are often associated with CSR. However, organizational investment typically reveals that the most difficult aspect is getting social support because different nations have different ideas about what constitutes a reasonable and concrete standard [64].

Lastly, incorporating ESG regulations into significant organizational investment processes involves precise and methodical implementation opportunities and dangers. Because ESG elements are assessed based on asset selection, measurement, and risk management processes, ESG policy inclusion, in contrast to typical schemes, does not require peer group evaluation or leader obesity [64]. Depending on the goals and asset classes of an investment, there are a number of ways to incorporate ESG elements and their benefits. The characteristics of ESG mergers typically include collaborative development strategies, measurable research, and performance evaluation tools; significant capital provided for ESG consideration assessments within group management teams; clear eviction guidelines to avoid companies with very low scores; and dedicated governance to oversee ESG mergers [65].

4.6. Methodology

We employed an organized review to map the significance of the works addressing ESG and ESCM. A general definition of this type of approach is a particular methodology that locates existing research, selects and contributes to them, analyzes and synthesizes data, and publishes the evidence in a way that permits rational, unambiguous judgments about what is and is not known [66–68]. According to the Popular Reporting Standards for Systematic Reviews and Meta-Analysis Protocols, systematic reviews of online publications have been reported [69, 70]. With the use of this protocol, reviewers can formulate a workable strategy, recognize possible issues, and clearly document by the plan. This enables others to compare the protocol and subsequently finish a review. Additionally, it avoids making arbitrary decisions about inclusion criteria and data extraction, aids in the replication and validation of

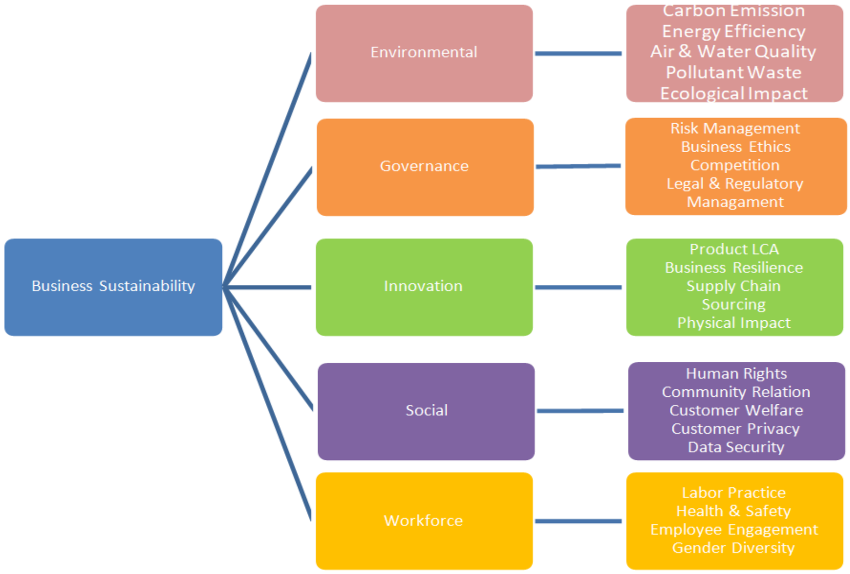

Figure 3. Business sustainability flowchart proposed by SASB.

Table 3. Article selection criteria.

Classification	Selection Criteria
Keywords	Environmental, Social, and Governance (ESG); Ethical Supply Chain Management (ESCM); Sustainability Development Goal (SDG); Corporate Social Responsibility (CSR);
Language & Journal type	English & Peer-reviewed Academic Journal
Time frame	20 years (2004-2024)

review procedures when necessary, and can lessen the amount of literature that is duplicated [71, 72].

Due to the aforementioned benefits, we have chosen to apply meta-analysis protocols in this research. Initially, we located a single data point that was derived from the first ethical supply chain study that we found during our search. To guarantee a high caliber of acceptable and legitimate articles, the conference proceeding, thesis, work in progress, and technical reports were all disregarded from our research. To ensure thorough coverage of the structured search phrases, such as ”environmental, social, and governance,” ”ethical supply chain,” and ”sustainability,” we then restricted our literature search to English academic peer-reviewed publications on Google Scholar [71, 72]. To confirm the transparency and lucidity of the study, the Reference section contains the full bibliographic information for every publication that was reviewed. Bibliometrics dissects academic productivity by nation, journal and researcher, and offers insight into all significant elements of the scientific macro-research dimension. It can be pulled and studied at the national level or by the academic structure of certain disciplines, recognize the impact and collaboration of different nations, research centers, publications, and scholars in particular fields of expertise, and provide a more comprehensive overview of the state and trends of academic advancement in numerous fields. The intermediate article-searching step follows the criteria mentioned in Table 3.

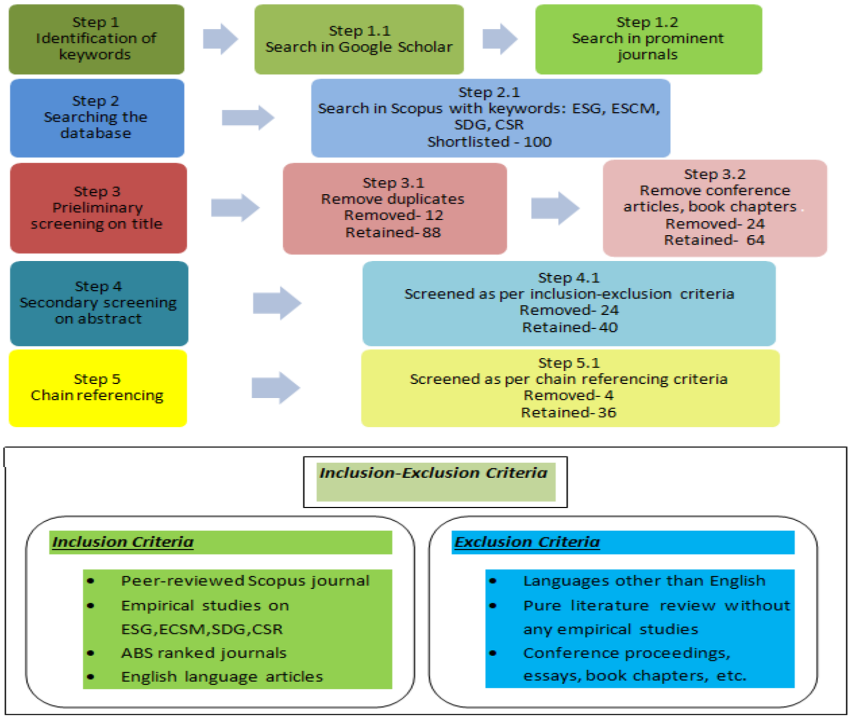

Figure 4. Flow diagram of search and selection criteria for the systematic review of this study.

5. Results and discussion

The researchers discovered that during the past 20 years, there has been a rise in publications in the field of both ESG and ESCM through bibliometric analysis. Despite an increase in related publications between 2004 and 2014, less than 250 documents were released annually overall (Figure 5). But in the seven years that followed the Paris Agreement's signature (from 2015 to 2024), the quantity of relevant documents grew annually, to 579 by that time. The total number of publications published between 2004 and 2024 was 7659. Furthermore, there was a rise in the number of published studies about ESG, suggesting that the importance of environmental issues has been emphasized by sustainable management scholars as a result of climate change [73]. Furthermore, there has been a rise in the quantity of published studies about ESG and ESCM, suggesting that researchers studying sustainable management have been motivated by climate change to emphasize the significance of environmental concerns. Enterprises now prioritize ESG and ESCM due to aims of net-zero carbon emissions, higher investment, and sustainable development [74].

Table 4 displays the findings of each scientific area's bibliometric examination. The rankings show how important research on climate change (10.31%), public administration (11.03%), technological sciences (13.25%), and other related areas like business administration (12.76%), and environmental

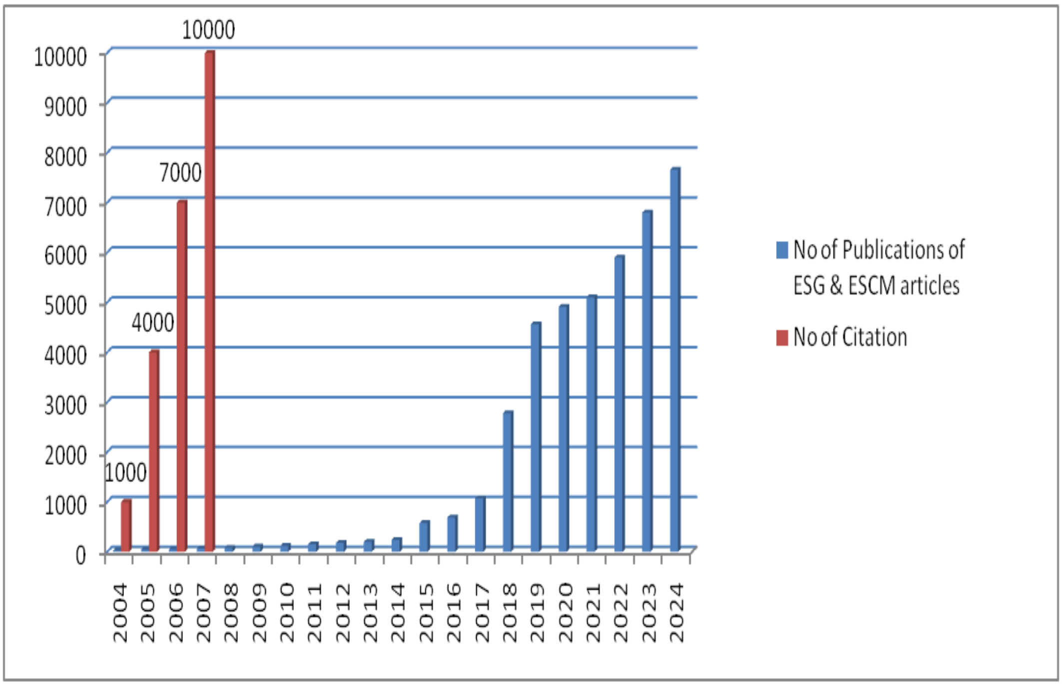

Figure 5. Number of publications of ESG & ESCM articles and their citation (2004–2024).

sciences (29.55%) are to ESG research. There could be more than 7659 papers altogether if one document covers several fields. This would be more than 100% of disciplines and journals. Popular ESCM research themes included sustainable development and environmental governance, and related research concentrated on adaptive management, natural resource management, environmental management, and resilience management, according to an assessment of discipline and journal groups.

Investors' top concerns in recent years have been sustainability and corporate investments. As a result, the purpose of this study is to identify ESG-related characteristics, the criteria that investors should consider when making decisions about business investment and sustainability, and the significance of these factors. Based on ESG performance, investors assess corporate social and environmental responses since companies with low scores are more likely to be involved in ESG issues. Non-social and environmental corporations who have not implemented ESG practices are also subject to pressure from governments and regulatory organizations. For businesses all around the world, ESG performance is now a mark of environmental consciousness and community involvement. These days, dependable business procedures pique investors' curiosity more than a company's financial and operational advantages [75].

Organizational financial performance may be impacted by the level of CSR activity in ESG policies. According to the results, social performance has significantly improved economically, and environmental performance has slightly improved as well. However, there is scant evidence of a link between governance and economic activity [76]. Research on rebranding indicates that business participation in public responsibility initiatives raises innovation levels. Businesses can be shaped by research introducing rates of technological change [77]. According to [78], time-dependent assessments have

Table 4. Ranking of disciplines and countries of publication associated with ESG and ESCM research.

Ranking	Disciplines	Number of Articles	% of total publications(7659)
1	Environmental sciences	2264	29.55%
2	Technological sciences	1015	13.25%
3	Business administration	978	12.76%
4	Public administration	845	11.03%
5	Research on climate change	790	10.31%
6	Research on engineering	516	6.73%
7	Research on water resources	449	5.86%
8	Research on development	390	5.09%
9	Social sciences	248	3.23%
10	Biodiversity	164	2.14%
Ranking	**Origin (Country)**	**Number of Articles**	**% of total publications(7659)**
1	U.S.A	2276	29.71%
2	England	1156	15.09%
3	Australia	916	11.95%
4	Canada	759	9.90%
5	China	676	8.82%
6	Spain	520	6.78%
7	Germany	470	6.13%
8	Belgium	398	5.19%
9	Sweden	290	3.78%
10	South Korea	198	2.58%

consistently shown results for the ESG processes of businesses in terms of their design capacity.

6. Limitations

There are some limitations to this study. While traditional supply chains were set up to deliver stability and minimize costs this fast-paced, ESG-centric world that we live in today requires a different sort of supply chain. The new priorities of resilience, agility, and sustainability cannot be tacked onto existing supply chain set-ups. Organizations can encourage ethical and sustainable practices that benefit communities and workers by including social issues into supply chain planning. It is easier said than done, though. When it comes to incorporating ESG concepts into their operations, supply chain operators confront a number of significant obstacles. Based on the above discussion, it appears reasonable to conclude that companies are not required to disclose all information related to their sustainability practices as this can make it difficult to evaluate the sustainability and ethical impact of ESG investments [79].

Although useful for examining research patterns, bibliometric studies are prone to biases that could skew the findings and restrict how they can be interpreted. The overrepresentation of particular nations or journals is one prevalent bias that may distort the perceived significance and impact of studies conducted in particular areas or publications. Additionally, the absence of qualitative case study insights may restrict the breadth of comprehension and even simplify complicated events.

- **Bias in bibliomentric data:** Research from nations where English is the primary language is disproportionately highlighted by bibliometric databases, which frequently give preference to English-language journals. This may understate the important contributions made by other areas.
- **Constraints in bibliometric analysis:** It is possible to evaluate bibliometric data—particularly citation analysis—without knowing the larger context of the study, which includes the particular research topic, methodology, and study restrictions.

7. Conclusions

This bibliometric study examined trends and advancements in the last 20 years of ESG and ESCM research and performed a fact-based examination of how ESG has been applied to improve corporate performance, preserve the environment, and restore value. Environmental sustainability, pollution and waste, greenhouse gas emissions, social considerations, CSR, global pandemics, religion, gender, political influence, organizational structure, and ownership are some of the ESG variables that have an impact on businesses and are summarized in this article. ESG transparency, sustainable governance, the size of the governing body and the firm, economic performance, restructuring and investment, corporate governance, internal and corporate employment, shareholder rights, stakeholder selection, and technical development are examples of economic and administrative components [80].

A logical analysis revealed that corporate governance, property rights, global performance, adaptive governance, and SDGs are the main themes of ESCM and ESG research . Key study focuses included resource applications, global research, surveys, studies of ESG practices, and reductions in carbon emissions. In summary, ESCM research is multidisciplinary, indicating that the growth of several study fields is essential to the maturity of ESG research. Lastly, co-management and the combined efforts of public and private institutions can boost ESG and produce a sustainable, environmentally friendly, and creative economic ecosystem in addition to the involvement of institutions, organizations, and individuals. Although the primary driver of ESCM development is financial performance, investors and consumers are becoming increasingly interested in the connection between CSR and financial performance.

This article went beyond this bibliometric analysis to explain the increasing interest in ESCM's CSR concerns. This interest can be explained by a variety of ethical and sociological factors, and several empirical studies demonstrate the beneficial interaction between the dynamics of financial practices and CSR initiatives. There is not a systematic framework that unifies the growing significance of CSR in supply chain management, despite these compilations of studies. The author plans to undertake additional studies in this area and this work is the first attempt in that regard.

Future research should take into account the sustainability points offered by different reference providers for a comparative study. Another direction for future research could be the very detailed results that come from industrial segregation. In the future, similar outcomes from the current study can be compared using test procedures to gather baseline data from industries.

Use of AI tools declaration

Artificial Intelligence (AI) tools have not been used in the creation of this article.

Conflict of interest

The authors declare that there is no conflict of interest.

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