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Environmental, Social, and Governance (ESG) Factors in International Trade: A Systematic Review and Integrative Framework

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Environmental, Social, and Governance (ESG) Factors in International Trade: A Systematic Review and Integrative Framework

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Abstract

Environmental, Social, and Governance (ESG) factors have become central to international trade, transforming how firms, industries, and governments engage in global markets. This study conducts a systematic literature review to synthesize current knowledge on the ESG–trade nexus. Using content analysis, three key thematic clusters were identified: (i) ESG in supply chains and logistics, (ii) ESG in export performance and international competitiveness, and (iii) ESG and trade within geopolitics, energy, and resource security. The synthesis reveals that ESG has evolved from a voluntary corporate initiative into a structural determinant of global competitiveness, resilience, and legitimacy. Building on these findings, the study proposes an integrative ESG–Trade framework, which conceptualizes ESG as a multidimensional governance ecosystem comprising (i) institutional and regulatory, (ii) technological and operational, and (iii) geopolitical and strategic dimensions. This framework explains how sustainability regulations, digital transformation, and global political economy dynamics co-evolve to shape trade flows and industrial upgrading. The study highlights the need for greater regulatory coherence and strategic ESG integration while offering a foundation for future interdisciplinary and empirical research on sustainable trade governance.

Keywords: ESG; international trade; global value chains; geopolitics; sustainability regulations; ESG–Trade framework

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1. Introduction

Environmental, Social, and Governance (ESG) factors have become a central concern in international trade, reshaping how firms and countries engage in global markets. The adoption of ESG practices is no longer viewed merely as voluntary corporate responsibility but increasingly as a source of comparative advantage, resilience, and market legitimacy. Empirical research shows that ESG adoption can enhance export intensity and technological upgrading while simultaneously strengthening firms' ability to withstand external shocks such as financial crises or geopolitical disruptions [1–3]. Conversely, weak ESG performance can undermine international competitiveness, restrict access to global value chains, and heighten vulnerability to trade barriers [4,5]. At the macro level, governments and international institutions are embedding ESG principles into trade-related policies, with the European Union's Corporate Sustainability Reporting Directive (CSRD) [6] and

Corporate Sustainability Due Diligence Directive (CSDDD) [7] representing two of the most far-reaching regulatory instruments influencing exporters worldwide. These developments underscore the growing significance of ESG as a structural driver of international trade patterns.

Although the relevance of ESG for trade is now widely acknowledged, the current research landscape remains conceptually and empirically dispersed. Studies tend to examine ESG through isolated lenses, such as supply chain resilience, export competitiveness, or energy geopolitics, and often treat ESG either as a firm-level reporting practice or as a regulatory constraint, without clarifying the multilevel mechanisms through which ESG becomes "trade-relevant." As a result, it remains unclear when ESG operates as a competitiveness-enhancing capability, when it functions as a compliance cost that may resemble a non-tariff barrier, and how these effects differ across regulatory regimes, technologies, and geopolitical settings. This fragmentation has limited theoretical integration and hindered the development of policy-relevant insights. While earlier reviews, e.g., [8,9], have provided foundational frameworks in related fields such as sustainable supply chain management and corporate social responsibility, they do not explain how ESG-related regulation, digital compliance infrastructures, and geopolitical dynamics jointly shape trade outcomes. This unresolved integration problem motivates the present study.

Accordingly, the purpose of this article is to provide an analytical consolidation of the ESG–trade literature by (i) mapping its knowledge structure, (ii) identifying the dominant explanatory mechanisms and boundary conditions across research streams, and (iii) developing an integrative framework that supports empirical testing and informs policy and managerial decision-making. Specifically, the present study conducts a systematic literature review on ESG and international trade and identifies three interrelated clusters: (i) ESG in supply chains and logistics, (ii) ESG in export performance and international competitiveness, and (iii) ESG and trade within geopolitics, energy, and resource security. The added value of this review lies in moving from a fragmented set of findings to a coherent explanatory model. Based on these clusters, this study suggests an Integrative ESG–Trade Framework, which conceptualizes ESG as a multidimensional governance ecosystem characterized by three mutually reinforcing dimensions: (i) institutional and regulatory, (ii) technological and operational, and (iii) geopolitical and strategic. This framework captures how sustainability regulations, digital transformation, and global political economy dynamics co-evolve to shape trade flows and industrial upgrading trajectories.

By proposing this integrative framework, the study contributes to theory-building in the intersection of international business, sustainability studies, and political economy. It also provides a foundation for policy and managerial decision-making in an era where ESG performance increasingly determines access to markets, investment, and legitimacy in global trade. The paper proceeds as follows: after outlining the methodology, the findings are presented through the three thematic clusters, followed by a discussion that develops and explains the integrative ESG–Trade framework. The conclusion then highlights the study's theoretical and practical implications and outlines directions for future research.

2. Theoretical Background

2.1. ESG Factors

ESG represents a framework for evaluating organizational performance beyond traditional financial metrics, encompassing three interconnected pillars that collectively assess corporate sustainability and ethical impact [10–12]. The environmental dimension addresses an organization's impact on natural systems, including carbon emissions, resource depletion, waste management, biodiversity conservation, and climate change mitigation efforts. The social component examines relationships between organizations and stake-

holders, encompassing labor practices, human rights, diversity and inclusion, community engagement, product safety, and supply chain labor conditions. The governance pillar focuses on leadership structures, executive compensation, shareholder rights, board composition and independence, transparency, business ethics, and anti-corruption measures [11].

The evolution of ESG can be traced through several developmental phases. Early corporate social responsibility (CSR) initiatives in the 1950s–1970s established foundational concepts of business accountability to society [13]. CSR emerged in the 1950s as a normative concept emphasizing firms' responsibility to consider the social consequences of their actions beyond profit maximization, later expanding in the 1960s–1970s toward broader stakeholder-oriented perspectives [13–15]. However, CSR remained largely voluntary and weakly standardized, limiting comparability and integration into financial decision-making [16]. The modern ESG framework crystallized in the early 2000s through key institutional developments. The 2006 UN Principles for Responsible Investment (PRI) formally integrated ESG considerations into investment analysis [17], marking a watershed moment in mainstreaming ESG in financial markets. Subsequent developments including the Paris Agreement, the Task Force on Climate-related Financial Disclosures, and the UN Sustainable Development Goals have further institutionalized ESG.

2.2. International Trade

International trade can be defined as the cross-border exchange of goods and services between economic actors located in different countries. By enabling countries and firms to expand beyond domestic markets and to access products, inputs, and technologies not available locally, international trade intensifies competition and can improve efficiency through greater market openness [18]. International trade remains a cornerstone of economic development and competitiveness because it generates measurable welfare gains through access to foreign goods, lower prices, and more efficient allocation of resources in general equilibrium [18,19]. At the firm level, trade is also linked to higher productivity and reallocation dynamics: only the more productive firms tend to export (and expand), while less productive firms contract or exit, raising aggregate industry productivity through selection and reallocation effects [20,21].

In today's economy, the importance of trade is further amplified by the expansion of global value chains, where countries and firms specialize in specific stages of production rather than only final goods. This fragmentation means that trade is increasingly about coordinating cross-border production networks and sourcing intermediates efficiently [22]. Finally, international trade is increasingly shaped by institutional conditions and expectations about market access: reductions in trade policy uncertainty can substantially affect export entry, trade volumes, and welfare, highlighting why stable and credible trade regimes matter in contemporary global markets [23].

2.3. ESG and International Trade

ESG considerations are increasingly reshaping global trade through evolving consumer preferences, regulations, and corporate strategies. Sustainability-conscious markets reward ESG-compliant products (e.g., eco-labels) while imposing barriers on others [24]. The European Union's Carbon Border Adjustment Mechanism (CBAM) [25] exemplifies this shift by linking environmental standards to trade policy, imposing carbon levies on imports from countries with weaker climate regulations to prevent carbon leakage and ensure fair competition. Similarly, the EU Deforestation Regulation [26] restricts imports associated with deforestation, illustrating how environmental objectives are embedded in trade policy.

Global supply chains serve as a crucial interface between ESG principles and international trade. The EU CSDDD [7] establishes binding obligations for companies to identify,

prevent, and mitigate adverse human rights and environmental impacts across their global value chains. Complementarily, new frameworks such as the EU's CSRD [6] extend ESG disclosure requirements beyond the EU, embedding sustainability criteria throughout international supply chains and influencing corporate reporting worldwide. Similar principles are reflected in the UN Guiding Principles on Business and Human Rights [27] and the OECD Guidelines for Multinational Enterprises [28], which together constitute the global normative framework for responsible business conduct.

3. Methodology

To explore the relationship between ESG and international trade, a systematic literature review was carried out. Following the PRISMA guidelines (Table S1) to enhance transparency and reproducibility [29], the process was structured into three main stages: (i) planning the review, (ii) executing the review, and (iii) reporting and synthesizing the findings [30,31].

Since electronic databases are the primary source of peer-reviewed research [32], this study employed the Scopus database, recognized as the largest repository of abstracts [33,34] and known for its extensive disciplinary coverage [35–37]. Scopus has also been widely used as a sole database in systematic literature reviews because it supports data reliability and consistency across retrieved records while offering advanced search functionalities, e.g., [38,39].

The search string employed was:

((ESG OR "environmental social governance") AND ("international trade" OR "global trade" OR "international supply chain" OR "global supply chain" OR "import" OR "export"))

On 10 July 2025, the predefined search string was applied, requiring its occurrence in the title, abstract, or keywords of the retrieved studies. No lower time bound was imposed; only an upper limit was applied, restricting the time frame to publications up to 2024. This initial search yielded 110 records, with the earliest publication dating to 2004. From these, only English-language documents, specifically journal articles, conference papers, and book chapters, were retained, resulting in a final sample of 92 publications. Thus, the final search string (including applied filters) was as follows: TITLE-ABS-KEY ((ESG OR "environmental social governance") AND ("international trade" OR "global trade" OR "international supply chain" OR "global supply chain" OR "import" OR "export")) AND PUBYEAR > 2003 AND PUBYEAR < 2025 AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "cp") OR LIMIT-TO (DOCTYPE, "ch")) AND (LIMIT-TO (LANGUAGE, "English")).

Following the approach suggested by Xiao and Watson [30], three of the authors independently screened titles and abstracts against predefined inclusion and exclusion criteria. Studies were included if they (i) explicitly examined the nexus between ESG and trade and (ii) incorporated an international, cross-country, or global dimension. Studies were excluded if: (i) they examined ESG, but trade was not a main focus; (ii) they addressed international trade, but ESG, covering the environmental, social, and governance pillars, was not a central analytical focus; or (iii) they examined ESG in trade-related contexts but lacked an explicit international or global dimension. After the abstract screening stage, 54 articles were identified for full-text assessment. At this point, two of the authors carefully examined the full texts to determine their alignment with the research objectives. Articles that did not meet the established inclusion criteria were excluded. The full-text screening process resulted in the exclusion of 17 studies, leaving a final sample of 37 documents for detailed analysis (Figure 1).

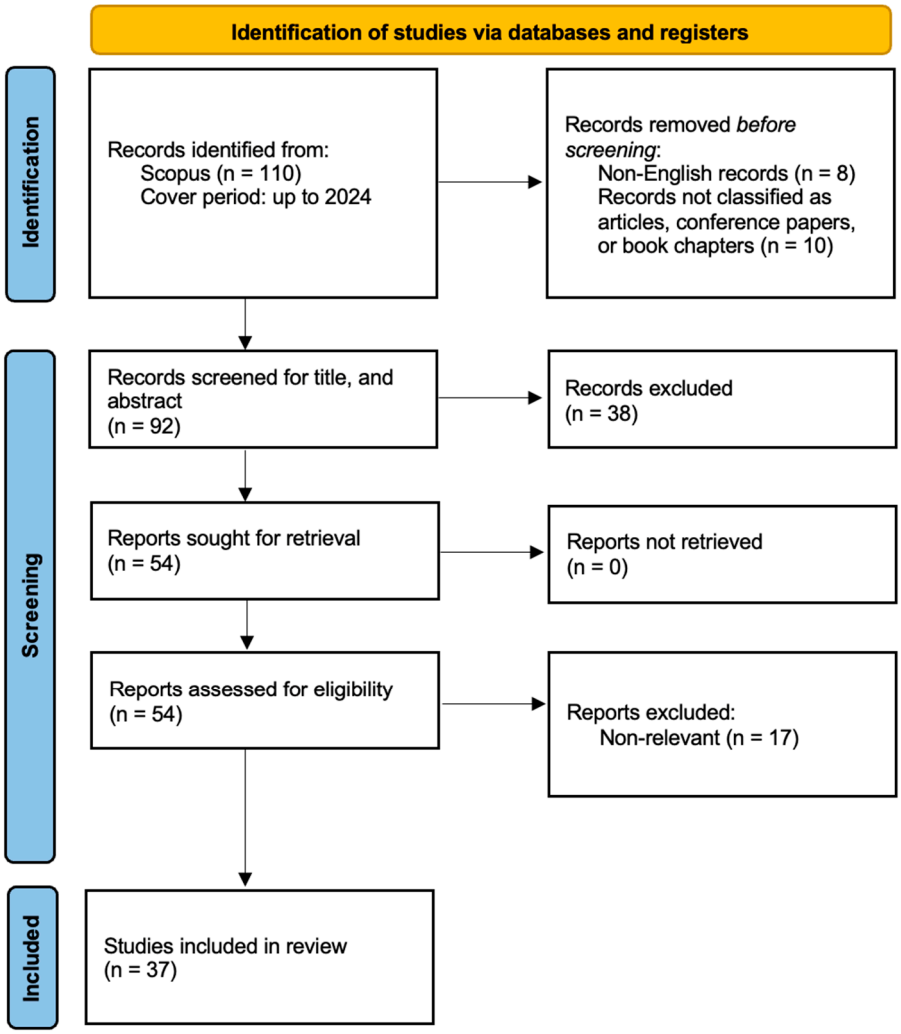

Figure 1. PRISMA 2020 flow diagram.

4. Results

From the final pool of 37 documents, a content analysis was conducted. It is noteworthy that all the relevant studies were published within the last three years, highlighting the novelty and timeliness of the research field. Specifically, 11 studies were published in 2022, 14 in 2023, and 12 in 2024 (Figure 2). This distribution underscores the growing academic interest in the topic and emphasizes the up-to-date nature of this study.

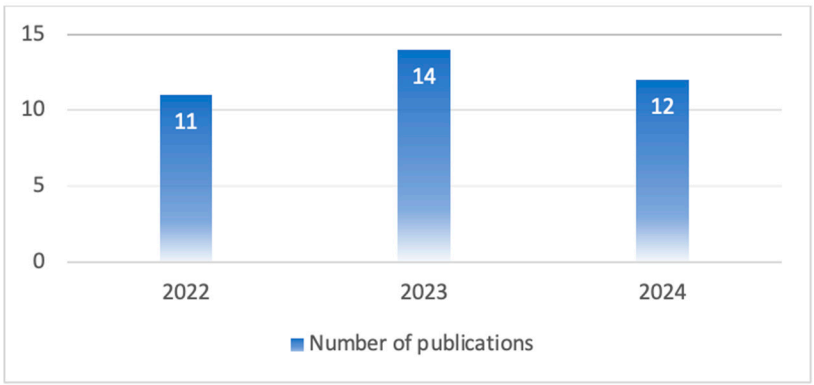

Figure 2. Number of publications per year. Source: Authors' own creation.

In terms of document type, the sample consists predominantly of journal articles (27 documents; 73%), followed by conference papers (8 documents; 22%) and book chapters (2 documents; 5%), indicating that the literature is largely consolidated in peer-reviewed journal outlets (Figure 3).

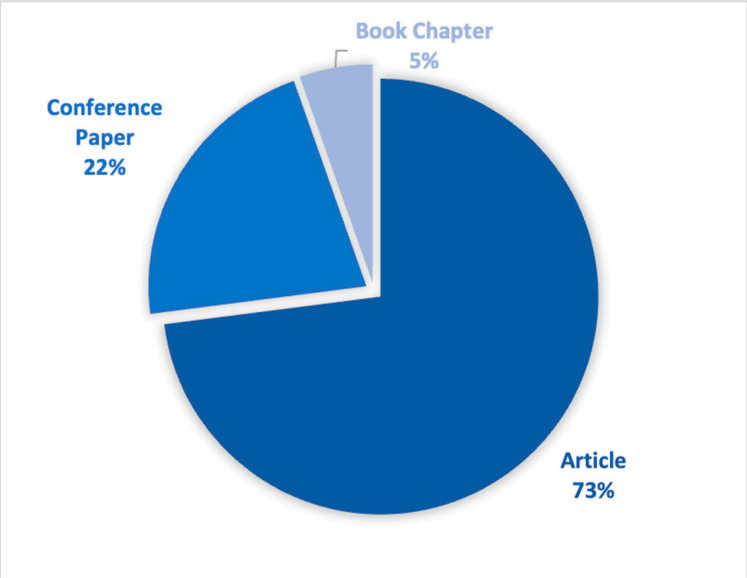

Figure 3. Document type. Source: Authors' own creation.

The content analysis of the 37 documents led to the emergence of three main thematic areas (Figure 4). The first theme focuses on ESG in supply chains and logistics, highlighting how sustainability practices influence global production and supply networks. The second theme centers on ESG within export performance and international competitiveness, addressing the role of responsible business practices in shaping trade outcomes and market positioning. The third theme relates to geopolitics, energy, and resource security in ESG and trade, emphasizing the intersection between environmental policies, geopolitical dynamics, and access to critical resources. Together, these themes reflect the multidimensional nature of the ESG–trade nexus and provide the basis for the subsequent synthesis.

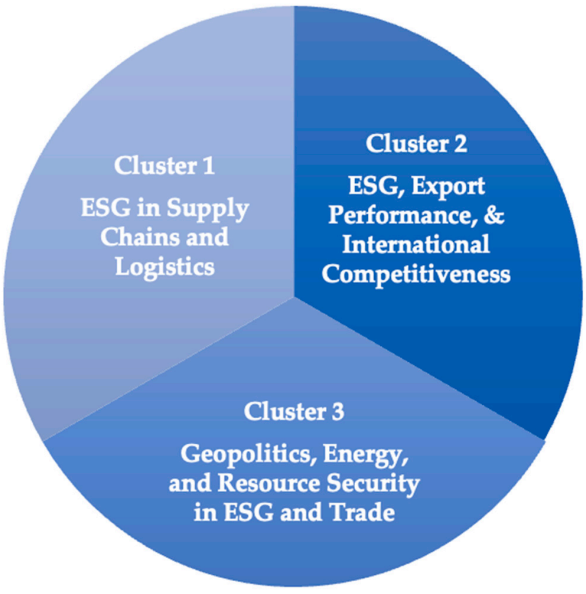

Figure 4. Three thematic clusters of ESG-Trade nexus. Cluster 1: Studies [40–52]; Cluster 2: Studies [1–5,53–62]; Cluster 3: Studies [63–71]. Source: Authors' own creation.

4.1. Cluster 1—ESG in Supply Chains and Logistics

This cluster brings together studies that examine how ESG considerations intersect with global supply chain management and logistics under environmental pressure, evolving regulatory expectations, and technological transformation, rather than treating ESG as a standalone reporting obligation. Across the cluster, ESG is framed as an end-to-end execution and governance challenge spanning multi-tier sourcing, logistics nodes (ports/shipping), and downstream market access mechanisms and contractual requirements [40–42].

Across the publications, ESG is consistently linked with sustainability risk management and resilience, with repeated emphasis on the "dual objective" of strengthening sustainability and resilience through ecosystem collaboration, shared performance metrics, and data-enabled coordination among supply-chain partners [43,44]. The cluster also positions ESG pressures as operating both upstream and downstream of the supply chain. In that sense, governance conditions and technological progress are associated with natural-resource outcomes that influence the sustainability of global supply-chain distribution, while market expectations and compliance demands shape behaviour closer to the point of trade and market access [45].

A recurring concern across the cluster is responsible sourcing and the practical implementation of ESG due diligence in fragmented networks. Gervais et al. [41] operationalise risk-based due diligence by combining trade-linked material flow analysis with ESG screening to identify dependency and ESG hotspots across multi-tier supply chains, illustrated through the case of silver used in photovoltaics. This contribution is important because it demonstrates how concentrated sourcing combined with weak governance can amplify environmental and social exposure, and how due-diligence prioritisation can be evidence-based rather than purely declarative. Related work reinforces these governance implications by interpreting strengthened international guidance on corporate responsibility and disclosure expectations, including expanded attention to climate change and biodiversity-related due diligence [46].

The cluster also highlights how sectoral vulnerabilities, operational complexity, and organisational capability gaps shape supply-chain risk and ESG exposure. Zhou and Yuen [40] focus on container shipping as a backbone of international trade and develop a Bayesian-network approach to identify and prioritise organisational sustainability risks, emphasising governance and workforce capability as influential risk drivers and proposing cost-effective mitigation portfolios. Complementing this risk assessment perspective, Tsang et al. [47] use an event study design to examine how firms respond to major supply chain disruptions and show that stronger ESG orientation is associated with more resilient performance, suggesting that ESG can function as a capability that mitigates vulnerability under stress. At the infrastructure level, Seares [42] illustrates how ESG relevant objectives can be embedded in large scale port and container supply chain redesign, showing that logistics sustainability is shaped by long horizon investment and integrated design choices.

Regulation and enforceability are central to the cluster's framing of supply-chain ESG, especially in the EU context. Hiessl [48] situates the EU's legislative initiative on corporate ESG due diligence as an attempt to move beyond voluntary mechanisms by strengthening accountability for labour rights and environmental harms along global value chains while also noting implementation constraints and enforceability challenges. Peter [49] complements this by examining how EU sustainability reporting and due-diligence rules can cascade contractually along international supply chains and be pursued via commercial arbitration, stressing the need for careful drafting of climate-related clauses and attention to procedural complexities (e.g., consolidation/joinder) that arise in multi-tier disputes. More broadly, EU regulation is presented as capable of shaping cross-border supply-chain gov-

ernance and market access through disclosure requirements, taxonomy-related pressures, and due-diligence expectations that diffuse beyond EU borders [48–50].

Finally, multiple studies frame digital technologies as practical enablers of ESG implementation through transparency, evaluation, and traceability. Qian et al. [51] propose a green supply-chain circular-economy evaluation system under an ESG framing that leverages Industrial Internet of Things data capture and blockchain-based integrity to support monitoring and assessment. Kealley et al. [52] provide an industry pilot from the Australian sugar sector showing how blockchain traceability can support sustainability signalling (via accreditation), permissioned data-sharing across actors, and potential market-access/value-creation benefits. Collectively, these contributions position analytics and traceability as operational infrastructures for ESG compliance and differentiation while also implying that adoption depends on coordination, data integration, and capability development across supply-chain partners [44,51,52].

Overall, the cluster frames the ESG–trade nexus as a supply-chain and logistics implementation problem: prioritising ESG risks across multi-tier networks and key logistics operators, addressing capability- and infrastructure-linked sustainability risks in logistics systems, responding to evolving due-diligence regimes and enforceability pathways, and deploying data-enabled tools that strengthen traceability and credibility (Table A1).

4.2. Cluster 2—ESG, Export Performance, and International Competitiveness

This cluster brings together studies that examine the role of ESG practices in shaping firms' international trade performance, particularly their export intensity, resilience, and competitiveness. Across the cluster, ESG is treated less as a purely ethical attribute and more as a competitiveness mechanism that can improve market access and legitimacy, relax financial and informational frictions, and support upgrading (e.g., higher value-added, higher carbon productivity) in internationally exposed firms and sectors.

Several studies concentrate on firm-level export outcomes. Evidence from Chinese listed firms indicates that stronger ESG performance is positively associated with export intensity, with channel tests suggesting financing- and capability-related pathways [1]. Complementing this export-intensity view, Ma et al. [2] show that ESG performance is linked to export resilience, emphasizing a "risk resistance/resilience" logic whereby ESG strengthens firms' capacity to absorb external shocks and sustain export activity. Related work connects ESG with digital upgrading in export strategies. Guo et al. [5] find that digital transformation is positively associated with firms' export performance, with ESG responsibility operating as an important mediating mechanism; implying that digital upgrading and ESG commitments can be mutually reinforcing.

Beyond the question of export volume, other studies shift the analytical focus to the quality and composition of export value creation. Yue and Li [3] show that ESG practices are associated with higher domestic value-added in exports and that spillovers can occur across regions, indicating that ESG adoption may diffuse competitiveness benefits beyond individual firms. At the policy–competitiveness interface, Mahajan and Majumdar [53] examine environmental policy stringency in relation to revealed comparative advantage in environmentally sensitive goods (textiles), illustrating how ESG-related regulatory pressure can reshape long-run trade competitiveness; an important reminder that ESG enters export performance through the institutional and regulatory environment, not only firm voluntarism.

The cluster also demonstrates that the ESG–export relationship is conditional on constraints, governance arrangements, and international embeddedness. In emerging-market SMEs, Teplova et al. [54] show that ESG and innovative activity are associated with export intensity under financial constraints, highlighting that the ESG–export link is not uniform

but depends on constraints and firm structure. At the corporate governance and internationalization interface, Wu and Nguyen [55] document that ESG is positively associated with accounting- and certain market-based performance measures, and the relationship is conditioned by foreigners on boards and export orientation, underscoring that international connectedness can amplify ESG-related performance effects. In a similar international business framing, Hussain et al. [56] find that ESG disclosure relates to firm internationalization and financial performance in Asia-Pacific emerging markets, positioning ESG transparency as a credibility and signaling device in cross-border expansion.

Additional evidence indicates that ESG can shape trade competitiveness indirectly through supply-chain relationships, sectoral expectations, and trade-enabling infrastructure. Mei [57] finds that customers ESG performance is positively associated with firms' carbon productivity, consistent with a supply-chain contagion effect. The relationship operates mainly through increased pollution-control investment and improved internal gross product, and is more evident for smaller firms, less-polluting industries, and domestic-oriented firms. Sector-specific work further supports the idea that ESG-related attributes can function as "market access currencies". Klinger et al. [58] show that credence attributes and ESG criteria interact with certification and sustainable forest management indicators in ways that can influence trade expectations in forest products. ESG is also embedded in the logistics backbone of trade. Caldeira dos Santos and Pereira [59] propose an ESG performance scoring method for port operations to support responsible investment and operational decisions; highlighting that export competitiveness increasingly depends on ESG-aligned infrastructure performance, not only firm-level practices. Related regional and industrial development work positions ESG as a strategic tool for export-capable sector upgrading, as seen in Kyrgyzstan's light-industry context [60] and in policy proposals to support ESG-oriented export projects under uncertainty [61].

Overall, this cluster converges on the view that ESG adoption is becoming a crucial determinant of export-related performance, but the relationship is contingent on enabling conditions. It varies with technology and digital transformation, financial constraints and innovation capacity, governance and international embeddedness, and supply-chain and sectoral market expectations (Table A2).

4.3. Cluster 3—Geopolitics, Energy, and Resource Security in ESG and Trade

This cluster consolidates work that places ESG explicitly within the "hard constraints" of geopolitics and the energy transition; trade wars, sanctions, post-war reconstruction, and critical-material dependencies, rather than treating ESG only as a voluntary corporate responsibility or reporting tool. Across the papers, ESG is positioned as a strategic response to external shocks that reshape (i) national and firm competitiveness, (ii) resource and energy security, and (iii) the feasibility of sustainability transitions across regional contexts [63–65].

A major line of evidence in the cluster links ESG to competitiveness and risk management under conflict and strategic rivalry. Using the U.S.–China trade war as a natural "competition shock," Xu et al. [63] show how ESG becomes intertwined with international competitive dynamics, implying that ESG capabilities can function as strategic assets when firms face heightened uncertainty and external constraints. Related work indicates that sanctions and geopolitical fragmentation can reshape ESG agendas themselves. Pokrovskaya et al. [64] discuss ESG agenda formation under sanctions, asking how ecological transformation and ESG implementation formats change when the geopolitical environment shifts abruptly. Together, these contributions locate ESG at the intersection of market pressure and political economy, where compliance, legitimacy, and strategic positioning are conditioned by the evolving global order.

The cluster also highlights how sanctions-era constraints alter sustainability priorities and sectoral adjustment pathways. Zakirov et al. [66] analyse Russia–Mongolia foreign economic relations through the lens of sustainable development, emphasising that commodity structures and resource-oriented trade can intensify environmental pressures and raise ESG-relevant concerns in bilateral trade patterns. At the domestic sector level, Aleksandrov et al. [67] examine the Russian agro-industrial sector under sanctions and a "green agenda," arguing that sustainability goals increasingly intersect with the need for structural reform and modernization (including innovation and digitalisation) when external markets and inputs are disrupted. In this sense, ESG is framed less as a standalone objective and more as part of resilience-oriented economic restructuring under constrained international integration.

Another contribution extends ESG from firm disclosure toward recovery planning and investment prioritisation in conflict-affected settings. Zolotova [68] develops an ESG-based regional investment profiling approach for Ukraine's light industry, using ESG rating logic to guide post-war recovery strategy and resource allocation across regions. This contribution suggests that ESG metrics can be repurposed as a practical tool for identifying priorities and directing recovery-oriented capital in high-uncertainty environments.

Energy security and the material foundations of decarbonisation are also central across the cluster, underscoring that ESG trajectories are constrained by resource availability and energy-system realities. Isetani et al. [65] show that clean-energy transition pathways are inseparable from critical raw material access, arguing for Indo–Japanese collaboration as a response to national-security risks created by concentrated mineral supply chains. From a resource governance and industrial strategy perspective, Sinclair and Coe [69] examine Australia's critical-minerals strategies and demonstrate that industrial upgrading tied to critical minerals can proceed without parallel environmental or social upgrading, highlighting a core ESG tension in transition mineral supply chains. At the "legacy energy" end of the transition, Brodny and Tutak [70] address coal's continued role in European energy security and propose pathways for the polish coal-mining industry to pursue innovative and sustainable development by combining open innovation and triple-helix collaboration with ESG principles. Nalule et al. [71] add a "Global South lens" by discussing the challenges and opportunities posed by Africa's oil and gas resources during the energy transition, reinforcing that transition pathways, and thus ESG trade-offs, differ substantially by development context and resource endowments.

Overall, Cluster 3 depicts ESG as a crisis-conditioned governance and strategy framework shaped by geopolitics and transition constraints. It connects ESG to (i) strategic competition and trade conflict, (ii) sanctions-era agenda reconfiguration and domestic sector adaptation, (iii) sustainable development in resource-oriented cross-border trade, (iv) post-war reconstruction and investment prioritisation via ESG screening logics, and (v) energy security and critical-material dependencies that can either enable or bottleneck decarbonisation trajectories (Table A3).

5. Discussion

The synthesis of the three thematic clusters: (i) ESG in supply chains and logistics, (ii) ESG in export performance and international competitiveness, and (iii) ESG and trade within geopolitics, energy, and resource security, reveals the emergence of a coherent yet complex transformation in the relationship between sustainability and international trade. Although each cluster focuses on distinct analytical levels, their convergence illustrates how ESG considerations have evolved from a voluntary reporting framework into a multidimensional mechanism that shapes competitiveness, resilience, and global economic governance. ESG principles have become the connective tissue linking firm-level strategy,

global regulatory dynamics, and the reconfiguration of trade networks under technological and geopolitical change.

Across the studies reviewed, a consistent pattern emerges: ESG operates simultaneously as a driver of firm performance and a response to systemic pressures in the international trade environment. In the context of supply chains, the adoption of ESG-oriented management practices enhances transparency and risk mitigation, particularly when supported by digital innovations such as blockchain, big data analytics, and artificial intelligence [40,51]. These same technological advancements extend to export-oriented firms, where ESG integration contributes to improved market access, legitimacy, and investor confidence [1,2]. At the macro level, geopolitical and energy-related dynamics, such as trade sanctions, critical mineral dependencies, and the transition toward clean energy, further amplify the strategic relevance of ESG as countries seek to balance competitiveness with sustainability imperatives [64,69]. Collectively, these findings suggest a circular relationship: ESG adoption enhances competitiveness and resilience, while regulatory and geopolitical shifts accelerate ESG diffusion and institutionalization across global value chains.

A cross-cluster reading positions ESG as an emergent mechanism of global economic governance. The proliferation of extraterritorial regulations, particularly the European Union's CSRD and CSDDD, extends sustainability standards beyond European borders, compelling firms worldwide to align with new compliance regimes [48,50]. This phenomenon, often described as the "Brussels Effect", reshapes international competition by transforming ESG compliance into a prerequisite for global market access. The alignment of governance frameworks across jurisdictions thus reinforces ESG as both a regulatory necessity and a strategic tool of trade diplomacy. However, these mechanisms also generate asymmetries, as developing economies and small enterprises face higher adjustment costs and limited institutional capacity to meet ESG demands, raising concerns about equity and inclusiveness in sustainable trade transitions.

Technological transformation further strengthens the integrative role of ESG across clusters. Digital infrastructures are no longer peripheral enablers but central instruments for achieving transparency, efficiency, and accountability in global trade. In supply chains, digitalization facilitates traceability and compliance verification; in export markets, it reduces information asymmetries and enhances reputation; and in resource and energy governance, it supports monitoring of environmental impact and critical material flows [5,44,51,65]. This convergence highlights that digital transformation and ESG integration are mutually reinforcing processes that define the competitiveness of firms and nations alike. The resulting configuration reflects an emerging paradigm of "digital sustainability," where technological and environmental objectives are increasingly inseparable.

At the same time, the synthesis underscores a broader political economy dimension of ESG in trade. Resilience, once considered an operational concern, now constitutes a strategic and systemic attribute of sustainable trade ecosystems. Firm-level resilience, strengthened by ESG adoption, mirrors the macro-level need for diversification and energy security in a volatile geopolitical context, e.g., [47]. This duality illustrates that resilience has become both an outcome and a measure of ESG maturity. Yet, it also exposes inherent inequalities: advanced economies are better positioned to absorb the financial and technological costs of ESG transition, while emerging economies risk marginalization if global sustainability frameworks are not accompanied by redistributive mechanisms such as green financing, capacity building, and technology transfer.

Taken together, these interlinked findings point toward the formation of an integrative ESG–trade framework that conceptualizes how ESG reshapes international trade through three interdependent dimensions (Figure 5). The institutional and regulatory dimension

captures the diffusion of ESG norms, regulatory harmonization and the standardization of sustainability reporting. The technological and operational dimension captures the digitalization of compliance, data infrastructures, and the operational embedding of ESG within firm strategies and supply-chain practices. The geopolitical and strategic dimension situates ESG within wider shifts in energy transitions, strategic dependencies, and global value chain restructuring.

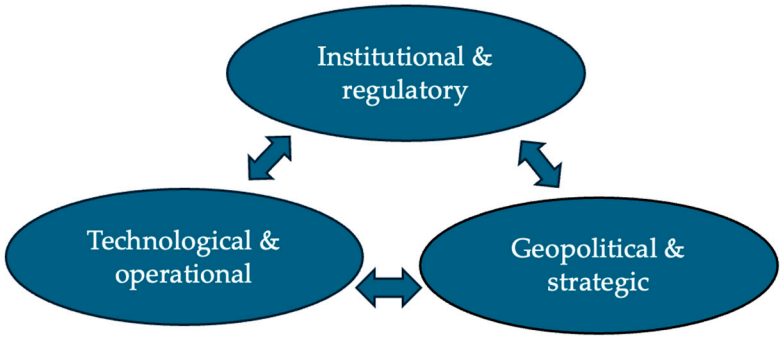

Figure 5. Three interdependent dimensions of the Integrative ESG–Trade Framework. Source: Authors' own creation.

In the proposed framework, these dimensions function as joint drivers that shape (a) ESG governance and implementation mechanisms (e.g., reporting and assurance regimes, traceability and due-diligence systems, supplier monitoring and coordination) and, in turn, (b) trade-related outcomes, including market access, upgrading trajectories, risk management and resilience, and sources of international competitiveness (Figure 6). Crucially, the dimensions are mutually constitutive rather than merely coexistent. Regulatory pressures necessitate technological solutions while being shaped by strategic and geopolitical dynamics; technological capabilities enable regulatory compliance and provide tools for navigating geopolitical complexity; geopolitical considerations influence both regulatory frameworks and technological development. Overall, the framework positions ESG not as a firm-centric reporting practice but as a multi-level governance ecosystem linking micro-level behavior, meso-level supply-chain governance, and macro-level trade policy, thereby influencing trade flows and competitiveness under sustainability and resilience imperatives.

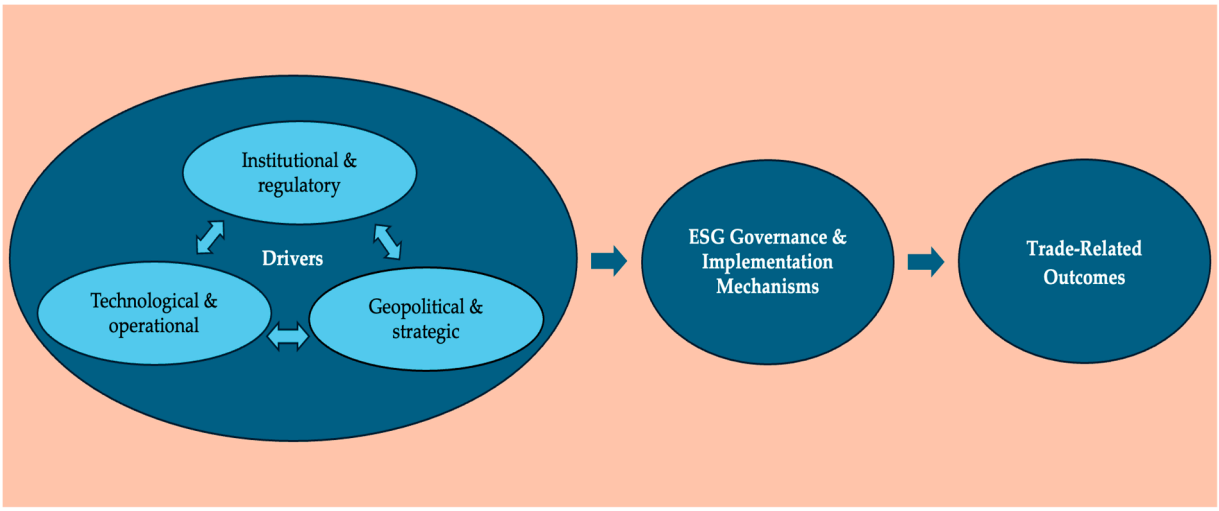

Figure 6. Integrative ESG-Trade framework. Source: Authors' own creation.

The proposed framework makes a novel contribution by integrating dimensions that existing literature treats separately or in isolation. Practitioner frameworks like the ICC Principles provide transactional assessment tools [72], while academic research examines either firm-level performance mechanisms, e.g., [1,2], regulatory compliance challenges, e.g., [48,50], or geopolitical dynamics, e.g., [63,64] without synthesizing these streams. This framework addresses the fragmentation by conceptualizing institutional/regulatory, technological/operational, and geopolitical/strategic dimensions as mutually constitutive rather than independent domains, revealing how regulatory requirements necessitate technological solutions while being shaped by geopolitical forces; how technological capabilities enable compliance and geopolitical navigation; and how geopolitical considerations influence regulatory design and technology priorities. This systemic integration positions ESG not as a compliance burden or performance variable but as a comprehensive governance ecosystem fundamentally reshaping international trade architecture.

6. Conclusions

This study provides a comprehensive synthesis of the emerging literature on ESG and international trade, consolidating findings from 37 peer-reviewed studies published between 2022 and 2024. The analysis revealed three major clusters: (i) ESG in supply chains and logistics, (ii) ESG in export performance and competitiveness, and (iii) ESG in geopolitics, energy, and resource security, each representing a critical yet previously disconnected dimension of the ESG–trade nexus. The integration of these clusters led to the development of the Integrative ESG–Trade Framework, a novel conceptual model that explains how ESG has evolved from a corporate reporting tool into a systemic governance architecture underpinning global trade. The framework identifies three interdependent dimensions: (i) the institutional and regulatory (shaping compliance and standardization across jurisdictions), (ii) the technological and operational (driving digital traceability, monitoring, and performance), and (iii) the geopolitical and strategic (linking ESG to energy security, resource management, and global competitiveness). Together, these dimensions illuminate the multi-scalar and interdisciplinary nature of ESG as both a determinant and outcome of modern trade governance.

6.1. Practical Implications

From a policy perspective, the results highlight the urgent need for global regulatory alignment to reduce ESG fragmentation and ensure fair competition. International initiatives such as the EU's CSRD and the CSDDD are setting global standards that influence firms beyond European borders. Recent policy developments, including the European Commission's Omnibus package [73], indicate ongoing efforts to refine these frameworks and reduce the reporting burden on smaller entities. Policymakers should build on this momentum to promote multilateral cooperation, harmonized disclosure systems, and targeted financial incentives, particularly for SMEs, to mitigate compliance challenges and prevent ESG from functioning as a non-tariff trade barrier.

From a managerial perspective, firms should approach ESG not merely as a compliance necessity but as a strategic asset that enhances innovation, risk management, and reputational capital. The integration of digital tools such as blockchain, big data analytics, and AI can transform ESG into a source of competitive advantage by improving transparency, traceability, and operational efficiency. Moreover, ESG-oriented strategies can help firms adapt to geopolitical uncertainty, secure financing, and access high-value markets that prioritize sustainability.

6.2. Theoretical Implications

From an academic perspective, the proposed Integrative ESG–Trade Framework makes a significant theoretical contribution by bridging and integrating insights from traditionally separate fields. It advances the literature on international business by conceptualizing ESG not merely as a firm-level strategy but as a systemic determinant of global competitiveness and trade governance. It contributes to sustainability studies by embedding environmental and social responsibility within technological and institutional contexts, thus linking micro-level corporate practices to macro-level policy and geopolitical structures. Moreover, it enriches the political economy and international relations domains by positioning ESG as a mechanism of global economic governance and a tool of trade diplomacy. This interdisciplinary synthesis provides a holistic lens for understanding how regulatory, technological, and strategic forces co-evolve in shaping the global trade system.

6.3. Limitations

This review has several limitations. First, the evidence base is drawn from studies published between 2022 and 2024. This was not an a priori restriction by the authors but reflects the recency of the ESG–international trade literature, which has only recently begun to develop. While this enhances relevance to current regulatory and geopolitical conditions, it limits historical depth, may introduce trend bias, and constrains cluster generalizations where subtopics are still represented by relatively few studies. Second, because the proposed framework is derived from synthesis rather than primary empirical testing, it remains conceptual and should be interpreted as a structured explanation of mechanisms and linkages that requires empirical validation. Finally, the review relied on Scopus and retained English-language publications, which may exclude relevant regional scholarship and introduce database and language coverage bias.

6.4. Future Research

Future research can expand this study in several promising directions. First, scholars should empirically validate the proposed framework across industries and regions, assessing its explanatory power in diverse regulatory and geopolitical contexts. A central question is to what extent do institutional/regulatory, technological/operational, and geopolitical/strategic conditions jointly predict trade outcomes such as market access, export performance, and upgrading? Second, interdisciplinary research should explore how digital technologies mediate the relationship between ESG compliance, supply chain governance, and export performance. In particular, how do traceability and analytics technologies change the relationship between ESG compliance and export performance? Third, investigations into global inequalities in ESG adoption, particularly among SMEs and developing economies, can offer insights into inclusive and equitable pathways for sustainable trade. This motivates the question: do ESG disclosure and due-diligence requirements impose disproportionate compliance costs on SMEs and firms in developing economies, and which support mechanisms mitigate these effects? Finally, the evolving intersection of ESG and global geopolitics, including energy transitions and critical raw material governance, warrants closer examination as sustainability becomes a defining feature of global trade diplomacy. Accordingly, how do geopolitical tensions and strategic resource dependencies shape ESG rule-making and alter global value chain participation and trade patterns? Together, these research directions can strengthen the empirical grounding of the ESG–trade nexus and refine the proposed framework by clarifying its boundary conditions, causal mechanisms, and relevance across evolving regulatory and geopolitical environments.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su18020677/s1, Table S1: PRISMA 2020 Checklist.

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Appendix A

Table A1. Studies included in Cluster 1.

Title	Authors & Year	Contribution to Cluster 1
Risk-based due diligence in supply chains: The case of silver for photovoltaics	Gervais et al. (2023) [41]	ESG hotspot screening for supply-chain due diligence
Main contents and implications of the 2023 revision of the OECD Guidelines for multinational enterprises	Ahn (2024) [46]	Corporate responsibility guidance shaping climate/biodiversity due diligence
A roadmap for sustainable global supply chain distribution: Exploring the interplay of ECON-ESG factors, technological advancement and SDGs on natural resources	Işık et al. (2024) [45]	ESG/governance conditions shaping resource pressures relevant to supply chains.
Examining supply chain vulnerability via an analysis of ESG-prioritized firms amid the Russia–Ukraine conflict	Tsang et al. (2024) [47]	Heterogeneous supply-chain vulnerability
A strategic framework for achieving sustainability and resilience in global supply chains	Klement et al. (2023) [43]	ESG-linked supply-chain risk management and resilience framing.
Green supply chain circular economy evaluation system based on industrial internet of things and blockchain technology under ESG concept	Qian et al. (2023) [51]	ESG evaluation of green supply chains using the Industrial Internet of Things and blockchain
Westport supply chain integrated design	Seares (2023) [42]	ESG integration in port/trade-gateway infrastructure redesign
Labour rights & their enforcement in global value chains: The EU's legislative initiatives on corporate ESG due diligence in context	Hiessl (2023) [48]	EU corporate due diligence for labour/environmental harms in value chains.
Climate change and supply chain arbitrations: Impact of EU law on the BRI and non-EU entities	Peter (2023) [49]	Contractual cascade and arbitration enforcement of ESG duties in supply chains.
How European regulation on ESG impacts business globally?	Redondo Alamillos & de Mariz (2022) [50]	EU-driven diffusion of sustainability expectations across cross-border value chains
Emerging opportunities for Australian sugar using blockchain technology	Kealley et al. (2022) [52]	Blockchain traceability pilot enabling sustainability signalling and data-sharing.
Application of analytics to achieve supply chain resilience	Cohen (2022) [44]	Coordination/metrics challenges for ESG implementation across supply-chain.

Table A2. Studies included in Cluster 2.

Title	Authors & Year	Contribution to Cluster 2
Does corporate ESG performance promote export resilience? New insights from risk resistance and resilience.	Ma et al. (2024) [2]	ESG association with export resilience under shocks
ESG disclosure, firm internationalization, and firm financial performance: Evidence from Asia-Pacific	Hussain et al. (2024) [56]	ESG disclosure as credibility signal for internationalisation and performance.
Can customer ESG performance improve corporate carbon emission productivity? An empirical study from listed companies in China.	Mei (2024) [57]	Customer-ESG spillovers raising exporters' carbon productivity.
Digital transformation, ESG responsibility and corporate's export performance.	Guo et al. (2024) [5]	Digital transformation, export performance, and ESG responsibility link
The influence of ESG practices on domestic value-added to exports during the period of technological change	Yue & Li (2024) [3]	ESG association with export upgrading and domestic value-added
ESG and firm performance: The effects of foreigners on board and export orientation.	Wu & Nguyen (2024) [55]	Governance/international embeddedness conditioning ESG–performance effects.
ESG Initiatives for the managed development of light industries in the regions of Kyrgyzstan.	Kulueva et al. (2023) [60]	ESG-oriented sector upgrading.
Evaluation of support for ESG projects of environmentally responsible companies in the face of economic uncertainty	Mamedov et al. (2023) [61]	Policy/finance support for ESG-oriented export projects under uncertainty
The Relationship between Environmental, Social, Governance, and export performance in manufacturing companies: A literature review	Li & Li (2023) [62]	Literature synthesis on ESG–export performance links in manufacturing.
Assessing the effect of corporate ESG management on corporate financial & market performance and export.	Yang & Han (2023) [4]	ESG management effects on export alongside financial/market performance
Credence attributes in the forestry sector and the role of environmental, social and governance (ESG) factors.	Klinger et al. (2022) [58]	ESG credence attributes/certification shaping trade expectations in forest products.
The multifaceted sustainable development and export intensity of emerging market firms under financial constraints: The role of ESG and innovative activity.	Teplova et al. (2022) [54]	ESG–export intensity under financial constraints in emerging-market SMEs
Environmental policy stringency and comparative advantage of environmental sensitive goods: A study of textile exports in G20 countries.	Mahajan & Majumdar (2022) [53]	Environmental policy stringency and comparative advantage in sensitive goods.
Does corporate ESG performance improve export intensity? Evidence from Chinese listed firms	Wu et al. (2022) [1]	ESG association with export intensity.
ESG performance scoring method to support responsible investments in port operations.	Caldeira dos Santos & Pereira (2022) [59]	Port ESG scoring as trade-enabling infrastructure performance.

Table A3. Studies included in Cluster 3.

Title	Authors & Year	Contribution to Cluster 3
Navigating international competition with ESG: Insights from the US-China trade war	Xu et al. (2024) [63]	ESG upgrading under U.S.–China trade-war competitive pressure.
Critical mineral strategies in Australia: Industrial upgrading without environmental or social upgrading	Sinclair & Coe (2024) [69]	Critical minerals (resource-based) focus; social and environmental upgrading.
Current paradigm of ESG strategy in new geopolitical situation	Pokrovskaya et al. (2023) [64]	ESG agenda reconfiguration under sanctions and fragmentation
Foreign economic relations of Russia with Mongolia in the light of the concept of sustainable development	Zakirov et al. (2023) [66]	Russia–Mongolia sustainable-development lens on resource-oriented trade
Problems and prospects for sustainable development of the Russian agro-industrial sector under international sanctions and green agenda	Aleksandrov et al. (2023) [67]	Sanctions, green agenda, and agro-industrial restructuring/modernisation
Post-war recovery strategy for Ukrainian light industry: Regional ESG rating application	Zolotova (2023) [68]	ESG rating logic for post-war reconstruction and regional investment priorities
Indo–Japanese collaboration on energy security and critical raw materials (CRM)	Isetani et al. (2022) [65]	Critical raw material security for clean-energy transition cooperation
Challenges of the polish coal mining industry on its way to innovate and sustainable development	Brodny & Tutak (2022) [70]	Coal-region transition balancing energy security and decarbonisation via ESG/innovation.
Energy transition and Africa's oil and gas resources: Challenges and opportunities	Nalule et al. (2022) [71]	Oil & gas transition trade-offs and just-transition constraints

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