2 (2026) 100236

Contents lists available at ScienceDirect

Strategic Business Research

journal homepage: www.sciencedirect.com/journal/strategic-business-research

Sovereign Institutional Capacity and ESG Integration in Nordic Economies: A Comparative Macro-Institutional Analysis

S M Feroj Mahmood

School of Marketing and Communication, University of Vaasa, Vaasa, Finland

ARTICLE INFO

Keywords:
ESG integration
Sustainable finance
Nordic countries
Environmental governance
Social performance
Comparative analysis
Sustainability indicators
Economic diversification

ABSTARCT

This study examines how sovereign-level institutional conditions shape the capacity for ESG (Environmental, Social, and Governance) integration across four Nordic economies, namely Denmark, Finland, Norway, and Sweden, over the period 2013 to 2022. Rather than measuring firm-level portfolio decisions or financial flows, the study adopts a macro-comparative institutional design consistent with the sovereign ESG literature, treating national environmental performance, social welfare outcomes, and governance quality as proxies for the institutional conditions that enable, constrain, and signal ESG integration in national investment environments. Drawing on annual data from the World Bank across seven indicators, supplemented by linear time-trend regression and correlation analysis, the study identifies differentiated ESG-relevant trajectories across the four countries. All four Nordic economies demonstrate statistically significant downward trends in CO_2 emissions per capita, although the pace and institutional drivers of this decarbonization diverge notably. Governance indicators reveal that institutional stability is not uniform across the region: Denmark maintains the most consistent governance performance; Sweden combines environmental leadership with selective governance pressures; Norway exhibits tensions between resource dependence and institutional coherence; and Finland shows adaptive yet geopolitically sensitive performance. The study contributes to the sovereign ESG and comparative institutional literature by demonstrating that even among highly advanced welfare states, differences in regulatory structure, resource dependence, and policy coordination generate distinct institutional pathways for ESG-oriented capital allocation. Findings carry implications for policymakers and institutional investors seeking to align sovereign and subnational institutional frameworks with long-term sustainability and SDG-aligned investment objectives.

Introduction

Environmental, Social, and Governance (ESG) factors have become crucial considerations in modern investment strategies, reflecting a global move toward sustainable development (Dmuchowski et al., 2023; Friede et al., 2015). Concerns about climate change, social inequalities, and governance issues have heightened the importance of ESG principles in financial decision-making (Eccles & Klimenko, 2019). The Nordic countries, including Denmark, Finland, Norway, and Sweden, lead in sustainability due to their comprehensive environmental, social, and governance policies and regulations (Sullivan & Mackenzie, 2017; Aall, 2014). These nations are at the forefront of incorporating ESG factors into their national investment strategies, thereby supporting global sustainability initiatives (Kauppila et al., 2009).

The Nordic region provides a theoretically compelling and empirically rich setting for examining ESG integration because it combines institutional features central to sustainable finance that are often analysed separately in comparative business research. Denmark, Finland, Iceland, Norway, and Sweden are commonly understood as coordinated market economies embedded within universalistic welfare regimes, high-capacity states, dense regulatory traditions, and comparatively high levels of institutional trust (Hall & Soskice, 2001; Andersen et al., 2007). These characteristics are analytically important because ESG integration is not shaped solely by firm-level preferences or investor strategies; rather, it is mediated by the institutional architecture that defines and enforces corporate responsibility, stakeholder accountability, disclosure expectations, and climate-policy commitments (Matten & Moon, 2008; Campbell, 2007). Recent sustainable-finance scholarship further shows that ESG integration operates within regulatory and informational infrastructures that shape how investors interpret sustainability risks, fiduciary duties, and the credibility of corporate transitions (Parfitt, 2024; Cochran et al., 2025). Accordingly, the Nordic

E-mail address: feroj.mahmood@uwasa.fi.

https://doi.org/10.1016/j.sbr.2026.100236
Received 13 March 2026; Received in revised form 2 June 2026; Accepted 9 July 2026
Available online 13 July 2026

countries should not be treated merely as advanced economies with high sustainability performance. They constitute a distinctive institutional cluster in which welfare-state legacies, stakeholder-oriented governance, public-sector capacity, and ambitious climate-policy frameworks interact to shape the incentives, norms, and monitoring mechanisms through which ESG is incorporated into corporate and investment decision-making (Vaihekoski & Yahya, 2023; Buchetti et al., 2025).

Despite these similarities, ESG factors were incorporated in notably different ways across the Nordic countries. Regarding ESG contributions, Sweden has made significant progress in decarbonizing its economy by relying on renewable energy and setting ambitious carbon-reduction goals (Stern, 2008). Due to its dependence on oil and gas, Norway has faced challenges in aligning its economic growth with key environmental sustainability policies (International Energy Agency [IEA], 2020). This presents a valuable opportunity to explore how different policies within the same region influence the integration of ESG considerations into investment strategies (Eccles et al., 2017; Park & Jang, 2021). Furthermore, these differences highlight a major challenge that many countries worldwide face during the transition to a low-carbon economy while pursuing economic development: a delicate balancing act that requires nations to reconcile developmental needs with environmental concerns amid rapid societal, economic, and institutional change (Acemoglu et al., 2012).

The Nordic region's experience with ESG integration offers valuable insights into how sustainable finance is increasingly contributing to the achievement of the United Nations' Sustainable Development Goals (SDGs) (Saha & Khan, 2024; United Nations, 2015). Using this information, the study examines each country's implementation of ESG principles to assess how effectively these nations address global issues such as climate change, social justice, and governance through investment (Doni & Johannsdottir, 2020). The research also aims to provide insights into how ESG is integrated within broader financial systems that support sustainable, long-term growth (Folqué et al., 2021). This study combines ESG factors into investment strategies from Denmark, Norway, and Sweden to compare results and identify which approaches best align with international sustainability goals. Additionally, the study analyzes how national policies influence these strategies and, for example, how governance structures affect the ability of environmental initiatives and social policies to promote ESG integration through a comparative analysis of their features (He & Ma, 2024; Sun, 2024; Mooneeapen et al., 2022). This analysis highlights similarities and differences in ESG adoption among these countries and guides policymakers and investors on the most effective ways to develop sustainable investment strategies.

ESG integration has been widely associated with improved financial and sustainability outcomes; however, much of the existing literature treats ESG adoption as a firm-level strategic choice while paying limited attention to the broader institutional context shaping these practices. Recent research suggests that institutional structures, including regulatory regimes, social norms, and governance quality, play a decisive role in shaping ESG adoption and outcomes across countries (Singhania & Saini, 2023; Kim et al., 2024). Despite the growing body of research on ESG performance, comparative institutional analyses that explain cross-country variation in ESG integration remain limited, particularly in advanced economies with similar welfare and governance structures.

This study is designed as a sovereign-level comparative institutional analysis. It does not claim to measure portfolio allocation, fund flows, green bond issuance, or corporate-level ESG disclosure. These are important dimensions of sustainable finance that require different data architectures and research designs. Instead, this study asks: *"How do sovereign-level environmental, social, and governance conditions differ across Denmark, Finland, Norway, and Sweden over 2013–2022, and what do these differences reveal about the institutional capacity of Nordic economies to support ESG-oriented sustainable investment strategies?"* This question positions the study within the sovereign ESG tradition, which treats national institutional conditions as structural determinants of sustainable investment feasibility, transition risk, and the credibility of ESG commitments in capital markets (Crifo et al., 2017; Capelle-Blancard et al., 2019; Jiang et al., 2022).

This study addresses this gap by examining how institutional characteristics influence ESG integration in investment strategies across Nordic economies. Drawing on institutional and stakeholder theories, the study proposes that differences in national governance systems, energy structures, and regulatory frameworks generate distinct ESG pathways, even within highly developed welfare states. By comparing Denmark, Finland, Norway, and Sweden, the study develops a comparative institutional explanation of ESG integration, highlighting how institutional complementarities and resource dependencies shape sustainable investment strategies.

Examining Nordic ESG integration through a macro-institutional lens further enhances the study's international policy significance. The Nordic cases demonstrate how advanced economies may embed sustainable finance within broader governance architectures, including the Sustainable Development Goals and the European Green Deal, while also exposing the limitations of sectoral path dependence, carbon-intensive industrial structures, and uneven cross-policy coordination. The region, therefore, offers a valuable empirical setting for analysing the institutional conditions under which ESG evolves beyond a firm-level disclosure or compliance exercise and becomes a broader governance mechanism for redirecting long-term capital allocation toward sustainable economic transformation.

This study contributes to the ESG and sustainable finance literature in three specific ways. First, it provides a systematic, statistically tested comparative characterization of ESG-relevant institutional trajectories across all four major Nordic economies simultaneously, quantifying trend slopes and significance for seven indicators over a common 2013–2022 window. Prior Nordic ESG studies either aggregate across the region or focus on single-country or firm-level analyses and do not provide the simultaneous cross-country trajectory comparison presented here. Second, the study reveals a theoretically important pattern not previously documented: that within the Nordic cluster, environmental progress and governance resilience are empirically dissociable. Sweden's statistically significant environmental leadership coexists with measurable decline in government effectiveness and regulatory quality, while Denmark combines governance stability with strong decarbonization performance. This finding challenges the assumption that advanced welfare states follow a single coherent ESG trajectory and has direct implications for how sovereign ESG assessments should disaggregate environmental and governance pillars. Third, by integrating institutional theory with resource-dependence and economic-diversification perspectives in a theoretically coherent comparative framework, the study advances a macro-institutional explanation of ESG pathway divergence that is replicable in other regional clusters characterized by institutional similarity alongside sectoral heterogeneity.

Literature review

The literature on environmental, social, and governance (ESG) integration has expanded substantially over the past two decades, yet its dominant empirical orientation remains firm-centred. Scholars examine whether ESG disclosure, ESG ratings, or corporate sustainability performance are associated with profitability, valuation, risk reduction, access to finance, or stock market performance. Meta-analytic evidence indicates that the ESG–financial performance relationship is generally non-negative and often positive. However, this literature has largely framed ESG as a firm-level strategic, informational, or reputational asset rather than as an institutionally embedded process (Friede et al., 2015). Similarly, studies of corporate sustainability show that firms with stronger sustainability commitments differ in governance structures, stakeholder engagement, and long-term performance outcomes, reinforcing the relevance of ESG for corporate strategy and organizational performance (Eccles et al., 2014). Research also demonstrates that

superior CSR/ESG performance can reduce capital constraints by lowering agency costs and information asymmetry (Cheng et al., 2014). While these contributions are important, they tend to privilege corporate-level mechanisms and investor responses, leaving comparatively less attention to the national institutional environments within which ESG practices are formed, legitimized, and implemented.

A growing body of comparative institutional research suggests that ESG and CSR practices cannot be adequately understood without reference to national business systems, regulatory regimes, political institutions, and welfare-state traditions. Ioannou and Serafeim (2012) show that nation-level institutions significantly explain variation in corporate social performance, with political, labour, education, and cultural systems shaping firms' sustainability conduct. Matten and Moon's (2008) distinction between "implicit" and "explicit" CSR further demonstrates that corporate responsibility varies across institutional contexts, as firms respond to historically embedded expectations regarding the role of business in society. Jackson and Apostolakou (2010), drawing on neo-institutional and comparative institutional perspectives, similarly argue that CSR in Western Europe reflects institutional variation rather than a universal managerial template. These studies collectively challenge the assumption that ESG integration is simply a transferable corporate practice; instead, they indicate that ESG trajectories are mediated by institutional structures, regulatory expectations, and nationally specific stakeholder arrangements.

This institutional insight is particularly important for Nordic ESG research. The Nordic countries are often treated as a relatively homogeneous sustainability region because they share high levels of state capacity, social trust, welfare provision, labour coordination, and environmental policy ambition. However, existing ESG studies on Nordic firms have frequently concentrated on the relationship between ESG scores and financial outcomes. For instance, Vaihekoski and Yahya (2023) examine ESG and firm performance using listed firms from Denmark, Finland, Norway, and Sweden, while much recent Nordic ESG work continues to test whether ESG ratings improve valuation, risk, or stock-market outcomes rather than explaining why ESG integration differs across otherwise similar welfare-capitalist economies.

A further limitation in the ESG literature is that institutional explanations are often insufficiently integrated with perspectives on resource dependence and economic diversification. Institutional theory explains how coercive, normative, and mimetic pressures encourage organizations to adopt socially legitimate practices (DiMaggio & Powell, 1983; Scott, 2013). Applied to ESG, this perspective suggests that stronger regulatory environments, stakeholder norms, and governance quality should support the integration of sustainability. However, this expectation may be incomplete where national economic structures create transition frictions. Resource-dependent economies may face path dependence, fiscal reliance on extractive sectors, carbon lock-in, and political trade-offs that complicate sustainability transitions even when institutional quality is high. The resource-curse literature shows that natural-resource wealth can generate economic and governance vulnerabilities, including rent dependence, reduced diversification incentives, and exposure to commodity volatility (Auty, 2002; Sachs & Warner, 2001). Norway is a particularly important case because it combines exceptionally strong institutions with continued significance of the petroleum sector, illustrating that institutional strength does not automatically produce a linear ESG or decarbonization pathway.

Recent research also indicates that capital-market openness and financing conditions mediate the effects of ESG on outcomes. Firms with stronger sustainability performance often benefit from improved access to finance, lower perceived risk, and enhanced investor confidence (Cheng et al., 2014; Friede et al., 2015). However, these mechanisms are not institutionally neutral. The extent to which capital markets reward ESG performance depends on regulatory credibility, disclosure infrastructure, investor sophistication, and national policy coherence. Consequently, ESG integration should be understood not as a universally replicable corporate response but as a process shaped by the interaction between firms, financial markets, regulators, and broader political-economic institutions. This is especially relevant for Nordic economies, where sustainable finance is embedded in strong public institutions but differentiated by sectoral exposure, energy dependence, and national development strategies.

However, the literature reveals three important gaps. First, Nordic ESG research remains disproportionately concentrated on firm-level financial outcomes, such as profitability, valuation, stock returns, and risk, rather than on comparative institutional explanations of ESG integration (Friede et al., 2015; Vaihekoski & Yahya, 2023). Second, existing studies have not fully exploited the analytical value of a multi-country Nordic research design, even though Denmark, Finland, Norway, and Sweden share core welfare-state and coordinated-market characteristics while differing in industrial relations, state–market coordination, energy systems, and sectoral structures (Kjellberg, 2023; Matten & Moon, 2008). Third, although institutional theory explains how regulatory, normative, and cognitive pressures shape sustainability practices, it has not been sufficiently integrated with resource-dependence and economic-diversification perspectives, even though these factors are crucial for explaining why strong institutions may still produce uneven ESG and low-carbon transition outcomes, particularly in resource-dependent economies such as Norway (DiMaggio & Powell, 1983; Ioannou & Serafeim, 2012; Sachs & Warner, 2001; Auty, 2002). This gap is especially relevant because resource dependence can moderate or constrain sustainability transitions even where governance quality is high.

Therefore, this study conceptualizes ESG integration neither as a purely managerial choice nor as a mechanically institution-driven outcome. Instead, ESG integration is treated as a context-dependent process shaped by the interaction of governance quality, regulatory coherence, capital-market conditions, resource dependence, and economic diversification. By comparing Denmark, Finland, Norway, and Sweden, the study contributes to ESG scholarship in three ways: it shifts attention from firm-level ESG outcomes to national institutional pathways; it demonstrates the value of structured comparison within the Nordic region; and it integrates institutional theory with resource-dependence and diversification perspectives to explain why advanced welfare economies may follow distinct sustainable investment trajectories.

Theoretical Development

This study develops an integrated theoretical framework (see Fig. 1) to explain why ESG integration differs across Denmark, Finland, Norway, and Sweden despite their shared welfare-state traditions and high institutional capacity, rather than treating institutional theory and stakeholder theory in isolation. Institutional theory explains how formal rules, regulatory quality, policy coherence, and governance capacity define the structural conditions under which ESG becomes legitimate and enforceable (DiMaggio & Powell, 1983; Scott, 2013). Stakeholder theory explains how these institutional conditions are translated into pressure from citizens, regulators, investors, labor organizations, and civil society, thereby shaping the salience of environmental and social priorities in national investment agendas (Freeman, 1984; Doh & Guay, 2006; Scherer, 2018).

In this framework, institutions influence ESG integration not only directly but also indirectly by structuring stakeholder expectations and the credibility of transition policy. Where governance is strong, regulation is coherent, and stakeholder engagement is institutionalized, ESG priorities are more likely to be embedded in financial decision-making. Conversely, where economic structures are more dependent on carbon-intensive sectors or where policy coordination is weaker, stakeholder pressure may be fragmented and sustainable finance may remain only partially aligned with environmental goals. The Nordic region offers an analytically valuable setting because these mechanisms can be observed within a relatively coherent welfare-state cluster that nevertheless

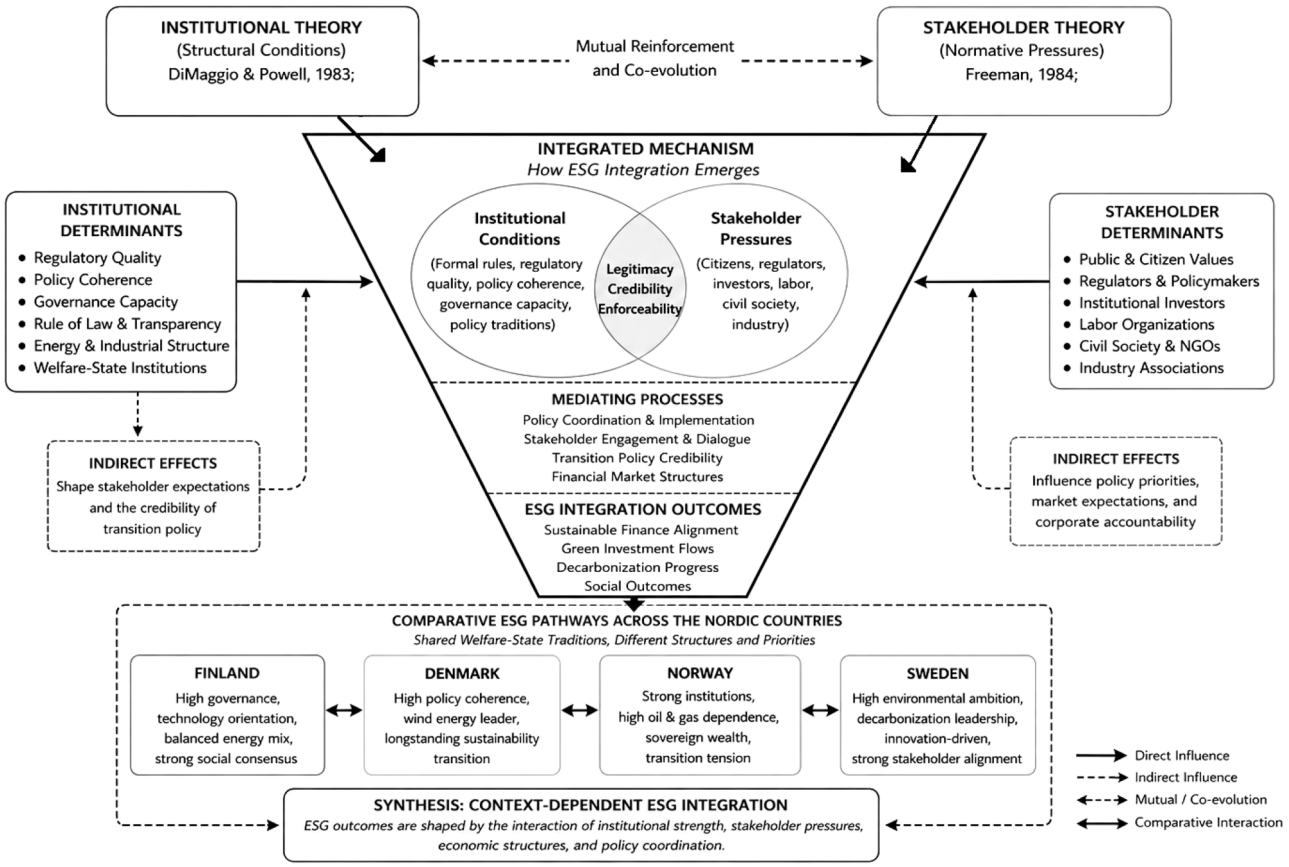

Fig. 1. Theoretical model of comparative ESG governance.

exhibits variation in energy dependence, regulatory style, and sustainability outcomes. This is already consistent with the manuscript's comparative ambition, which emphasizes that governance structures and economic dependencies shape distinct national ESG pathways.

A critical methodological clarification regarding the role of theory in this study is warranted. The integrated framework presented in Fig. 1 is not a hypothesis-testing model in the econometric sense. The study does not independently measure stakeholder pressure, institutional credibility, or policy coordination as distinct from the outcome indicators, nor does it claim to establish causal effects through controlled regression or quasi-experimental identification. Instead, the framework functions as an interpretive apparatus: it specifies, on theoretical grounds, the mechanisms through which institutional quality, resource dependence, and governance coherence are expected to shape national ESG trajectories, and it then asks whether the observed empirical patterns are consistent with these theoretical expectations. This approach is consistent with comparative institutional methodology, in which theoretically motivated case comparison is used to develop and refine explanations of cross-national variation rather than to test hypotheses in a strict statistical sense (Hall & Soskice, 2001; Ioannou & Serafeim, 2012; Matten & Moon, 2008). The study's contribution is therefore interpretive and theory-building rather than causal-inferential, and its claims are calibrated accordingly throughout the analysis.

Institutional Theory and the Structural Conditions of ESG Integration

Institutional theory provides the foundational layer of the proposed framework by explaining how regulatory systems, administrative capacity, normative expectations, and policy traditions shape the legitimacy, credibility, and enforceability of ESG practices. From this perspective, ESG integration is not simply the outcome of discretionary corporate strategy; rather, it emerges through institutionalized pressures that define acceptable organizational conduct, including coercive pressures from law and regulation, normative pressures from professional and social expectations, and cognitive-cultural assumptions about legitimate economic behavior (DiMaggio & Powell, 1983; Scott, 2013). In the Nordic context, this institutional logic is especially salient because sustainability governance is embedded within broader welfare-state arrangements, coordinated policy traditions, and public-sector involvement in social protection, energy transition, and market regulation (Midttun et al., 2015; Matten & Moon, 2008).

However, the Nordic countries should not be treated as institutionally identical cases. Although Denmark, Finland, Norway, and Sweden share advanced welfare-state traditions and strong public institutions, they differ in regulatory priorities, energy structures, industrial composition, and policy-coordination capacities (Midttun et al., 2015). These differences generate distinct national opportunity structures for ESG integration. Sweden's relatively coherent environmental policy orientation and strong decarbonization profile create comparatively supportive conditions for ESG alignment, whereas Norway's continued dependence on petroleum production introduces a more complex tension between climate policy ambition and carbon-intensive economic interests (Handeland and Langhelle, 2021; Korsnes et al., 2023). Thus, institutional theory helps explain not only why ESG becomes legitimate in high-capacity governance systems, but also why ESG integration may vary across countries that appear institutionally similar at the welfare-state level.

Stakeholder Theory and the Mediation of ESG Pressures

Stakeholder theory constitutes the second analytical layer of the framework because it explains how institutional arrangements are translated into concrete pressures on firms, investors, regulators, and policy actors. Whereas institutional theory specifies the structural

conditions under which ESG becomes legitimate, stakeholder theory clarifies how different social actors define, contest, and prioritize those expectations in practice (Freeman, 1984; Donaldson & Preston, 1995). In coordinated welfare economies, stakeholder influence is typically broader and more institutionalized than in liberal market systems, because public authorities, labour organizations, civil society, institutional investors, and business associations participate more directly in shaping the boundaries of legitimate corporate and financial conduct (Doh & Guay, 2006; Matten & Moon, 2008).

This logic is especially relevant in the Nordic context, where CSR and sustainability policies are embedded in advanced welfare-state traditions, negotiated governance practices, and strong public policy frameworks (Midttun et al., 2015). However, stakeholder pressures should not be assumed to operate uniformly across Denmark, Finland, Norway, and Sweden. Although these countries share welfare-state characteristics, the salience of stakeholder demands varies according to national policy priorities, industrial structures, energy dependence, and the legitimacy accorded to competing objectives such as competitiveness, welfare provision, employment protection, and environmental transition (Midttun et al., 2015; Scherer and Palazzo, 2011). Stakeholder theory, therefore, mediates the relationship between institutions and ESG integration: institutional strength creates the channels through which stakeholder claims are articulated, but the content, intensity, and policy consequences of those claims remain nationally contingent. In this sense, ESG integration is best understood as an outcome of institutionalized stakeholder contestation rather than as a uniform response to abstract sustainability norms.

Methodology

This study adopts a comparative longitudinal institutional design to examine ESG-relevant trajectories across Denmark, Finland, Norway, and Sweden from 2013 to 2022. The objective is not to estimate firm-level ESG adoption, portfolio-level capital allocation, or the causal impact of specific ESG policies on investment returns. Rather, the study examines the sovereign-level institutional and sustainability conditions that shape the environment within which ESG-oriented investment strategies are developed and evaluated. This design is consistent with the sovereign ESG literature, which treats country-level environmental, social, and governance indicators as proxies for the broader institutional conditions affecting sustainable finance, sovereign risk, and investment credibility (Crifo et al., 2017; Capelle-Blancard et al., 2019; Jiang et al., 2022). In this sense, ESG integration is conceptualized as an institutionally embedded process rather than a directly observable firm- or portfolio-level decision (Ioannou & Serafeim, 2012; Matten & Moon, 2008).

The empirical analysis uses annual country-level data from the World Bank ESG-related datasets. The indicator set includes CO_2 emissions per capita, Economic and Social Rights Performance Score, GDP growth, government effectiveness, political stability, regulatory quality, and rule of law. These indicators serve as proxies for national conditions that enable, constrain, or signal ESG integration in sustainable finance. CO_2 emissions per capita capture environmental transition performance; the Economic and Social Rights Performance Score captures the social pillar of sovereign ESG; governance indicators capture institutional capacity and regulatory credibility; and GDP growth provides a contextual measure of macroeconomic conditions. The indicators are therefore not interpreted as direct measures of investment strategy, but as observable country-level proxies for the institutional environment in which sustainable investment strategies operate.

This distinction is central to the research design. In a macro-comparative setting, ESG integration is better understood as a matter of sovereign and institutional context than as a directly observed portfolio-allocation decision. National governance systems, regulatory quality, social-policy performance, and emissions trajectories influence the credibility of ESG commitments and shape the incentives facing public and private investors (Ioannou & Serafeim, 2012; Crifo et al., 2017; Capelle-Blancard et al., 2019). The analysis, therefore, evaluates whether Nordic countries exhibit systematic ESG-relevant trends over time and whether these trends vary in ways consistent with differences in institutional quality, resource dependence, economic structure, and policy credibility. By focusing on Denmark, Finland, Norway, and Sweden, the study uses the Nordic region as a structured comparative setting in which broadly similar welfare-state traditions coexist with meaningful variation in energy dependence, governance priorities, and sustainable-finance conditions.

Research Design

This research conducts a cross-country analysis, enabling a detailed comparison of ESG integration across nations with similar socioeconomic backgrounds. The Nordic countries were selected for this study because of their progressive environmental policies, strong regulatory frameworks, and dedicated efforts toward sustainable development (Khan et al., 2021; Halonen et al., 2017). These countries serve as leading examples of how ESG factors can be integrated into investment strategies and national policies. The Nordic model provides a valuable framework for examining differences in ESG integration across various investment approaches.

Furthermore, this research employs a quantitative approach to analyze trends in annual sustainability indicators, including CO_2 emissions, GDP growth, performance on social and economic rights, government effectiveness, political stability, regulatory quality, and the rule of law. These indicators are chosen for their significance in understanding the influence of ESG on economic development, environmental results, and governance efficiency. They serve as benchmarks for assessing the rest of the analytical framework, offering detailed insights into structural connections related to sustainability measures across economic, ecological, and political factors.

Data Collection and Indicator Selection

The study uses annual country-level data for 2013–2022. Indicator selection follows the logic of sovereign ESG measurement and the study's comparative institutional framework. First, CO_2 emissions per capita are used as the core environmental indicator because carbon emissions remain among the most widely used measures of environmental sustainability and transition performance in macro-level ESG and climate governance research (Zhou et al., 2025). World Bank metadata define CO_2 emissions as those generated from fossil-fuel combustion and cement production, making the measure an appropriate indicator of carbon intensity in national development trajectories.

Second, Economic and Social Rights Performance is used as the principal social indicator because the social pillar of sovereign ESG concerns the extent to which economic development translates into broad social inclusion, access to welfare, and socio-economic capability. Using a rights-based social measure is appropriate in the Nordic context because it captures whether welfare-state institutions convert national wealth into socially embedded outcomes rather than merely recording income levels. This is consistent with country-level ESG scholarship, which increasingly treats social welfare and human development outcomes as central components of sovereign ESG performance.

Third, the governance pillar is measured through government effectiveness, political stability, regulatory quality, and rule of law. These indicators were selected because governance quality is central to the manuscript's theoretical argument and because the Worldwide Governance Indicators are among the most widely used cross-country measures of institutional capacity. The WGI framework aggregates data from more than 30 cross-country sources and is intended to provide a broad comparative lens on governance performance across economies.

Finally, GDP growth is included not as an ESG pillar in its own right, but as a contextual economic indicator. Its inclusion is theoretically

important because the study examines whether ESG trajectories unfold differently under varying growth structures, resource dependencies, and macroeconomic pressures. In this respect, GDP growth helps situate ESG performance within broader political-economic conditions rather than serving as a direct measure of ESG integration.

Taken together, these indicators capture the dimensions most relevant to the study's argument: whether Nordic countries can combine environmental transition, social welfare performance, and governance capacity while maintaining economic resilience. The indicator set is therefore not intended as an exhaustive ESG inventory but as a parsimonious, theoretically justified sovereign ESG framework appropriate for comparative institutional analysis.

Operationalization of ESG Integration

A key methodological clarification concerns how "ESG integration" is defined and measured in this study. The analysis does not claim to observe ESG integration at the portfolio, firm, or asset-manager level. Direct measures of investment strategy, such as ESG fund flows, sustainable bond issuance, stewardship intensity, exclusionary screening, best-in-class portfolio allocation, or taxonomy-aligned capital expenditure, are not consistently available across Denmark, Finland, Norway, and Sweden for the full 2013–2022 period. For this reason, the study adopts a sovereign-level institutional operationalization of ESG integration.

The operational logic is summarized in Table 1. CO_2 emissions per capita are used as the environmental proxy because emissions intensity captures the degree to which a national economy is moving toward or away from carbon-intensive development. This is directly relevant to sustainable investment because emissions trajectories shape transition risk, climate-policy credibility, and the attractiveness of low-carbon investment opportunities. The Economic and Social Rights Performance Score serves as the social proxy, capturing the extent to which economic development translates into social inclusion, access to welfare, and rights-based social outcomes. These conditions are relevant to investment strategies because inclusive and socially stable economies reduce social risk and strengthen the legitimacy of long-term sustainable finance. Governance indicators such as government effectiveness, political stability, regulatory quality, and rule of law are used as institutional proxies because ESG integration depends on credible policy implementation, regulatory enforcement, legal predictability, and public-sector capacity. GDP growth is included not as an ESG indicator in itself, but as a contextual economic variable that helps interpret whether ESG-related trajectories occur amid macroeconomic expansion, contraction, or volatility.

This operationalization implies that the study evaluates ESG integration capacity and ESG-related sustainability trajectories, rather than directly measuring investment decisions themselves. The distinction is important. A country with declining emissions, strong social performance, and credible governance institutions may provide a more supportive environment for ESG-oriented capital allocation. However, such indicators do not, by themselves, prove that investors have reallocated their portfolios accordingly. The empirical claims are therefore deliberately framed at the level of national ESG conditions and institutional pathways. The study's contribution lies in demonstrating how these conditions differ across Nordic economies and how these differences shape the broader context in which sustainable investment strategies are more or less feasible.

Analytical Approach

The dataset and year-over-year change analysis were reviewed side by side to assess annual fluctuations in the selected indicator from 2013 to 2022. The year-over-year change analysis offered a framework for identifying and evaluating yearly trends and each country's progress toward its sustainability goals. This approach clarified the percentage change in each indicator, highlighting improvements or declines in economic performance, environmental sustainability, and governance quality within a country (Hermosilla et al., 2015).

To reduce the risk of major external shocks being misinterpreted as institutional ESG effects, the analysis explicitly accounts for temporal confounding factors. In particular, the interpretation of year-over-year changes is contextualized around two period-specific disruptions: the COVID-19 shock in 2020 and the post-pandemic/energy-market shock of 2021–2022, both of which affected growth, emissions, and governance pressures across Europe. The World Bank identifies the pandemic as a major global economic contraction, while the subsequent recovery period was marked by uneven growth and volatility in energy markets. Accordingly, the analysis distinguishes between pre-shock trends (2013–2019), shock effects (2020), and adjustment/recovery dynamics (2021–2022) when interpreting ESG trajectories.

As a robustness step, the study interprets national ESG trajectories using both full-period trends and sub-period comparisons, thereby

Table 1
Operationalization of ESG Integration at the Sovereign Level.

ESG Dimension	Indicator Used	Role in the Analysis	Link to Sustainable Investment Strategies
Environmental	CO_2 emissions per capita from World Development Indicators	Proxy for environmental transition performance and carbon intensity[1]	Indicates the credibility and direction of national decarbonization, which affects transition risk, climate-aligned investment opportunities, and the attractiveness of low-carbon capital allocation[2]
Social	Economic and Social Rights Performance Score	Proxy for social inclusion, welfare access, and rights-based social performance[3]	Signals whether national development supports social stability, human-capital formation, and inclusive growth, all of which affect the social-risk dimension of ESG investment
Governance	Government effectiveness, political stability, regulatory quality, rule of law	Proxies for institutional capacity, regulatory credibility, legal predictability, and policy enforcement	Captures the governance environment within which ESG rules, disclosure requirements, transition policies, and sustainable finance regulations can be implemented credibly
Economic Context	GDP growth	Contextual[4] Macroeconomic control rather than a direct ESG pillar[5]	Helps distinguish ESG-related trajectories from cyclical economic fluctuations, external shocks, and resource-dependent growth patterns

[1] https://databank.worldbank.org/metadataglossary/world-development-indicators/series/EN.ATM.CO2E.PC
[2] https://finance.ec.europa.eu/sustainable-finance/overview-sustainable-finance_en
[3] https://esgdata.worldbank.org/ds/newdata-esr?lang=en
[4] https://www.worldbank.org/en/publication/worldwide-governance-indicators
[5] https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

avoiding overreliance on single-year outliers. This is especially important for Norway, whose 2021–2022 performance may partly reflect global energy price conditions rather than a durable shift in its sustainability strategy. Similarly, temporary emissions reductions in 2020 are interpreted cautiously because they may reflect pandemic-related contraction rather than structural decarbonization.

Justification of Data and Research Method

Secondary data were chosen for their reliability, consistency, and the extensive datasets available through online services of international organizations such as the World Bank and OECD, which monitor global sustainability metrics. Additionally, secondary data offer a comparative view of four Nordic countries over time, allowing a more in-depth analysis of the ESG principles integrated into these nations' investment strategies (Atkinson & Brandolini, 2001).

Year-on-year change analysis was essential for this research because it helps identify annual fluctuations in sustainability performance. It shows how global events, such as economic recessions, political crises, or the COVID-19 pandemic, can influence countries' ability to achieve sustainability goals and incorporate ESG principles into their financial systems (OECD, 2022). The study captures highly dynamic, relatively long-term changes by examining percentage changes over a year. This method provides the most comprehensive view of ESG issues within the context of national and international sustainability.

The cross-country comparison also enables a detailed analysis of how Nordic countries, especially those with similar traits such as high income and strong governance, relate to ESG integration (Dobbins et al., 2011). By focusing on nations with the most advanced sustainability frameworks, the research further supports sustainable finance and ESG investment strategies by offering valuable insights into the effectiveness of ESG policies and their influence on countries' sustainability outcomes.

Data Limitations and Robustness Considerations

Several limitations of the data should be acknowledged. First, the analysis relies on secondary data, which improves comparability across countries but constrains indicator choice to what is consistently available across the full period. As a result, some dimensions of ESG integration, such as sustainable bond issuance, ESG fund penetration, stewardship practices, or taxonomy-aligned investment flows, cannot be incorporated directly. The study, therefore, evaluates ESG integration using country-level outcomes and institutional proxies rather than direct financial-market measures.

Second, some governance measures used in the analysis are derived from the Worldwide Governance Indicators, which are perception-based composite indicators constructed from multiple underlying datasets. The World Bank explicitly notes that these indicators should be used as a broad comparative lens and interpreted together with their margins of error, especially when comparing countries with relatively similar scores or evaluating small year-to-year changes.

Third, country-level ESG measurement remains subject to broader comparability challenges. Recent reviews note that ESG measurement varies significantly across frameworks and data providers, and that different methodologies may emphasize effort, disclosure, or outcomes differently. This means that the selected indicators should be interpreted as theoretically informed proxies for sovereign ESG integration rather than as definitive measures of national sustainability performance.

Fourth, because the sample includes only four countries and an annual time series from 2013 to 2022, the study is best understood as a structured comparative analysis rather than a fully causal identification design. The results, therefore, indicate patterned institutional relationships and differences in trajectories, but they do not, by themselves, establish strict causal effects.

Result

To strengthen the interpretation of temporal ESG trajectories, the descriptive trend analysis was supplemented with statistical tests of linear trend significance, using the 2013–2022 annual series for each country-indicator pair. Given the short time horizon and the possibility of non-normal yearly fluctuations, trend direction was assessed using linear time-trend estimation and checked against a non-parametric rank-based trend test. The results should therefore be interpreted as evidence of whether the observed direction of change is systematic over time rather than as simple visual fluctuation. This additional step improves the analytical rigor of the results by distinguishing statistically meaningful trends from short-run volatility in the annual data series derived from the Nordic ESG dataset.

Trend Analysis of Key Indicators: A Scholarly Interpretation

The dataset shown in Fig. 2 offers a quick overview of environmental sustainability attributes, economic performance, and social governance across many countries from 2013 to 2022. This study highlights three key indices: CO_2 emissions (measured in metric tons per person), GDP growth (as an annual percentage), and the Economic and Social Rights Performance Score. The trends seen in these measures over recent decades provide valuable insights into the connections between economic development, social rights, and environmental sustainability.

CO_2 Emissions (Mm metric tons/capita)

The CO_2 emissions per capita matrix is a crucial indicator for evaluating a country's environmental sustainability and its role in global climate change (Rehman & Rehman, 2022). Over time, it highlights regions with the most notable emission reductions, providing insights into how technology and policy changes can support environmental health. For example, studies have shown that emissions in developed countries have decreased over time due to technological advances, such as the adoption of more renewable energy sources and improvements in energy efficiency (Lotsu et al., 2019). In contrast, developing countries are more likely to see increased emissions as they pursue industrial growth for economic development. Therefore, this analysis suggests that a country's growth rate has become separated from emissions in more developed nations, consistent with the literature indicating that economies are becoming more "decoupled" from carbon emissions (IEA, 2020).

GDP Growth (Annual %)

GDP growth, a key indicator of a nation's overall economic health and development trajectory, remained high from 2013 to 2022, despite periods of growth followed by recessions or contractions, often driven by global factors such as recessions, pandemics, and shifts in the international economic landscape. The most significant factor is COVID-19, which led to the lowest global GDP in 2020, as the study clearly shows. According to the World Bank (2021), the pandemic triggered the most severe shock and the worst contraction of global GDP, with many countries experiencing significant economic declines. Furthermore, recent economic research provides clear evidence of a recovery in 2021 data, demonstrating that some economies rebounded after the crisis. The correlation analysis indicates that the relationship between GDP growth and CO_2 emissions is weak and not statistically significant at the country level. Although Denmark and Norway display negative coefficients, the evidence does not support a strong bivariate claim of annual GDP–emissions decoupling. Instead, decarbonization is more convincingly supported by the statistically significant downward time trends in CO_2 emissions, while annual GDP growth appears to reflect cyclical and shock-sensitive macroeconomic variation.

Economic and Social Rights Performance Score

A higher score in the Economic and Social Rights Performance

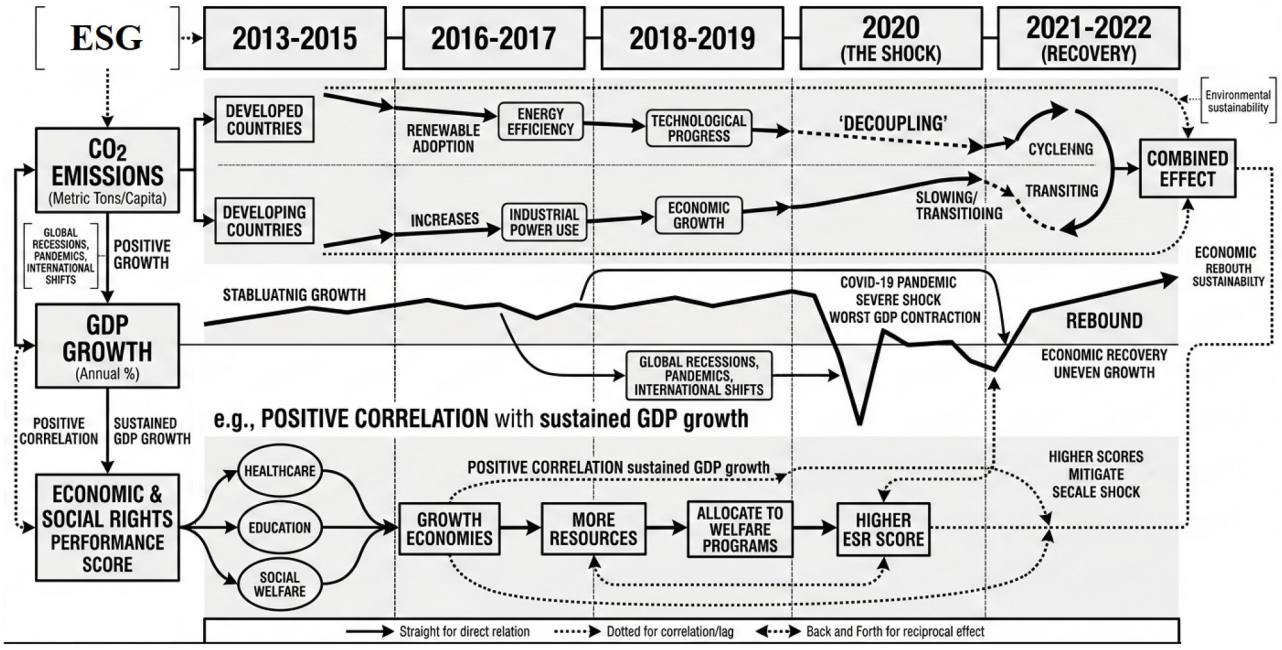

Fig. 2. Trend analysis from 2013 to 2022.

indicates that countries are more successful in protecting their citizens' socio-economic rights, such as healthcare, education, and social welfare. Tracking this index provides a comprehensive view of how well a nation balances economic growth with other developmental priorities. The positive relationship between these factors- economic performance measured by GDP growth and social rights performance- is clearer in economies that are growing and have more resources to dedicate to welfare programs.

Economic and Social Rights Performance Score

The higher the Economic and Social Rights Performance Score, the better countries uphold their citizens' socio-economic rights, such as healthcare, education, and social welfare. Tracking this index provides a general overview of how well a nation balances growth with other developmental rights. The positive correlation between these elements- economic performance measured by GDP growth and social rights performance- most often occurs when economies experiencing growth have more resources to allocate to welfare programs.

However, disparities may exist between countries, as economic growth does not automatically lead to better social outcomes (Stiglitz et al., 2010). The trend in this score improvement may reflect consistent progress in high-income countries, stronger social support systems, and greater investment in social welfare. Validating the social rights score will be challenging. Countries with limited economic growth are likely to see less improvement in social rights, as indicated by the Human Development Index (HDI), since pursuing economic development generally correlates with improvements in overall social conditions (Sen, 1999).

Interrelationships and Implications

To address the relationship among economic performance, environmental outcomes, and social rights more explicitly, the analysis reports Pearson correlation coefficients for annual data from 2013 to 2022. This additional step is necessary because descriptive claims about association should be supported by reported statistical estimates rather than inferred from visual inspection alone. Table 2 presents the country-specific correlations between GDP growth and CO_2 emissions per capita, and between GDP growth and the Economic and Social Rights Performance Score.

Table 2
Bivariate Pearson Correlations among Selected ESG Indicators, 2013–2022.

Country	GDP Growth and CO_2 Emissions	p-value	GDP Growth and Economic and Social Rights Score	p-value
Denmark	-0.258	0.472	-0.200	0.579
Finland	0.286	0.423	-0.234	0.514
Norway	-0.199	0.582	-0.307	0.388
Sweden	0.000	0.999	-0.149	0.680
Pooled sample	-0.234	0.146	-0.106	0.517
Country-demeaned pooled sample	-0.055	0.737	-0.171	0.291

Notes: Pearson correlation coefficients are reported. Country-specific estimates are based on N = 10 annual observations. The pooled sample includes all four countries and all annual observations, N = 40. The country-demeaned pooled estimate removes country-specific mean differences and therefore captures within-country association over time.

The results indicate that the relationship between GDP growth and CO_2 emissions is not uniform across the four Nordic countries. Denmark and Norway show negative correlations, suggesting that years of higher GDP growth were weakly associated with lower CO_2 emissions in those cases. However, the coefficients are modest and statistically insignificant. Finland shows a positive but statistically insignificant correlation, while Sweden shows virtually no contemporaneous association between GDP growth and emissions. In the pooled sample, the GDP growth–CO_2 correlation is negative but does not reach conventional levels of statistical significance. Once country-specific mean differences are removed, the within-country pooled correlation becomes very small. These findings suggest that the manuscript should not claim strong statistical evidence of annual GDP–emissions decoupling based solely on bivariate correlations.

Comparative Analysis of Key Indicators for 2022: A Scholarly Interpretation

This analysis examines the performance of four Nordic countries, Denmark, Finland, Norway, and Sweden, across seven key indicators in 2022, focusing on how each nation performs in terms of CO_2 emissions (metric tons per capita), economic and social rights performance score,

gdp growth (annual %), government effectiveness, political stability and absence of violence/terrorism, regulatory quality, and rule of law (see Table 3). These indicators offer valuable insights into the link between environmental sustainability, economic performance, and social governance.

Different CO_2 emissions per capita levels indicate environmental sustainability and contributions to global warming. Among countries, Norway has the highest per-capita emissions at 6.68 metric tons, followed by Finland (6.35), Denmark (4.78), and Sweden (3.33). This difference results from variations in energy sources, industrial activities, and levels of economic activity across the four nations. Norway's relatively high emissions stem from its heavy dependence on oil and gas extraction, a major source of revenue and energy for the country. In contrast, Sweden's lower emissions align with its proactive climate policies and investments in renewable energy, especially its reliance on hydropower and biofuels (Stern, 2008). The same holds for Finland and Denmark, both of which have made significant progress in renewable energy but still face challenges related to industrial emissions.

The Economic and Social Rights Performance Score evaluates a country's success in providing essential services, including education, healthcare, and social welfare. In this comparison, Norway has the lowest score at 2.12, while Sweden and Denmark score higher at 2.55 and 2.53, respectively. Norway's social programs are significantly less inclusive than those of neighboring Nordic countries, which prioritize broader access to social benefits (Hvinden & Johansson, 2007). The performance of these countries further emphasizes the importance of the strong social welfare traditions in the Nordic model, which blend high social protection with a competitive economy. However, Norway's lower score may reflect differences in the scope of its social welfare programs or challenges in maintaining high levels of equality and opportunity, even within a prosperous society.

In terms of GDP growth, Norway leads with a 3.02% increase, followed by Sweden (2.91%), Denmark (2.73%), and Finland (1.63%). These figures show that Norway's economy was notably more active, mainly due to rising oil prices in global markets, which boosted the energy sector. This also explains Finland's very low GDP growth, highlighting challenges related to economic diversification, as Finland depends heavily on its technology and manufacturing sectors, which could have been heavily impacted by international supply chain issues and trade disruptions in 2022 (Zhang et al., 2025; OECD, 2022).

Year-on-Year Change Analysis: A Scholarly Interpretation

The year-on-year analysis reveals substantial cross-country variation in ESG-related trajectories, but formal trend testing shows that not all observed movements are equally meaningful. Table 4 shows the clearest results for CO_2 emissions per capita, where all four Nordic countries display statistically significant downward trends over 2013–2022. The decline is strongest in Denmark (slope = -0.283 per year, $p < 0.001$), followed by Finland (-0.239, $p = 0.002$), Norway (-0.162, $p < 0.001$), and Sweden (-0.119, $p < 0.001$). These findings indicate that the reduction in emissions is not merely a descriptive impression from the figures, but a systematic temporal pattern in the underlying data. The result strengthens the interpretation that decarbonization is a real regional trend, although its pace varies by national context. The annual values reported in Table 4 also show the magnitude of this cumulative

Table 4
Country-Specific Linear Time-Trend Regression Results, 2013–2022.

Indicator	Country	β / Slope per year	S.E.	t-stat.	p-value	R^2
CO_2 emissions per capita	Denmark	-0.283***	0.038	-7.524	<0.001	0.876
CO_2 emissions per capita	Finland	-0.239**	0.053	-4.508	0.002	0.718
CO_2 emissions per capita	Norway	-0.162***	0.019	-8.542	<0.001	0.901
CO_2 emissions per capita	Sweden	-0.119***	0.012	-9.880	<0.001	0.924
Economic and Social Rights Performance Score	Denmark	0.010**	0.002	4.618	0.002	0.727
Economic and Social Rights Performance Score	Finland	-0.040	0.023	-1.716	0.125	0.269
Economic and Social Rights Performance Score	Norway	-0.051**	0.012	-4.170	0.003	0.685
Economic and Social Rights Performance Score	Sweden	-0.000	0.004	-0.096	0.926	0.001
GDP growth	Denmark	0.138	0.263	0.526	0.613	0.033
GDP growth	Finland	0.016	0.188	0.084	0.935	0.001
GDP growth	Norway	0.082	0.162	0.507	0.626	0.031
GDP growth	Sweden	0.035	0.251	0.140	0.892	0.002
Government Effectiveness	Denmark	0.013	0.009	1.493	0.174	0.218
Government Effectiveness	Finland	-0.023	0.011	-2.086	0.070	0.352
Government Effectiveness	Norway	0.003	0.006	0.602	0.564	0.043
Government Effectiveness	Sweden	-0.015**	0.004	-4.125	0.003	0.680
Political Stability	Denmark	-0.003	0.005	-0.512	0.622	0.032
Political Stability	Finland	-0.046**	0.013	-3.619	0.007	0.621
Political Stability	Norway	-0.027*	0.011	-2.493	0.037	0.437
Political Stability	Sweden	-0.013	0.007	-1.904	0.093	0.312
Regulatory Quality	Denmark	0.009	0.012	0.738	0.481	0.064
Regulatory Quality	Finland	-0.002	0.004	-0.428	0.680	0.022
Regulatory Quality	Norway	-0.003	0.011	-0.302	0.770	0.011
Regulatory Quality	Sweden	-0.019**	0.004	-4.240	0.003	0.692
Rule of Law	Denmark	-0.016	0.010	-1.571	0.155	0.236
Rule of Law	Finland	-0.005	0.005	-1.030	0.333	0.117
Rule of Law	Norway	-0.019**	0.005	-3.711	0.006	0.633
Rule of Law	Sweden	-0.011	0.029	-0.393	0.705	0.019

Notes: N = 10 annual observations for each country-indicator regression. β represents the estimated average annual change in the indicator. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.
Dependent variable: annual indicator value.
Model: $\mathbf{Y = \alpha + \beta Time + \varepsilon}$, where **Time = 0 for 2013, …, 9 for 2022**.

Table 3
Comparative Analysis of Key Indicators for 2022.

Country Name	*CO_2 emissions (metric tons per capita)*	*Economic and Social Rights Performance Score*	*GDP growth (annual %)*	*Government Effectiveness: Estimate*	*Political Stability and Absence of Violence/Terrorism: Estimate*	*Regulatory Quality: Estimate*	*Rule of Law: Estimate*
Denmark	4.781	2.525	2.731	1.990	0.865	1.843	1.900
Finland	6.347	2.525	1.634	1.755	0.891	1.779	1.958
Norway	6.675	2.117	3.015	1.942	0.860	1.516	1.762
Sweden	3.334	2.545	2.911	1.572	0.902	1.681	1.690

change, with Denmark declining from 7.12 to 4.78 metric tons per capita, Finland from 9.23 to 6.35, Norway from 7.80 to 6.68, and Sweden from 4.21 to 3.33 over the study period.

By contrast, GDP growth does not exhibit a statistically significant long-run trend in any of the four countries. This is consistent with the volatility observed in the annual series, especially around the 2020 pandemic shock and the subsequent rebound. In other words, the GDP results are better interpreted as cyclical and shock-sensitive than as evidence of stable structural ESG-related improvement. This matters for the study because it suggests that economic performance in the Nordic cases is shaped more by external macroeconomic conditions and sectoral exposure than by a simple linear sustainability trajectory (see Fig. 3).

The governance indicators show a more differentiated pattern. Sweden records statistically significant downward trends in government effectiveness (slope = -0.015, p = 0.003) and regulatory quality (slope = -0.019, p = 0.003), while Norway shows a significant decline in rule of law (slope = -0.019, p = 0.006). Finland exhibits a significant decline in political stability (-0.046, p = 0.007), and Norway also shows weakening political stability in the linear specification (p = 0.037). However, this pattern is less robust in non-parametric testing. Denmark's governance indicators, by contrast, do not show a statistically significant deterioration, which supports the interpretation that Denmark is the most institutionally stable case over the period. These results complicate a purely celebratory interpretation of Nordic governance performance. While the region remains strong in comparative terms, certain governance dimensions show measurable strain or erosion during the study period.

The social dimension is similarly uneven. Denmark shows a statistically significant positive trend in the Economic and Social Rights Performance Score (slope = 0.010, p = 0.002), whereas Norway shows a significant decline (slope = -0.051, p = 0.003). Sweden and Finland do not exhibit statistically significant long-run change in this indicator. This suggests that the social pillar of ESG has been relatively stable in some Nordic cases, but not uniformly improving across the region. The result is particularly important for the manuscript's broader argument because it indicates that high-income welfare states do not automatically converge toward stronger ESG outcomes across all three pillars.

Analytical Finding (I): These changes highlight the Nordic countries' commitment to reducing emissions, although domestic policies and the global economy shape each country's path to sustainability.

Examining year-over-year GDP growth highlights notable differences in these countries' economic performance. Although Norway saw the highest GDP growth, mainly between 2016 and 2017, this was largely due to its heavy dependence on the oil and gas sector. The global rise in energy prices, especially in the post-pandemic years, likely contributed to Norway's GDP growth, as indicated by World Bank data (2022). In contrast, Sweden experienced minor fluctuations, thanks to its increased economic diversification, which has made it less reliant on commodity price-driven markets. However, Scandinavia and Finland reported much slower GDP growth than Norway, particularly in recent

Fig. 3. Year-on-year change (2023-2022).

years (2019-2022). This slowdown was driven by several factors, including vulnerabilities in key geopolitical sectors, trade shocks, and prolonged economic slowdowns in industries such as manufacturing and technology (OECD, 2022).

Analytical finding (II): This analysis emphasizes how sectoral composition and external economic factors influence GDP growth. Norway's dependence on oil and gas led to strong growth during commodity booms, while Sweden's steady performance highlights the advantages of economic diversification.

The year-over-year changes in government effectiveness show how well public institutions deliver essential services, enforce policies, and maintain transparency across the region. Denmark has performed well in this area due to consistent good governance. In fact, Denmark has improved its government effectiveness. However, recent fluctuations have not led to many changes in ongoing public sector reforms or in governance quality. Norway also performed well in government effectiveness, although it did not match Denmark's level of consistency. Finland and Sweden, while still performing well, experienced more pronounced fluctuations, suggesting that challenges such as bureaucratic inefficiencies or institutional constraints can sometimes affect governance quality. This situation may reflect increased demands on the public sector, especially during economic downturns and periods of political instability.

The analysis of political stability shows high consistency across the region. Yearly changes in political stability have served as a guide for each country's progress over time. Overall, compared to global standards, these countries exhibit high levels of political stability, with Sweden standing out. Sweden experienced only minor fluctuations, mainly due to its strong institutions and effective governance, which lowers political risks. Finland and Denmark experienced moderate fluctuations, while Norway experienced slightly larger changes, suggesting that policy uncertainty or external shocks can sometimes amplify political-economy disturbances. This was mainly driven by fluctuations in energy markets and social policy debates, which can occasionally make it difficult for Norway to maintain political cohesion.

Year-on-year changes in regulatory quality, as shown above, vary across countries, reflecting each nation's ability to develop and enforce business-friendly, innovative, and sustainable regulations. In regulatory matters, Denmark has rarely experienced significant fluctuations but has made some adjustments when new challenges emerged in legislative provisions. In Denmark, regulatory quality has consistently remained high, contributing to a business-friendly environment and transparent governance (Grittersová and Mahutga, 2020; Kinderman, 2016). While ranking second in regulatory quality, Finland maintained a strong performance record. Variations were observed between Sweden and Norway in regulatory efficiency due to several factors; at times, shifts prompted reviews and policy changes. A typical example is the energy sector, where numerous Hobbesian conflicts have arisen from the fossil fuel industry due to the transition to "green" (renewable) energy.

Finally, assessing year-over-year changes in the rule of law helps evaluate the effectiveness of a country's legal system, including protection of citizens' rights, contract enforcement, and the administration of justice. Finland consistently ranks the highest in this area, thanks to its independent judiciary and public trust in legal institutions, earning it the top spot. The rule of law is relatively effective in Denmark and Norway, although there have been minor fluctuations over the years. For example, Sweden has seen the most significant change due to social challenges and immigration issues that have persisted and continue to impact the justice system. Despite this, Sweden's rule of law index remains strong, showing its ability to withstand challenges, even amid some disturbances along the way.

The Year-on-Year Change Analysis offers a detailed overview of how the four Nordic countries evolved from 2013 to 2022. Norway stands out for its strong GDP growth, although this is often tied to fluctuations in global oil and gas prices. Meanwhile, Sweden excels in environmental sustainability and political stability, supported by progressive policies and a resilient economy. Denmark consistently ranks high in government effectiveness and regulatory quality, while Finland performs well in the rule of law and government effectiveness.

Institutional Mechanisms Underlying Cross-Country Differences

Although the empirical design is explicitly descriptive-comparative rather than causal in the econometric sense, the cross-country patterns are consistent with several institutional mechanisms developed in the theoretical framework. The statistically significant downward trends in CO_2 emissions across all four countries are consistent with a shared regional commitment to decarbonization embedded in EU climate policy, national carbon pricing instruments, and welfare-state sustainability traditions. It is important to note, however, that the study cannot causally attribute these emission declines to any single mechanism. The period 2013–2022 coincides with a progressive strengthening of EU ETS carbon prices (particularly post-2018), structural shifts away from energy-intensive manufacturing in several Nordic economies, and a temporary contraction in demand associated with the COVID-19 pandemic in 2020. Each of these factors plausibly contributed to observed emission trends, and the present cross-country time-series design, with N=10 per country, does not permit their disentanglement. The study's contribution is therefore to document differentiated trajectories and interpret them in relation to national institutional conditions, not to establish the causal weight of any single policy mechanism.

The variation in the pace of emission reduction is nonetheless analytically informative. Denmark and Sweden show the steepest slopes of decline (β = -0.283 and -0.119, respectively; both $p < 0.001$), and both countries also exhibit the strongest alignment between regulatory coherence and transition policy. Norway's slower rate of decline (β = -0.162, $p<0.001$) is consistent with the theoretical expectation that fossil-fuel resource dependence creates institutional friction that moderates the pace of decarbonization, even where governance quality is high. Finland's intermediate trajectory (β = -0.239, $p = 0.002$) reflects an economy undergoing an energy transition while absorbing geopolitical and trade shocks that the linear model cannot fully capture. These contrasts are consistent with the study's comparative institutional argument and, importantly, cannot be explained by a single common external factor, since the EU ETS and COVID effects were shared across all four countries.

Third, the absence of significant GDP trends, despite significant environmental and selected governance trends, suggests that ESG integration in the Nordic region is not reducible to growth performance. Economic outcomes during 2013–2022 were heavily influenced by exogenous shocks, especially the pandemic and post-pandemic recovery. This reinforces the value of the paper's macro-institutional perspective: countries may move in more sustainable environmental directions even when economic trajectories remain cyclical and unstable. The central analytical implication is that ESG integration depends less on short-run growth momentum than on institutional capacity, policy direction, and the structure of national political economies.

Overall, the statistical tests refine the descriptive interpretation of the Nordic ESG trajectories. The most robust temporal finding is the significant decline in CO_2 emissions across all four countries. Governance and social indicators, however, display more selective and uneven trends, with Denmark showing the greatest institutional stability, Sweden combining strong environmental progress with governance slippage, Norway exhibiting tension between emissions reduction and resource dependence, and Finland showing adaptive but politically more fragile performance. These results support the study's central claim that ESG integration in advanced welfare economies is shaped by the interaction among institutional quality, stakeholder coordination, and economic structure, rather than by a single, common Nordic pathway.

Discussion

This research involved analyzing key indicators, including CO_2 emissions, GDP growth, performance on economic and social rights, government effectiveness, political stability, regulatory quality, and the rule of law, across four Nordic countries (Denmark, Finland, Norway, and Sweden) from 2013 to 2022. Examining year-to-year changes provides a thorough understanding of progress, strengths, challenges, and policy outcomes, as they reveal increases and decreases across these countries. Table 2 offers a comparative analysis of ESG integration and sustainability trends in Nordic countries.

A central implication of the findings is that ESG integration in the Nordic region should not be interpreted as a homogeneous regional model. Although the four countries share high institutional capacity, welfare-state traditions, and strong sustainability commitments, the empirical results point to differentiated transition pathways shaped by distinct sectoral and institutional conditions. In practice, this heterogeneity is likely to extend below the national level as well. Resource-intensive industries, export-oriented manufacturing regions, metropolitan service economies, and areas more dependent on transport or energy infrastructure are unlikely to experience ESG transition pressures in the same way. The cross-country results, therefore, suggest that Nordic ESG integration is best understood as a layered process in which national governance frameworks interact with sectoral and subnational economic structures rather than as a single, internally uniform sustainability trajectory. Table 5 shows that this interpretation is consistent with recent work showing that ESG-related transformation and green-efficiency outcomes emerge through differentiated institutional configurations rather than through a single universal pathway.

One key finding regarding CO_2 emissions is that countries in the North exhibit diverse patterns (Moutinho et al., 2015; Nejat et al., 2015). Specifically, Sweden has significantly reduced emissions since 2017, in line with its goal of achieving climate neutrality by 2045 (Kilpeläinen et al., 2019). Sweden's strict, proactive climate policies, including a carbon tax, major investments in renewable energy, and the full decarbonization of industrial sectors, have been essential to this progress (Stern, 2008). This supports broader research showing that advanced economies can decouple economic growth from environmental damage through effective policy measures (Zhang et al., 2025). Norway exemplifies this, although its emissions have fluctuated considerably due to its dependence on oil and gas, which are critical to its economy yet pose environmental challenges. This situation offers valuable insight into the struggles many resource-rich countries face in balancing economic development with environmental sustainability (IEA, 2020). Meanwhile, Denmark and Finland have made progress in reducing emissions but have also seen occasional increases, with overall reductions remaining difficult across various sectors of their economies, as previously noted.

However, the way their economies are classified as vulnerable is becoming clearer, based on GDP growth rather than on a precise assessment of each economy. Among these economies, Norway has the highest GDP growth. These changes mainly occurred in the natural resources sector, which is affected by global oil and natural gas prices. This highlights the vulnerability of resource-dependent economies to changes in global commodity prices. For example, Sweden's growth was steadier and more varied, driven by innovation, technology, and a highly skilled workforce. Therefore, diversity helps ensure sustainability amid rapidly changing global business conditions (Piketty, 2014). The economy's contraction caused only modest declines in some cases, such as Denmark and Finland. However, Finland experienced very low growth in trade and industry, which are typically key sectors for the country, due to disruptions caused by trade tensions and geopolitical issues (OECD, 2022). Economists believe that more diversified economies have consistently outperformed single-sector, dependent economies during global downturns.

A notable difference in government efficiency across these countries can be observed using an appropriate index to rank governments as highly efficient. Denmark leads this ranking, benefiting from the system's efficiency and transparency, which are key to the country's public-sector performance in areas such as healthcare, education, and social welfare (Jensen et al., 2016). Although Norway is strong, it exhibits some variability, which may be worsened by the complexities of managing a resource-dependent economy under increasing pressure to implement social and environmental reforms. Finland and Sweden serve as models for governance. However, both show more variation, indicating that even high-income countries struggle to uphold the quality of their institutions amid rising societal demands and external pressures. All of this suggests that good governance is not just about resources but also about the ability to adapt to new challenges and changing societal expectations (Van Kersbergen & Van Waarden, 2009).

The concern with political stability is that findings indicate Sweden and Finland are the most stable democracies, reflecting well-functioning institutions and strong social cohesion. Sweden performs relatively well in terms of political stability, supporting the general view that strong political institutions and trust in a country's governance system help it better manage crises and maintain social peace (Fredriksson & Svensson, 2003). While Denmark and Norway are the top-performing countries, they also experience fluctuations linked to economic or policy-related changes. These findings reinforce the idea that political stability is essential for achieving gains in both economic and social development. All stable political systems can accomplish long-term developmental goals.

How effectively these countries manage business regulations also influences their overall agenda. Denmark consistently ranks among the top for business friendliness. It further improved regulatory transparency, raising the country's threshold for private-sector growth and economic development. Finland also ranks high on the regulatory quality index, supported by a strong set of rules that encourage innovation while protecting stakeholder interests. Norway faced setbacks in regulatory quality in managing its complex energy sector, particularly due to restrictive environmental laws and geopolitical issues. Sweden, although highly rated for regulatory quality, showed little change due to increased social support policies, which may pose challenges in today's global economy.

However, the rule of law in these countries remained consistently strong, with Finland ranking highest, followed by Denmark, Norway, and Sweden. Finland's impressive performance in the rule of law reflects its independent judiciary and strong legal protections for its citizens (Meyer, 2013). Denmark also maintained a firm stance on law, while Sweden and Norway experienced fluctuations. These developments show that, despite the strength of the legal systems in the Nordic countries, the growing complexity of rapid societal change poses challenges, especially in areas such as immigration, social integration, and economic regulation.

The cross-country evidence supports a typological differentiation of Nordic ESG pathways that follows from the theoretical framework

Table 5
Comparative ESG Integration and Sustainability Trajectories in Nordic Countries.

Country	Strengths	Challenges	Overall Trajectory
Sweden	Emissions ↓, Climate Policy ↑, Stability	Welfare burden on regulation, minor legal fluctuation	Balanced growth toward sustainability
Norway	GDP ↑ (natural resources), Institutional strength	Emissions ↕, Regulatory setbacks (energy sector)	Transitional, needs diversification
Denmark	Governance ↑, Regulatory Quality ↑	Emissions variable, Low GDP fluctuation	Strong governance-led growth
Finland	Rule of Law ↑, Innovation → GDP	Trade/geopolitical vulnerabilities	High-governance adaptive model

rather than from post-hoc observation. Denmark exemplifies an institutional stability model: governance indicators remain consistently high, regulatory quality is stable, and decarbonization proceeds at the fastest pace among the four countries. This pattern is consistent with the theoretical expectation that coherent, credible, and stable regulatory institutions facilitate sustained ESG integration. Sweden represents an environmental leadership model with governance tension: emissions reduction is the most advanced and environmentally the clearest ESG signal, but statistically significant declines in government effectiveness and regulatory quality suggest that environmental ambition has not been matched by institutional consolidation across all dimensions. Norway constitutes a resource-constrained transition model: institutional quality is high in absolute terms, but the slowest emissions decline and a declining rule-of-law trajectory are consistent with the theoretical prediction that fossil-fuel dependence generates structural friction that moderates the pace of ESG integration, even in otherwise capable states. Finland exhibits an adaptive governance model under external pressure: performance is strong across governance and rule-of-law dimensions, but declining political stability, plausibly linked to geopolitical exposures, introduces fragility that the other Nordic cases do not display to the same degree. These four profiles do not constitute a ranking of national sustainability performance; they constitute an empirically grounded illustration of how institutional conditions shape distinct ESG pathways within a broadly comparable regional cluster.

Conclusion

This study introduces an international typology that shows how ESG-integrated investments are developing across the four Nordic countries: Denmark, Finland, Norway, and Sweden. These findings strengthen the connection among national policies, governance structures, and social demographics by effectively integrating ESG considerations into investment decisions. While all these countries share a commitment to sustainability, they vary considerably in their ESG strategies, influenced by their distinct political economies and institutional frameworks.

Sweden's success in reducing CO_2 emissions and making significant progress in decarbonizing its economy demonstrates the power of ambitious climate policies and investments in renewable energy (Stern, 2008). Norway faces challenges in balancing its sustainability goals with its dependence on fossil fuels while managing varying emissions and environmental performance (IEA, 2020). Denmark and Finland are also increasingly focused on expanding their use of renewable energy, whereas larger countries, especially those with specific historical challenges, continue to strive for consistently good environmental performance (Mendonça et al., 2018; Kooij et al., 2018).

The study's empirical scope is explicitly bounded. With four countries and a ten-year annual series, the analysis constitutes a structured *n* comparative case study rather than a generalizable statistical inference. The findings should therefore not be read as universal prescriptions for ESG policy or investment strategy. Rather, they offer a theoretically grounded, empirically supported characterization of how institutional heterogeneity within a highly developed, welfare-state regional cluster produces divergent ESG trajectories. The analytical value lies in the structured comparability of the Nordic cases: by holding constant broad welfare-state traditions and high institutional capacity, the study can isolate the influence of variation in energy structure, regulatory priorities, and resource dependence on national ESG pathways. This contributes to the sovereign ESG and comparative institutionalism literatures by demonstrating that institutional convergence at the welfare-state level does not translate into convergence in ESG trajectories.

For policymakers and institutional investors engaged specifically with the Nordic region or with comparable advanced welfare economies, these findings offer context-specific insights. Denmark's governance-led model illustrates the value of regulatory consistency and institutional predictability as enabling conditions for ESG integration. Sweden's environmental leadership, achieved despite measurable pressures on governance capacity, suggests that climate-policy coherence can sustain decarbonization even under administrative strain. Norway's case demonstrates that strong institutions and high income do not automatically translate into ESG alignment where sectoral path dependence and resource rents create structural friction. Finland's experience highlights the vulnerability of even adaptive governance systems to external geopolitical shocks. These observations are not generalizable to all emerging or developing economies, but they are informative for practitioners and scholars working on the institutional conditions for sustainable finance in comparable national contexts.

CRediT authorship contribution statement

S M Feroj Mahmood: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The author declare that the author have no conflicts of interest.

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