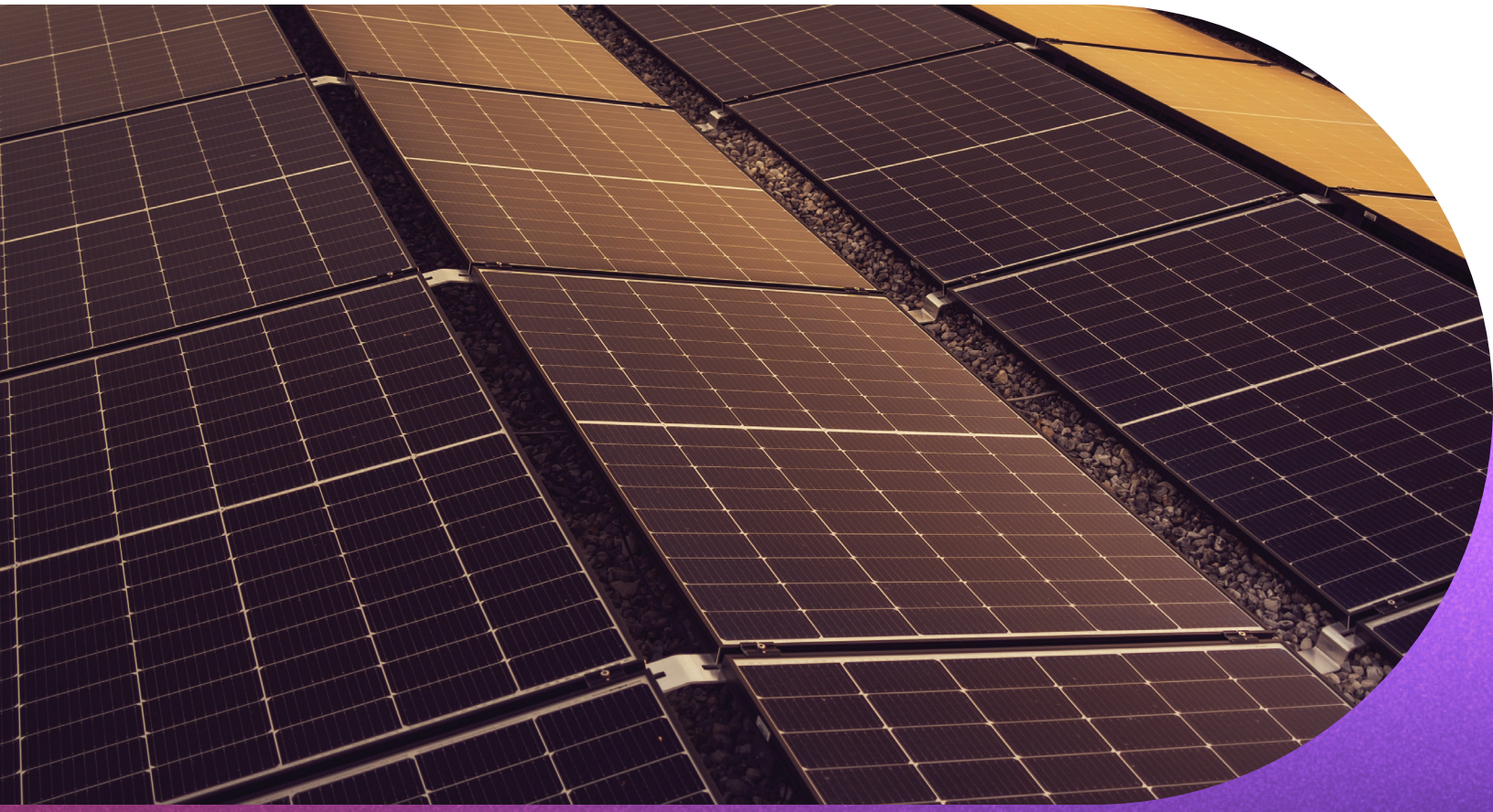
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Governing for ESG Performance in Megaprojects: An Interorganizational Perspective

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Executive Summary

Environmental, social, and governance (ESG) principles and practices have become a defining priority for megaprojects worldwide. Yet, unlike corporate ESG, megaproject ESG is shaped by temporary organizations, fragmented governance structures, and multiple stakeholders whose collective actions determine sustainability outcomes. Existing ESG literature and frameworks therefore struggle to capture these unique governance challenges of megaprojects and call for a new project governance perspective that safeguards the future of sustainable project delivery.

This research develops an integrated perspective to explain how interorganizational project governance measures can improve megaproject ESG performance. The study follows a four-stage research design. First, a systematic literature review establishes a project-specific ESG framework, extending the conventional corporate-oriented ESG framework by explaining the missing puzzle for megaproject ESG. Second, qualitative case studies of project-based organizations reveal why megaproject ESG implementation frequently suffers from institutional decoupling, where organizational reporting systems become disconnected from project execution. Third, fuzzy-set qualitative comparative analysis (fsQCA) identifies multiple governance configurations that enable high megaproject ESG performance under different organizational conditions. Finally, panel data analysis demonstrates how digital transformation strengthens ESG performance with a consideration of institutional differences.

The findings suggest that realizing the full potential of ESG in megaprojects requires moving beyond compliance-oriented organizational-level management practices toward governance designs that enable each project to create its own environmental and social value. High megaproject ESG performance cannot be achieved through reporting compliance practices

alone. Instead, high megaproject ESG performance requires a combination of governance structures and measures, organizational capabilities, and digital technologies. Moreover, multiple governance pathways can lead to high ESG performance, suggesting that organizations should adopt governance configurations that match their own institutional conditions rather than pursuing a single good practice.

For practitioners, this research provides an evidence-based governance framework for improving ESG performance throughout the megaproject life cycle. Project-based organizations should focus on reducing institutional decoupling, strengthening governance capabilities across organizational boundaries, and integrating digital capabilities with consideration of institutional infrastructure to aim for long-term organizational and societal outcomes.

Introduction

Environmental, social, and governance (ESG) principles and practices have become an increasingly important consideration in the planning, delivery, and operation of megaprojects. Governments, investors, regulators, and local communities now expect infrastructure projects to not only deliver assets within planned cost and schedule, but also to minimize environmental impacts, create long-term social value, and establish transparent governance throughout the project life cycle. Consequently, ESG has gradually shifted from a voluntary corporate responsibility initiative to an important criterion considered for project investment and governance (Müller et al., 2026). This trend is particularly evident in transport, energy, and public infrastructure projects, where ESG performance increasingly influences financing decisions, regulatory approvals, stakeholder acceptance, and long-term project value.

Although ESG has become a strategic priority for megaprojects, existing ESG frameworks remain predominantly developed from the perspective of organizations rather than projects. Most ESG standards, rating systems, and disclosure frameworks assume stable organizational boundaries and continuous organizational operations. These assumptions are rarely held in megaproject environments. Unlike firms, megaprojects are temporary organizations that integrate multiple independent organizations, including owners, contractors, consultants, suppliers, regulators, and local communities. ESG performance therefore emerges from the collective actions of numerous participating organizations instead of the actions of a single focal organization. The temporary nature of projects further complicates governance because responsibilities, contractual relationships, and stakeholder interactions continuously evolve throughout the project life cycle.

These characteristics generate several practical challenges that are insufficiently addressed by current ESG research. First, project organizations frequently adopt corporate ESG reporting systems that are designed for permanent organizations, resulting in measurement indicators that fail to reflect project-specific sustainability issues. Important project characteristics, including temporary organizing, interorganizational collaboration, and life cycle delivery, remain underrepresented in existing ESG frameworks. Consequently, practitioners often lack an appropriate framework for assessing ESG performance at the project level. This disconnect reflects a fundamental criticism of ESG frameworks as a whole—namely, that conventional ESG encourages disclosure and reporting transparency rather than concrete operational action. Megaproject delivery represents a critical domain to address this challenge. Because megaprojects involve tangible physical assets, complex supply chains, and site-level activities, effective interorganizational project governance can

help better steer how these ESG elements are incorporated throughout the project implementation.

Second, organizations increasingly produce comprehensive ESG reports, yet improvements in reported performance do not necessarily translate into improvements in project delivery. ESG responsibilities are often concentrated within sustainability departments, while project teams responsible for day-to-day delivery possess limited understanding of how ESG objectives should influence operational activities, or vice versa. As a result, substantial gaps emerge between organizational sustainability commitments and project implementation.

Third, despite growing investments in ESG governance, practitioners still have limited evidence regarding which governance arrangements are most effective for improving project ESG performance. Existing studies generally examine individual governance mechanisms in isolation such as board characteristics, ownership structure, ESG committees, or reporting quality. However, governance mechanisms rarely operate independently in practice. Instead, organizations achieve megaproject ESG performance through combinations of governance arrangements that reinforce one another. Different project-based organizations may therefore require different governance configurations depending on their inherent characteristics. Identifying these alternative governance pathways remains an important research challenge.

Finally, rapid advances in digital technologies are transforming the governance of megaprojects. Digital tools provide unprecedented opportunities for monitoring environmental performance, coordinating multiple stakeholders, improving transparency, and supporting evidence-based decision-making. Nevertheless, digital transformation alone does not guarantee better ESG outcomes. Its effectiveness depends on whether organizations possess governance mechanisms capable of integrating digital information into project management and strategic decision-making. Understanding how digital transformation complements organizational governance therefore represents an important question for both researchers and practitioners.

This study addresses these challenges by developing an integrated perspective for understanding and improving ESG performance in megaprojects at the governance level. Rather than treating ESG as a reporting exercise or a collection of independent sustainability initiatives, this research conceptualizes megaproject ESG performance as an outcome of interorganizational governance across the project ecosystem. Specifically, we distinguish corporate-oriented governance (firm-level reporting and regulatory compliance) from megaproject interorganizational governance (the dynamic, multipartner coordination and control structures throughout the project life cycle). This study further develops a comprehensive research framework by integrating conceptual development, qualitative diagnosis, configurational analysis, and causal inference. The resulting framework explains not only *what* constitutes project ESG performance, but also *why* implementation barriers emerge, *how* governance configurations overcome these barriers, and *when* digital transformation amplifies governance effectiveness.

Specifically, the research consists of four interconnected tasks. The first develops an ESG framework tailored to megaprojects by comparing existing literature in both megaprojects and organizational settings. The second investigates the institutional barriers that prevent ESG strategies from being effectively implemented in project practice, identifying systematic forms of institutional decoupling between reporting and execution. The third introduces the structure–strategy–implementation (SSI) framework and employs fuzzy-set qualitative comparative analysis (fsQCA) to identify multiple governance configurations that lead to

high ESG performance under different organizational conditions. The fourth examines how digital transformation interacts with governance mechanisms using longitudinal panel data, revealing the complementary relationship between institutional governance and technological capability.

Taken together, these four tasks provide a coherent explanation of how megaproject organizations can improve ESG performance—defined here as tangible project life cycle outcomes on all individual pillars of ESG aspects, such as operational carbon reduction, zero-harm labor safety, positive community engagement, and transparent supply-chain relationships—through governance rather than compliance alone. The study contributes to both research and practice by moving beyond firm-centered ESG thinking toward a project-centered and interorganizational governance perspective. More importantly, it provides practitioners with an evidence-based governance framework that supports ESG implementation throughout the entire megaproject life cycle, from organizational strategy and governance design to project execution and continuous digital-enabled improvement.

Research Framework and Literature Review

This study takes the realization of megaproject ESG as its core objective, progressing along the logical chain of "theoretical foundation to practical problems to coping solutions to innovative optimization" (Figure 1). First, a systematic literature review is conducted to construct the megaproject ESG framework, thereby delineating the unique conceptual boundaries of megaproject ESG. Second, drawing on empirical evidence from Norwegian

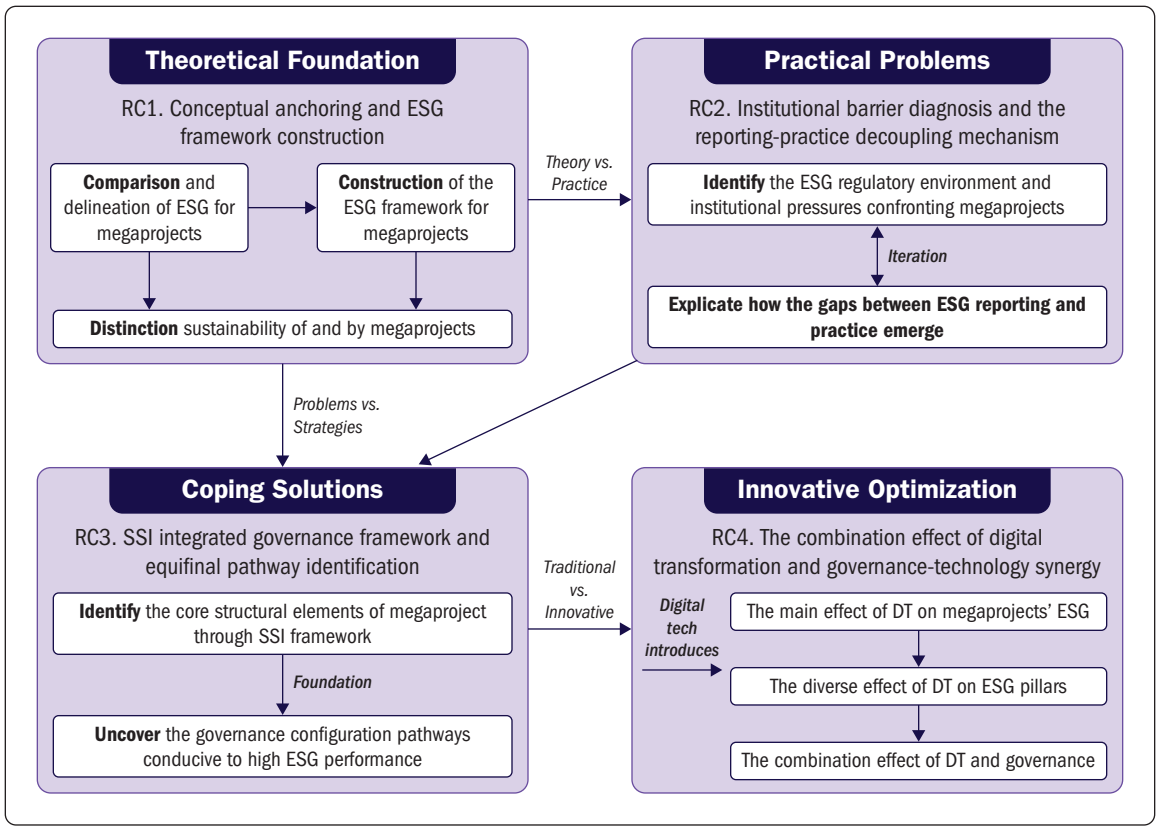


Figure 1. Systematic research framework.

infrastructure megaprojects, the study diagnoses the root causes of institutional decoupling. Third, the fsQCA method is employed to identify equifinal governance configurations within an integrated SSI framework. Finally, digital transformation is introduced as a key contextual variable to unravel the synergistic mechanism between institutional advantages and technological change. The four research tasks are built progressively upon one another, forming a complete research cycle (RC) from theoretical construction to practical implementation.

Research Task 1: Systematic Literature Review on Megaproject ESG and Theoretical Framework Construction

This task addresses the foundational question of what constitutes megaproject ESG and advances conceptual construction through three subquestions. The first conducts a comparative analysis of conceptual dimensions and measurement indicators between corporate ESG and megaproject ESG, revealing the inadequacy of conventional ESG frameworks when confronted with the inherent characteristics of megaprojects, namely their temporariness, multiorganizational collaboration, and cross-life cycle nature. The second identifies the unique dimensions and indicators that megaproject ESG ought to encompass, proposing the megaproject ESG framework that integrates these characteristics with the environmental, social, and governance pillars. The third draws a critical distinction between the sustainability of the megaproject and the sustainability by the megaproject, elucidating the divergent management logics underpinning these two analytical levels. Collectively, these three subquestions establish the conceptual basis for all subsequent investigations.

Research Task 2: Identifying Institutional Barriers and Decoupling Between Reporting and Practices for Megaproject ESG

This task shifts the inquiry to the research question of why megaproject ESG underperforms. Grounded in multicase empirical evidence from Norwegian infrastructure megaprojects, two subquestions are deployed to expose the roots of institutional decoupling. The first identifies the ESG regulatory environment and institutional pressures confronting megaproject organizations, delineating how external compliance requirements cascade down to the project level. The second explicates how the gap between ESG reporting and practice emerges, with particular emphasis on the cognitive divide whereby ESG expertise concentrates at the organizational level while project-level implementers lack adequate comprehension, and on the institutional deficiency whereby data flows unidirectionally upward for reporting purposes without effective feeding back into project operations. Both subquestions jointly demonstrate that the obstacles to megaproject ESG performance are attributable not to technological limitations or insufficient willingness, but to a misalignment between organizational design and project practice.

Research Task 3: SSI Integrated Governance Framework and Pathway Identification

This task proposes coping strategies to address the institutional decoupling dilemma. The first identifies the core elements of megaproject governance, encompassing critical dimensions such as board composition, ESG committee establishment, reporting quality, organizational size, and ownership concentration, thereby establishing the theoretical

foundation of the structure–strategy–implementation (SSI) framework. The second uncovers the configurational pathways conducive to high ESG performance, revealing equifinal pathways under heterogeneous resource endowments and governance structures. Together, these two subquestions furnish governance configuration strategies for heterogeneous megaproject organizations.

Research Task 4: The Combination Effect of Digital Transformation and Governance-Technology Synergy

This task introduces digital transformation as a pivotal contextual variable after the foundational governance pathways have been clarified. The first subquestion examines the overarching effect of digital transformation on megaproject ESG performance. The second disentangles the heterogeneous effects of digital transformation across the environmental, social, and governance dimensions, specifying the dimensional disparities and priority sequencing of technology-enabled improvement. The third investigates the boundary role of organizational governance, namely how institutional advantages moderate the ESG-enhancing effect of digital transformation and how these two forces generate synergistic effects. Collectively, the three subquestions reveal that the promotional effect of digital transformation on ESG performance is highly contingent upon the establishment of institutional advantages, and that the synergy between institutional governance and technological change constitutes the critical pathway for advancing megaproject ESG performance.

Methods

The research adopts mixed-methods research design guided by a framework of problem-driven inquiry, method adaptation, and mechanism verification (Figure 2).

Research Task 1 constructs the conceptual foundation of megaproject's ESG through systematic literature review. The review follows Sauer and Seuring (2023) and screens publications from the Web of Science and Scopus databases (118 articles). Through in-depth coding, indicators are initially extracted across the three pillars of environment, social, and governance. Three rounds of expert focus groups are then conducted to iteratively validate the indicators. The first round completes thematic clustering, and the second round removes inapplicable corporate-level indicators and refines the dimensions. The third round consolidates overlapping indicators and supplements project-specific ones such as green procurement and certification. The process yields a megaproject ESG assessment framework.

Research Task 2 employs a multiple-case study design to diagnose institutional barriers in ESG practices within megaproject organizations. The study selects nine project-oriented organizations in the Norwegian infrastructure sector and obtains process data through semistructured interviews and systematic analysis of organizational ESG documents. Data analysis follows the thematic analysis by Braun and Clarke (2006). Interview transcripts and documentary content are openly coded, and patterns are identified to consolidate codes into latent themes.

Research Task 3 adopts fsQCA to explore equivalent causal paths that produce high ESG performance. Drawing on multiprincipal–agent theory, the study constructs an integrated structure–strategy–implementation (SSI) framework that treats organizational structure,

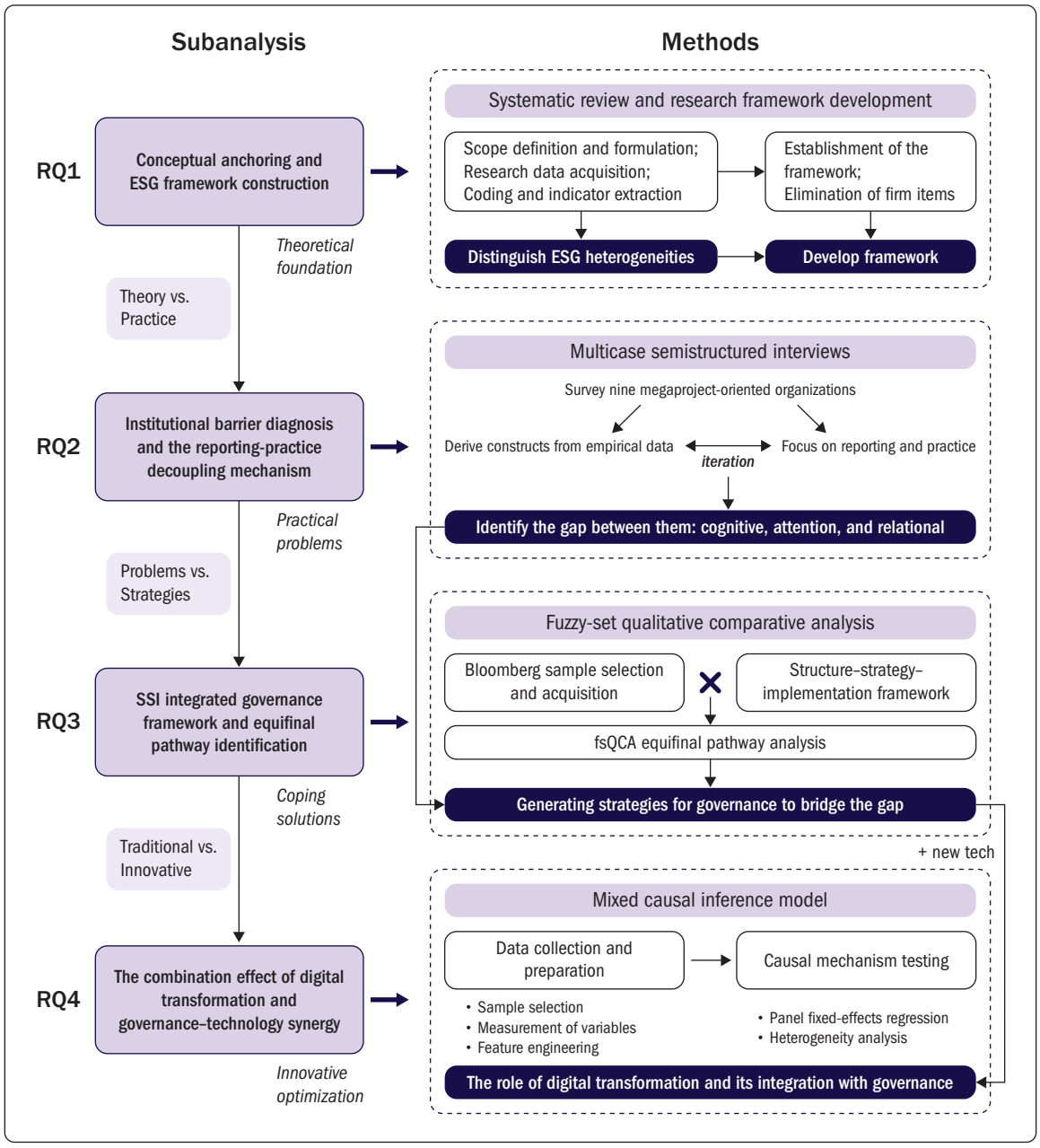


Figure 2. Research roadmap.

ESG strategy, and implementation mechanisms as core conditional variables in megaprojects. The data are drawn from 156 project-oriented enterprises in the Bloomberg ESG database.

Research Task 4 extends the scope to digital technology domains, examining how digital transformation synergizes with governance mechanisms to enable ESG performance in large projects. The study samples global project-based enterprises and adopts a mixed causal inference model. The sample covers 305 enterprises participating in large projects in energy, infrastructure, and related sectors from 2014 to 2023. Panel fixed-effects regression and the difference-in-differences (DiD) estimator are used to identify the causal

effect of digital transformation on ESG while controlling unobserved heterogeneity at the enterprise and time levels.

Data Collection

Literature Data

To address Research Task 1, this study adopts a systematic literature review approach. The review follows the framework proposed by Sauer and Seuring (2023) and conducts searches in Web of Science and Scopus. Keyword combinations including large projects, sustainability, and ESG are used in the search. The search results undergo systematic refinement through thematic relevance screening, quality standard screening, and full-text in-depth verification (Figure 3). Ultimately, 118 highly relevant articles are retained.

Qualitative Data

To address Research Task 2, this study adopts a qualitative data collection strategy within a multiple-case study design. Data collection proceeds in two phases. The first phase selects nine project-oriented organizations in the Norwegian infrastructure sector as case samples, including BN, SV, and NV (Table 1). Through systematic analysis of public and internal ESG documents, the study establishes a baseline understanding of formal reporting practices. The second phase conducts semistructured interviews as the core data source. The interviews follow two protocol guides respectively tailored to organizational- and

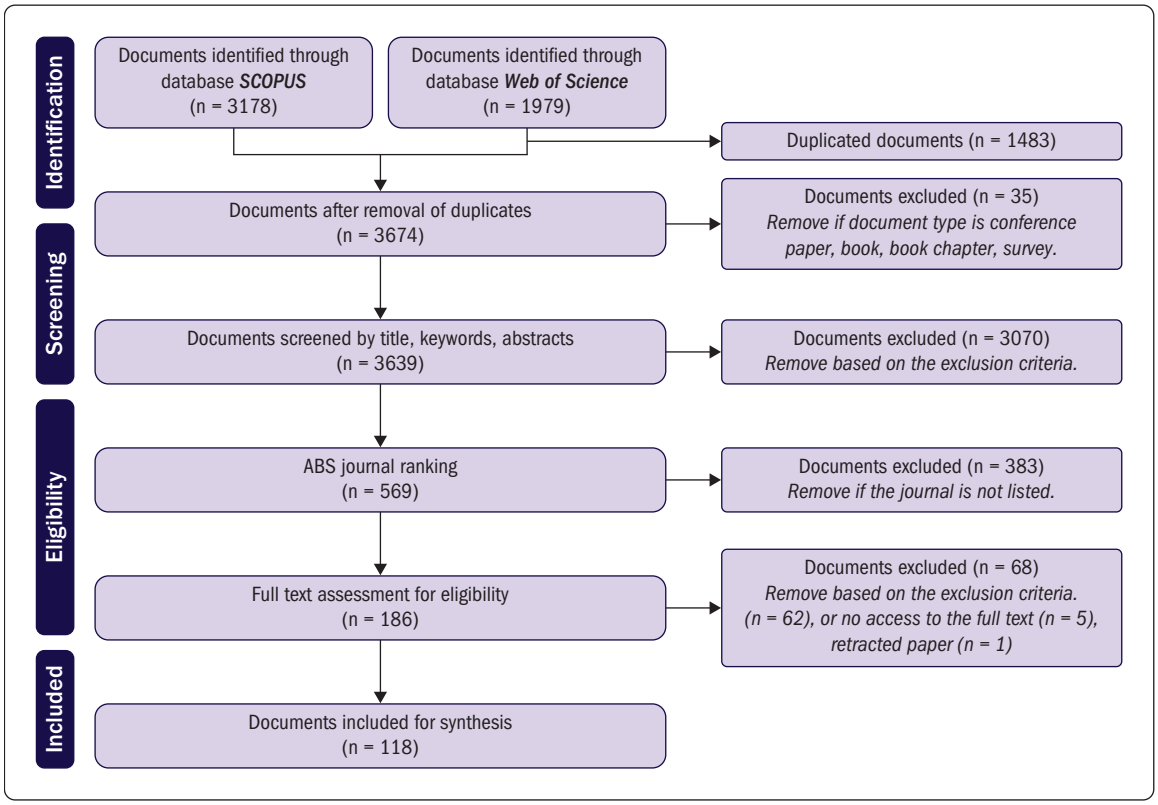


Figure 3. PRISMA flow diagram for literature data extraction.

Table 1. Sources of Qualitative Data

Interview and Date	Organization ID	Professional Background	Main Themes	Duration	Transcription Word Count
1. 19.03.26	SV	Director of sustainability, construction division	Organizational sustainability reporting and understanding	35 min	3,314
2. 20.03.26	BN	Head of sustainability reporting and strategic reporting	Organizational sustainability reporting and understanding	40 min	4,437
3. 23.03.26	FB	Sustainability lead	Organizational sustainability reporting and understanding	38 min	3,557
4. 30.03.26	SUN	Environmental advisor	Organizational sustainability reporting and understanding	47 min	5,000
5. 31.03.26	NV	Sustainability lead	Organizational sustainability reporting and understanding	41 min	4,828
6. 31.03.26	SG	Senior advisor, climate and environment	Organizational sustainability reporting and understanding	30 min	3,278
7. 06.05.26	BN	Environmental advisor and coordinator for external environment and climate projects	Project sustainability reporting and understanding	20 min	2,238
8. —	NV	Project manager	Project sustainability understanding	—	506
9. —	SV	Project manager	Project sustainability practices	—	2,523

Note. To safeguard the confidentiality of surveyed firms, all company names in this table are anonymized.

project-level respondents. During interviews, respondents describe their daily work, their familiarity with ESG frameworks, and perceived barriers to information flow. This study employs data triangulation.

Quantitative Data

To address Research Task 3, this study adopts secondary quantitative data from the Bloomberg database, covering 156 large project-oriented enterprises from 2020 to 2022 (Figure 4). Through this data source, the study obtains structural information on seven key

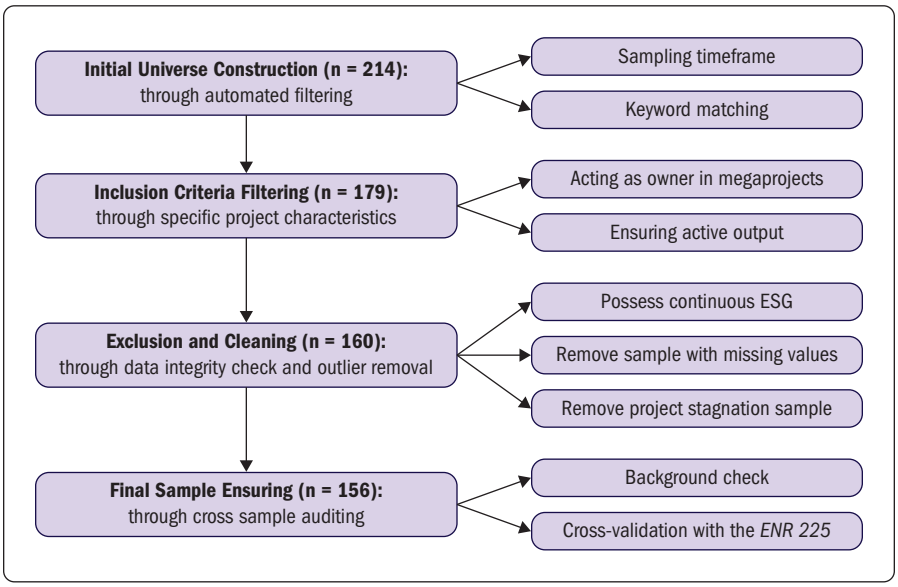


Figure 4. Sample screening process for study 3.

conditional variables, including organizational size, large shareholder ownership, board independence, board diversity, emission reduction initiatives, and ESG reporting quality.

To address Research Task 4, this study adopts merged panel data from the Refinitiv Eikon ESG database and the Bloomberg database, covering 305 listed enterprises that participated in large projects from 2014 to 2023. The sample screening criterion requires that enterprises engage in large project construction or operate in industries such as energy and infrastructure. ESG performance data are obtained from the Refinitiv Eikon ESG database. Data for the corporate governance index (CGI) are obtained from the Bloomberg database. Digital transformation is measured by combining a dictionary-based approach with corporate annual reports.

Data Analysis

Data Analysis for Research Task 1

To construct the framework of megaproject ESG, this study adopts a hybrid coding and expert iterative analysis strategy. The data analysis takes the 118 articles selected through the systematic literature review as the unit of analysis and proceeds in two stages. In the first stage, two researchers apply a hybrid coding strategy that combines deductive and inductive approaches. Relevant indicators and characteristics are extracted from the literature based on a preestablished framework of environment, social, and governance. This analysis combines theoretical knowledge with practical judgment.

Data Analysis for Research Task 2

To diagnose the decoupling between commitments and practices in megaproject ESG, this study adopts thematic analysis, strictly following the procedure of Braun and Clarke (2006). The analysis begins with data familiarization. The process then proceeds with systematic coding. Starting with open coding, key expressions related to ESG implementation processes are extracted line by line, with coding focusing on two thematic areas: information transmission

and responsibility attribution. After coding, the process moves to pattern identification and theme generation, during which scattered codes are consolidated into potential macrolevel themes.

Data Analysis for Research Task 3

To explore equivalent governance paths for resolving institutional decoupling, this study adopts fsQCA for configurational data analysis, strictly following Ragin (2009). We adopted fsQCA because it effectively captures complex interrelationships, causal asymmetry, and equifinality—identifying how distinct configurations of governance conditions can yield the same high megaproject ESG performance. The first step is data calibration, during which seven original continuous variables are transformed into fuzzy-set membership scores. The second step is truth table construction. Frequency thresholds and raw consistency thresholds are set, and statistically reliable combinations are retained after simplification using the Quine-McCluskey algorithm. The third step is solution selection, during which the solution type that balances complexity and parsimony is chosen.

Data Analysis for Research Task 4

To examine how digital transformation and governance mechanisms synergistically enable ESG performance, this study adopts a hybrid causal inference model. First, using the digital transformation index (DTI) as the independent variable and the composite ESG score as the dependent variable, a fixed-effects regression model is employed. Second step, the sample is divided into two subsamples: developed markets and developing markets. Machine learning prediction models are applied to each subsample, and feature importance analysis is used to identify differences in the explanatory power of DTI across the three ESG pillars. Third, the corporate governance index (CGI) and its interaction with DTI are introduced, and a panel regression model following propensity score matching (PSM) is employed to test whether governance mechanisms significantly moderate the relationship between digital transformation and ESG.

Results and Discussion

Results and Discussion for Research Task 1

Part 1: Comparing ESG in Megaprojects and Corporate Contexts

ESG is defined as a business's impact on the environment and society and the transparency of its governance in terms of company leadership, executive pay, audits, internal controls, and shareholder rights (British Business Bank, 2022). There are very few studies directly addressing megaproject ESG, with related concepts such as megaproject social responsibility (MSR) remaining fragmented (He et al., 2019; Ma et al., 2021). A clear definition of megaproject ESG is still lacking.

To examine the distinctions, we compared the E, S, and G pillars between corporate ESG (Refinitiv framework) and megaproject ESG (OECD, 2020). For the E pillar, corporate ESG comprises resource use, emission, and innovation. Megaproject ESG covers similar themes—water management, energy management, greenhouse gas (GHG) emissions, ecological impacts—but innovation is entirely missing. This reflects a fundamental dilemma: Given the temporary nature of megaprojects, organizations are reluctant to invest in project-specific ESG innovation when benefits may not transfer to future projects

(Granqvist & Gustafsson, 2016). For the S pillar, corporate ESG includes workforce, human rights, community, and product responsibility. Megaproject ESG mirrors most themes but notably omits working conditions (a critical issue in construction) and data privacy. For the G pillar, corporate ESG encompasses management, shareholders, and corporate social responsibility (CSR) strategy. Megaproject ESG lacks shareholder-related mechanisms (replaced by project owners) and ESG reporting and transparency (due to nonlisted status). These systematic omissions demonstrate that corporate ESG frameworks cannot be directly transplanted to megaprojects.

We further grouped antecedents into 10 categories, revealing a fundamental asymmetry in what drives ESG performance (Table 2). Corporate ESG is predominantly driven by internal organizational factors. Corporate ESG research encompasses a wide range of investment-related factors and is CEO or board related. In contrast, megaproject ESG is primarily shaped by external contextual factors—stakeholder pressure, community engagement, government involvement, regulatory frameworks, and institutional pressures. Megaproject ESG research covers extensive interorganizational antecedents that have limited equivalents in corporate ESG. Conversely, market-related factors and ESG practice-related factors (ESG KPIs, ESG strategy, ESG reporting) are explored exclusively in corporate ESG. Megaproject ESG has developed distinctive antecedent categories that have no equivalent in corporate ESG literature. This asymmetry reflects the different organizational logics at play. Corporations are ongoing entities with stable governance structures, enabling sophisticated internal ESG capabilities. Megaprojects are temporary, multiorganizational undertakings with finite timelines, requiring ad hoc coordination among diverse stakeholders. The predominance of interorganizational antecedents underscores megaproject ESG's externalities and institutional dependencies.

Three fundamental differences thus emerge. First, megaproject ESG lacks a clear definition. Second, dimensionally, innovation, working conditions, data privacy, shareholder mechanisms, and ESG transparency are systematically underrepresented. Third, regarding antecedents, corporate ESG is internally driven, whereas megaproject ESG is externally driven by stakeholder relationships, government regulation, and institutional pressures. These findings necessitate a tailored, project-level ESG framework.

Part 2: Developing a Megaproject-ESG Framework

Based on a systematic literature review and three rounds of expert focus groups, we developed a megaproject-ESG framework (Figure 5).

The environmental pillar is operationalized through three interrelated concerns: (1) contamination control and ecological safeguarding, (2) material and energy stewardship, and (3) climate resilience and mitigation. Distinct from conventional corporate ESG standards, the framework delivers measurable indicators oriented to the full life cycle of infrastructure megaprojects. The contamination-related indicators respond to the intensive pollution and waste outputs inherent to the construction sector (Zhang et al., 2022). The stewardship-oriented indicators address the massive consumption of raw materials and energy in megaproject delivery, explicitly incorporating risks associated with resource depletion (Hoekstra & Wiedmann, 2014). The climate-related indicators reflect the dual attribute of megaprojects: They act as major sources of greenhouse gas emissions while simultaneously being vulnerable assets exposed to climate hazards (Hayes et al., 2019).

Table 2. Influencing Factors for Corporate ESG and Megaproject ESG

Groups of Antecedents	Antecedents for Corporate ESG	Antecedents for Megaproject ESG
Investment related	Green investments/stock greenness (Yan et al., 2021)	Intervention of financial actors (Theurillat & Crevoisier, 2013)
	Shareholder engagement (Barko et al., 2022)	
	Going public/underpricing (Harasheh, 2023)	
	Ownership by institutional investor/ mutual funds (Aluchna et al., 2022)	
	Corporate venture capital (Battisti et al., 2022)	
	Cross-listing (Del Bosco & Misani, 2016)	
	Stock price (Grewal et al., 2019)	
	Fund characteristics (Kim & Yoon, 2023)	
CEO and board related	Dynamic CEO capability (Heubeck, 2023)	CEO narcissism (Lin et al., 2018)
	Coopted director (Maneenop et al., 2024)	
	Woman director/board gender diversity (Cambrea et al., 2023; De Masi et al., 2021; Eliwa et al., 2023)	
	Staggered board (Tanthanongsakkun et al., 2023)	
	Board size/CEO duality (Husted & Sousa-Filho, 2019)	
Interorganizational relationship related	Stakeholder legitimacy (Lee & Raschke, 2023)	Stakeholder pressure (Ali et al., 2023); external stakeholder (Ma et al., 2022); stakeholder involvement (Castelblanco et al., 2024; Kroh & Schultz, 2023)
	State–business interaction (Meng et al., 2023)	Community engagement (Di Maddaloni & Sabini, 2022); public engagement (Fleury & Gomes, 2024); public perception (Chen et al., 2018); government connections (Yang et al., 2020)
	Social norms (You, 2023)	Social capital (Wang et al., 2021)
		Long-term and multiorganizational collaboration (Morabito & Robert, 2023)

(*continued*)

Table 2. Influencing Factors for Corporate ESG and Megaproject ESG (Continued)

Groups of Antecedents	Antecedents for Corporate ESG	Antecedents for Megaproject ESG
Appraisal and government related	Mandating ESG reporting (Aboud et al., 2024; Cordazzo et al., 2020)	Environmental audit (He et al., 2009); environmental assessment (Partidário & Coutinho, 2011)
	Governmental inspection (Wang et al., 2023)	Hierarchical governance (Brunet & Cohendet, 2022)
	Political system/labor system/culture system (Baldini et al., 2018)	Government involvement (de Vries, 2021); regulatory framework (Leurent et al., 2017)
Market related	Market structure (Moskovics et al., 2024)	
	Market flexibility (Edmans et al., 2023)	
ESG practice related	ESG KPI (Gebhardt et al., 2023)	
	ESG strategy (Carlsson Hauff & Nilsson, 2023)	
	ESG report types (Luo & Tang, 2023; Maniora, 2017)	
Strategies and organization related		Strategic ambiguity (Suprayoga et al., 2020)
		Company reputation and long-term economic benefit, employee commitment and loyalty, and credibility gain (Van Nguyen et al., 2024)
Individual level		Transformational leadership and transactional leadership (Wang et al., 2023)
		Change agent (Wood Jr. & Morais, 2022)
Operational and design related		System engineering (Locatelli et al., 2014)
		Modularization (Mignacca et al., 2020); operational competitiveness (Leurent et al., 2017)
Unspecified others	Sustained competitive advantage (Bhandari et al., 2022)	Institutional pressure (Xie et al., 2022); economic pressure and institutional pressure (Xie et al., 2023)
	Firm size (Drempetic et al., 2020)	Task complexity (Roehrich et al., 2023)
	Digital transformation (Lu et al., 2024)	

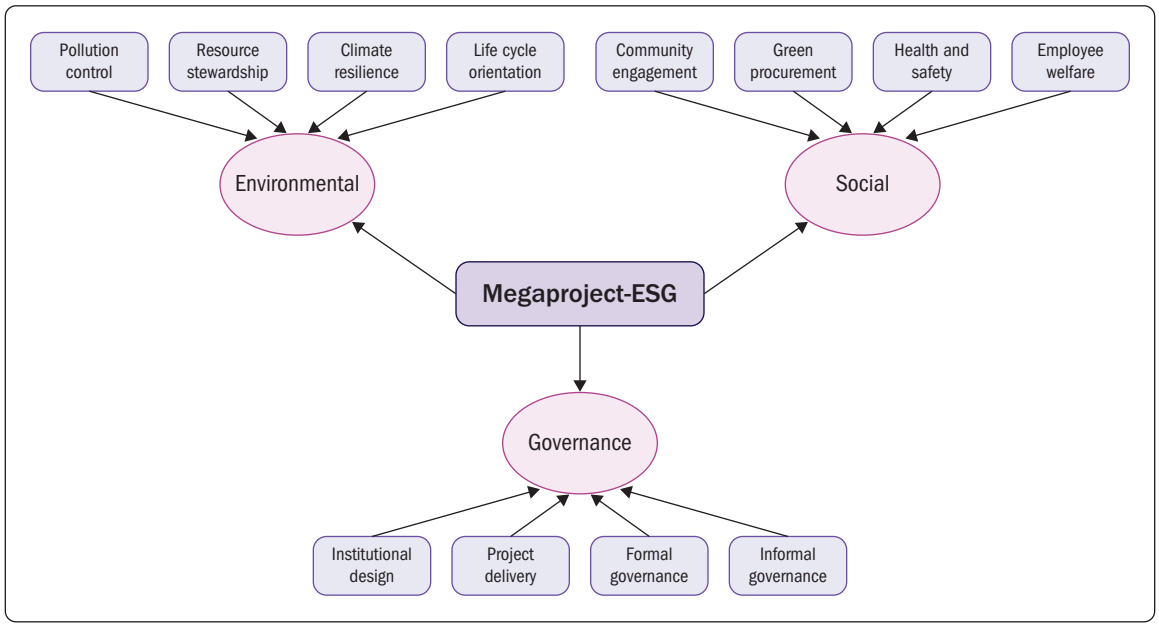


Figure 5. Megaproject-ESG themes for sustainable infrastructure.

Social indicators are organized around four themes: (1) stakeholder interaction and public relations, (2) sustainable procurement chain oversight, (3) occupational and public well-being assurance, and (4) workforce welfare and entitlements. For megaprojects with far-reaching regional impacts, these indicators help mitigate the risk of "social washing" (Locatelli et al., 2025) by prioritizing continuous community engagement across all project phases, which is essential to securing and maintaining the social license to operate (Di Maddaloni & Davis, 2017). Supply chain indicators centered on green procurement across multitiered engineering supply chains (Kadefors et al., 2021). The well-being and welfare themes further highlight the human-oriented nature of social sustainability.

Governance indicators are organized into four categories: (1) institutional architecture, (2) project delivery management, (3) codified regulatory, and (4) relational coordination mechanisms. A key innovation tailored to megaproject contexts is that the governance dimension extends beyond generic corporate governance paradigms. The framework differentiates codified regulatory mechanisms from relational coordination mechanisms. This distinction acknowledges that sustainable outcomes in megaprojects rely heavily on flexible, trust-based coordination, which cannot be fully prescribed by rigid formal contracts (Cao & Lumineau, 2015; Xue et al., 2017). The institutional-architecture indicators incorporate leadership arrangements alongside institutional design (Guo et al., 2014; Wang et al., 2024), whereas the delivery-management indicators translate abstract governance principles into actionable practices for megaproject implementation (Eriksson et al., 2017).

The megaproject-ESG framework makes three core contributions. First, it adapts ESG logic to the unique characteristics of infrastructure megaprojects, abandoning the simple transplantation of enterprise-oriented ESG evaluation systems. Second, it advances governance research by separating codified and relational coordination mechanisms. Third, it establishes project-specific social indicators that operationalize social sustainability assessment for large-scale infrastructure initiatives.

Results and Discussion for Research Task 2

Megaproject owner organizations have adopted comprehensive sustainability reporting frameworks, yet a systematic detachment persists between organizational-level reporting and project-level practice. This task diagnoses why ESG implementation fails at the project level despite extensive organizational commitments (Figure 6).

The findings reveal a clear cognitive gap between how sustainability is understood at the organizational level compared to the project level. People working with sustainability at the strategic level and those implementing projects operate in largely separate conceptual worlds. The interviewee from BN described their work as centered on Corporate Sustainability Reporting Directive (CSRD) compliance, while a geologist embedded in the Follobanen project manages uranium release from tunnel drilling. Both do sustainability-related work, but in entirely different realities: "It is not their job to relate to something called CSRD" (BN, interview, 2026). This lack of shared understanding has practical consequences. BN's internal audit found that breaches of environmental conditions are often linked to lack of competence.

Interviews with project managers revealed that ESG is largely unknown at the project level. One responded "No" when asked about ESG, adding: "That is for several levels over me, there's [an] umbrella, so it's up in the top structure" (SV, project manager, 2026). Sustainability at the project level is understood in technical and operational terms—Building Research Establishment Environmental Assessment Method (BREEAM) certification, material recycling—with no reference to ESG as a broader framework.

The findings also point to a relational gap. While sustainability is implemented through projects, reporting is organized through departments at the organizational level. One strategic-level interviewee described: "I sit sort of at the very top [...] and then there are those who actually do the projects." Sustainability work is "spread across the organization. HR works on its part, procurement works on its part, and the environmental department works on its part" (FG, interview, 2026). Data flows in one direction—from projects to organizational reporting—without returning in a form that supports better practice.

The scope of sustainability reporting itself represents an attention challenge. BN reports across 700 data points in a 100-page report, yet the interviewee acknowledged: "I shouldn't claim that everything written there is particularly useful." At the project level, attention is pulled toward immediate physical and operational realities. As the BN interviewee noted, while climate is the top priority at the corporate level, project employees may experience other issues as more important "because they are closer to them in their everyday lives."

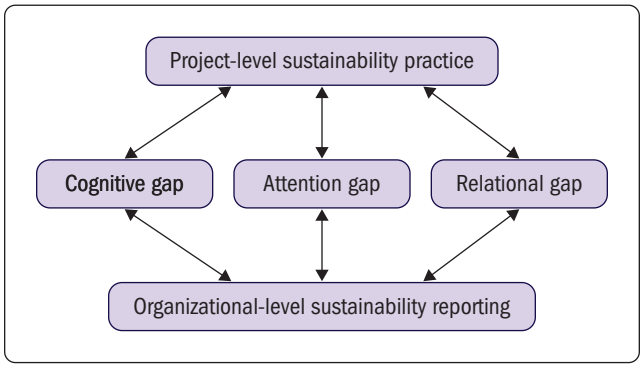


Figure 6. Dimensions of the ESG reporting gap.

These patterns are shaped by institutional pressures (DiMaggio & Powell, 1983). Coercive pressures drive formal CSRD adoption. Normative pressures lead organizations like FG to mirror CSRD structures despite no legal obligation. Mimetic pressures explain why NV continued CSRD reporting even after regulatory changes. Organizations adopt frameworks to signal legitimacy, consistent with Meyer and Rowan's (1977) observation that formal structures are adopted not because they improve performance, but because they confer legitimacy. The cognitive gap reflects this dynamic: Lower levels rarely develop ownership of strategic goals. When sustainability is treated as a reporting obligation managed by a dedicated function, meaningful engagement at the project level is unlikely. This aligns with Müller et al. (2026). Based on the attention-based view (Ocasio, 1997), what people focus on depends on their situation—situated attention. Organizational-level staff face regulatory requirements and external expectations, directing attention toward compliance and strategic goals. Project-level staff face physical constraints and operational pressures, directing attention toward concrete problems. Because these groups are in fundamentally different contexts, their attentional priorities diverge. Together, these gaps produce two types of decoupling (Bromley & Powell, 2012). Policy-practice decoupling occurs when formal frameworks exist at the organizational level but are not embedded in project-level work. Means-ends decoupling occurs when organizations follow reporting systems, but the means do not serve the intended ends.

In summary, the governance barriers to ESG implementation in megaprojects are not technical or motivational—they are systemic. The cognitive gap concentrates on expertise at the organizational level. The relational gap ensures data flows only upward. The attention gap means organizational and project levels attend to fundamentally different issues. Together, these produce both policy-practice and means-ends decoupling. Organizations invest heavily in reporting systems that confer external legitimacy but fail to translate into meaningful engagement where projects are delivered. Closing this gap requires deliberate efforts to build ESG literacy across levels, enable bidirectional data flows, and align attentional priorities between strategic and operational contexts.

Results and Discussion for Research Task 3

The findings from Part 2 revealed systematic decoupling between organizational-level ESG reporting and project-level practice, characterized by cognitive, relational, and attention gaps. These governance barriers stem from a fundamental mismatch between organizational design and project operational realities. Task 3 addresses the question: How can these governance barriers be resolved? The answer lies not in one-size-fits-all solutions, but in identifying configurational pathways that align organizational structure, ESG strategy, and implementation practices to achieve high ESG performance (Figure 7). Drawing on agency theory and the structure–strategy–implementation (SSI) framework, this section examines how different organizational settings combine strategic and implementation factors to produce superior ESG outcomes.

These seven conditions encompass organizational settings (context, shareholder power distribution, board characteristics), ESG strategy, and ESG implementation. The analysis, based on 156 megaproject-oriented organizations with 397 data entries from Bloomberg's ESG database, identifies configurational pathways leading to high and low ESG performance. Before presenting the pathways, we conducted a necessary condition analysis to identify which conditions are required for high ESG performance.

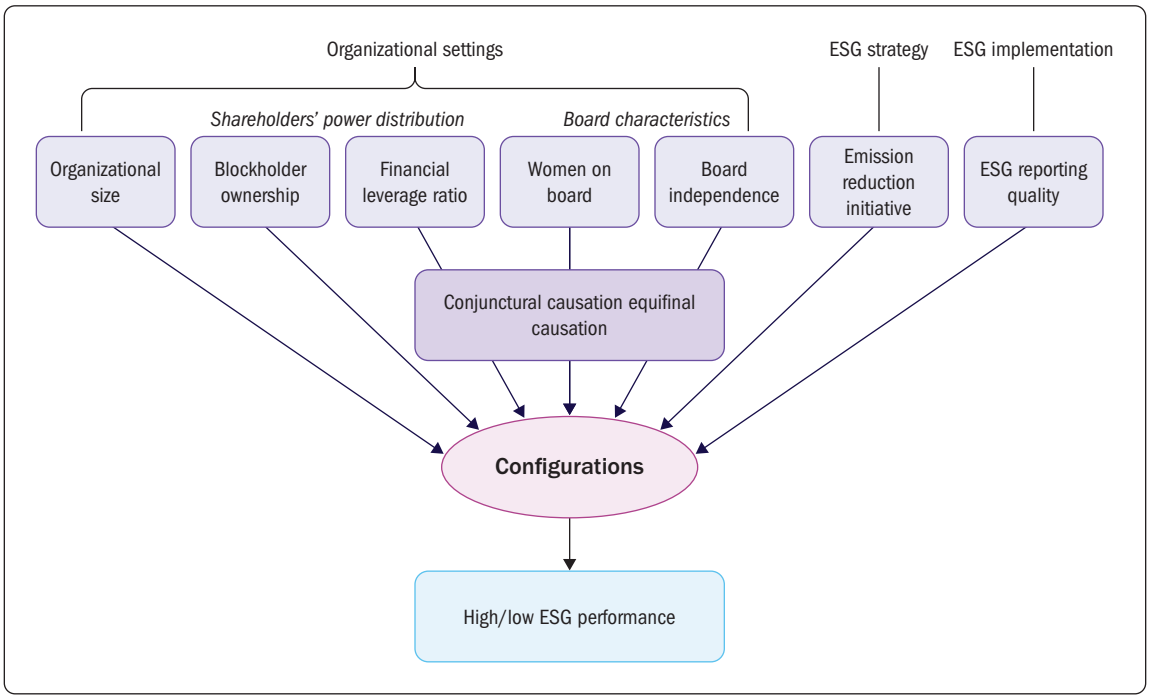


Figure 7. Research model.

Based on the analysis, only the emission reduction initiative is a necessary condition for achieving high ESG performance (consistency = 0.968). This means that without a formal emission reduction strategy, organizations pursuing megaprojects are unlikely to achieve high ESG performance regardless of other governance attributes. Conversely, the absence of emission reduction initiatives is a necessary condition for low ESG performance (consistency = 0.828).

The configurational analysis identifies seven distinct pathways leading to high ESG performance. These pathways demonstrate equifinality—different governance configurations can achieve the same high performance depending on organizational context (Table 3).

Governance-driven ESG optimizer (Solution Group S1) comprises three configurations (S1a, S1b, S1c) unified by the absence of blockholder ownership (i.e., ownership concentration by shareholders with large equity stakes capable of influencing corporate decisions) and the presence of emission reduction initiatives as core conditions. Drawing on agency theory, the absence of blockholder ownership effectively inhibits Type II agency conflicts, allowing management to prioritize long-term sustainability over short-term compliance costs (Taglialatela et al., 2024). In megaprojects, dispersed ownership structures encourage management to utilize emission reduction initiatives as strategic tools for securing organizational legitimacy. The efficacy of board diversity is highly contingent on gender diversity as a heterogeneous cognitive resource in environmental risk identification (Harjoto et al., 2015). This configuration suggests diverse perspectives translate into environmental performance only when accompanied by monitoring authority and resource redundancy.

Table 3. Solutions for High Megaproject-ESG Performance

	Configurations for High Megaproject-ESG Performance							
	Conditions	**S1a**	**S1b**	**S1c**	**S2a**	**S2b**	**S2c**	**S3a**
Context	Organizational size	●	⊗		⊗	●	⊗	●
Shareholders power distribution	Blockholder ownership	⊗	⊗	⊗			⊗	⊗
	Financial leverage ratio			⊗	⊗			●
Board characteristics	Women on board	●	⊗	⊗		●		●
	Board independence		●		●	●	●	●
ESG strategy	Emission reduction initiative	●	●	●	●	●	●	
ESG implementation	ESG reporting quality			●	●	●	●	
	Raw coverage	0.266	0.138	0.198	0.245	0.270	0.269	0.182
	Unique coverage	0.027	0.012	0.068	0.026	0.043	0.020	0.010
	Consistency	0.899	0.846	0.891	0.952	0.977	0.960	0.941
	Solution coverage	0.588						
	Solution consistency	0.883						

Note. ● = the presence of a core condition; ● = the presence of a peripheral condition; ⊗ = the absence of a core condition; ⊗ = the absence of a peripheral condition; and [blank] = "don't care" (hereafter the same).

Stakeholder-centric ESG strategist (Solution Group S2) comprises three configurations (S2a, S2b, S2c) unified by board independence and ESG reporting quality as core conditions, with emission reduction initiatives as peripheral conditions. Grounded in stakeholder theory, megaprojects function as arenas for stakeholder interactions where governance focuses on reconciling conflicts among actors (Raghunandan & Rajgopal, 2022). Board independence exercises monitoring functions to mitigate agency risks wherein management might prioritize financial objectives over social responsibilities. High-quality ESG disclosure acts as a robust signaling mechanism aligning emission reduction with social orientations, enhancing megaproject legitimacy within complex regulatory environments (Herremans et al., 2016).

Large-enterprise power distributor (Solution Group S3) comprises a single configuration (S3a) where organizational size is a core condition. Large firms with absent blockholder ownership, board gender diversity, and board independence achieve high ESG performance even with high financial leverage (Figure 8). This reflects that larger firms have greater visibility and accountability to stakeholders (Manetti & Toccafondi, 2012). The inclusion of board independence and gender diversity aligns with institutional logics, prioritizing inclusivity and transparency (Arayssi et al., 2020).

Table 4 summarizes how different governance configurations translate into specific strategic actions. In summary, the SSI framework advances megaproject sustainability theory by

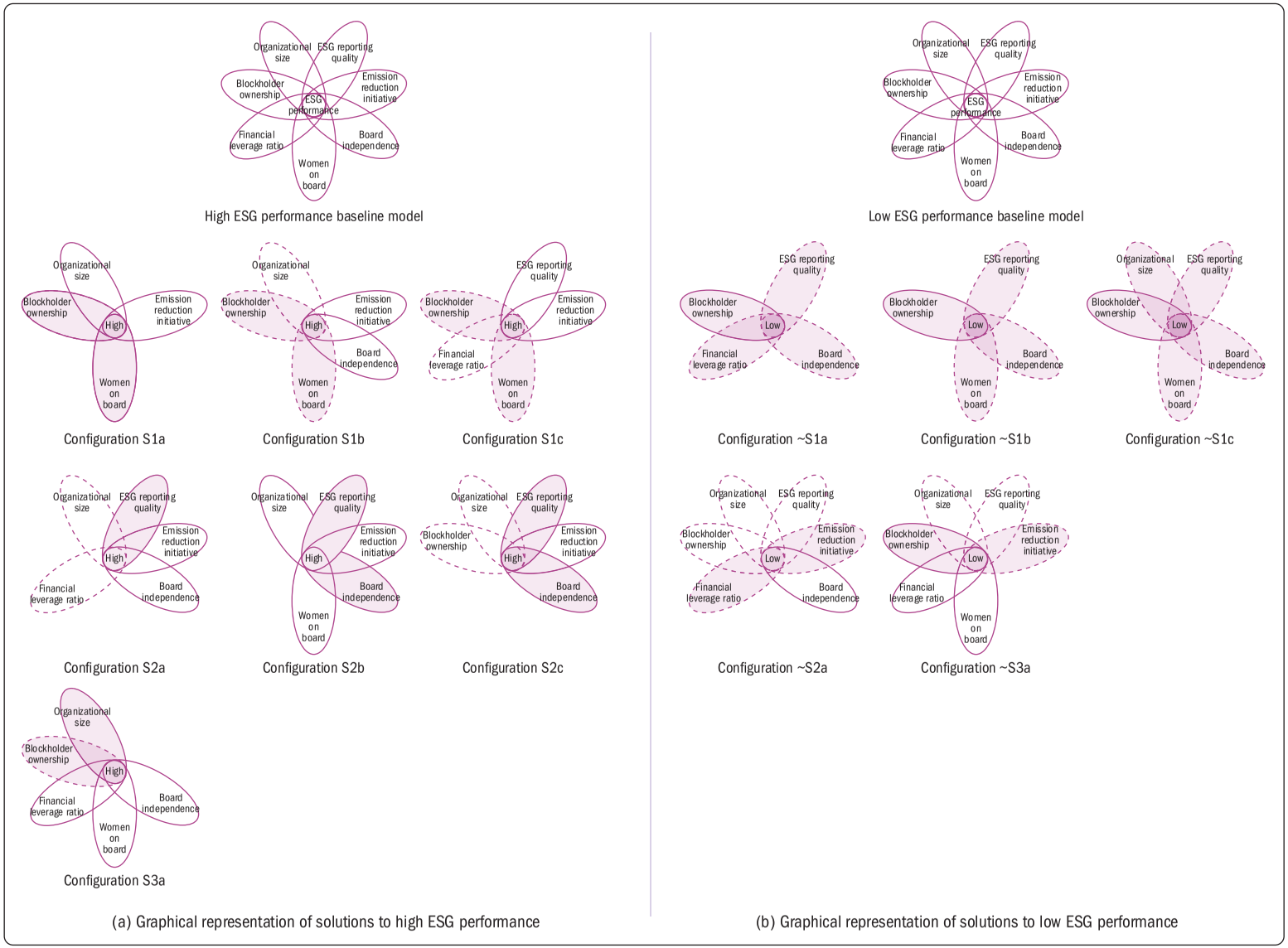


Figure 8. Graphical representation of solutions to ESG performance.

Table 4. OLS Regression With Clustered Standard Errors—DiD Results

Variable	Coefficient	Std. Error	z	*p* value
treated_post	0.423	0.070	6.043	0.000
log_Total_Assets_std	0.4848	0.037	13.034	0.000
ROE_std	0.0097	0.012	0.793	0.428
log_Maturity_std	0.1257	0.038	3.314	0.001
Macro_PC1	0.0649	0.035	1.838	0.066

demonstrating how configurational governance connects the dual imperatives of sustainability of and by megaprojects (Martens & Carvalho, 2017; Rokio et al., 2024). The framework bridges the gap between the episodic nature of projects and the systemic continuity essential for sustainability transitions. The findings establish that the missing link is not better frameworks, but better mechanisms for translating framework requirements into project-level understanding, ownership, and action.

Results and Discussion for Research Task 4

Research Task 4 extends the research scope to frontier technology domains, examining how digital transformation enables megaproject ESG performance in different institutional contexts (Figure 9).

For Hypothesis 1, the PanelOLS model with firm and year fixed effects shows that lagged digital transformation has a small but significant positive effect on ESG performance ($\beta = 0.0358$, $p = 0.023$). This indicates that improvements in digital transformation (DT) in previous periods are associated with higher ESG performance. Enterprise size is a strong positive predictor ($\beta = 0.0858$, $p < 0.001$).

The DiD model further validates the causal interpretation: The treated post indicator is a strong positive predictor ($\beta = 0.423$, $p < 0.001$), indicating a significant increase in ESG scores following digital transformation indicators (DTI) adoption. The event study supports the parallel trends assumption, with pretreatment coefficients statistically insignificant and close to zero, while posttreatment effects turn positive (Figure 10).

In summary, DT has a causal and positive effect on overall ESG performance of megaproject enterprises, confirmed by panel fixed effects, DiD, and event study designs. From a

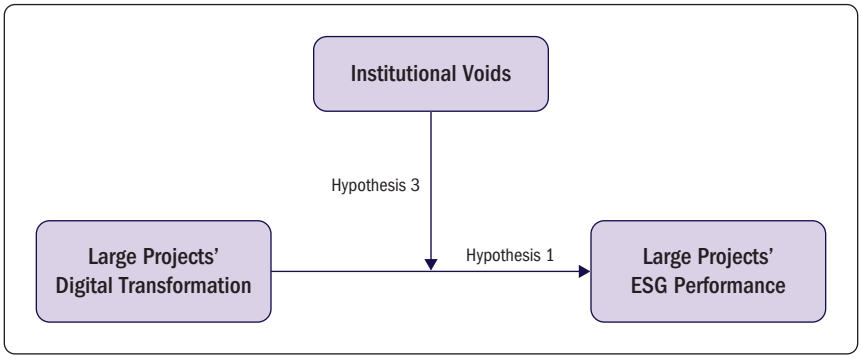


Figure 9. Research framework.

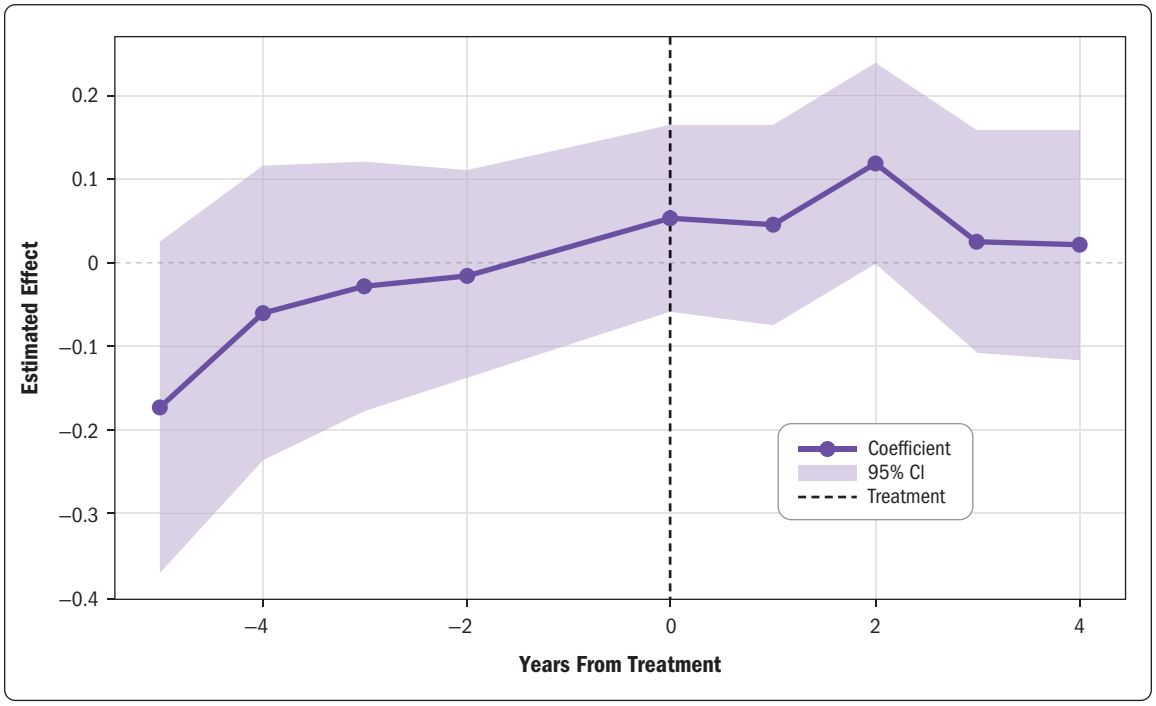


Figure 10. Event study/dynamic DiD plot.

resource-based view perspective, digital resources—such as advanced data systems, process automation, and analytics—are valuable, rare, and difficult-to-imitate assets that enable enterprises to develop unique ESG capabilities (Table 5).

For Hypothesis 2, error correction models show that DT investments drive rapid improvements in environmental (β = 0.099, $p < 0.001$) and social (β = 0.087, $p < 0.001$) outcomes for megaproject enterprises, but governance effects are not significant in the short run (β = 0.028, $p = 0.216$). All pillars show significant long-run adjustment toward equilibrium.

First, DT has a causal and positive effect on overall ESG performance of megaproject enterprises, confirmed by panel fixed effects, DiD, and event study designs. Second, pillar-specific effects vary by country context: For developed countries, DT primarily drives environmental and social improvements; for developing countries, DT has its greatest impact on governance. Third, institutional quality does not directly explain cross-country differences, but improvements in institutional quality yield greater ESG gains for developing countries. Fourth, the positive effect of DT on ESG does not significantly depend on

Table 5. Error-Correction Model Estimates by Pillar

Pillar	DTI_diff Coef.	DTI_diff *p* value	EC Lag Coef.	EC Lag *p* value
Environmental	0.099	<0.001	−0.236	<0.001
Social	0.087	<0.001	−0.225	<0.001
Governance	0.028	0.216	−0.132	0.048

institutional quality. In essence, digital transformation and institutional quality function as dual enablers of ESG performance for large projects: DT provides the technological capability for improvement, whereas institutional quality creates the enabling environment that allows such improvements to materialize most effectively—particularly for enterprises operating in developing countries where institutional gaps are largest.

Practical Applications of Findings

Megaprojects are increasingly expected to deliver not only infrastructure, but also environmental, social, and economic value. As a result, project success is expanding beyond the traditional "iron triangle" toward long-term value creation. The findings of this research suggest several practical implications for the future of project management.

Move From ESG Reporting to ESG Governance

Many organizations have established mature ESG reporting systems, yet reporting alone rarely changes project delivery. This research shows that ESG performance depends on whether management practices of senior executives or project management offices translate organizational sustainability commitments into project-level decisions and day-to-day execution. Rather than viewing ESG as an annual reporting exercise, organizations should embed ESG into governance structures, project controls, procurement strategies, and operational decision-making throughout the project life cycle. High megaproject ESG performance relies on embedding sustainability directly into daily decision-making, procurement, and project controls.

Example: Instead of auditing ESG metrics once a year, incorporate real-time ESG KPIs into weekly project review meetings and tie subcontractor progress payments to safety and carbon-reduction milestones.

Integrate Governance Systems Rather Than Implementing Isolated ESG Initiatives

Organizations often introduce individual governance practices, such as ESG committees, reporting requirements, or board reforms, expecting each initiative to improve sustainability performance. The configurational findings demonstrate that these mechanisms create value only when they operate as complementary governance systems. Project owners should therefore design integrated governance architectures in which organizational structures, strategic priorities, and implementation mechanisms reinforce one another.

Example: Pair a board-level social and labor rights steering committee with mandatory project-level fair wage and safety auditing tools, and publish transparent, verified site-level carbon disclosure reports.

Build Governance That Fits the Project Rather Than Copying Good Practices

The study identifies multiple governance configurations that achieve similarly high ESG performance. There is therefore no universal governance model applicable to every megaproject. Rather than adopting off-the-shelf solutions, project organizations should treat relevant good practices merely as a baseline starting point. Achieving effective ESG

performance requires an explicit design process that actively tailors and adapts these foundational practices to the project's specific ownership structures, organizational capabilities, institutional environments, and resource constraints. Ultimately, successful governance stems from continuous contextual adaptation rather than the passive implementation of standardized ESG templates.

Example: A public–private partnership (PPP) megaproject in a highly regulated region should prioritize joint risk-sharing governance, whereas a private-led energy transition project might adopt digital-enabled supply-chain management measures.

Use Digital Technologies to Strengthen Governance

Digital transformation provides unprecedented opportunities for improving transparency, monitoring ESG performance, and coordinating project participants. However, technology alone does not improve sustainability outcomes. Digital platforms, AI, BIM, digital twins, and analytics create value only when governance mechanisms enable project teams to transform data into coordinated decisions and organizational learning. Digital investment should therefore be accompanied by governance investment.

Example: Deploying an Internet of Things (IoT)–based carbon tracking platform is only effective if the governance framework clearly assigns cross-organizational accountability for acting on real-time emission issues.

Develop Project Managers as Ecosystem Governors Rather Than Project Controllers

The future role of project managers extends beyond managing scope, schedule, and cost. ESG performance increasingly depends on coordinating multiple organizations whose decisions collectively influence project outcomes. Future project professionals will therefore require competencies in governance design, stakeholder orchestration, sustainability leadership, and digital collaboration. Managing individual projects is gradually evolving into governing interconnected project ecosystems.

Example: Implement collaborative contracting models where project managers facilitate multiparty risk/reward sharing rather than managing strict transactional boundaries.

Redefine Project Success Beyond the Iron Triangle Toward Life Cycle Value Creation

The findings reinforce a broader transformation within the project management profession. Modern project management increasingly moves beyond the traditional "iron triangle" of time, cost, and scope, evaluating success by whether a project delivers lasting value that outweighs its required effort and financial investment. Future megaprojects will increasingly be evaluated by their ability to generate lasting environmental, social, economic, and governance value alongside traditional delivery performance. This requires governance systems capable of balancing short-term project objectives with long-term societal outcomes throughout the asset life cycle.

Example: Establish postproject social impact evaluation frameworks and long-term community legacy funds built into the initial project charter and funding agreement.

Pursue Project ESG Certification to Drive Competitive Advantage

Organizations should actively pursue independent ESG performance certifications for their megaprojects rather than relying solely on internal disclosures. Certification establishes standardized third-party benchmarks that make sustainability outcomes quantifiable and directly comparable across different projects. By validating megaproject ESG performance through recognized certification frameworks, project owners and contractors transform sustainability from a cost center into a core value proposition, whereby enhancing brand reputation and securing a distinct competitive advantage in future tenders where green public procurement and sustainability certifications are key evaluation criteria.

Example: A regional infrastructure authority might require all contractors to aim for a project-level ESG certification during delivery. By embedding these benchmarked criteria into the tender process, bidding consortiums leverage their certified construction and community engagement records to win future public infrastructure contracts, while the completed rail asset receives a recognized sustainability rating that unlocks green bond financing potential.

Extend Policy Focus From Firm-Level Compliance to Project-Level Compliance for Broad Societal Value

Beyond project practitioners, the findings offer critical implications for policymakers aiming to maximize long-term societal benefits from major infrastructure investments. Since megaproject ESG performance relies heavily on multiorganizational collaboration and governance-technology synergies rather than standardized compliance, policies should move away from rigid, one-size-fits-all reporting mandates. Policymakers should instead design supportive institutional frameworks (e.g., cross-organizational ESG data sharing standards, green public procurement incentives) that reduce institutional decoupling and bridge the cognitive gap between strategic regulation and project-level execution. By fostering an enabling regulatory ecosystem that aligns institutional quality with digital infrastructure, governments can ensure that megaprojects contribute to broader socioecological welfare beyond the boundary of individual project delivery.

Example: A transport ministry updates its infrastructure regulations to mandate project-level ESG frameworks for major public builds. Rather than relying on static corporate disclosures, the policy embeds balanced ESG levers directly into public procurement and contract management: procurement scoring bonuses for low-carbon materials (E), contractually mandated local workforce hiring quotas and community welfare protection (S), and standardized cross-organizational data protocols to ensure supply-chain transparency and joint risk-sharing (G). By tying these verifiable metrics to existing stage-gate payment milestones rather than creating complex new administrative layers, regulators gain a practical, enforceable mechanism to align megaproject delivery with national sustainability goals

Leverage Project Delivery as the Primary Engine to Realize ESG Ambitions

Governments and organizations should actively leverage the project delivery phase as the primary operational vehicle for realizing ESG goals, rather than treating delivery as a purely technical or cost-driven execution stage. Project delivery encompasses the physical construction site, multitier supply chain interactions, and direct community touchpoints

where real environmental and social impacts actually occur. By embedding ESG elements directly into daily site operations, project owners and contractors bridge the gap between high-level corporate reporting and field-level execution and materialize their ESG goals.

Example: A national rail authority can mandate joint-venture contractors to integrate electric heavy machinery and low-carbon materials directly into their daily site delivery schedules.

Ultimately, this research supports the vision of PMI of advancing project management as a profession that positively impacts society. The future of project management will not be defined simply by delivering projects more efficiently, but by governing complex project ecosystems that consistently create sustainable value for organizations, communities, and future generations.

What Should Project Leaders Do Next?

- **Conduct an ESG governance audit**: Assess whether your current ESG efforts are isolated initiatives or integrated governance mechanisms, and possibly have your projects certified by project-specific ESG standards.
- **Define life cycle value metrics**: Based on the strategic goal of your (next) project, establish multidimensional success criteria that extend beyond the handover date to include socioenvironmental goals extending more than 10 years into the future.
- **Tailor the governance fit**: Map local institutional regulations and stakeholder expectations to design a project-specific ESG governance framework.
- **Empower digital-governance synergies**: Pair digital transformation investments (building information modeling [BIM], analytics) with clear decision-making protocols to ensure data leads to action.
- **Upskill project teams**: Train project managers and team members about ESG, allowing them to understand megaproject ecosystem, stakeholder orchestration, and cross-organizational collaboration.
- **Establish feedback loops**: Use project-level ESG data to continuously refine corporate-level sustainability strategies and, in turn, reimprove project-level performance.
- **Share cross-projects learnings**: Engage in industry-wide data sharing to reduce cognitive gaps and raise baseline standards across the megaproject sector.

Implications for Future Research

While this study provides actionable insights into the interplay among governance, technology, and ESG integration, several promising avenues exist for future scholarly inquiry. First, longitudinal studies covering the operational and decommissioning phases of megaprojects are needed to evaluate whether early-stage ESG governance practices translate into sustained long-term societal and environmental outcomes. Second, future research could conduct cross-contextual comparative analyses across different institutional frameworks and infrastructure sectors to assess the generalizability of these findings. Third, as emerging technologies, such as generative AI (GenAI), rapidly mature, researchers should investigate how automated data validation and decentralized governance structures can further mitigate institutional decoupling, enhance transparent reporting, streamlining

interorganizational collaborations and prevent greenwashing in complex megaproject networks. Finally, in response to growing political backlash, greenwashing concerns, and the corporate shift away from ESG, researchers should investigate how high megaproject ESG performance can be pursued in a verifiable, ROI-sensitive way rather than symbolic manner.

Conclusion

This study advances the understanding of ESG performance in megaprojects by shifting attention from corporate-centered ESG toward an interorganizational project governance perspective. Rather than treating ESG as a reporting exercise, the research demonstrates that successful ESG performance emerges from the interaction among governance structures, organizational strategies, implementation capabilities, and digital transformation.

Through a mixed-method research design combining systematic literature review, qualitative case studies, configurational analysis, and causal inference, the study develops a comprehensive explanation of how governance designs influence megaproject ESG performance. The proposed ESG framework expands the conceptual boundaries of project ESG, whereas the institutional decoupling perspective explains why ESG implementation often falls short of organizational intentions. The SSI governance framework further reveals that multiple governance configurations can produce high ESG performance, emphasizing the importance of organizational fit rather than universal governance solutions.

Beyond its theoretical contributions, this research offers practical guidance for improving sustainability governance across the megaproject life cycle. By integrating governance reforms with digital transformation and reducing the gap between organizational commitments and project execution, project organizations can strengthen their capacity to deliver sustainable infrastructure that creates long-term environmental, social, economic, and governance value.

Overall, this research contributes to the growing transition from managing projects for successful delivery toward governing megaprojects for sustainable value creation, providing both researchers and practitioners with an integrated framework for advancing ESG performance in complex project environments.

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Appendix: List of Publications and Presentations

Environmental, social, governance of megaprojects: A systematic literature review, EURAM, Linzhuo Wang, June 2024, University of Bath

Developing an economic, environmental, social and governance (E-ESG) framework for sustainable infrastructure delivery

Unpacking challenges in megaproject ESG performance: A governance perspective

Balancing organizational settings, ESG strategies and ESG reporting: A fuzzy-set qualitative comparative analysis of megaproject ESG performance

Causal effects of digital transformation on ESG performance: Evidence from project-based industry

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