

Article

Political Factors Affecting Corporate Sustainability Decisions: The Impact of Tariffs and Corruption on Adoption of UN Global Compact Principles

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Abstract

The global construction industry faces significant environmental and social sustainability challenges that hinder its alignment with the United Nations Sustainable Development Goals (SDGs). This study investigates the impact of country-level corruption and trade tariffs, and the moderating role of Intellectual Property Rights (IPR) protection, on construction firm SDG engagement. A quantitative analysis was conducted using an original dataset of 195 observations of construction firms across 31 countries collected from 2003 to 2022, with SDG engagement scores derived from public sources and country and institutional data from the World Bank and the Heritage Foundation. Ordinal logistic regression tested the direct and moderated effects of corruption, tariffs, and IPR on SDG engagement, controlling for other variables. The findings reveal that higher perceived home-country corruption and higher home-country tariffs are significantly and negatively associated with company SDG engagement scores. Stronger home-country IPR protection was found to weaken the negative impact of corruption and enhance the positive effects of lower tariffs on SDG engagement. Finally, the results highlight that institutional environments have a critical role in shaping firms' sustainability actions, suggesting that effective governance, an open trade perspective, and intellectual property protection are key enablers of corporate SDG alignment. These findings contribute to the literature by providing evidence of how institutional quality can foster responsible business strategies in the construction industry and offer practical insights for policymakers seeking to reduce barriers to sustainable development.

Keywords: construction industry; sustainability; Sustainable Development Goals (SDGs); institutional theory; corruption; trade tariffs; intellectual property rights; governance



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1. Introduction

1.1. The Construction Industry: A Complex Engine of Economics and Societal Development

The international construction industry stands as a cornerstone of the global economy and a fundamental engine for societal development. Its activities underpin virtually every aspect of modern life, providing the essential physical infrastructure, including buildings, transportation networks, energy systems, and water sanitation facilities, that enables communities to function and economies to thrive [1]. The industry represents a significant portion of global Gross Domestic Product (GDP), often estimated between 5 percent and

7 percent globally [2], and employs millions worldwide [1]. Investment in construction often serves as a key governmental tool for economic stimulus and national development strategies [3].

However, this immense scale and economic vitality come at a considerable environmental cost. The construction sector is among the world's largest consumers of raw materials, responsible for extracting and processing vast quantities of minerals, timber, water, and aggregates [4]. Globally, buildings and construction activities account for approximately 36 to 40 percent of final energy use and nearly 40 percent of energy-related carbon dioxide (CO₂) emissions [5]. The manufacturing of key materials like steel, cement, and glass contributes significantly to this footprint [6]. Furthermore, the industry generates substantial waste streams, with construction and demolition waste (CDW) accounting for roughly one-third of all waste in the European Union and exceeding double the municipal solid waste generated in the United States [7,8]. Excessive water consumption at construction sites also poses a growing concern, particularly in regions facing water scarcity [9].

Beyond the tangible environmental footprint, the construction industry's social dimension is equally complex and challenging. While providing critical infrastructure and employment, the sector is frequently plagued by issues that run counter to sustainable development principles. The industry has an ignominious reputation as being among the most corrupt sectors globally [10,11], with corrupt practices potentially accounting for between 10 and 35 percent of project costs [1]. Furthermore, the industry grapples with significant social sustainability challenges. These include poor health and safety records in many regions [12], precarious employment conditions, human rights abuses such as modern slavery within complex supply chains [13], and often inadequate community engagement [14,15]. Project-based work, fragmentation, complex multi-stakeholder relationships, and extensive global supply chains create inherent difficulties in implementing consistent and effective sustainability and governance practices [1].

The consequences of weak governance and corruption were evident in the February 2023 earthquakes in Turkey and Syria. Thousands of buildings collapsed, resulting in more than 50,000 deaths [16]. Post-disaster analyses highlighted systemic failures. Lax enforcement of building codes and the reported practice of "construction amnesties" that legalized non-compliant structures were often linked to corrupt practices involving contractors and local authorities [1]. This event underscores how failures in governance allow bad actors to prioritize profit over safety and compliance, compromising essential infrastructure and leading to loss of life.

Additionally, social sustainability remains a significant area of concern. Issues such as inadequate health and safety standards [17], the vulnerability of supply chains to human rights abuses like modern slavery [18], and insufficient engagement with host communities [19] detract from the industry's social license to operate. Inherent characteristics, such as project complexity, fragmented value chains, and reliance on temporary labor, exacerbate environmental, social, and governance (ESG) challenges, making the pursuit of holistic sustainability a particularly demanding, yet essential, undertaking [20].

The inherent complexities and documented challenges of the construction sector are further amplified by heightened economic volatility, geopolitical instability, rapid technological shifts, and intensifying social and environmental pressures [21]. The construction industry is particularly vulnerable to these disruptive forces. It has long project cycles, significant upfront investments, heavy reliance on global supply chains for materials and labor, sensitivity to regulatory changes, and exposure to resource price fluctuations [22]. Supply chain breakdowns, unexpected inflation [23], geopolitical conflicts impacting material flows or project locations, and the physical impacts of climate change [24] directly threaten project

viability, financial stability, and long-term operational continuity. Navigating this complexity requires proactive and sophisticated strategic responses from industry participants.

1.2. Challenges of Sustainability

In this complex context, embracing sustainability and cultivating organizational resilience have emerged not merely as ethical considerations or compliance burdens, but also as crucial strategic imperatives for survival and long-term success [25]. Thus, firms that integrate sustainability into their core strategy are often better equipped to anticipate environmental and social risks, adapt their operations, and maintain stability during periods of upheaval.

Engagement with established global sustainability frameworks, such as the United Nations Global Compact (UNGC) and the Sustainable Development Goals (SDGs), represents a key strategic pathway for construction firms seeking to navigate uncertainty and build sustainability performance and resilience [1,26]. The UNGC principles, which include human rights, labor, environment, and anti-corruption, provide a widely recognized platform for responsible business conduct [27]. The SDGs offer specific targets across 17 goals relevant to environmental protection, social equity, and economic prosperity [10,26]. They include SDG 9 (Industry, Innovation, Infrastructure), SDG 11 (Sustainable Cities), SDG 12 (Responsible Consumption/Production), and SDG 13 (Climate Action), all of which are relevant to construction [26,28].

The construction industry has a special position in engaging with these goals, as it directly shapes the built environment and serves as a key actor for sustainable infrastructure development. Its decisions have a massive impact on energy and resource use. For that reason, the sector is a major contributor to environmental challenges and a key driver of sustainable innovation in terms of development of new material, for example. Additionally, given the intrinsic public nature of construction projects, the industry also plays a key role in promoting transparency, integrity, and effective governance, which are essential for achieving the SDGs related to anti-corruption and institutional-strengthening goals.

1.3. Institutional Contexts and Sustainability

While firms develop strategies to cope with uncertainty and engage with sustainability imperatives, they must also contend with the institutional context of the countries in which they operate [29,30]. Institutional theory posits that organizations conform to the formal rules (laws, regulations, policies) and informal constraints (norms, cultures, ethics) of their environment to gain legitimacy, resources, and stability [31,32]. For multinational construction firms operating across diverse national contexts, understanding and navigating these varying institutional landscapes is critical for strategic decision-making, including the extent to which they align with global sustainability frameworks like the UN SDGs. Therefore, analyzing how specific country-level institutional factors influence SDG engagement is essential for a deeper understanding of the drivers and barriers to sustainability adoption in this sector.

This study focuses on two particularly salient country-level institutional factors known to significantly impact international business operations and strategic choices: corruption and trade policy, particularly tariffs. Corruption, defined as the abuse of public power for private gain [33,34], acts as a powerful informal institutional constraint. As previously noted, the construction sector is exceptionally prone to corruption [10]. Barkemeyer et al. [35] note that “firms have little choice over locations; they have to go where the respective resources are. Such geographic luck provides rent-seeking corrupt governments with the upper hand...” which can increase operational costs and uncertainty, distort resource allocation, and undermine trust [11]. Such an environment is likely to disincen-

tivize firms from undertaking costly, transparent, and long-term commitments to SDG engagement and similar initiatives, potentially leading to lower levels of alignment with global sustainability goals.

Tariffs representing formal trade barriers imposed by governments, constitute a critical aspect of the formal institutional environment. Trade policy directly influences the cost of imported goods, access to international markets and technologies, and the overall ease of participating in global value chains [36]. High tariffs can restrict access to sustainable technologies or materials, increase project costs, and potentially limit the international collaboration often necessary for achieving SDGs.

Furthermore, the influence of these primary institutional factors may not be uniform across all contexts. Intellectual Property Rights (IPR) Protection, another key formal institution, can act as a crucial moderating variable. Strong IPR protection signals a more stable and predictable regulatory environment, potentially fostering innovation and long-term investment [37]. It is plausible that robust IPR frameworks could buffer firms against some negative impacts of corruption by securing other competitive advantages, or potentially enhance the benefits of lower tariffs by enabling firms to better leverage innovative sustainable solutions developed in-house or accessed through trade. Understanding how IPR protection interacts with corruption and tariffs can thus provide a more nuanced picture of how the institutional configuration of a country shapes strategic engagement with global sustainability goals.

To empirically test these theoretical links, we conducted a quantitative cross-country approach study using logistic regression models based on a dataset of 195 observations of construction companies across 31 countries collected from 2003 to 2022. This methodological approach enables a rigorous assessment of both the direct and moderating institutional effects on corporate SDG engagement.

As indicated above, the main objective of this empirical research is to understand how home-country corruption and tariffs influence construction firms' sustainable performance with the Sustainable Development Goals (SDGs), and to evaluate the moderating role of Intellectual Property Rights (IPR) protection in these links. By focusing on the construction sector, this investigation aims to advance understanding of how institutional quality influences corporate sustainability performance worldwide. This research is key because it provides policy insights into how corruption, trade openness, and intellectual property can jointly foster more sustainable practices in a high-impact global industry.

2. Analytical Framework

2.1. United Nations Sustainability Framework

Launched in 2000, the United Nations Global Compact encourages businesses worldwide to adopt sustainable and socially responsible policies based on ten universally accepted principles covering human rights, labor, environment, and anti-corruption. Complementing the UNGC, the 17 SDGs, adopted by UN Member States in 2015 as part of the 2030 Agenda for Sustainable Development, provide a comprehensive blueprint for global prosperity, peace, and environmental protection [38].

Initially aimed at countries, the SDGs increasingly serve as a strategic framework for businesses to align their operations and contributions with global priorities [39]. The construction industry in particular plays an important role in nearly all the SDGs [26]. For instance, Ferreira et al. [40] found that several Sustainable Development Goals directly intersect with the Brazilian construction industry. Specifically, SDG 9 (Industry, Innovation, and Infrastructure) is positively impacted, while SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action)

are negatively impacted. Engagement with these goals signals a firm's intent to contribute positively to sustainable development challenges relevant to its operational sphere.

Given the voluntary nature of corporate sustainability initiatives, assessing genuine commitment can be challenging. However, a firm's formal engagement with frameworks like the UNGC and its public alignment with the SDGs offer a measurable proxy for its strategic commitment to internationally recognized sustainability norms. Different levels of engagement exist, ranging from formal participation in the UNGC (requiring reporting and fees) to independent adoption and reporting on specific SDGs [1]. Analyzing these varying levels of engagement across a large sample of firms allows for a quantitative assessment of how deeply embedded these global sustainability principles appear to be within corporate strategies, particularly in response to different institutional environments.

Critics of these measures highlight that participation in initiatives like the UNGC lacks rigorous verification mechanisms, potentially allowing firms to engage symbolically, thereby greenwashing their activities without significant operational change [1]. Companies might selectively report on favorable SDGs ("cherry-picking") while ignoring more challenging areas [41]. Despite these concerns, the level of formal engagement remains a valuable, publicly available indicator of a firm's stated strategic priorities and its willingness to align with the global sustainability discourse, providing a quantifiable basis for analyzing influences on these strategic choices. This study utilizes a nuanced measure of SDG engagement, recognizing these limitations while leveraging the indicator's utility for large-scale comparative analysis.

It is also important to recognize that firms are profoundly shaped by the institutional context of the countries in which they operate [29,30]. Institutional theory posits that organizations conform to the formal rules (laws, regulations, policies) and informal constraints (norms, cultures, ethics) of their environment to gain legitimacy, resources, and stability [31,32]. For multinational construction firms operating across diverse national contexts, understanding and navigating diverse institutional landscapes is critical for strategic decision-making, including their alignment with global sustainability frameworks like the UN SDGs. Therefore, analyzing how specific country-level institutional factors influence firms' SDG engagement is essential for a deeper understanding of the drivers and barriers to sustainability adoption in this sector.

2.2. Institutional Dimensions: Corruption, Tariffs, and Intellectual Property Rights

Building on the established importance of the construction industry, its inherent challenges, and the strategic relevance of sustainability engagement via frameworks like the UNGC and SDGs, this study focuses on the critical influence of the national institutional context. While internal firm strategies are vital, external institutional environments significantly mediate how companies, particularly multinationals, perceive risks and opportunities and ultimately shape their strategic responses, including their level of SDG engagement [29,30,32].

Consequently, this research quantitatively investigates the influence of specific country-level institutional factors on construction firms' measured engagement with the UN SDGs. Drawing from the documented susceptibility of the sector to governance failures and its operation within global markets [1,10], we focus on three key institutional dimensions.

Corruption: The prevailing level of perceived corruption within a country, representing a critical informal institutional constraint that likely impacts the feasibility and attractiveness of transparent, long-term sustainability commitments.

Tariffs: The level of trade tariffs, acting as a formal institutional barrier or facilitator influencing international operations, costs, and potentially the adoption of globally oriented sustainability practices.

Intellectual Property Rights (IPR) Protection: As a key formal institution reflecting regulatory quality and support for innovation [37], the strength of IPR protection may alter how firms respond to the pressures of corruption or the constraints and opportunities presented by tariffs when determining their level of SDG engagement.

2.3. 4Cs Framework of Strategic Responses to Global Governance

While institutional factors exert significant pressure, firms also exhibit distinct strategic orientations in response to global governance pressures and sustainability expectations. To better understand the potential underlying logic behind varying firm responses to institutional contexts, this study draws conceptually upon the 4Cs framework of strategic responses to global governance [1,21]. This framework categorizes firms based on two dimensions: their relationship orientation towards global governance institutions (Collaborative vs. Combative) and their temporal orientation towards addressing global issues (Proactive vs. Reactive). This results in four archetypes: Collaborators (proactive, collaborative), Compliers (reactive, collaborative), Counteractors (reactive, combative), and Combatants (proactive, combative) [1].

It is important to emphasize that this paper does not empirically classify firms into these 4Cs categories. Instead, the framework serves as a valuable theoretical lens through which to interpret the quantitative findings regarding SDG engagement scores. It helps conceptualize the different underlying strategic postures that firms might adopt when facing specific institutional configurations. For instance, a high measured SDG engagement score (our quantitative dependent variable) might reflect an underlying proactive and collaborative (Collaborator) orientation, while a very low score, particularly in a high-corruption environment, might suggest an underlying combative and reactive (Counteractor) logic, even if not explicitly measured as such here.

By using the 4Cs framework conceptually, we can better understand why certain institutional factors, such as high levels of perceived corruption or restrictive tariffs, might correlate with lower average SDG engagement scores. These institutional pressures may foster environments where reactive or combative strategic orientations become more prevalent or rational for firms, leading them to minimize costly engagement with global norms like the SDGs. Conversely, supportive institutional contexts might enable or encourage proactive, collaborative orientations, reflected in higher SDG engagement levels. This lens provides a richer theoretical backdrop for interpreting the statistical relationships between national institutions and firms' strategic sustainability engagement within the global construction industry.

3. Research Questions and Contribution

Building on the established relevance in international business of a country's level of corruption, trade policy, and intellectual property rights, and leveraging a firm's UN SDG engagement score as a measurable proxy for strategic commitment, this research addresses the following core questions:

Research Question 1 (RQ1): How do home country corruption and tariffs influence construction firms engagement with UN SDGs, as measured by their UN SDG scores?

Research Question 2 (RQ2): How does the strength of home country Intellectual Property Rights (IPR) protection moderate the relationship between (a) home country corruption and firms' UN SDG engagement scores, and (b) home country tariffs and firms' UN SDG engagement scores?

Research Question 3 (RQ3): Based on the empirical findings for RQ1 and RQ2, what are the implications of these key institutional factors for promoting sustainability and potentially enhancing resilience within the global construction industry?

The primary objective is thus to empirically test the direct and moderated effects of perceived corruption, trade tariffs, and IPR protection on the degree to which construction firms align with the UN SDG framework. By answering these questions, this study seeks to provide concrete evidence on how national institutions facilitate or impede corporate engagement with global sustainability norms in the construction sector. The findings aim to contribute actionable insights for both policymakers seeking to foster sustainable development and industry leaders navigating complex global operating environments. Such insights could ultimately inform efforts to build a more sustainable and resilient construction industry worldwide.

Previous studies have explored the relationship of national institutional variables with various aspects of corporate sustainability activity. The new contributions of this study include:

- Testing the moderating relationship of intellectual property rights protection between two institutional variables (corruption and tariffs) and corporate sustainability actions.
- Utilizing an objective measure of corporate sustainability activity (engagement with the UN's SDGs) as opposed to typical subjective measures.
- Focusing on the international construction industry, a sector with high socioeconomic and sustainability impact.

4. Literature Review

4.1. Sustainability, SDGs, and the Construction Industry: Navigating Drivers and Barriers

The critical need for improving sustainability within the global construction industry is well-established, stemming from its significant environmental, social, and economic impacts outlined previously. The United Nations Sustainable Development Goals provide a comprehensive, internationally recognized framework for guiding industries towards practices that balance economic development with environmental protection and social equity [26,38]. As noted above, several SDGs directly engage the core activities and responsibilities of the construction sector [26]. The successful pursuit of these goals globally is thus intrinsically linked to the trajectory of the construction sector.

Despite the clear relevance of the SDGs and the broader sustainability agenda, adoption within the construction sector is influenced by a complex interplay of driving forces and persistent barriers. Key drivers pushing firms towards more sustainable practices include increasing regulatory pressures and government policies in many regions [42], growing awareness and expectations from diverse stakeholders such as clients, investors, employees, and communities [43], and the pursuit of potential competitive advantages, including enhanced reputation, cost savings through resource efficiency, and improved financial performance [44]. Furthermore, ethical considerations and committed leadership can play a significant role in embedding sustainability within corporate culture and strategy [45]. Some firms recognize sustainability not just as risk mitigation but as integral to long-term value creation and resilience [46].

Conversely, significant barriers continue to impede widespread and deep adoption of sustainability principles and SDG alignment. High perceived or actual costs associated with sustainable technologies and practices, coupled with a predominant short-term focus on project budgets and timelines, remain major obstacles [47]. A lack of awareness, knowledge, and expertise regarding specific sustainability measures, SDG frameworks, and reliable performance metrics hinders effective implementation, particularly among smaller firms or in certain regions [48]. The fragmented nature of the industry, characterized by complex supply chains and numerous specialized actors, complicates coordination and the consistent application of standards [49]. Moreover, weak regulatory enforcement in some jurisdictions reduces the incentive for compliance, while pervasive issues like corruption

can actively undermine efforts towards transparency and responsible practices [10,35]. These competing forces create a challenging landscape for construction firms seeking to meaningfully integrate sustainability and contribute effectively to the SDGs.

4.2. Institutional Theory, Global Governance, and Firm Strategy

To understand why construction firms might vary in their engagement with global sustainability initiatives like the SDGs, depending on their operating environment, we turn to Institutional Theory [30,32]. This theoretical perspective emphasizes that organizations do not operate in isolation but are embedded within complex institutional fields composed of formal rules and informal constraints that shape their behavior and strategic choices [31]. Formal institutions include laws, regulations, and policies (such as trade tariffs or IPR protection laws), while informal institutions encompass norms, values, cultural expectations, and prevalent ethical standards (such as the accepted level of corruption or societal views on environmental responsibility).

Organizations, particularly multinational enterprises operating across different countries, constantly navigate these diverse institutional pressures [29]. Conformity with prevailing institutions is often necessary to gain and maintain legitimacy, namely that an organization's actions are perceived to be desirable, proper, or appropriate within a given social system [50]. Legitimacy, in turn, facilitates access to critical resources, enhances stakeholder support, and contributes to organizational survival and success [32]. Consequently, firms often adopt structures, practices, and strategies that align with the institutional demands of their environment [51]. This practice sometimes leads to isomorphism, where organizations within a field become increasingly similar [31].

The decision of a construction firm to engage (or not engage) significantly with the UN SDGs can thus be interpreted as a strategic response shaped by these institutional forces. The global governance landscape, which includes frameworks like the UNGC and SDGs, represents a growing set of normative and, increasingly, regulatory pressures influencing corporate behavior [1]. Firms may engage with these frameworks for various reasons: to signal their alignment with global norms, enhance their legitimacy with international stakeholders (investors, global clients, NGOs), respond to isomorphic pressures from competitors, or genuinely integrate these principles as part of a long-term strategy for navigating complex global challenges [39]. However, the strength and nature of the specific national institutional context will significantly influence the perceived costs, benefits, and risks associated with such engagement. These circumstances, including the effectiveness of formal regulations, the pervasiveness of informal norms like corruption, and the overall stability of the operating environment, ultimately shape the level of SDG alignment.

4.3. Corruption as an Institutional Constraint on Sustainability Engagement

Within the institutional framework, informal constraints like pervasive corruption present a significant challenge to firms seeking legitimacy and operational stability. Research has found that corrupt environments negatively affect firms' engagement in corporate social responsibility [52–56].

As established earlier, the construction industry is particularly susceptible to corruption across various phases, from planning and procurement to execution and maintenance [1,10,11,35]. The normalization or expectation of corrupt practices fundamentally alters the strategic landscape for construction firms operating within such environments.

Beyond inflating direct project costs, operating in high-corruption contexts inflicts uncertainty, increases operational complexity, and erodes trust among stakeholders [35]. It can divert resources away from productive investments and potentially weaken formal

institutions like regulatory agencies. Such environments often encourage short-term, opaque decision-making rather than long-term, transparent strategic planning.

This institutional pressure directly conflicts with the requirements for meaningful engagement with the Sustainable Development Goals. Deep SDG alignment typically involves significant investment in new technologies or processes, transparent reporting on performance, long-term strategic commitments, and often requires ethical conduct and robust collaboration across supply chains and with diverse stakeholders [39]. These characteristics are fundamentally undermined in environments where corruption is prevalent. Firms may perceive SDG engagement as excessively risky, fearing that the necessary transparency could expose them to extortion or that investments could be jeopardized by unpredictable demands or unfair competition facilitated by corrupt practices [34]. Furthermore, there is evidence suggesting that companies facing higher exposure to corruption are less likely to communicate openly about their anti-corruption efforts or potentially other demanding sustainability initiatives [35].

Therefore, it is expected that a higher perceived level of home country-level corruption, acting as a powerful informal institutional constraint, will negatively influence construction firm willingness or ability to commit resources and strategic focus towards deep engagement with the UN SDG framework.

Hypothesis 1a: *Higher perceived home country-level corruption is negatively associated with a firm's UN SDG engagement score.*

4.4. Trade Policy (Tariffs) as an Institutional Constraint

National trade policy significantly shapes the environment for international business and sustainability engagement. Tariffs, which act as taxes imposed on imported goods, represent a key instrument of trade policy that directly affects the costs, logistics, and strategic calculations of firms operating across borders. Tariffs particularly affect those reliant on global supply chains, including most firms in the construction sector [36].

The primary impact of higher tariffs is an increase in the cost of imported materials, components, and potentially specialized equipment needed for construction projects. This can directly strain project budgets, potentially diverting funds away from discretionary investments [57], including those aimed at achieving higher levels of sustainability or aligning with specific SDG targets. Furthermore, high tariff barriers can limit access to innovative sustainable technologies or materials that may be available only from international suppliers. This limitation can constrain a firm's ability to adopt best practices related to environmental performance [58].

Moreover, restrictive trade policies can hinder the international collaboration often necessary for addressing complex global challenges embedded within the SDGs. Projects related to climate action (SDG 13), cross-border infrastructure (SDG 9), or technology transfer may rely on the relatively free flow of goods, services, and knowledge. Higher tariffs can create friction in these collaborations and signal a more protectionist national stance. This constraint can potentially reduce the incentive for firms headquartered or operating significantly within that country to prioritize alignment with globally oriented norms and goals like the SDGs [58].

Therefore, higher home country-level tariffs, as a formal institutional constraint, are expected to reduce both the capacity (due to increased costs and reduced access) and potentially the strategic incentive for construction firms to pursue deep engagement with the UN SDG framework. This leads to the expectation of a negative association between tariff levels and measured SDG engagement scores.

Hypothesis 2a: *Higher home country-level tariffs are negatively associated with a firm's UN SDG engagement score.*

4.5. The Moderating Role of Intellectual Property Rights Protection

The impact of specific institutional constraints may be contingent on the broader institutional configuration of a country. Intellectual property rights protection ensures legal rights to creators or owners of inventions, literary and artistic works, designs, symbols, names, and images. Such protection provides mechanisms for protecting intangible assets and incentivizing innovation [37]. The robustness of IPR enforcement reflects a country's commitment to protecting investments in knowledge creation and technological advancement [59].

Strong IPR protection is widely considered crucial for fostering innovation, encouraging foreign direct investment (particularly in R&D-intensive sectors), and facilitating technology transfer [60,61]. By securing returns on innovation, robust IPR regimes can enable firms to pursue more complex, long-term competitive strategies that rely on differentiation through unique technologies or processes, rather than solely on cost or potentially illicit advantages [37]. This capacity for innovation and long-term strategic planning is often essential for developing and implementing comprehensive sustainability initiatives and aligning effectively with multifaceted frameworks like the SDGs, which may require novel technological solutions or significant process redesigns [62]. Various studies have found a positive relationship between a country's IPR protection and firms' sustainability activities [63–65].

Considering the interaction with corruption, stronger IPR protection might mitigate the negative influence of a high-corruption environment on SDG engagement in several ways. First, firms operating under strong IPR protection may possess valuable intangible assets that provide a legitimate source of competitive advantage, potentially reducing their perceived need to engage in corrupt practices to secure contracts or navigate bureaucracy. Second, a strong IPR system often reflects the presence of effective governance mechanisms and a functioning rule of law. These provisions can foster greater trust among firms, regardless of perceived corruption levels, by providing reliable legal protections for intellectual property. This environment may enhance confidence to pursue long-term investments in sustainability, secure in the knowledge that their core innovations are protected within a stable institutional framework [57]. In such contexts, the disincentivizing effect of perceived corruption on costly, transparent SDG engagement might be dampened because firms have alternative, protected avenues for value creation and greater faith in institutional stability concerning their key assets. Therefore, we expect the negative impact of corruption on SDG engagement to be less pronounced in countries where IPR is strongly protected.

Hypothesis 1b: *The negative relationship between home country-level corruption perception and a firm's UN SDG engagement score is weaker in countries with stronger IPR protection.*

Hypothesis 2b: *The negative relationship between home country-level tariffs and a firm's UN SDG engagement score is weaker (or the positive effect of lower tariffs is stronger) in countries with stronger IPR protection.*

4.6. Institutional Pressures and Strategic Orientations. A Conceptual 4Cs Interpretation

Conceptually, the 4Cs framework [1,21] helps interpret these hypotheses, as its logic illuminates the strategic orientations shaping firms' responses to institutional effects on SDG engagement.

Hypothesis 1a, predicting a negative relationship between corruption and SDG engagement, aligns with the expectation that highly corrupt environments may foster strategic orientations less conducive to embracing global sustainability norms. Firms facing pervasive corruption might adopt a Counteractor stance (reactive, combative), focusing on navigating illicit demands or even participating in corrupt practices themselves, making costly and transparent SDG initiatives unattractive or unfeasible. Alternatively, firms might adopt a purely reactive Complier stance, doing the bare minimum required by law or immediate pressures, thereby avoiding deep, resource-intensive SDG engagement. Both orientations would manifest quantitatively as lower SDG engagement scores.

The moderating role of IPR protection (Hypothesis 1b) suggests that formal institutions can alter these strategic calculations. In environments with strong IPR, even if corruption perception is high, firms possessing valuable intellectual property may feel more secure in maintaining their legitimate competitive advantages. This security could enable a shift towards a more proactive Collaborator orientation (proactive, collaborative), allowing firms to pursue long-term value creation through sustainability and SDG alignment despite the challenging informal environment. Strong IPR might provide the stability needed to offset the risks associated with corruption, thus weakening the negative correlation between corruption and SDG scores.

Similarly, Hypothesis 2a, linking higher tariffs to lower SDG engagement, resonates with the potential for resource constraints or protectionist pressures to encourage reactive strategies. High tariffs increase costs and limit access, potentially forcing firms into a Complier stance focused solely on core operations and cost management, with little capacity for proactive SDG integration.

Conversely, the framework implies that supportive institutional contexts would create an environment more conducive to Collaborator or Complier orientations. Such country-level conditions reduce operational risks and costs, facilitate international collaboration and access to innovation, and increase the legitimacy gains from aligning with global sustainability norms, potentially resulting in higher SDG engagement scores for firms located in those countries.

5. Methodology

5.1. Sampling and Data Sources

To test our hypotheses, we constructed a unique dataset comprising firm-level observations of 238 construction firms in 31 countries. The data was collected from 2003 to 2022. After dropping observations with missing key variables, the final sample comprises 195 firm-level observations. The data include variables from multiple sources, which enable a comprehensive examination of the relationships posited in this study. Specifically, we utilize data from company websites, public relations reports, and the United Nations' Sustainable Development Goals database. It is important to note that key elements of company data were derived from a manual search of company websites. We only include companies whose main company webpage was available in English so that our research team could effectively and reliably corroborate the data and insights gleaned from this manual search.

To supplement the dataset, we use country-level data from the Culture Factor Group (formerly Hofstede Insights), the World Bank Governance Indicators dataset (WBGi), and the World Bank's Development Indicators (WBDI) dataset. Data from the Culture Factor Group provide valuable analytical tools to measure and account for the impact of culture across borders [66]. This dataset captures six unique dimensions of culture and assigns each country a score for each of the six measures. Within our study, data from the Culture Factor Group is used to capture moderating variables of interest. The data from the WBGi and WBDI has been collected annually for 260 countries for 52 years (1970–2022). Numerous

previous studies have validated the WBGI and WBDI as reliable sources of country-level data to examine cross-country phenomena (e.g., [67,68]).

The integration of these data sources enables the creation of a novel dataset designed to examine the influence of proximity and social consensus on moral decision-making. This analysis is conducted both directly and within the context of two cultural dimensions: the extent to which a society leans towards collectivism versus individualism and the degree to which it is oriented towards indulgence versus restraint. To enhance the robustness of our findings and minimize alternative explanations, we incorporate a range of control variables sourced from the WBGI, WBDI, and the Heritage Foundation.

5.2. Variables and Measures

Variables and measures are provided in Table 1.

Table 1. Variables and Measures.

Variable Name	Description	Value	Source
Firm	Unique indicator of the firm	1 to 238	World Bank Development Indicators
UN SDG Score	Categorical indicator of the level of membership of a firm within the Global Compact Initiative.	0 to 4	United Nations' Global Compact
Corruption	Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Inverted so that a higher score represents more corruption for ease of interpretation.	Continuous	World Bank Governance Indicators
Tariffs	Simple mean applied tariff is the unweighted average of effectively applied rates for all products subject to tariffs calculated for all traded goods.	Continuous	World Bank Development Indicators
IPR Protection	The degree to which intellectual property is protected by the government.	Continuous	Heritage Foundation
Economic Freedom	Economic freedom is the fundamental right of every human to control his or her own labor and property. In an economically free society, individuals are free to work, produce, consume, and invest in any way they please. In economically free societies, governments allow labor, capital, and goods to move freely, and refrain from coercion or constraint of liberty beyond the extent necessary to protect and maintain liberty itself. Based on 12 dimensions of governmental institutions.	Continuous	Heritage Foundation
Government Subsidies	Total amount (in USD) of subsidies, grants, and other social benefits include all unrequited, nonrepayable transfers on current account to private and public enterprises.	Continuous	World Bank Development Indicators
Military Protection	Military expenditures data from SIPRI are derived from the NATO definition, which includes all current and capital expenditures on the armed forces.	Continuous	World Bank Development Indicators
Inflation	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	Continuous	World Bank Development Indicators
IFDI	Foreign direct investment refers to direct investment equity flows in the reporting economy. It is the sum of equity capital, reinvestment of earnings, and other capital	Continuous	World Bank Development Indicators
Unions	A summary index of the degree of centralization of collective bargaining	Continuous	Organization for Economic Cooperation and Development AIAS Database
Government Effectiveness	Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution.	Continuous	World Bank Governance Indicators
Individualism	Individualism is the extent to which people feel independent, as opposed to being interdependent as members of larger wholes.	Continuous	Hofstede
Power Distance	Power Distance is the extent to which the less powerful members of organizations and institutions (like the family) accept and expect that power is distributed unequally.	Continuous	Hofstede
Indulgence	In an indulgent culture it is good to be free. Doing what your impulses want you to do, is good. Friends are important and life makes sense. In a restrained culture, the feeling is that life is hard, and duty, not freedom, is the normal state of being.	Continuous	Hofstede

Dependent Variable. The dependent variable, UN SDG score, captures a firm's progress toward sustainable development as measured by key international benchmarks. This score is an ordinal level variable ranging from 0 to 4 based on the level of compliance that a company demonstrates in aligning with the UN SDGs. The data is publicly available from the United Nations' Global Compact dataset. The higher the level of compliance, the higher the score. The classifications for this variable are as follows: 0 = Non-member, 1 = GC General Member, 2 = GC Learner, 3 = GC Active, and 4 = GC Advanced. Each category reflects a progressively higher level of commitment to the UNGCI principles. This measure also takes into consideration instances of firms being expelled and later rejoining. The measure has been validated in previous research [69], allowing for nuanced analysis of variation among firms across countries and over time.

Independent Variables. The two independent variables of interest are perceived home country-level corruption and tariffs. *Corruption* is captured from the World Bank Governance Indicators Database. This score is reported annually for all countries in the World Bank's repository and measures perceptions of corruption within a country. It is derived from governance indices that provide standardized scores for corruption prevalence. The measure is on a scale of -2.5 to 2.5 indicating the degree to which the government effectively controls corruption. To aid interpretation of the findings we converted them so that a score of 0 would represent a country that has total corruption, while higher values indicate lower levels of corruption.

The second independent variable is *tariffs*. Tariffs represent trade barriers and are measured as the average tariff rate applied by a country to imported goods. The simple mean applied tariff is calculated as the unweighted average of effectively applied rates for all products subject to tariffs calculated for all traded goods. This measure is also obtained from the World Bank Development Indicators dataset.

Moderating Variable. The study includes one moderating variable: intellectual property rights protection (*IPR Protection*). IPR Protection is measured using indices that assess the strength of legal protections for intellectual property in a country. This measure is reported annually in the Heritage Foundation dataset for economic freedom. This measure is continuous and positive. Higher numbers indicate that the country has higher levels of IPR Protection whereas scores closer to zero indicate that the country has limited protection of intellectual property rights.

Control Variables. We incorporate an extensive set of control variables to account for alternative explanations and ensure the robustness of our findings. These variables capture key economic, cultural, and institutional dimensions that could influence a country's sustainability performance. First, we control for *Economic Freedom*, which reflects the openness of a country's economic policies. Countries with higher economic freedom are likely to foster innovation and investment, which may positively influence firms' sustainability scores. This continuous variable is drawn from the Heritage Foundation. Second, *Government Subsidies*, measured as expenditures on public subsidies as a percentage of GDP, reflects the extent to which governments support specific industries or activities. Subsidies may directly impact sustainability by promoting or inhibiting green initiatives or technologies. This measure comes from the WBDI. Third, *Military Protection* is assessed through defense spending as a proportion of GDP. Higher military expenditures could divert resources away from sustainability efforts, potentially impacting a country's development priorities. This comes from the WBDI. Fourth, *Inflation*, represented by annual percentage changes in the consumer price index, can affect economic stability and investment in sustainability, as high inflation often leads to reduced funding for long-term projects. This comes from the WBDI. Fifth, Inward Foreign Direct Investment (*IFDI*), as a percentage of GDP, indicates the level of foreign investment a country attracts. Higher IFDI may enhance

sustainability through technology transfer and capital inflows. This comes from the WBDI. Sixth, Union Density, the proportion of the workforce represented by unions, captures the influence of labor organizations. Unions may advocate for better working conditions and environmental protections, positively impacting sustainability. This measure comes from the OECD's AIAS dataset. Seventh is *Government Effectiveness*, which measures the quality of governance. Effective governance can drive policies and programs that improve sustainability outcomes. This comes from the WBGI. Eighth, *Individualism*, a cultural dimension developed by Hofstede, reflects the degree to which societies prioritize individual versus collective goals. Individualistic societies may emphasize personal responsibility in sustainability practices. Ninth, *Power Distance*, another Hofstede dimension, measures societal acceptance of hierarchical authority. Higher power distance may affect the inclusivity of sustainability initiatives and decision-making processes. Tenth, *Indulgence*, also from Hofstede, assesses societal norms regarding gratification versus restraint. Indulgent societies may prioritize consumer-driven behaviors, which could influence resource usage and sustainability efforts.

These 10 control variables collectively provide a nuanced understanding of the factors that may impact firms' sustainability scores and help isolate the effects of the primary variables of interest.

5.3. Research Design

We employ an ordinal logistic regression to analyze the relationships between the dependent, independent, and moderating variables. This method is appropriate given the ordinal nature of the dependent variable and the complexity of the relationships being tested [70,71]. Ordinal logistic regression models how changes in the independent variables influence the likelihood of a firm reporting a higher UN SDG score. Thus, we select ordinal logistic regression because it explicitly accounts for the ordered nature of the dependent variable while preserving the ranking information. It models the log-odds of being at or below a given category of the dependent variable as a function of the independent variables, allowing for estimation of how changes in predictors affect the likelihood of higher versus lower outcomes across the ordered scale. In this context, using OLR ensures that the estimation technique aligns with the measurement properties of the dependent variable and helps to avoid bias from inappropriate linear assumptions.

Our analysis follows Frazier, Tix, and Barron's [72] sequential modeling approach to examine the individual and combined effects of the variables. The base model includes only control variables, while subsequent models add the independent variables and interaction terms to test moderating effects. Continuous variables are standardized to facilitate interpretation and reduce multicollinearity. We use the following two full models:

$$UN\ SDG\ Score\ k = \beta_0 + \beta_1\ Corruption + \beta_2\ Corruption\ X\ IPR\ Protection + \beta_m\ Control\ Variables + \varepsilon$$

$$UN\ SDG\ Score\ k = \beta_0 + \beta_3\ Tariffs + \beta_4\ Tariffs\ X\ IPR\ Protection + \beta_m\ Control\ Variables + \varepsilon$$

When testing Hypotheses 1a and 2a, we assess the impact of corruption and tariffs, respectively, on a company's UN SDG score. In these models, if b_1 is positive and significant, it suggests that reduced corruption will be associated with higher UN SDG scores for firms in those countries. If b_3 is negative and significant, it suggests that higher tariffs will be associated with lower UN SDG scores for firms in those countries.

When testing Hypotheses 1b and 2b the above full models using the interaction terms (i.e., b_2 , b_4) are employed. Positive values for the interaction terms (i.e., b_2 , b_4) indicate that corruption and tariffs have amplified effects on UN SDG Scores as a result of increased IPR protection.

6. Results

6.1. Descriptive Statistics and Correlations

Table 2 provides descriptive statistics and correlations for the variables. The average UN SDG score across all companies for all countries in our sample is 3.36, with a standard deviation of 0.99, indicating variation in engagement with sustainable development goals. Thirty-two companies have a UN SDG score of 0, or non-reporting, twenty-four companies have a UN SDG score of 1, thirty-six have a score of 2, eighty-six a score of 3, and fifty-eight companies have a UN SDG score of 4. Correlations among the variables are generally low to moderate, with the highest being between Government Effectiveness and Economic Freedom. Variance Inflation Factor (VIF) tests indicate no significant multicollinearity, with all VIF values below 5.

Table 2. Descriptive Statistics and Correlations.

	Variable	Mean	s.d.	1	2	3	4	5	6	7	8	9	10	11	12	13
1.	UN SDG Score	3.36	0.99													
2.	Corruption	43.88	36.13	0.01												
3.	Tariffs	8.68	0.77	−0.03	−0.67											
4.	IPR Protection	7.04	1.37	0.04	−0.90	0.69										
5.	Economic Freedom	7.42	0.72	−0.04	−0.83	0.74	0.84									
6.	Government Subsidies	7.37	2.78	−0.11	−0.21	0.17	0.15	0.54								
7.	Military Protection	7.88	2.00	0.03	−0.69	0.58	0.61	0.60	0.28							
8.	Inflation	9.23	0.84	−0.16	−0.13	0.09	0.13	0.45	0.53	0.04						
9.	IFDI	6.54	1.15	0.00	−0.73	0.62	0.82	0.76	0.12	0.40	0.22					
10.	Unions	6.68	1.19	0.04	−0.36	0.42	0.58	0.47	−0.10	−0.02	−0.06	0.56				
11.	Government Effectiveness	0.96	0.74	0.02	−0.91	0.68	0.91	0.85	0.17	0.54	0.20	0.77	0.48			
12.	Individualism	4.12	0.14	0.01	0.53	−0.49	−0.56	−0.58	−0.25	−0.42	−0.02	−0.49	−0.35	−0.67		
13.	Power Distance	3.94	0.22	0.12	0.17	0.10	−0.06	−0.27	−0.52	−0.20	−0.23	−0.01	0.14	−0.22	0.38	
14.	Indulgence	47.09	21.54	−0.09	−0.18	0.22	0.30	0.31	0.23	0.27	0.20	0.28	0.14	0.06	−0.03	0.30

6.2. Main Test Results

The results of the ordinal logistic regression models are presented in Table 3. Model 1 includes only control variables, highlighting the significant positive effects of Government Effectiveness ($\beta = 0.65$, $p < 0.01$) and Economic Freedom ($\beta = 0.42$, $p < 0.05$) on UN SDG scores. Model 2 adds the first independent variable *corruption*. With the coding (described above) that we implemented, our results indicate that reduced levels of corruption have a significant positive effect on UN SDG scores ($\beta = 1.35$, std. error 0.604 $p < 0.05$). Conversely, we can conclude that higher levels of corruption would have a negative or reductive impact on UN SDG scores. This model indicates support for hypothesis H1a. Model 4 adds the second independent variable *tariffs*. Tariffs has a significant negative effect on the UN SDG Score ($\beta = -1.01$, std. error 0.38, $p < 0.01$). This model indicates support for hypothesis H2a.

Table 3. Results.

Variables	Model 1		Model 2		Model 3			Model 4			Model 5	
Economic Freedom	0.82	(0.85)	0.75	(0.84)	1.53	*	(0.88)	1.92	*	(0.95)	1.27	(0.85)
Government Subsidies	0.21	(0.36)	0.37	(0.38)	−0.20		(0.36)	0.00		(0.35)	−0.08	(0.35)
Military Protection	0.41	(0.29)	0.68	*	(0.31)	0.66	*	(0.30)	0.64	*	(0.31)	0.79
Inflation	−0.49	(0.31)	−0.64	*	(0.32)	−0.49	*	(0.29)	−0.56	*	(0.29)	−0.32
IFDI	−0.26	(0.38)	−0.30	*	(0.39)	−0.41		(0.35)	−0.19		(0.37)	−0.26
Unions	−0.54	*	(0.27)	−0.47	*	(0.27)	−0.80	**	(0.28)	−0.38	*	(0.28)
Government Effectiveness	−0.54		(0.66)	0.44		(0.78)	−0.30		(0.57)	−0.61		(0.65)
Individualism	−0.08		(0.24)	0.17		(0.27)	−0.05		(0.24)	−0.26		(0.26)
Power Distance	0.79	***	(0.24)	0.78	***	(0.23)	0.69	**	(0.23)	1.11	***	(0.28)
Indulgence	−0.69	**	(0.27)	−0.67	**	(0.26)	−0.81	**	(0.27)	−0.79	**	(0.27)
IPR Protection	0.30		(0.57)	0.62		(0.60)			(0.56)	−0.08		(0.56)
Corruption			1.35	*	(0.60)							
IPR x Corruption					−0.79	*	(0.35)					
Tariffs								−1.01	**	(0.38)		
Tariffs x Corruption											0.83	**
Wald Chi Squared	21.52 *		26.81 ***		28.44 ***		28.86 ***				28.54 ***	
Log Likelihood	−188.44		−185.8		−184.98		−185.77				−184.93	
Observations (n)	195		195		195		195				195	

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Models 3 and 5 introduce the interaction terms to test the moderating role of IPR Protection. It is also worth noting that, by itself, IPR Protection has a statistically insignificant direct effect in our sample and analysis (see Model 1). The interaction between Corruption and IPR Protection is significant and negative ($\beta = -0.79$, std. error 0.351 $p < 0.05$). With the coding we implemented for corruption (described above) our results suggest that stronger IPR protection weakens or dampens the impact of corruption on SDG engagement. This provides support for hypothesis H1b. Additionally, the interaction between Tariffs and IPR Protection is positive and significant ($\beta = 0.83$, std. error 0.318, $p < 0.1$) indicating that strong IPR frameworks can serve as a buffer (or work to reduce) against the negative impacts that tariffs have on UN SDG scores. This provides support for hypothesis H2b.

These results support our hypotheses and provide nuanced insights into how governance factors influence sustainable development outcomes.

6.3. Robustness Tests Results

We conduct several additional analyses as checks on reliability and robustness, and to ensure that the findings are not due to alternate explanations. For brevity we describe but do not present the empirical results, which are available upon request.

Alternate Independent Variables. We used two alternative independent variables to test the reliability of the main findings. First, as an alternative to *corruption* we used government integrity. This measure is a continuous and positive variable collected from the Heritage Foundation's Economic Freedom dataset. It measures the degree to which a government maintains and upholds integrity in the enforcement of rules and regulations. Second, as an alternative to *tariffs* we used the total number of tariffs and trade barriers that a country has in place. This is drawn from the WBDI.

Alternate Dependent Variable. In our main analyses we utilize UN SDG score as the primary dependent variable to measure the sustainability of the companies in our sample. We purposely selected this measure given its use and validation from prior research. Additionally, we constructed a unique measure to respond to criticisms of existing measures of sustainability—specifically that measures like the UN SDG score are self-reported. Thus, we constructed a measure to capture the stage of corporate citizenship that analyzes firm activity, not simply self-reported activity. We built on Mirvis and Googins's Stages of Corporate Citizenship and created an ordinal measure for sustainability behavior where scores range from 1 to 4, ascending in order of corporate citizenship [73]. We utilized a team of undergraduate and graduate student researchers who were trained in the measure of corporate citizenship and the differences between each stage, and were provided with examples. Two scorers rated each company. Companies where raters' scores were further than one score apart were dropped from the sample for consistency and then the two scores were averaged. This measure represents a robustness measure for the sustainability score of each company.

Alternate Controls. Further, we substituted multiple alternate control variables to test the reliability of the results. First, as an alternative measure of government effectiveness we use regulatory quality, a continuous measure collected annually from the WBGI dataset. This measure assesses the quality of the formal regulations and processes of the government per year. Second, as an alternate for inflation we used estimated inflation from the previous year, a continuous measure collected annually from the WBDI dataset. Third, as an alternative to unions we used whether the country has strong centralized bargaining agreements as measured in the OECD's AIAS dataset. The alternate control variables provide consistent support for our hypotheses.

The consistency of the findings using different methods and measures suggests the results are quite robust to alternate specifications.

7. Discussion

7.1. Summary of Research Objectives and Findings

This study set out to investigate the influence of specific national institutional factors on the level of engagement with the United Nations Sustainable Development Goals (SDGs) among firms in the global construction industry. Specifically, we aimed to determine: (1) the direct impact of country-level corruption perception and trade tariffs on firms' measured UN SDG engagement scores, (2) the moderating effect of Intellectual Property Rights (IPR) protection on these relationships, and (3) the broader implications of these findings for promoting sustainability and resilience within the sector.

The analysis yielded several key findings. First, supporting Hypothesis 1a, a higher level of perceived home country-level corruption was found to be significantly and negatively associated with firms' UN SDG engagement scores. Second, supporting Hypothesis 2a, higher home country-level tariffs were also significantly and negatively associated with SDG engagement. Third, the results provided evidence for the moderating role of IPR protection. Supporting Hypothesis 1b, stronger IPR protection significantly weakened the negative relationship between corruption and SDG engagement. Supporting Hypothesis 2b, stronger IPR protection was found to enhance the positive effects of lower tariffs (or weaken the negative effect of higher tariffs) on SDG engagement, suggesting a complementary positive effect between open trade environments and robust IPR frameworks in facilitating sustainability alignment. These findings provide empirical support for the argument that national institutional configurations play a crucial role in shaping corporate strategic engagement with global sustainability agendas in the construction industry.

7.2. Institutional Pressures, Global Governance, and Strategic Responses

The results provide strong quantitative validation for the core tenets of Institutional Theory within the specific context of sustainability engagement in the global construction industry. The significant impact of country-level corruption (an informal institution) and trade tariffs (a formal institution) on firms' UN SDG engagement scores empirically demonstrates that strategic choices for organizations regarding global norms are indeed heavily influenced by the institutional environment in which they operate [30,32]. Firms appear to adjust their level of costly and visible commitment to global sustainability standards based on the perceived pressures, risks, and legitimacy considerations embedded within their national contexts. This aligns with DiMaggio and Powell's [31] argument that "rational actors make their organizations increasingly similar as they try to change them" (p. 147), a process driven by the coercive, mimetic, and normative forces within their institutional field [29].

Furthermore, this study extends the application of Institutional Theory by specifically examining the interface between corporations and international organizations setting global standards. While much institutional analysis focuses on national contexts or industry sectors, our research uses the theory to understand how firms respond strategically to the normative and institutional pressures emanating from global governance bodies like the United Nations, as embodied in the UNGC principles and the SDG framework. The varying levels of SDG engagement observed, and their sensitivity to national institutional factors, illustrate how firms navigate the legitimacy demands originating from both national environments and the increasingly salient global institutional landscape represented by these international initiatives.

The moderating role of IPR protection further highlights the complexity and contingency within institutional environments. It supports the notion that institutions do not operate in isolation. Rather, their interplay shapes organizational outcomes [32]. The finding that strong IPR weakens the negative effect of corruption (H1b) suggests that

robust formal institutions, particularly those signaling strong rule of law and protection for innovation, can potentially buffer firms against the detrimental impacts of weak informal institutions. This allows firms with valuable intellectual property or innovative capabilities to potentially pursue longer-term strategies, like SDG engagement, even in challenging environments. Similarly, the finding that strong IPR enhances the positive impact of lower tariffs (or weakens the negative effect of higher tariffs) (H2b) points towards complementarities between different types of formal institutions. Open trade regimes combined with strong innovation protection seem to create a particularly favorable environment for alignment with global sustainability norms.

Conceptually framing these findings through the 4Cs lens [1,21] adds a layer of strategic interpretation. While not classifying firms, the results imply how institutional pressures might shape the prevalence of certain underlying strategic orientations. The negative impact of high corruption and high tariffs on SDG scores (H1a, H2a) aligns with the logic that such environments may push firms towards reactive Complier stances (minimal engagement due to cost/risk focus) or potentially even Counteractor orientations (active avoidance or cynicism towards global norms). Conversely, the positive interaction effects involving strong IPR (H1b, H2b) suggest that supportive institutional configurations can enable proactive Collaborator orientations, where firms strategically embrace SDG engagement as part of their core value proposition, leading to higher measured scores. This conceptual linkage helps bridge the macro-level institutional analysis with micro-level strategic reasoning, offering a richer understanding of why construction firms exhibit varying levels of engagement with global sustainability goals under different national conditions. This study thus reinforces Institutional Theory's applicability, particularly at the interface of national and global governance pressures, while demonstrating the utility of the 4Cs framework for interpreting strategic responses.

7.3. Implications for Policy and Practice

Implications for Construction Companies. Our findings offer several practical insights for leaders and strategists within international construction companies navigating the complexities of global operations and sustainability demands. Foremost, the results underscore that a company's operating environment significantly influences its ability and incentives to pursue deep SDG engagement. It is therefore crucial for leaders to actively assess the specific institutional contexts of the countries where they operate, particularly concerning levels of perceived corruption, trade policies, and the strength of IPR protection. This contextual understanding is fundamental for realistic strategic planning regarding sustainability initiatives, as simply adopting a global policy without considering national institutional variations may lead to implementation failures or unintended risks.

Consequently, a one-size-fits-all approach to SDG engagement is unlikely to prove effective across diverse institutional landscapes. In environments characterized by high corruption or restrictive tariffs, companies may need to adopt more nuanced or internally focused sustainability strategies. This could involve prioritizing robust internal governance and anti-corruption measures as a primary focus, concentrating on operational efficiencies that yield environmental benefits with clearer cost savings, or perhaps pursuing less visible, but still impactful, social initiatives appropriate to the local context. Where SDG engagement is pursued publicly in challenging environments, careful risk management and transparency regarding operational realities become essential.

Furthermore, the finding that strong IPR protection can moderate the negative impacts of corruption and potentially enhance the benefits of open trade suggests that innovation and intellectual property can serve as strategic assets beyond their core commercial value. Companies possessing strong innovation capabilities and established patents might

discover greater strategic flexibility, potentially enabling them to pursue sustainability leadership aligned with a Collaborator orientation even within challenging institutional settings. Thus, investing in relevant research and development and actively protecting IPR could indirectly support the achievement of broader sustainability objectives.

Given the construction sector's high susceptibility to corruption and the finding that high home country corruption perception negatively impacts SDG engagement, reinforcing ethics, compliance, and anti-corruption controls remains paramount. Strong internal corporate governance serves as a crucial buffer against detrimental external pressures and stands as a prerequisite for credible engagement with global norms. Additionally, governments could create transparent public procurement systems linked to sustainability performance KPIs, introducing tax cuts or preferential financing for companies that integrate SDG information into their reporting, for example. Expand public–private partnerships aimed at improving local infrastructure and energy efficiency could also be a very good strategy to encourage sustainable performance. These measures can create a positive institutional dynamic that rewards ethical and sustainable behavior, even in challenging governance contexts.

Finally, because institutional risks and the impacts of trade policy extend throughout the value chain, construction firms should enhance the due diligence processes for suppliers and subcontractors, understanding the institutional environments of their partners to better manage risks.

Strategic Orientation Dynamics and Collaborator Motivations. Although institutional environments influence the prevalence of certain strategic orientations, firms are not static entities. Transitions between these strategic orientations are possible at various organizational levels, driven by evolving internal strategies and external pressures [1]. Understanding what motivates firms, particularly those acting as exemplars in the Collaborator archetype, is crucial for fostering broader industry progress towards sustainability and resilience.

Collaborator firms in the construction industry typically demonstrate a deeper understanding of the sector's profound impact on the economy, society, and the environment, and they recognize that their core business activities are intrinsically linked to achieving Sustainable Development Goals [1,26].

Proactive engagement with environmental and social issues can also be seen as a core component of risk management and building organizational resilience in the face of increasing uncertainty and regulatory scrutiny [74]. While the quantitative data suggests that supportive institutional environments (e.g., low corruption, low tariffs, strong IPR) facilitate higher SDG engagement scores, it is often these internal strategic motivations, enabled by such environments, that drive firms to move beyond a Complier stance.

Potential Levers for Change. The United Nations' 2030 Agenda is a call to action, but achievement relies heavily on the collective efforts of governments, civil society, and the private sector, including the construction industry [26,38]. Our results underscore that creating an enabling national institutional environment is a critical prerequisite for unlocking the full potential of the private sector's contribution to these global goals.

Macro-level institutional variables are key levers that international organizations like the UN, national governments, and multi-stakeholder initiatives can potentially influence to foster greater corporate sustainability engagement. While direct engagement with individual companies through platforms like the UNGC is valuable, its effectiveness appears significantly mediated by the background institutional context. Efforts focused solely on corporate reporting or voluntary principles may face considerable headwinds in environments with deeply entrenched corruption or highly protectionist trade policies.

Therefore, encouraging greater SDG alignment within the construction industry effectively requires action beyond the firm level. Supporting national governments in implementing robust anti-corruption measures, consistent with SDG 16, appears critical. Initiatives enhancing transparency in public procurement, strengthening the rule of law, and reducing bribery opportunities could create a more conducive environment for firms to engage transparently with the SDGs. Simultaneously, promoting coherent policy frameworks where national governments consider the sustainability implications of their trade policies is important.

Understanding the potential dampening effect of tariffs on SDG-related investment could inform more integrated policymaking. Furthermore, strong, enforceable IPR protection is valuable: as our findings suggest, IPR not only fosters innovation but may also enhance the capacity to pursue sustainability goals, making support for robust national IPR regimes an indirect lever for sustainability.

Lastly, global frameworks themselves may benefit from contextualization, recognizing that the adoption and impact of initiatives like the UNGC and SDGs are context-dependent. Therefore, tailoring support mechanisms and expectations to prevailing national institutional challenges might be more effective than a uniform global approach. In sum, fostering a global construction industry that actively contributes to the SDGs requires addressing not only firm-level strategies but also the macro-level institutional architecture within which these firms operate.

Overall, our results point to the importance of embedding institutional awareness into business strategies and operational practices in the construction industry. Companies can strengthen their sustainability behavior by implementing a clear anti-corruption compliance approach, fuel transparency in procurement and subcontracting, and prioritizing deals with suppliers and clients operating with strong governance standards. Moreover, firms should have strong intellectual property protection to foster innovation in sustainable building materials and energy-efficient technologies. Additionally, policymakers can support this process by promoting international trade agreements that reduce tariff barriers for sustainable construction materials and by enforcing stronger IPR frameworks that encourage technological diffusion. With that, these measures can help create a more tangible advances in sustainable construction practices.

8. Limitations and Directions for Future Research

Although this study provides valuable quantitative insights into the institutional determinants of SDG engagement within the global construction industry, certain limitations inherent in the research design should be acknowledged. These, in turn, offer promising avenues for future research.

First, the study's focus on the construction industry, while providing deep sectoral insights, necessarily limits the generalizability of the findings to other industries. Construction possesses unique characteristics (project-based nature, complex supply chains, high corruption susceptibility) that may influence the observed relationships between institutions and sustainability engagement differently than in sectors like manufacturing, services, or technology. Future research should therefore test the applicability of these findings by examining the impact of corruption, tariffs, IPR, and other institutional factors on SDG engagement or broader sustainability performance across diverse industries to build a more comprehensive cross-sectoral understanding.

Second, the sample used in this study was not a random sample of all global construction firms. Furthermore, the reliance on publicly available data, predominantly from websites accessible in English, inevitably biases the sample towards larger, publicly listed, multinational corporations. Smaller, private, or domestic firms, particularly those in

non-English speaking regions or developing countries, are likely underrepresented. This limitation means the findings may primarily reflect the behaviors and pressures faced by larger MNEs. Thus, future research employing different sampling strategies, potentially including surveys or direct data collection, is needed to capture the experiences and institutional responses of smaller and medium-sized enterprises within the construction sector globally. Accessing non-public data or utilizing local language sources would also be beneficial.

Building on the current findings, future research should also delve deeper into internal, firm-level factors. While this study focused on external institutional pressures, investigating the role of corporate leadership (CEO commitment, board structure, leadership styles), organizational culture, firm resources and capabilities, ownership structure, and the maturity of internal management systems is crucial for a holistic understanding. Examining the interplay between these internal factors and the external institutional environment would be particularly insightful. Additionally, expanding the scope of institutional variables beyond corruption, tariffs, and IPR to include factors like specific regulations, political stability, or cultural dimensions could further refine our understanding.

Finally, employing longitudinal research designs to track firms and institutional environments over time would allow for stronger causal inferences regarding the impact of institutional change on sustainability strategies. Complementing quantitative approaches with qualitative methodologies, such as comparative case studies of firms in divergent institutional settings, could provide rich contextual detail on the mechanisms and decision-making processes underlying the observed patterns of SDG engagement.

9. Conclusions

This study investigated the critical role of national institutional environments in shaping the engagement of global construction firms with the UN Sustainable Development Goals, particularly how country-level corruption, trade tariffs, and IPR protection influence corporate alignment with the SDG framework.

Our quantitative analysis revealed that higher perceived corruption and higher tariffs significantly hinder SDG engagement, highlighting the constraining effect of unfavorable informal and formal institutions, respectively. Conversely, the findings indicate that strong IPR protection can play a crucial enabling role, mitigating the negative impact of corruption and potentially enhancing the benefits of open trade policies for sustainability alignment.

These results contribute significantly to Institutional Theory by empirically demonstrating the impact of specific national institutions on corporate strategic responses to global sustainability norms, particularly at the interface between firms and international organizations like the United Nations. Conceptually, the findings, as examined through the 4Cs framework, demonstrate how institutional pressures shape the underlying relevant strategic orientations, namely Collaborator, Complier, and Counteractor types, that drive varying levels of SDG engagement.

Practically, this research underscores the need for policymakers to foster enabling institutional environments that are effective in combating corruption, considering sustainability in trade policy, and strengthening IPR as ways to encourage private sector contribution to the SDGs. For construction industry leaders, the findings emphasize the importance of understanding and navigating institutional contexts, tailoring sustainability strategies, and reinforcing internal governance to build both sustainability performance and long-term resilience.

According to this outcome, legislators should prioritize a more transparent public procurement frameworks, anti-corruption monitoring systems, and trade policies that incentivize the exchange of sustainable construction solutions. Also, business executives should

translate these institutional insights into real corporate actions by investing in compliance mechanisms, establishing cross-border collaborations, and promoting innovation-driven sustainability solutions. By aligning public policy instruments with the corporate world, both policymakers and industry leaders can jointly accelerate the construction sector's transition towards a more responsible, competitive, and sustainability-oriented industry.

Ultimately, addressing the complex sustainability challenges facing the global construction industry requires a concerted effort that acknowledges the powerful interplay between corporate strategy and the institutional architecture within which firms operate. Fostering environments that support, rather than hinder, responsible corporate behavior is essential for leveraging the construction industry's potential to contribute meaningfully to a more sustainable and resilient future.

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