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ARTICLE

Materiality in Environmental Information Disclosure: A Comparative Analysis of the Securities Law of the United States and China

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ABSTRACT

The purpose of this study lies in exploring the role of materiality in environmental information disclosures under the securities laws of the United States and China, discussing the differences in the regulatory mechanism, limits of enforcement, and challenges of seeking global harmonization. The paper does a comparative legal analysis of statutory provisions, judicial interpretations, and regulatory frameworks of the U.S. Securities and Exchange Commission (SEC) and the China Securities Regulatory Commission (CSRC). Furthermore, it provides frameworks of global sustainability reporting such as the Task Force on Climate-related Financial Disclosures (TCFD) and the Global Reporting Initiative (GRI). The findings show that U.S. securities law uses a financial materiality standard with respect to what companies must disclose to investors. On the other hand, China's regulatory approach has a double materiality in considering not only financial impacts but also wider environmental and social factors. Although there are these distinctions, both of these jurisdictions face issues of common obstruction such as ambiguities in materiality determination, inconsistent enforcement, and fear of greenwashing. This paper asserts that the U.S. and China regulatory frameworks need to converge more to promote greater corporate transparency and ESG disclosures. Regulators can even align disclosure practices with internationally recognized standards of work to add confidence for investors, fight off misleading sustainability claims and ensure accountable reporting in pertinent environments. The study concludes that the green challenges of global markets can only be tackled by regulating cooperative actions and using standardized reporting guidelines.

Keywords: Securities Law; Environmental Information Disclosure; ESG; Materiality; SEC; CSRC; MEE

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1. Introduction

The priorities of businesses have shifted in response to global changes in favor of sustainable development. This raises ESG (environmental, social, and governance) considerations to the forefront of corporate governance [1]. Climate change along with resource depletion and environmental degradation are serious threats to both ecosystems and corporate financial health and stability [2]. Therefore, shareholders, regulators, civil society, and others have been calling for increased transparency of corporate environmental practices. Among them, the demand for disclosing material environmental information to allow investors to receive information about how a company deals with the risks and opportunities associated with environmental factors has come to the forefront.

In the United States, the legal foundation for corporate disclosure requirements is securities law which requires public companies to disclose all "material" information to facilitate investors in their decisions. In this context, materiality acts as a gatekeeper, deciding what data matters and is of interest and needs to be disclosed [3]. Yet, as with any concept of materiality, there is no single notion of materiality when applied to environmental information [4]. The issue has been clarified by legal and regulatory frameworks. Regulation S-K was established by the Securities and Exchange Commission (SEC) through its regulations on providing material information, including, environmental risks and opportunities [5]. As demonstrated by recent regulatory developments like the SEC's 2024 rules amidst the emergence of the first global pilots for standardized, increased transparency in this field, efforts are underway to standardize and improve transparency in this field [6]. These rules require companies to report greenhouse gas emissions and their impact [7]. These measures are intended to bridge the different corporate reporting practices and match US standards to global frameworks of sustainability. However, these regulatory changes have also served to prompt debate about how these changes could be made, what the costs of such changes may be, and the ramifications for corporate compliance.

Environmental disclosure law in China has evolved considerably, in response to the growing emphasis on sustainable development and environmental accountability by the country. The China Securities Regulatory Commission (CSRC) defines and imposes disclosure requirements for listed companies [8]. Recent regulations, i.e., the Guidelines for Environmental Information Disclosure by Listed Companies require that companies disclose material environmental risks and impacts with emphasis on compliance with environmental laws [9]. Furthermore, "double materiality" is included to some extent in some disclosure frameworks acknowledging the significance of both financial significance and broader environmental impacts [10]. This is a global trend and aligns with the country's commitment to goals for international sustainability including the Paris Agreement. However, Chinese regulators struggle with the same problems as the U.S. regulators. China's effort to align corporate reporting with its national environmental priorities is demonstrated further through mandatory sustainability reporting for high-polluting industries and large enterprises.

The landmark decisions of the Supreme Court, such as *TSC Industries, Inc. v Northway, Inc.* (1976) and *Basic Inc. v Levinson* (1988), have put a framework in place to evaluate whether materiality is a context-specific concept [11]. These rulings show that materiality is counted by whether the information is important to a reasonable investor in making investment decisions. Yet, these principles offer a broad outline, which makes the application of these principles to environmental information complex and controversial, due to the specificity of environmental risks and their financial implications. In China, disclosure standards are more clearly defined by regulatory authorities such as the CSRC and environmental agencies, and the judicial interpretations of materiality are not as developed [12]. It is a regulatory-driven approach, which is compliant, but it leaves scope for variability in the application of how materiality is determined, particularly in the case of cross-border context.

The material environmental information is of much more significance than legal compliance. The role of ESG disclosures in corporate governance has become increasingly significant in recent times as a result of the recent regulatory developments. More and more investors are starting to see ESG factors as a core consideration for valuing companies as they look for the long-term value and resilience of a company [13]. Studies show companies with strong environmental performance outperform peer companies in risk management, innovation, and reputation [13]. Since investors are demanding that companies become more transparent about how they are tackling environmental challenges, such as climate change, carbon emissions, and regulatory compliance, companies are expected to provide more information[14]. With global initiatives like the Paris Agreement and the Task Force on Climate-related Financial Disclosures (TCFD) increasing the emphasis on the financial materiality of climate-related risks, this demand has grown[15]. Concerns about corporate disclosures have increased, as the rise of "greenwashing" has raised questions about the credibility of corporate disclosures. Greenwashing is defined as the act of making false claims about environmental properties or performance[16]. Reputational damage, regulatory scrutiny, and legal liabilities therefore result in companies that fail to provide an accurate, comprehensive story about both their environmental performance and their environmental impact, information both new and often hidden for decades[17]. Although materiality has been applied to environmental disclosures to a certain extent these challenges persist. Many environmental risks are inherently uncertain and of long-term nature and therefore it is difficult for companies to precisely assess the financial impacts[18]. The 2024 climate disclosure rule from the SEC requires that companies disclose Scope 1, 2, and, in some cases, Scope 3 greenhouse gas emissions, which is standardizing environmental reporting[19]. China's CSRC 2021 Guidelines also mandated environmental disclosures for high polluting industries, as a further way for country to ensure financial transparency based on sustainability[20]. Mandatory ESG disclosures help in raising transparency, but they are counterproductive when the regulatory enforcement is irregular[21]. Furthermore, materiality is not subjectively fallible which causes companies to present inconsistent practices in corporate reporting.

The purpose of this paper is to review the environmental disclosures and related legal and regulatory frameworks in the US and China and to investigate the understanding and application of the concept of "materiality" in the two jurisdictions. The research questions addressed by the study are:

1. What are the definitions and provisions of materiality contained in U.S. and Chinese securities laws regarding environmental disclosures?
2. What are the main challenges and ambiguities companies encounter when they comply with the requirements of environmental disclosures?
3. How is each jurisdiction learning to be more transparent and more sustainable in corporate practices?

The study makes a contribution to the literature by comparing these frameworks, identifying the gaps in disclosure enforcement, defining materiality inconsistently, and opportunities for the harmonization. In particular, considering this at the comparative level is particularly important as more and more markets move toward standardized ESG reporting practices. While prior studies have looked at corporate disclosures and materiality within a single jurisdiction, very little research has sought to compare two major economies' approaches to environmental disclosure, namely China and the US. This is in light of the worldwide movement toward corporate ESG accountability and the understanding of these two prominent regulatory frameworks is becoming important. By characterizing and proposing ways of overcoming cross-jurisdictional challenges, this study contributes to existing scholarship, specifically regarding the areas of laptop precursors device scans and data retention.

The paper is structured as follows: First, it overviews U.S. securities law's legal framework for materiality, tracing its origins and evolution, alongside the SEC's current endeavors to improve climate-related disclosures. The second section focuses on the Chinese legal framework. The third section examines the implications of materiality for corporate reporting practices, from both a challenge and opportunity perspective. In the fourth section, a comparative analysis of the securities laws in both nations is done. The conclusion brings together the findings and provides suggestions for the future direction of materiality in environmental disclosures.

2. Materiality under the U.S. Securities Law

In the following section, the importance of environmental materiality in the context of corporate governance is set and the way in which U.S. securities law defines and enforces disclosure obligations is examined.

2.1. Judicial Frameworks

U.S. securities law relies heavily on materiality as a centerpiece for defining the boundary for information disclosure to investors. It is meant to ensure public companies provide the right information so investors can make informed decisions while preserving market integrity [22]. The judicial history of positive materiality has shaped and refined the concept, including its context-specific and investor-centered nature.

2.1.1. The TSC Industries Standard for Materiality

In *TSC Industries, Inc. v. Northway, Inc.* (1976), the Supreme Court established that information is material if it has a "substantial likelihood that a reasonable shareholder would think of it as important in an investment decision" [23]. The Court remarked that materiality depends on whether the information would significantly change the "total mix" of facts available to the investor [23]. To achieve this balance between comprehensive disclosure and an unacceptable flood of information, however, this standard would necessarily impose requirements upon every issuer regarding ways to disclose information that otherwise would be left to its discretion [24]. However, this has been a source of criticism, in particular, in context to the environmental risks, which are often speculative and long-term, and may not easily fit within a "total mix" approach for materiality determination [25]. Nevertheless, the *TSC Industries Inc.* decision served as the origin of the beginning discussion of materiality through these challenges.

2.1.2. The Contextual Approach Following the Basic Inc.

Basic Inc. v Levinson (1988) is an example of the Supreme Court furthering upon the materiality standard when it came to discussing the disclosure of merger negotiations [26]. It drew attention to the highly dynamic nature of materiality, which cannot be established in isolation but instead must take account of the context in which the information is disclosed. The *Basic Inc.* decision has introduced a contextual approach that has huge implications for environmental disclosures. Environmental information differs from financial data, which tends to have immediate and quantifiable impacts, being long-term risks and uncertainties [27]. Yet this case also showed how incorporating a context-specific standard can be difficult when applied to nonfinancial information [28]. This uncertainty is caused by the absence of clear thresholds of materiality, which makes companies uncertain as they must navigate the subjective expectations of investors, regulators, and the court [26]. Nevertheless, proponents see this flexibility as a feature rather than a bug, enabling the materiality test to evolve with the whims of a changing market and ever-shifting investor priorities.

2.1.3. Materiality in Health-Related Disclosures—The Matrixx Iinitiatives, Inc. Standard

In *Matrixx Initiatives, Inc. v. Siracusano*, the Court decided on whether adverse event reports were material when they were not statistically significant [29]. As environmental incidents or potential liabilities that have not yet had financial implications, this decision bears implications for environmental disclosure. The ruling says that companies cannot disregard the materiality of environmental information simply because it has not had an immediate financial impact or because it does not have statistical significance [27]. Instead, they must look at the much broader context and deeper implications this has on investor decision-making over the longer term. However, critics say the approach could prove burdensome on companies, who would be compelled to report on a wide range of incidents that might not be financially significant [28]. Proponents counter, though, that it encourages more transparency and enables investors to factor in more risks, consistent with the reasonable investor as expectations evolve.

2.1.4. Materiality in Financial Disclosures—The SEC v. Bank of America Corp. Standard

The SEC charged Bank of America in *SEC v Bank of America Corp.* (2010) with non-disclosure of material information about bonuses paid to Merrill Lynch executives before a shareholder vote on acquiring Merrill Lynch [30]. The court was asked whether this omission was material to investors. Bank of America settled the case and agreed to pay a big penalty for failing to disclose information that could affect shareholder decisions [30]. While the case at hand does not concern environmental disclosure, it highlights the principle, more generally, that omissions of material information, for whatever the subject matter, will give rise to serious legal and financial consequences [31]. It is a call to companies, not just to create comprehensive and transparent disclosures, including on environmental risks and liabilities, but to do so in a way that is easily accessible and understandable to investors.

2.2. Statutory Frameworks for Materiality

Corporate disclosures in the United States are regulated through the Securities and Exchange Commission's (SEC) Regulation S-K, which is the most important regulatory framework governing corporate disclosures [32]. It lays down the clear requirements for companies to provide material information about the issues relating to investor's interests including environmental risks and opportunities [32]. Regulation S-K sets up a structured approach with specific provisions such as Items 101, 103, and 303 so that public companies provide a transparent picture of their environmental liabilities, risks, and strategies. While designed to improve investor protection, these provisions, however, raise serious questions about compliance costs, interpretative challenges, and the efficacy of disclosure mechanisms.

2.2.1. Item 101: Environmental Impacts

Under Regulation S-K, Item 101 involves a description of a company's business in which material effects upon the company resulting from compliance with environmental laws are also to be disclosed [33]. It includes describing the financial and operational impact of regulatory compliance, environmental fines, and capital expenditures for environmental requirements [34]. For example, companies operating in industries that are heavily regulated, like energy, manufacturing, or mining must describe what they would spend to meet emission standards, waste management regulations, or remediation standards for contaminated sites (**Figure 1**).

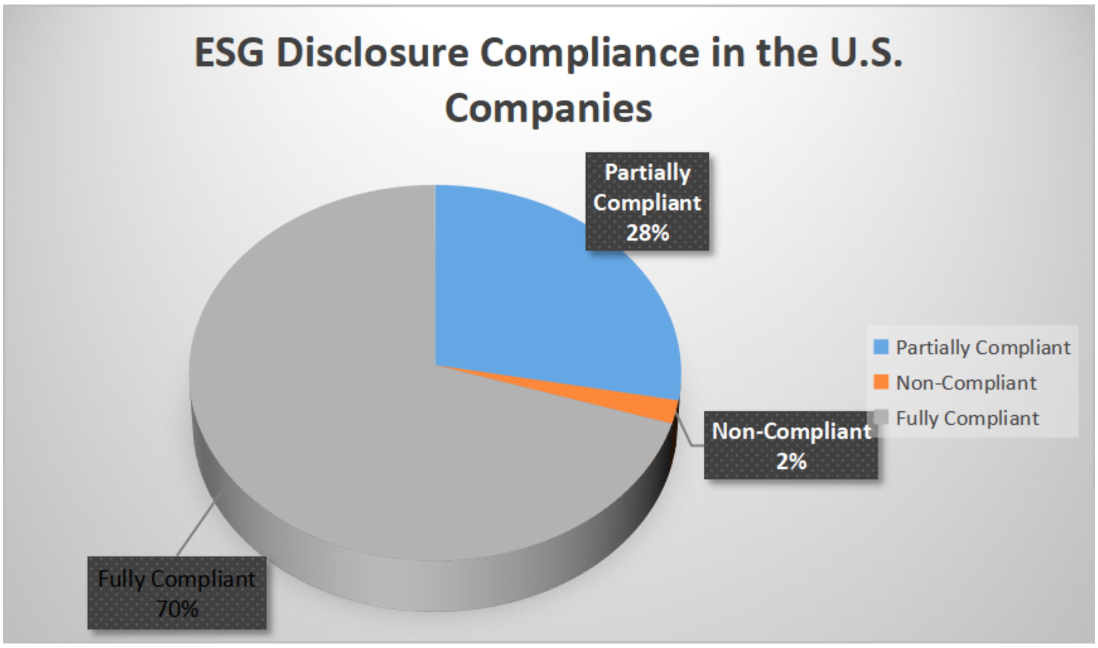

Figure 1. ESG Discosure Compliance in the U.S. Companies.

Source: The CAQ (2024) https://www.thecaq.org/sp-500-and-esg-reporting.

This provision shows the SEC's intent to make sure investors know how much environmental compliance will cost them [34]. For instance, a manufacturing company with high emission-producing costs because of stricter emissions standards has to disclose this impact and this can alter an investor's perception of the company's profitability and its long-run viability. Proponents argue that Item 101 provides enough flexibility for companies to focus on the most relevant aspects of environmental obligations particular to their industry [35]. However, critics say the subjective determination of what counts as "material" can generate inconsistent reporting across industries [36]. Compliance may influence how a company reports financial impacts, so that the company may underreport the financial impacts to retain its market position, leading investors to receive an incomplete picture of the financial health of the company.

2.2.2. Item 103: Transparency

Regulation S-K Item 103 requires public companies to disclose material legal proceedings, including environmental-related legal proceedings which are likely to have a significant impact on the company's financial condition. This provision stresses the idea of transparency of litigation risk—e.g. suits over pollution, violations of environmental standards, or tangles with regulatory agencies. The SEC mandates such disclosures to give investors a sneak peek into possible liabilities that may affect a company's ability to survive financially [35]. Item 103 is exemplified by the illustrative example of BP's disclosure after the Deepwater Horizon oil spill in 2010 [37]. Due to their far-reaching financial and reputational impact, the litigation and the associated regulatory penalties were material. Disclosure under Item 103 allowed investors to decide whether or not they would invest in the company, based on the breadth of the company's legal liability. Yet not all environmental legal proceedings are unequivocally labeled as material. It is argued that the ambiguity in deciding when to disclose defines which cases should be revealed, especially in smaller suits and in ongoing investigations where the outcome is still unknown [38]. This could result in over-disclosure where immaterial lawsuits clutter financial reports or under-disclosure in which very important risks remain undisclosed.

2.2.3. Item 303: Environmental Trends, Events, and Uncertainties

Regulation S-K Item 303 requires that companies discuss known trends, events, or uncertainties that are reasonably likely to have a material effect on their financial condition, operations, or cash flows. It entails managing environmental risks including environmental liabilities resulting from climate change, resource scarcity, or changed business and societal regulations [39]. Item 303 attempts to supply investors with a broad picture of emerging risks and their possible effect on a company's future performance by focusing on forward-looking information [39]. The requirement to disclose forward-looking information however presents many challenges [39]. Given that many risks companies need to assess and quantify are speculative and uncertain, such as the costs of future regulatory changes or the financial ramifications of carbon pricing, companies must find a way to quantify them [40]. It has been argued that it could make companies vulnerable to legal liabilities if their predictions turn out not to have been, or if companies fail to disclose the uncertainties that turn out to exist. Though there are challenges with Item 303, Item 303's proponents believe that they help foster transparency and accountability. The provision aligns with the trend for investor demand for comprehensive ESG information by encouraging companies to report not only on current environmental risks but also on how they address future uncertainties. Additionally, it encourages businesses to become more proactive in planning for, and monitoring risks, in ways like scenario analysis and stress testing to more fully grasp and reduce possible environmental impacts.

2.2.4. The Climate Disclosure Rule: A New Approach by SEC

In March 2024, the SEC introduced new rules requiring climate-related disclosures under Regulation S-K to be standardized. Public companies are required under these rules to disclose greenhouse gas emissions, the financial impact of climate risks, and how they are managing these risks [41]. The SEC is attempting to remedy the variability in today's reporting practices by mandating uniform and comparable disclosures, in part, to be confident that investors understand the reliability of the information being provided. The introduction of a climate disclosure rule constitutes a significant turn toward integrating sustainability into financial reporting. Companies, for example, are now obligated to report Scope 1, 2, and sometimes Scope 3 greenhouse gas emissions, which offer investors a clear picture of a company's carbon footprint [42]. The level of detail allows investors to evaluate how much of the companies' value is exposed to regulatory risks such as carbon taxes or emission reduction mandates, or how it aligns with global climate goals.

However, the climate disclosure rule has been strongly opposed by businesses, small and medium-sized businesses in particular, as they say compliance is costly and onerous. Often, large investments in data collection and reporting infrastructure are needed for detailed emissions assessments and scenario analyses [43]. Furthermore, the obligation to disclose prospective information about financial impacts stemming from climate risk also creates a legal liability of a disclosed scenario failing to evolve [44]. Supporters of the rule argue that the rule's benefits outweigh its costs and point to the advantages standardized disclosures provide to market transparency and to make the process of allocating capital more efficient. The rule provides clear and comparable information to reduce information asymmetry and to encourage trust in corporate governance [45]. It also works in sync with other global ESG initiatives, including the Task Force on Climate-related Financial Disclosures (TCFD), making U.S. markets leading for ESG integration [42]. In that regard, Regulation S-K and the SEC's climate disclosure rule are major steps toward increased transparency and accountability in corporate environmental reporting. These provisions mandate disclosures on the material effects of environmental compliance legal proceedings and emerging environmental risks and provide investors with meaningful insights into the financial effects of environmental factors. Nevertheless, due to the subjectivity of materiality assessments and difficulties of forward-looking reporting, further refinements and standardization of disclosure requirements remain a necessary feature.

3. Judicial and Regulatory Frameworks in China

The U.S. framework is formed primarily through judicial interpretations and investor-based regulations whereas China's approach relies on administrative compliance with national environmental policies. This section examines the Chinese regulatory challenges.

In China, the disclosure of environmental information has traditionally been the responsibility of administrative agencies, such as the China Securities Regulatory Commission (CSRC) and the Ministry of Ecology and Environment (MEE), which historically have had very limited power to enforce those disclosability requirements. The bodies establish and carry out regulations that obligate corporations to disclose any environmental practices [46]. Yet, the area has witnessed an evolution in the judiciary's role in this, as courts increasingly take up the defense of environmental disclosure, both through public interest litigation and landmark cases. These agencies work together to ensure that companies comply with these environmental disclosure standards, representing the country's stance of supporting transparency and responsibility for corporate environmental behavior.

3.1. Regulatory Framework

The CSRC is the chief rule-maker and enforcer for the disclosure standards of publicly listed companies. Its key tool is the use of quantitative benchmarks to determine materiality [47]. For example, the CSRC classifies an environmental matter as being material if this liability has a direct financial impact of at least 10% of a company's revenues or profits [48]. This clear threshold simplifies compliance for companies, as the above would create measurable criteria for companies on what information must be disclosed [49]. Such a system allows corporate reporting methods to be aligned with investor expectations based on those issues of substantial financial impact. The quantitative metrics, however, have significant limitations. The focus is on environmental risk, which is normally long-term, uncertain, and qualitative and is difficult to quantify. For instance, risks associated with regulatory changes or damage to a company's reputation do not necessarily have short-term effects on the company's revenue or profit, but they can have big long-term implications. However, by concentrating primarily on the short-term financial impacts, the CSRC's unsystematic approach tends to overlook these other dimensions of materiality.

The Ministry of Ecology and Environment (MEE) complements the CSRC's efforts. In the wake of the need for more comprehensive reporting standards, the MEE passed the Measures on the Management of Environmental Information Disclosure for Companies in December 2021 [50]. Such measures are a big step toward corporate accountability. Annual environmental information disclosure is required, which includes details on pollutant discharges, environmental violations, and measures of rectification [50]. The MEE's measures require the inclusion of such data to offer a more detailed picture of companies' environmental performance. To further its focus on financial materiality, the CSRC challenges the MEE to complement its work by integrating qualitative and compliance aspects of environmental disclosure [50]. For instance, polluting companies must now share in real-time their emissions and pollution levels (**Figure 2**).

Such measures are operationalized such that the principles of transparency and public accountability find resonance in the practice of affording ready and reliable access to the information by the stakeholders. A real-time reporting system for monitoring air and water quality, and regulatory body and public scrutiny on corporate environmental performance can be considered a practical example.

Despite these advances, however, problems persist in implementing administrative enforcement. The biggest problem is that enforcement is not practiced in the same way across different regions in China. For example, richer regions like Beijing and Shanghai generally have stronger regulatory capacity and enforcement capability than economically backward regions which place greater emphasis on industrial growth than environmental compliance [51]. It does not even level the playing field between companies that operate in different parts of the country or the ability of companies to comply with disclosure standards. In this context, the relationship between the CSRC and the MEE is another challenge. The two agencies have similar functions but with a lack of a unified approach sometimes causes overlapping mandates and a lack of enforcement [52]. However, this gap will only be closed by a closer and more integrated collaboration to develop guidelines that could balance environmental disclosure's financial and non-financial aspects.

Figure 2. ESG Discosure Compliance in Chinese Companies.

Source: China Briefing (2024) https://www.china-briefing.com/news/china-releases-esg-reporting-standards-for-businesses.

3.2. Judicial Interventions

Traditionally, administrative agencies have been the main enforcers of environmental disclosure standards in China, but the judiciary is increasingly stepping in, with the aid of environmental public interest litigation and landmark rulings. The courts are emerging as an engagement in strengthening corporate accountability and granting the public access to environmental information.

3.2.1. The Shandong Green Development Project Case

The Shandong Green Development Fund Project is one of the striking examples of judicial intervention in environmental matters. It shows the role of the judiciary in environmental policy and corporate practices [53]. It seeks to catalyze private, institutional, and commercial capital for climate-positive infrastructure and businesses in the province of Shandong, which is experiencing serious environmental problems [53]. Although this fund serves mainly as a "financial" tool, the judiciary's increasing intervention as a counterforce to its involvement in legally overseeing and monitoring the climate-oriented development projects reflects its expanding service in this area. Such projects suggest the judiciary takes seriously environmental interests, beyond traditional financial materiality boundaries and thus reflects its engagement with issues of public concern. The courts have started to fill in systematized gaps in environmental enforcement by fostering collaborations between administrative bodies, financial institutions, and even private entities. The case represents a potential bridge between administrative objectives and societal expectations by highlighting how judicial oversight can close the gap between administrative and environmental risks and opportunities.

3.2.2. Exemplary Cases in Public Interest Litigation

Environmental public interest litigation in China, as a manifestation of judicial engagement in corporate accountability and transparency in environmental governance, has demonstrated that the judiciary is increasingly important for enforcing corporate accountability and guaranteeing environmental transparency in China. Several notable cases illustrate the impact of legal actions on obtaining company compliance with environmental regulations and on the company's CSRC and MEE disclosure obligations.

3.2.3. The PetroChina Dalian Oil Spill

A significant case in this context is the PetroChina Dalian Oil Spill (2010), where serious environmental damage was caused due to a substantial oil spill by a pipeline explosion[54]. Under CSRC material disclosure standards, PetroChina listed on multiple exchanges, was required to report the incident details and its environmental impacts. It signaled that corporate environmental management practice was deficient.

3.2.4. Zijin Mining Group's Environmental Incident

Similarly, in 2010, the Zijin Mining Group's Environmental Incident caused a major polluting event to the Ting River after a toxic leak from its copper plant in Fujian Province. Zijin Mining was forced to publicly reveal its environmental impact and remedial measures for the incident, which spewed yellowish dust into the air and caused heavy ecological damage, under CSRC regulations[55]. Timely and transparent environmental disclosures were underscored by regulatory penalties incurred on the company.

3.2.5. ConocoPhillips China Bohai Bay Oil Spill (2011)

In a similar vein, major marine pollution was caused by oil leaks in the ConocoPhillips China Bohai Bay Oil Spill (2011)[56]. While a foreign company, ConocoPhillips was a subject of MEE's regulations that required disclosure of the environmental impact of the spill[57]. In this case, the enforcement focus was on regulatory oversight as a tool that can help hold companies responsible for their plight of environmental harm.

3.2.6. Jiangxi Copper Company's Dexing Mine Case (2021)

In furtherance, the Jiangxi Copper Company's Dexing Mine Case (2021) was a case of wastewater discharge alleged to have caused heavy metal-associated contamination of 430 acres (175 hectares) of farmland rendering it unsuitable for agriculture[58]. The company denied wrongdoing but, as a listed company, Jiangxi Copper was obliged to report any material incident under CSRC regulations. The plaintiffs' litigations were dismissed at first instance, but the ongoing appeal implies the necessity of a judicial review of corporate accountability.

Together these cases help in demonstrating the importance of litigation and regulatory enforcement in maintaining corporate transparency, promoting sustainability, and reinforcing public trust.

3.3. Interactions between the Judicial and Regulatory Approaches

The increasing role of the courts in environmental matters is based on legislative provisions giving the courts the jurisdiction to adjudicate public interest cases. Articles 55 and 58 of the Civil Procedure Law authorize procuratorates and eligible NGOs to initiate public interest litigation in cases of environmental harm[59]. In turn, such a statutory framework has led to the filing of lawsuits that seek to require corporations to respond to environmental impacts and to meet disclosure standards[60]. However, challenges exist to the judiciary's role. With environmental risks that have long-term uncertainties and non-quantifiable impacts, courts often struggle to assess the materiality of such risks[60]. For instance, a lawsuit over an unsuccessful company's effort to inform how climate change might harm its business presented difficult scientific and economic information.

However, the judiciary is increasingly intervening in environmental governance but does so without operating in a vacuum. The judiciary and administrative agencies like the CSRC and the MEE should collaborate in this respect to enforce disclosure standards comprehensively[61]. Administrative and judicial mechanisms can be complementary when joint initiatives, like the publication of public interest cases by the SPC and SPP, are undertaken to address certain aspects of the harmonization problem. For instance, although the CSRC enforces quantitative benchmarks on disclosure, the judiciary can deal with qualitative dimensions of materiality and thus contribute holistically to the phenomena of corporate responsibility[62]. There is one potential area for enhanced collaboration. This includes the process of judicial guidelines for cases where environmental risks are material. Such guidelines would give courts a predictable framework by which to evaluate cases involving disclosure violations, eliminating the inconsistencies in judicial decisions and thus improving predictability for corporations. At the same time, cross-agency training programs could train judges on their ability to undertake and solve technical cases in the environmental domain appropriately.

3.4. Opportunities and Challenges

Problems with the consistency and effectiveness of China's materiality framework for environmental disclosures reduce its value. The imperfect realization of its goals is hindered by the subjective nature of materiality judgments and selective and uneven regional enforcement of disclosure, corporate governance, and restitution [63]. Environmental risks are unlike financial risks, which are often quantifiable because environmental risks can be speculative, long-term, and hard to measure [64]. Lack of standardization results in variations, some companies over-disclose immaterial data to dodge scrutiny, while others pose important risks to secure their position in the market. Such practices undermine the intended objective of the framework if there is no clear, actionable information for stakeholders. These inconsistencies are made worse by sector-specific and regional disparities. The strict regulation of high-polluting industries makes it an uneven field of play when it comes to less-regulated industries [65]. Owing to this, enforcement also varies by region. In areas like Beijing and Shanghai, there are strict disclosure standards but economically dependent regions may have to focus more on growth than accountability. The application of the materiality principles is weakened by these disparities.

However, China's "double materiality" adoption presents many opportunities. It adopts a financial and broader societal and environmental impacts approach that is relevant for investors and aligns with global ESG standards. This, in turn, leads to the emergence of initiatives such as the Green Finance Guidelines (2017), which encourage investment toward renewable energy and clean technologies, and relate to national as well as international environmental goals [66]. This adds to the transparency. The Environmental Protection Law (2014) article 53 allows public access to environmental information to afford public oversight [67]. Cases such as the Shandong Green Disclosure Case serve as evidence of the judiciary's role in bridging the gap in the enforcement and applying the materiality principles consistently.

4. A Comparative Analysis of the Materiality Concept in the USA and China

The contrast in the legal and regulatory framework of materiality in environmental disclosures between the United States and China is fundamental and results from their different legal traditions and governance frameworks. Though they may be different in many respects, both countries confront similar issues as to how to decide on what is material, how to ensure that disclosure practices are consistent, and in a context where there is a growing need to have transparency in corporate reporting. This comparative analysis explores the similarities, differences, ambiguities, and critiques of the materiality frameworks in both jurisdictions and how they can be construed concerning their corporate governance and sustainability implications. For this, a qualitative legal analysis of the relevant regulatory guidelines and provisions, and case law precedents is done from the U.S. Securities and Exchange Commission and China Securities Regulatory Commission. In furtherance of this, the impact of this situational analysis is combined with all the international frameworks, such as the Paris Agreement, Task Force on Climate-related Financial Disclosures (TCFD), and the Global Reporting Initiative (GRI), to create a broader context. It focuses on different ways in which enforcement mechanisms, legal interpretations, and reporting obligations between the partners are different.

4.1. Judicial vs. Administrative Emphasis

One of the most glaring differences between how the US and China operate is their differences in leaning towards judicial versus administrative mechanisms. Judicial decisions have generally shaped the idea of materiality in the US. In *TSC Industries, Inc. v Northway, Inc.* (1976), the theory of materiality has been defined as having a substantial likelihood that a reasonable investor, in doing so would consider the information important to a decision [68]. In *Basic Inc. v Levinson* (1988) this standard, refined, was applied, applying a "total mix" of information approach based on a contextual understanding of materiality particular to investor interests [69]. China's materiality framework is overwhelmingly administrative with the CSRC and MEE as the administrators and enforcers of materiality standards [70]. Despite the significant role played by U.S. courts in interpreting materiality, Chinese courts have historically been disengaged. However, cases like the Shandong Green Disclosure Case are recent judicial interventions that show a growing role for the judiciary, in cases where public health or a major environmental interest is at stake. It implies possible change towards a balanced system, which combines administrative and judicial oversight.

4.2. Double Materiality vs. Investor-Centric Framework Design

The US materiality framework is still focused on investor-related information that has a direct impact on financial performance and decisions. The SEC enforces Regulation S-K, which requires disclosures of material environmental risks, compliance costs, and emerging liabilities. This approach is exemplified by items 101, 103, and 303 which require transparency on regulatory impacts, legal proceedings, and forward-looking risks [71]. In contrast, China has adopted a "double materiality" approach which takes into account the financial significance for investors as well as broader, societal and environmental ones [72]. Accordingly, Article 53 of the Environmental Protection Law (2014) and CSRC's Guidelines for Environmental Information Disclosure by Listed Companies (2010) have a dual perspective as well [73]. This approach fits international frameworks such as TCFD, yet it complicates balancing investors and societal expectations.

4.3. Ambiguities and Challenges in the Implementation of the Environmental Regulations

There are a number of international environmental agreements and reporting frameworks that influence the accounting of environmental risk at the corporate level. For example, the Paris Agreement, the Task Force on Climate-Related Financial Disclosures (TCFD), and the Global Reporting Initiative (GRI) are key global initiatives that set guidelines on how to increase the visibility of the environmental risk and climate related financial impact on the companies [74]. Many of these frameworks have yet to be implemented in the jurisdictions, leaving them with several legal and regulatory challenges. The biggest concern is how ESG disclosure requirements are not standardized. In the USA, materiality decisions have inherent subjectivity and can generate inconsistency because different courts can reach different conclusions concerning similar facts [75]. The unpredictability gives companies no chance to gauge the legal landscape, and to balance amongst the interests of investors and stakeholders, including regulators. Other critics contend that judicial interpretations can do no better than to adaptively supplement legislative or regulatory guidance with more consistent standards for environmental disclosures [76]. Materiality is interpreted differently by national regulators, hence there are inconsistencies making it impossible to compare markets [77]. Additionally, corporate resistance further complicates implementation because many firms complain of high compliance costs and a complexity in data collection.

For example, the United States consolidates financial materiality standards, while the European Union's CSRD necessitated a double materiality approach for firms to disclose financial and environmental risks [78]. ESG reporting is in the early stages of development in China with the CSRC and the Ministry of Ecology and Environment (MEE) requiring disclosures for high-emission industries only, resulting in gaps in the compliance of the voluntary reporting [79]. There is also a lack of enforcement mechanisms for such global environmental treaties. The Paris Agreement sets the emissions reduction goals, but the legally binding enforcement measures are not present; compliance remains still at the discretion of national governments [80]. As a result, there has been an uneven implementation whereby some countries are on the firms and have adopted very stringent ESG reporting requirements whereas others are still bereft of comprehensive sustainability frameworks that will ensure proper sustainability reporting [81]. In particular, there are still jurisdictions where environmental disclosure is still voluntary or loosely regulated, for example, in emerging markets, where ESG policies are still not adopted in a robust manner [81].

China also faces its own set of challenges derived from its reliance on quantitative thresholds as a benchmark, for example, the 10 percent revenue or profit impact benchmark used by the CSRC [82]. By focusing too much on financial performance, risk is being overlooked, for example, reputational damage and regulatory uncertainty which may have no immediate effect on financial performance, but have significant long-term consequences. That is, inconsistencies are compounded by regional disparities in enforcement. Those regions with stronger regulatory institutions but are wealthier (Beijing, Shanghai) tend to have stricter compliance than regions that rely on the economy, which may prioritize growth over environmental accountability. Additionally, there is still much resistance from corporations to ESG disclosure and not enough push for it to be adopted widely [83]. As evident in many firms, there are high compliance costs, complex data collection, and fear of competitive disadvantage associated with mandatory reporting requirements. Specifically, in the US, SMEs have been arguing that the SEC's 2024 climate disclosure rule is too cost-intensive [84]. State owned enterprises (SOEs) in China tend to have higher disclosure rates while private firms struggle to integrate ESG reporting since it is not clear what information to provide [85].

While there are many challenges regarding regulation, it appears that there is a tendency toward harmonization. The SEC's 2024 climate disclosure rule requires companies to disclose Scope 1, 2 and in some cases, Scope 3 greenhouse gas emissions [19]. Along with that, China has also started to enhance its environmental reporting requirement, opting for the CSRC and MEE to strengthen its regulatory control over listed firms, to prevent greenwashing and enhance transparency [86]. Nevertheless, without stronger enforcement as well as global participation, ESG reporting advantages are likely to persist. To facilitate the development of a globally consistent sustainability reporting framework, the regulatory bodies, the standard setting organizations and the private sector would need to work together closely to address inconsistency in disclosures with meaningful corporate accountability.

4.4. Critique of Selective Disclosure Practices

Both jurisdictions share common criticism of selective disclosure practices. If the companies' predictions of future environmental risks fail to materialize, they may omit them in the U.S. to avoid potential legal liabilities [87]. Likewise, in China, some companies disclose immaterial data in excess or underreport significant risk to escape scrutiny or to keep up market competitiveness [19]. More importantly, these practices undermine the goals of the transparency of these frameworks, making investors and stakeholders unaware or misled about a transaction.

4.5. Opportunities for Improvement

Though they work through their difficulties, both frameworks can be better and harmonized. The combination of China's regulatory approach and its emphasis on public participation, which is manifested in the increasing use of environmental public interest litigation, is what makes such an approach unique. By both ensuring transparency and accountability, Article 53 of the Environmental Protection Law enables citizens and organizations to access environmental information [88]. The Shandong Green Disclosure Case is one of many examples where public oversight can fill gaps in enforcement and keep materiality principles consistent [87]. The strong legal traditions of corporate accountability are an asset for the U.S., which maintains an investor-centric model. In line with global ESG initiatives such as TCFD, the SEC's climate disclosure rule puts the U.S. in the top rank of countries in bringing sustainability into financial reporting [89]. While there is much to praise regarding the U.S. framework, the double materiality approach adopted by China could be adopted in the U.S. framework to capture the broader societal and environmental implications of corporate activity. This suggests that both systems are criticized and suffer from ambiguity regarding subjectivity in materiality judgments, and inconsistencies in enforcement and selective disclosure. If the U.S. and China tackle these challenges and apply their strengths, transparency, accountability, and sustainability will become the benchmarks for corporate governance in other jurisdictions.

5. Implications of Materiality in Corporate Reporting Practices

The materiality frameworks of the United States and China have substantial implications for corporate reporting practices. The different frameworks of each jurisdiction as corporations in the two locations work to navigate a framework of regulatory requirements shape their approach to environmental risk and opportunity disclosure, fostering transparency, accountability, and sustainability. This study finds that despite offering great investor protection in the U.S. framework, the determination of what constitutes materiality is inconsistent because of the capitalist judicial rulings on a case-by-case basis [90]. On the other hand, the Chinese regulatory-driven approach[89] guarantees compliance but is not flexible in adapting to the changing environmental risks. This brings to light lines of past research indicating that mandatory ESG disclosures increase corporate accountability. However, actual corporate behavior and investor decision-making subsequently are subject to assessment on how these disclosure frameworks influence it.

5.1. Impact on Disclosure Standards and Practices

The model in the United States is investor-centric and therefore it forces corporations to consider material risks and opportunities that affect financial performance directly. The focus on this will ensure that the environmental disclosures are according to the investors' needs and lead to the transparency of the capital markets. While the "total mix" approach offers corporations a great deal of discretion, variability remains in how companies interpret and report material environmental information[91]. The subjectivity of this leads to underreporting of long-term risks, especially with climate change or resource depletion which may not immediately impact financial performance yet do represent important issues for sustainability[91]. Contrarily, China's "double materiality" framework asks companies to strike a balance between investor concerns and broader societal and environmental responsibilities[92]. The dual perspective forces a more holistic approach to corporate reporting, inspiring companies to report not only the financial material risks but also their broader ecological impacts. For instance, the Chinese require their highly polluting industries to report real-time emissions data to increase transparency and accountability[92]. Nevertheless, reliance on quantitative thresholds, such as the 10% revenue or profit impact, excludes qualitative risks that are difficult to quantify but important to long-term sustainability.

5.2. Regional and Sectoral Variations

Corporate reporting practices vary as a result of regional and sectoral variations in both countries. Industries in the U.S., like energy and manufacturing are under a magnifying glass as they have very large environmental footprints[25]. Like in China, sectors with high pollution concentrations are also subject to more stringent reporting requirements[93]. However, there are inconsistencies because regional disparities in enforcement, especially in China, are common[65]. In regions where many companies are economically advanced, like Shanghai and Beijing, they follow stricter standards, while less developed regions allow companies to exploit regulatory gaps to reduce disclosures[94]. These disparities demand that a uniform enforcement mechanism be enacted to address this.

5.3. Public and Stakeholder Engagement

The two frameworks affirm the heightened significance of stakeholder involvement in determining corporate reporting procedures. Provisions like Article 53 of the Environmental Protection Law institutionalizing public participation in China provide citizens and organizations with an opportunity to demand greater transparency as well[53]. In cases like the Shandong Green Disclosure Case, public interest litigation advances the role of civil society in holding corporations to account[75]. The same is true in the U.S., as shareholder activism and institutional investor pressure force companies to implement truly holistic ESG reporting practices. For instance, investors expect more and more disclosures that can be aligned globally with frameworks such as the Task Force on Climate-related Financial Disclosures (TCFD) and the Global Reporting Initiative (GRI).

5.4. Corporate Innovation and Leadership Opportunities

Regulatory developments are transforming opportunities to be a leader in sustainability for corporations. Proactive reporting beyond minimum requirements can help a company build a better reputation, attract socially responsible investors, and lead to increased long-term resilience[31]. For instance, companies that practice scenario analysis and stress testing for climate risks are adopting forward-looking approaches, which are in line with best practices internationally[94]. Technology such as blockchain for real-time emissions tracking provides innovative ways of improving transparency and data accuracy as well[95].

5.5. Balancing Compliance and Innovation

It is a struggle for corporations to reconcile compliance with innovation. In the U.S., small and medium-sized enterprises have been strongly opposing the high cost of implementing the SEC's climate disclosure rule (**Figure 1**).

Likewise, Chinese companies may also struggle to meet financial and materiality demands at the same time, particularly when there is no obvious guidance on qualitative assessments. To build flexible but robust frameworks that are transparent enough to make a difference, yet innovative enough to move forward, will require collaboration between regulators, corporations, and stakeholders. These results corroborate Mezzanotte's findings that making investment material also increases transparency but confuses enforcement [31]. Just as Turner and Weirich show that materiality models that are driven by investors may fail to address important environmental risks. This paper confirms that cross border standardization of ESG remains a pending issue by looking at both regulatory frameworks and case studies.

6. Conclusion

The divergences in environmental disclosures addressing approaches stemming from legal traditions, regulatory structures, and governance priorities are illuminated by the analysis of materiality frameworks in the U.S. and China. While China has developed an administrative-centered, double materiality framework of incorporating societal and environmental considerations, the United States increasingly relies on a judicially defined investor-centric model. Both systems have their strengths and weaknesses, but both have some useful lessons for how corporate reporting can be more transparent and accountable. The U.S. investor approach allows materiality to approximately mirror the market's needs and financial transparency is used in decision-making. On the one hand, it gives too much emphasis on financial materiality and thus does not fully address the problem of environmental sustainability. On the other hand, it neglects the qualitative, long-term risks. It is a judicial interpretation that complicates corporate compliance through variability. Apart from all this, the SEC's 2024 climate disclosure rule or aligning with global frameworks like TCFD are huge steps towards making environmental reporting standardized and better. On the contrary, China's "double materiality" framework, which incorporates both financial and social interests, is also a progressive model of one country's commitment to sustainable development. Under an administrative-led system, strong enforcement by regulatory bodies such as CSRC and MEE are the guides to compliance especially in high-polluting industries. However, the framework still faces unaddressed challenges, such as selective disclosure practices, regional inequalities of enforcement, and the exclusion of qualitative risks that require some refinement of the framework. The environmental public interest litigation bridges these gaps by showing potential for growth in the role of public participation and judicial intervention through that litigation.

Common problems with critiques of both frameworks include the subjectivity of materiality judgments and the friction between regulatory demands and corporate innovation. The existence of materiality standards of disclosure practices is ambiguous and creates selective disclosure that devalues the purposes behind transparency and accountability. To respond to these criticisms a multi-pronged approach is required, including clearer qualitative assessments, uniform enforcement regimes, and more stakeholder involvement. There is an opportunity for the two jurisdictions to work together to harmonize the evolution of environmental disclosures. The purpose is to integrate the elements of China's "double materiality" framework into the U.S. system to enable corporations to consider an overall view of sustainability. Conversely, China can borrow a page from the U.S.'s investor-centric practices to boost financial materiality. Together, they can push the reporting standards to meet the global ESG frameworks, such as GRI and TCFD, to achieve cross-border consistency and attract foreign investment. In the face of the increasing complexity of regulatory landscapes in which corporations operate, companies with proactive and transparent reporting are less risky and present opportunities for long-term growth. Going forward, it would be in the interest of both the U.S. and China to develop policy reforms that better match disclosure to global ESG standards. Further, the U.S. could complement elements of the double materiality by augmenting the scope of sustainability issues considered, while China can better strengthen qualitative disclosure standards to create more confidence on the part of investors. The global ESG reporting framework should be developed to balance financial and environmental transparency in order to encourage cross border investment decision making by policymakers.

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