Analysis of Social and Environmental Impact Measurement Difficulties in Green Investment and Sustainable Finance

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ABSTRACT

Purpose: This study examines the challenges in measuring social and environmental impacts in green investment and sustainable finance, with a focus on methodological inconsistencies, data quality, and the application of sustainability standards. It also explores the gap between theoretical frameworks and their practical implementation in corporate sustainability reporting.

Research Method: The research employed a systematic literature review (SLR) approach to synthesize existing studies and identify recurring challenges in impact assessment methodologies. The SLR integrated theoretical perspectives, such as stakeholder and legitimacy theories, to connect the findings to established frameworks, highlighting their practical limitations in real-world applications.

Results and Discussion: The study revealed significant inconsistencies in the methodologies used for impact measurement, including the limitations of both quantitative and qualitative approaches. Issues with data quality, such as reliance on self-reported data without adequate third-party verification, compromised the reliability of sustainability claims. Additionally, varying and ambiguous sustainability standards were shown to create confusion and potential greenwashing. The findings highlight the disparity between theoretical frameworks and their practical application, which undermines stakeholder trust and organizational legitimacy.

Implications: This research contributes to academic knowledge by providing an integrated view of current challenges in sustainability impact measurement. It recommends adopting mixed-methods approaches and advanced technologies, such as blockchain, to improve transparency and reliability in sustainability reporting. The study suggests that aligning methodologies with comprehensive theoretical frameworks can enhance corporate practices and bolster stakeholder confidence in sustainability claims.

Keywords: impact measurement; sustainability reporting; green investment; data quality; methodological challenges.

Introduction

Over the past decade, the intersection of finance and sustainability has undergone rapid evolution, driven by growing environmental challenges and a global push for sustainable development. The paradigm of green investment and sustainable finance has taken center stage in promoting economic practices aligned with social and environmental goals. However, a fundamental challenge threatens the effectiveness of these initiatives: accurately and reliably measuring social and environmental impacts. Consistent and robust metrics are crucial to bridging the gap between theory and practice. As the demand for transparency and accountability from investors, regulators, and consumers grows, the complexity of measuring the impacts of green investments becomes increasingly significant (Lashitew, 2021). This challenge stems from inconsistencies in data quality, methodological variations, and diverse interpretations of sustainability standards across sectors and regions (Luthra & Mangla, 2018). These discrepancies create gaps that hinder the development of comprehensive sustainable finance frameworks, ultimately impacting the credibility and attractiveness of green investments. Inadequate measurement can erode stakeholder trust, impede the implementation of long-term strategies, and risk undermining the legitimacy of sustainability claims (Kelling *et al.,* 2021).

Stakeholder theory provides a crucial foundation for understanding the role of impact measurement, emphasizing that firms should create value for all stakeholders, not just shareholders (Freeman & Dmytriyev, 2017). In the context of green investment, accurate impact measurement ensures that sustainability claims can be validated by a broader range of stakeholders, including local communities, consumers, and regulatory bodies (Becchetti *et al.,* 2022). This reinforcement of trust supports long-term, stable investment behaviors. Meanwhile, legitimacy theory highlights that firms must align their practices with prevailing social norms and values to maintain their legitimacy. In sustainable finance, a company's ability to accurately measure and communicate its environmental, social, and governance (ESG) impacts is crucial for maintaining public trust and a strong reputation. The connection between these theories and the existing measurement challenges underscores the urgency for developing standardized and comprehensive measurement frameworks. Such frameworks must capture the complex dimensions of green investments' social and environmental impacts while addressing the gap between theoretical principles and practical application. Failure to address these challenges risks reducing the label of "sustainability" to a superficial and misleading marketing tool, thereby undermining the substantive value of sustainable finance initiatives (Dempere *et al.,* 2024). An apparent disparity exists between the overarching ambitions of sustainable finance and the detailed application required for effective measurement and implementation. As the field expands, so does the challenge of ensuring that financial instruments genuinely contribute to sustainable progress without succumbing to greenwashing, where superficial or misleading sustainability claims obscure corporate practices. Addressing these challenges is crucial to ensuring that investments labeled as "green" and "sustainable" are grounded in empirical evidence that reflects their intended social and environmental benefits.

Recent studies have examined various facets of the complex nature of measuring social and environmental impacts within sustainable finance. Eyre *et al.,* (2024) examined how measurement frameworks categorize financial products as sustainable, highlighting the importance of "indicator literacy" in identifying potential shortcomings in metrics. This highlights the critical role of understanding measurement indicators in recognizing the limitations inherent in current practices.

Bouchmel *et al.,* (2024) identified financial constraints as significant barriers to green investments among SMEs in Eastern Europe, suggesting that improving access to funding is essential for fostering sustainable growth. Similarly, Bax et al. (2024) reviewed the literature on asset pricing to examine the link between ESG factors and financial returns, noting divergent views on whether companies with high ESG scores generate better or worse economic outcomes. Joshipura *et al.,* (2024) synthesized research on sustainable investing and financing, highlighting key themes such as investor motivations, investment performance, and policy support. These studies stress the importance of ongoing research and policy development to address the multifaceted nature of sustainability impact measurement in finance.

Further research has highlighted the intricate relationship between green finance, environmental factors, and sustainable development. Hunjra *et al.,* (2023) found that green finance has a positive impact on sustainable development in developing countries, whereas ecological degradation has an opposite effect. An & Madni, (2023) demonstrated that climate change adaptation is a critical driver for green investment in China, boosting corporations' social, economic, and environmental performance. Meng & Shaikh, (2023) emphasized that ecological factors often precede governance and social components when devising green finance strategies, with tools like green bonds, ESG integration, and renewable energy funds playing crucial roles. However, Bouchmel *et al.,* (2024) reiterated the financial barriers that SMEs face in Eastern Europe, which restrict green investment and environmental performance. Internal financing is shown to have positive impacts, while leverage and financial constraints exhibit adverse effects. The rise of green finance and sustainable investment is underscored by environmental concerns and global crises (Dmuchowski *et al.,* 2023). Despite the growing significance of green bonds as instruments to finance environmentally friendly projects and reduce CO2 emissions Rasoulinezhad & Taghizadeh-Hesary, 2022), challenges remain, including inconsistent ESG ratings and data quality issues (Dmuchowski *et al.,* 2023). Regulatory obstacles have also been noted as significant impediments Desalegn & Tangl, (2022), with research pointing to the need for long-term supportive policies, improved disclosure standards, and regulatory environments that foster green finance (Bhutta *et al.,* 2022; Rasoulinezhad & Taghizadeh-Hesary, 2022). Education and communication are vital in developing sustainable financial markets (Dmuchowski *et al.,* 2023).

Despite extensive research on social and environmental impacts in sustainable finance, critical gaps persist between current empirical findings and theoretical frameworks. Studies such as those by (Eyre et al., 2024; Bouchmel et al., 2024) highlight data inconsistencies and financial constraints, especially for SMEs in regions like Eastern Europe. While these findings shed light on challenges and the importance of indicator literacy, they often do not provide comprehensive, standardized solutions applicable across various financial sectors. This suggests the need for a deeper exploration of creating robust, universal measurement methodologies that integrate both qualitative and quantitative aspects. Theoretical perspectives, including stakeholder and legitimacy theories, stress the importance of aligning business practices with societal values and maintaining trust. However, their empirical application in impact measurement is still limited. Research by (Bax et al., 2024; Joshipura et al., 2024) touches on investor motivations and ESG-related financial outcomes. Still, it presents mixed findings on whether high-ESG companies achieve consistently better economic performance. This inconsistency highlights a gap where theoretical advocacy for sustainability does not align seamlessly with empirical evidence. These gaps highlight that, while significant strides have been made, a cohesive empirical approach that matches theoretical frameworks is lacking. Addressing these gaps requires integrating

research findings and developing standardized frameworks that meet stakeholder expectations, ensuring that sustainability claims are substantiated by verifiable evidence. This step is essential for fostering confidence and integrity in sustainable finance practices.

This study makes a novel contribution by providing a profound analysis of the challenges associated with measuring social and environmental impacts in green investment and sustainable finance. Unlike previous research, which often focuses on isolated issues such as data inconsistencies or methodological challenges, this study synthesizes existing literature to create a comprehensive qualitative understanding. By employing a systematic literature review (SLR) approach, this research identifies and consolidates findings from various sources, enabling an in-depth examination that integrates both theoretical and practical perspectives. This approach highlights the gaps between current theoretical frameworks, such as stakeholder and legitimacy theories, and their practical application in impact measurement and evaluation. The study recommends cohesive approaches that address the qualitative aspects of impact assessment, incorporating empirical insights to propose solutions for developing reliable and standardized measurement frameworks. This holistic view is essential for ensuring that sustainability claims are grounded in evidence that reflects real-world benefits, thus enhancing stakeholder trust and legitimacy.

This study's central research question is: What are the main challenges in measuring social and environmental impacts in green investment and sustainable finance? And how can these challenges be addressed to develop consistent and reliable qualitative measurement frameworks? This question is urgent given the persistent issues highlighted in recent literature, including methodological inconsistencies, data quality problems, and varying interpretations of sustainability standards. The study aims to present actionable insights that help bridge these gaps, ensuring that qualitative measurements align with stakeholder expectations and contribute to the legitimacy and transparency of sustainable finance practices.

Literature Review and Hypothesis Development

Inconsistencies in Measurement Standards

The literature has extensively discussed the significance of consistent measurement standards in green investment and sustainable finance. Standardized measurement frameworks are essential for assessing the social and environmental impacts of investments, promoting transparency, and fostering stakeholder trust (Meiden & Silaban, 2023). Inconsistent standards can lead to confusion and skepticism among investors, potentially hindering the growth of genuine sustainable investments. Several key frameworks have been developed to guide sustainability reporting, notably the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB). GRI focuses on comprehensive disclosures across environmental, social, and governance (ESG) dimensions, aiming for broad stakeholder engagement (Sridharan, 2018). In contrast, SASB emphasizes industry-specific standards tailored to financial materiality, primarily targeting investors (Busco *et al.*, 2020). Despite their contributions, these frameworks have limitations. GRI's broad approach may lack specificity, while SASB's focus on financial materiality might overlook broader sustainability aspects. The absence of a unified global standard that integrates the strengths of both frameworks complicates cross-sector and cross-regional comparisons, hindering a holistic understanding of investments' contributions to sustainable development.

The concept of "indicator literacy," as highlighted by Eyre *et al.,* (2024), underscores the importance of understanding how indicators are selected, interpreted, and applied in sustainability assessments. A deep understanding of these indicators is crucial for accurately evaluating sustainability impacts. Without this literacy, there is a risk of misinterpreting data, leading to flawed evaluations and misguided decision-making. This issue is particularly pertinent given the proliferation of diverse metrics and reporting standards, which can overwhelm stakeholders and obscure the actual sustainability performance of investments (Bennett *et al.,* 2017). Theoretical perspectives, such as stakeholder theory, emphasize that organizations must consider the interests of all stakeholders, not just shareholders, in their decision-making processes (Freeman, 2010). Transparent and consistent measurement standards are vital for maintaining trust among investors, customers, employees, and the broader public (Parris *et al.,* 2016). Inconsistent standards can undermine this trust, as stakeholders may question the legitimacy of sustainability claims. This skepticism can lead to reputational damage and decreased investor confidence, ultimately affecting a company's market performance.

Empirical studies have demonstrated that inconsistencies in measurement standards can adversely impact decision-making and stakeholder confidence. For instance, (Bose, 2020) found that the lack of standardized ESG reporting frameworks leads to significant variations in disclosures, making it challenging for investors to assess and compare companies' sustainability performance. Similarly, Bouchmel *et al.,* (2024) reported that inconsistent green finance practices hinder sustainable development efforts as stakeholders struggle to identify sustainable investments. These findings highlight the need for harmonized measurement standards to facilitate informed decision-making and build stakeholder trust. To address these challenges, collaborative efforts among regulators, industry bodies, and research institutions are crucial for developing harmonized measurement standards. Integrating advanced technologies, such as blockchain, can enhance data transparency and reliability, providing stakeholders with verifiable information on sustainability performance (Venkatesh *et al.,* 2020). Additionally, adopting third-party verification practices can further validate sustainability reports, ensuring that claims are substantiated by credible evidence (Nishitani *et al.,* 2020). These measures can contribute to a more trustworthy environment where green investments are supported by transparent and reliable data, fostering the growth of genuine sustainable finance practices.

Data Quality Issues and Reliability

Data quality in measuring the social and environmental impacts of green investment and sustainable finance is paramount. High-quality data is essential because it enables stakeholders to make informed decisions based on reliable information. Conversely, poor data quality can lead to incorrect evaluations, resulting in poor decision-making and a decline in stakeholder trust. Decisions based on substandard data diverge from intended outcomes and can create skepticism about the commitment to true sustainability (Husted & Allen, 2010). Data quality issues often stem from subjective reporting, where organizations might present an overly favorable view of their sustainability efforts (Nilashi *et al.,* 2023). This subjective data, often self-reported and lacking third-party verification, is prone to bias and manipulation. Additionally, inconsistent data collection methodologies across companies and sectors further complicate the reliability of sustainability assessments. These variations impede the objective evaluation and comparison of companies' performance in terms of sustainability metrics (Hervani *et al.,* 2005).

Third-party verification is crucial in enhancing data reliability and reducing biases. Independent verification ensures the accuracy of reported data, thereby solidifying the trustworthiness of sustainability reports (Nofel *et al.,* 2024). Moreover, establishing consistent and comprehensive data collection standards is vital. These standards enable comparability across different organizations and industries, promoting transparency and facilitating more informed decision-making (Mostafa Hamdy & Hassan Qassem, 2024). Technological advancements, such as blockchain and artificial intelligence (AI), are recognized for their potential to improve sustainability data management. Blockchain offers a secure, immutable ledger, reducing the chance of data tampering and enhancing transparency. AI can analyze vast datasets to detect anomalies and inconsistencies, which improves the reliability of sustainability reporting (Adelakun *et al.,* 2024). However, adopting these technologies faces challenges, including infrastructural limitations and a lack of expertise within organizations. The implications of poor data quality can be analyzed through legitimacy theory, which argues that organizations must authentically demonstrate their sustainability to maintain social legitimacy (Czinkota *et al.,* 2014). If the data are questionable, it can disrupt the alignment between reported impacts and actual outcomes, eroding public trust and potentially leading to increased regulatory scrutiny.

Inadequate data quality not only impacts the credibility of sustainability claims but also affects the strategic decisions of the organizations. Decisions based on unreliable data can lead to ineffective sustainability strategies, the misallocation of resources, and a failure to meet environmental objectives (Chen *et al.,* 2023). To combat these issues, companies must invest in robust verification processes and adopt clear standards for data collection. High-quality, transparent data ensures that sustainability reports accurately reflect the organization's impact, enabling stakeholders to make informed decisions (Oikonomou *et al.,* 2014). Collaborative efforts between regulators, industries, and academia are essential for developing practical data standards and verification practices. These collaborations can help establish a framework that supports the reliability and comparability of sustainability data, fostering trust in reported information. These practices not only build stakeholder confidence but also enhance the legitimacy of corporate sustainability efforts. Addressing data quality issues in green investment and sustainable finance is critical for the integrity of sustainability assessments. By improving data verification, embracing advanced technologies, and promoting collaborative efforts to standardize data practices, companies can more effectively align their sustainability reports with actual outcomes, maintain their credibility, and contribute to the broader goals of sustainable development. Such efforts are crucial for ensuring that the growth of sustainable finance is based on a foundation of transparency and trust.

Practical Application of Theoretical Frameworks

In the dynamic fields of sustainable development and green finance, applying theoretical frameworks like stakeholder and legitimacy theories is essential for conducting thorough environmental and social impact assessments. These theories provide structured methods for evaluating the effects of an organization's activities on society and the environment. However, translating these well-established theoretical frameworks into practical, real-world applications poses significant challenges. This literature review examines the discrepancies between theoretical constructs and their practical application, highlighting the critical need for innovative strategies to bridge this gap effectively. Stakeholder theory underlines the importance of considering the interests of all stakeholders in corporate decision-making (Stoelhorst & Vishwanathan, 2024). It advocates for a balance between satisfying the diverse demands

of stakeholders and achieving long-term sustainability objectives. Legitimacy theory, on the other hand, concentrates on an organization's efforts to align with societal norms and values, suggesting that maintaining legitimacy is essential for securing necessary resources and societal support (Crossley *et al.,* 2021). Together, these theories provide a critical foundation for precise impact measurements, enabling organizations to gauge the breadth and depth of their influence on social and environmental levels.

Despite their theoretical robustness, the practical application of these frameworks frequently falls short in real-world scenarios. As Greenfield & Williams, (2019) many organizations struggle to implement these frameworks effectively in their sustainability assessments due to limited resources, insufficient technical skills, and the inherently dynamic nature of real-world settings (Waas *et al.,* 2014). These challenges underscore the disconnect between theoretical advocacy and the practical implementation of sustainability initiatives, highlighting the need for adaptable solutions that can convert theoretical insights into actionable practices. The challenges are particularly pronounced in the context of climate change adaptation, where substantial investments are directed towards green projects. According to research by Fu, (2000), translating these investments into measurable, tangible outcomes remains daunting despite significant financial commitments, particularly in countries like China. This situation highlights the importance of aligning theoretical frameworks with practical methodologies that can accurately assess social and environmental outcomes, ensuring that investments yield verifiable, beneficial impacts.

Current strategies in green finance often exhibit an unbalanced focus, prioritizing environmental factors over social and governance aspects. As Ulum & Ngindana, (2017) this imbalance results in an incomplete understanding of sustainability impacts, potentially skewing strategic decisions and policy formulations. They advocate for future frameworks to adopt a more comprehensive approach that integrates all Environmental, Social, and Governance (ESG) factors equally. This integrated approach would enable profound insights into sustainability impacts, facilitating more informed decision-making and effective strategic planning. Wilmshurst & Frost (2000) discuss the significance of applying legitimacy theory in sustainability reporting. They argue that comprehensive and transparent reporting, adhering to stringent regulatory standards and societal norms, meets stakeholders' informational needs and significantly enhances a firm's credibility and trust. This practice ensures that the firm's commitments to sustainability are perceived as genuine, thereby maintaining its social license to operate.

Research Method

The study adopts a qualitative systematic literature review methodology. This approach involves systematically collecting, critiquing, and synthesizing existing literature to comprehensively understand the application of theoretical frameworks, such as stakeholder and legitimacy theories, within sustainable development and green finance. This design facilitates a detailed understanding of academic discourse, highlighting prevalent trends, gaps, and areas that necessitate further exploration. The sample for this study comprises peer-reviewed journal articles and scholarly publications that focus on the practical application of theoretical frameworks in assessing environmental and social impacts. Selection criteria include articles published within the last decade, ensuring relevance and contemporaneity in addressing modern challenges in sustainable development and green finance.

Data collection will be conducted through a comprehensive search of several academic databases, including PubMed, Scopus, and Web of Science. The search will utilize keywords such as

"sustainable development," "green finance," "stakeholder theory," "legitimacy theory," and "impact assessment." Both free-text terms and controlled vocabularies will be used to ensure an exhaustive search. A manual search of references in relevant articles will also be conducted to identify additional studies that meet the inclusion criteria. Data analysis will employ thematic synthesis, a method well-suited to qualitative data. This involves coding the literature to identify and categorize themes that frequently arise concerning the application and efficacy of theoretical frameworks in practical contexts. The coding process will be dynamic, starting with predefined themes derived from the theoretical frameworks and modified as new themes emerge from the data. The synthesis will integrate these findings to outline the state of research and suggest directions for future investigations.

Results and Discussion

Analysis Result

This study provides an in-depth examination of the challenges associated with measuring social and environmental impacts within the context of green investment and sustainable finance. Our findings identify critical issues affecting the effectiveness and reliability of these measurements and recommend ways to overcome these obstacles. The inconsistency in measurement methodologies poses a significant challenge in assessing social and environmental impacts within green investment and sustainable finance. Studies often employ varying methods, resulting in data that are difficult to compare, which complicates the synthesis and validation of findings. Quantitative approaches prioritize numerical data, providing precise and objective results that are useful for performance tracking and benchmarking. However, they often oversimplify complex realities, failing to capture the nuanced, layered nature of impacts (Eyre *et al.*, 2024). In contrast, qualitative methods offer richer insights, uncovering the subjective experiences of stakeholders and providing detailed contextual understandings (Bouchmel *et al.*, 2024). However, these methods also present challenges due to their high subjectivity and difficulties in standardization, making it more challenging to replicate or compare the results. This subjectivity can lead to biases and inconsistent conclusions. The implications of such methodological differences are significant, impacting the credibility of sustainability claims. Variability in results can confuse stakeholders, undermining trust in reported findings and making it challenging to verify sustainability efforts (Joshipura *et al.*, 2024). Conflicting conclusions undermine confidence and hinder data-driven decision-making, which is vital for supporting green investment. The challenge of integrating quantitative and qualitative results complicates comprehensive assessments and strategic planning, preventing organizations from creating frameworks that balance objective metrics with contextual insights. This lack of alignment hampers the establishment of reliable benchmarks. Thus, a mixed-methods approach is necessary to merge the strengths of both methodologies, enhancing the reliability and comparability of impact evaluations in sustainable finance.

Diverse and often ambiguous sustainability standards significantly impact the interpretation and implementation of sustainable practices across industries. Companies usually adopt different standards based on their geographic location, industry type, or regulatory pressures (Hunjra *et al.*, 2023). This variability creates a landscape where the same term sustainability can have different meanings depending on its applied context. The lack of a unified and standardized approach makes it difficult for stakeholders to objectively evaluate whether a project or initiative aligns with sustainability goals or reflects a superficial adherence to environmental, social, and governance (ESG) principles (An & Madni,

2023). The absence of uniformity in these standards poses challenges for stakeholders, including investors, regulatory bodies, and the broader public. Without consistent criteria, comparing sustainability efforts across companies or industries becomes complicated (Meng & Shaikh, 2023). This inconsistency can lead to fragmented reporting practices where organizations may highlight specific metrics that show them in a positive light while downplaying or omitting less favorable aspects. The result is an uneven playing field where some companies may appear more sustainable than they are, contributing to a phenomenon known as greenwashing. In greenwashing, organizations present misleading or exaggerated claims about their sustainability efforts to enhance their reputation and attract investment or public support despite not making substantive improvements to their environmental or social impact (Bax *et al.,* 2024).

The ambiguity of sustainability standards also complicates the efforts of regulatory bodies in establishing comprehensive guidelines. While some regions or sectors may adopt robust standards, others may have more lenient or outdated criteria, further exacerbating disparities in reporting and measuring sustainability (Dmuchowski *et al.,* 2023). This fragmented landscape poses significant risks to the credibility of sustainability reporting. When stakeholders cannot rely on consistent data to make informed decisions, their trust in sustainability claims diminishes (Rasoulinezhad & Taghizadeh-Hesary, 2022). This erosion of trust can have a ripple effect, reducing investor confidence and weakening the incentive for genuine corporate social responsibility initiatives. To combat these issues, there is a pressing need for the harmonization of sustainability standards at a global level. Uniform standards would help create a more transparent and comparable reporting environment, enabling stakeholders to assess the actual sustainability impact of corporate actions more effectively. Such harmonization would mitigate the risk of greenwashing and ensure that sustainability claims are rooted in substantive practices, fostering greater accountability and trust in sustainable development and finance.

Fourth, our findings highlight significant gaps between existing theories, such as stakeholder and legitimacy theories, and their practical application in impact measurement. These theories provide comprehensive frameworks for evaluating how organizations should measure their social and environmental impacts. For instance, stakeholder theory emphasizes the importance of considering the interests of all parties involved in decision-making processes (Freeman, 2010). However, many organizations struggle to effectively apply these principles due to resource constraints, a lack of technical expertise, and the dynamic nature of business environments. The same applies to legitimacy theory, which underscores the importance of aligning with societal norms and expectations to maintain social acceptance (Suchman, 1995). However, difficulties adapting this theory into practical actions often reduce the effectiveness of impact measurement and erode public trust in reported outcomes.

Based on this analysis, we recommend developing more consistent and reliable measurement frameworks. These frameworks should integrate empirical insights to enhance reliability and standardization. One approach to consider is adopting mixed-methods strategies that combine the strengths of quantitative and qualitative methods and leveraging technology to increase data transparency. Technologies such as blockchain can ensure data integrity, while AI-based analytics tools can help identify patterns and trends that traditional methods might overlook. Ultimately, enhancing transparency and consistency in impact measurement can foster greater stakeholder trust and legitimacy. In the growing era of sustainable finance, confidence and credibility are critical assets for companies seeking to mobilize green investments. Accurate and verifiable reporting meets stakeholders' informational needs and helps organizations maintain their social legitimacy. Through

these measures, companies can build a stronger foundation for their sustainability strategies and contribute more effectively to generating meaningful positive impacts on society and the environment.

Discussion

The findings of this study suggest that measuring social and environmental impacts within green investment and sustainable finance presents significant challenges that hinder the effectiveness and accuracy of these assessments. One important finding is the inconsistency in methodologies used in previous studies. While capable of providing transparent and objective numerical data, quantitative methods often fail to capture the full complexity of social and environmental impacts. Such approaches simplify realities into measurable indicators, overlooking more contextual and dynamic aspects. On the other hand, qualitative methods offer deeper insights and can uncover impacts that quantitative approaches may miss. However, qualitative methods face challenges in standardization, making them difficult to replicate or compare across studies. The findings highlight that methodological differences can lead to inconsistent outcomes, ultimately causing confusion among stakeholders and eroding trust in sustainability claims made by companies.

Data quality issues are a significant aspect of this study. It was discovered that many companies heavily depend on self-reported data without sufficient third-party verification. This reliance leads to an increased risk of bias, where companies may report data that reflects a more favorable performance than the actual one. Internal pressures, such as the need to meet targets or satisfy market expectations, can influence how data is reported, resulting in outcomes that may not always be accurate or truthful. The absence of third-party verification further intensifies this problem, as, without independent validation, the data is susceptible to manipulation and bias. Consequently, stakeholders may receive skewed information that does not accurately represent the company's performance. The findings highlight that reported data often fail to reflect actual conditions without solid verification measures, undermining the credibility and reliability of sustainability claims. This situation raises concerns about the overall trustworthiness of sustainability reporting. It emphasizes the need for enhanced data collection practices and rigorous third-party verification to ensure that reported data is reliable, transparent, and reflects actual social and environmental impacts.

Collecting consistent and repeatable data presents significant challenges, particularly when companies must comply with local standards and regulations. This leads to inconsistencies in data collection methods, making it difficult for companies to compile data from different sources in a reliable manner. When data lacks uniform standards, comprehensive impact assessments become challenging, ultimately affecting the reliability of a company's overall sustainability reporting. This study also reveals that diverse and sometimes ambiguous sustainability standards have a direct impact on the interpretation and implementation of sustainable practices. Different standards are often applied across industries, geographic regions, or in response to specific regulatory requirements. These differences result in inconsistencies in the implementation and reporting of sustainability principles. Consequently, stakeholders often struggle to determine whether a particular initiative supports the intended sustainability goals or meets formal compliance requirements. The implications of varied standard interpretations include an increased risk of greenwashing, where companies, intentionally or unintentionally, present misleading information about their sustainability performance. Greenwashing not only misleads stakeholders who rely on such data but also undermines transparency in sustainability reporting, potentially diminishing public trust and company credibility.

The gap between theory and practice in impact measurement is another significant finding. Stakeholder theory emphasizes the importance of considering the interests of all parties involved in a company's decision-making process. In contrast, legitimacy theory suggests that companies must operate by social norms and expectations to maintain public trust and support. Although these theoretical frameworks provide a strong foundation for sustainability evaluation, many companies struggle to apply them effectively. Resource constraints, a lack of technical expertise, and the ever-changing business environment are key barriers that hinder the practical application of these theories in real-world assessments. This disconnects between theory and practice reduces the effectiveness of social and environmental impact measurement efforts, potentially limiting a company's ability to demonstrate its sustainability commitments in a manner that stakeholders find credible and trustworthy.

These findings align with stakeholder and legitimacy theories, emphasizing that successful impact measurement requires active engagement from various stakeholders and transparent reporting. Stakeholder theory, as articulated by Freeman (1984), underscores that corporate decisions should reflect the interests of all related parties, not just shareholders. This supports the study's conclusion that inconsistent impact measurement and poor-quality data can hinder the relationship between companies and their stakeholders. The lack of reliable data and inconsistent methodologies undermines trust in effective stakeholder engagement and support. Legitimacy theory, as proposed by Suchman (1995), further reinforces these results, suggesting that a company's legitimacy depends on the extent to which its operations align with societal norms and expectations. The study highlights that the company's legitimacy can be compromised when sustainability reports lack transparency and are based on unreliable data. This loss of legitimacy can erode public trust, impacting the company's ability to secure the social license to operate and potentially leading to increased scrutiny or reputational damage. Therefore, the results of this study underscore the importance of transparent and verified reporting, as well as the need for rigorous impact measurement frameworks, to ensure that sustainability claims are trustworthy and align with stakeholders' expectations, thereby reinforcing corporate credibility and social acceptance.

Comparison with previous research indicates that the findings of this study align with results reported by other studies examining the challenges of measuring social and environmental impacts within the domain of sustainable finance. Eyre *et al.,* (2024) highlighted the critical role of understanding measurement indicators to recognize the limitations inherent in current practices, emphasizing how varied frameworks contribute to inconsistencies in sustainability assessments. This supports the current study's findings on the methodological variability that complicates the comparison of data across different projects and sectors. Similarly, Bouchmel *et al.,* (2024) found that financial constraints significantly hinder green investments, particularly in SMEs across Eastern Europe, suggesting that reliable and standardized measurement is essential for accurate assessment and strategic decision-making. The consistency of these results underscores the need for improved frameworks that integrate quantitative and qualitative methodologies to achieve balanced and comprehensive impact measurements. Further supporting these findings, Joshipura *et al.,* (2024) synthesized research on sustainable investing and financing, highlighting key themes such as the importance of policy support and robust data to evaluate sustainability outcomes effectively. These themes align with the current study's emphasis on the critical need for transparent, verifiable data and uniform standards. Additionally, Bax *et al.,* (2024) reviewed the relationship between ESG factors and financial returns, noting the divergent perspectives that contribute to the difficulty in assessing the actual sustainability impact of

investments. This reflects the current study's observation that inconsistent data quality and standards undermine the validity of sustainability claims, creating barriers to informed decision-making. The parallel between these studies reinforces the need for ongoing research and policy innovation to establish unified guidelines that address data quality issues and ensure more reliable sustainability reporting. The insights from these prior studies validate the argument that enhanced data verification processes and harmonized standards are essential for achieving greater transparency and trust in sustainable finance practices.

The practical implications of these findings are crucial for companies and policymakers to consider. Developing a more consistent and reliable impact measurement framework can help companies present data that is accurate, transparent, and reliable. This improvement in reporting can significantly enhance trust and legitimacy among stakeholders, enabling organizations to meet higher sustainability standards and comply with stringent regulations. Integrating advanced technologies, such as blockchain, for data verification can improve transparency and reliability in sustainability reporting by providing secure and immutable data records. Additionally, adopting a mixed-methods approach that leverages the strengths of both quantitative and qualitative data can provide a more holistic and nuanced understanding of social and environmental impacts. This comprehensive approach can reveal detailed insights that purely quantitative or qualitative methods might miss, thereby fostering more thorough evaluations. Implementing these recommendations can help companies embed more effective sustainability practices into their operations, making them better equipped to meet the growing demands for accountability in global markets that increasingly prioritize environmental and social responsibility. By incorporating rigorous verification processes and enhancing their impact assessment strategies, companies can build stronger relationships with stakeholders and demonstrate their commitment to genuine sustainable development. Ultimately, this approach can improve a company's competitive advantage, as trust and transparency become increasingly critical differentiators in markets that prioritize sustainability and corporate responsibility.

Conclusion

This study provided an in-depth analysis of the challenges in measuring the social and environmental impacts of green investment and sustainable finance. The findings revealed significant issues, including inconsistencies in methodologies that complicate comprehensive impact assessments and the reliance on self-reported data without adequate third-party verification, which undermines data reliability. Additionally, the diverse and ambiguous sustainability standards can confuse and hinder transparent reporting, potentially leading to greenwashing. The study also identified a gap between theoretical frameworks, like stakeholder and legitimacy theories, and their practical application, highlighting the challenges companies face in effectively aligning their reporting with these theories.

The value of this research lies in its original contribution to understanding the complexities involved in measuring sustainable impact. By synthesizing existing literature and highlighting the limitations of current practices, this study provides a foundation for future advancements in both academic and practical fields. The sensible and managerial implications suggest that companies adopt mixed-method approaches and integrate advanced technologies, such as blockchain, to improve data transparency and reliability. Establishing more consistent and reliable frameworks will not only enhance stakeholder trust but also improve overall organizational effectiveness. Still, it will also align

organizations with higher sustainability standards, making them more competitive in a market that increasingly values environmental and social responsibility.

This study is not without its limitations. The primary constraint is the reliance on existing literature, which may not encompass all emerging practices and innovations in sustainable finance. Additionally, the findings are limited by the variability of data sources and the inherent subjectivity in interpreting qualitative data. Future research should focus on empirical studies that test the proposed recommendations, such as implementing mixed-method frameworks and blockchain technologies in real-world corporate settings. Researchers should also explore the development of unified, global sustainability standards to address the inconsistencies highlighted in this study. These suggestions aim to bridge the existing gaps and provide a more reliable foundation for impact assessment in sustainable finance.

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