International Journal of Advance and Applied Research
www.ijaar.co.in
ISSN – 2347-7075 Impact Factor – 8.141
Peer Reviewed Bi-Monthly
Vol. 12 No. 5 May – June 2025

Corporate Green Accounting and Environmental Sustainability: Current Prospects and Future Direction

Chhetan Chhoidub[1] & Vikas Pangtu[2]

[1] *Department of Commerce, PGDAV College (University of Delhi), Nehru Nagar, New Delhi-110065*

[2]*Department of Commerce, Shaheed Bhagat Singh College (University of Delhi), Sheikh Sarai Phase-II, New Delhi-110017*

Corresponding Author - Chhetan Chhoidub

DOI - 10.5281/zenodo.18776396

Abstract:

Corporate green accounting has emerged as a strategic mechanism for embedding environmental sustainability into corporate decision-making and financial reporting systems. The present review examines how environmental costs, resource-efficiency metrics, carbon disclosures, and ecological risk assessments can be integrated into traditional economic models to enhance transparency, accountability, and long-term value creation. By incorporating environmental externalities into corporate balance sheets and performance evaluations, green accounting strengthens organisational resilience and supports sustainable economic transformation. The theoretical foundations, particularly institutional theory and natural resource-based perspectives, are identified as central determinants shaping organisational transitions toward sustainable accounting practices, including leadership commitment, regulatory pressures, stakeholder expectations, and evolving ESG frameworks. Sectoral evidence from agriculture, manufacturing, energy, and maritime industries demonstrates that firms adopting structured green accounting frameworks report improved environmental performance, enhanced ESG outcomes, and stronger stakeholder trust. Despite its transformative potential, several systemic barriers persist. Measurement complexity, inconsistent regulatory standards, limited technical expertise, data gaps, and cultural resistance, especially within emerging economies, continue to impede widespread adoption. The fragmentation of reporting frameworks further complicates comparability and increases compliance burdens for corporations operating across jurisdictions. The review also highlights the growing role of digital innovation in strengthening green accounting systems. Technologies such as artificial intelligence, big data analytics, blockchain, and robotic process automation enhance data accuracy, predictive environmental modelling, real-time monitoring, and reporting harmonisation. However, technological integration introduces new technical, ethical, and organisational challenges, including cybersecurity risks and governance complexities. It also concludes that the future of corporate green accounting lies in the convergence of standardised global frameworks, technological integration, and empirical validation of sustainability impacts. It offers strategic insights for practitioners, policymakers, and researchers to accelerate adoption, overcome structural barriers, and align corporate reporting systems with global sustainability objectives.

Keywords**: **ESG frameworks; digital innovation; Blockchain; Corporate green accounting.

Introduction:

Corporate green accounting has proved to be a critical tool for integrating environmental stewardship in business decision-making. As stakeholder demands, greater transparency, and regulatory pressures mount, organisations are shifting towards a paradigm of accountability to mitigate global climate change, biodiversity loss, and resource depletion (John et al., 2025; Chotaliya et al., 2022; Alijawarneh et al., 2025). By including environmental costs, benefits, and risks in conventional financial models, which, in effect, enables them to assess, manage, and report their environmental effects in a transparent and balanced manner (John & Mishra, 2025; Chotaliya, 2025; Singh et al., 2019). Corporate Green Accounting is especially relevant in developing economies, where rapid industrialisation often leads to significant environmental degradation. In these contexts, robust green accounting models are essential for aligning corporate strategies with United Nations Development Goals (SDGs). Transparent environmental reporting not only ensures compliance with national and international regulations but also fosters long-term business sustainability and societal prosperity (John & Mishra, 2025; Chotaliya, 2025; Aljawarneh, 2025). It is an interdisciplinary field that involves accounting, environmental science, economics, and governance. The institutional theory and natural resource orchestration are considered foundational theories that offer valuable perspectives on drivers of adoption and performance; however, it is possible to note that external pressure and internal capacity interact to produce leaders who are likely to be commitment leaders, which is where leadership commitment serves as a key moderator (Song et al., 2025; Van, 2022; Rizavi et al., 2025). In addition, transparency, stakeholder trust, and comparison of environmental performance across industries are improved due to the integration of corporate social responsibility (CSR) and sustainability reporting practices (Phuoc et al., 2025; Usatenko et al.,2025). Despite its benefits, corporate green accounting is beset with chronic problems of measurement complexity, fragmented regulatory frameworks, and skill shortages. Cultural resistance remains particularly severe in emerging markets (Sun et al., 2021; Van et al., 2022; Khan et al., 2023). Meanwhile, the landscape is being transformed by digital innovations. Artificial intelligence, big data analytics, blockchain, and robotic process automation promise to improve data quality and predictive analytics, harmonise reporting, and present new technical, ethical, and organisational factors (Nain et al., 2024; Kaur et al., 2024; Mustafa et al., 2025). Drawing on a critical analysis of the case literature on corporate green accounting, the barriers to adoption, and the transformational power of technology in the sector, this review synthesises the conceptual underpinnings, practice applications, and future trends of corporate green accounting. The overall insight is that harmonised global structures, the integration of technology, and empirically proven concepts can advance the field by making green accounting a strategy that facilitates sustainable economic

development (Aljawarneh et al., 2025; Lamberton et al., 2025).

Theoretical Framework:

Theoretical backgrounds are based on several frameworks. The institutional theory describes the influence of external forces, such as regulatory, normative, and mimetic pressures, on organisational behaviour. In developed economies, environmental management accounting is adopted and integrated by strong institutional frameworks and stakeholder expectations. In contrast, in developing economies, the adoption and integration of environmental management accounting is more driven by coercive pressures like government mandates, though weaker institutional support in most instances limits widespread adoption (Van et al.,2022; Orgi et al., 2022)—Mimetic, which explains the motivation behind the adoption of environmental accounting. Coercive pressures are combining the insights of the past; both the Institutional Theory and the Natural Resource Orchestration framework can be seen as comprehensive frameworks for implementing and adopting corporate green accounting, especially across varied economies. The institutional theory is concerned with the impact of external forces on organizational behavior and decision-making, such as regulatory (coercive), normative, and the result of laws, government requirements and compliance requirements, and in developing countries these actions are usually the major force since their institutional support is not as strong and voluntary adoption is also low (Van et al.,2022; Borgi et al., 2022).

Normative pressures are based on professional norms, industry standards, and stakeholders' expectations. They are imposed by professional accounting bodies and sustainability organisations, enabling firms to adopt best practices in environmental reporting. Mimetic pressures arise when, in situations of uncertainty about best practices, firms adopt the practices of industry leaders or competitors that have already adopted green accounting. In developed economies, the combined effect of coercive, normative, and mimetic pressures is more complete and widespread in the adoption of environmental management accounting because of strong institutional structures and established regulatory systems, compared to developing markets, which may face only coercive pressures. However, no strong institutional infrastructure underpins the pressure (Van et al., 2022; Borgi et al., 2022). To supplement this, the Natural Resource Orchestration framework explains how internal processes and capabilities enable sustainability initiatives. It focuses on green intellectual capital and environment resource strategic management by using three main processes namely resource structuring (identifying, acquiring, and developing the environmental resource such as renewable energy systems, waste reduction technology, and sustainability expertise), resource bundling (pairing the environmental resources with other organizational resources like innovation and supply chain management to generate competitive advantages in sustainability performance) and resource leveraging (utilizing the capabilities to meet regulatory demands, improve brand reputation, and operational efficiency) (Song

et al., 2025; Rizavi et al., 2025). Leadership commitment is a key moderating variable in this paradigm, enhancing the relationship between resource coordination and sustainability performance; leaders committed to environmental stewardship develop an ecology of innovation, resource distribution, and sustainability effort congruence to corporate strategy (Song et al., 2025; Rizavi et al., 2025). The relationship between the two frameworks is synergistic: institutional pressures serve as external incentives to adopt green accounting, while resource orchestration provides the internal capacity to respond to them. This exchange in new markets is especially important. External requirements can trigger adoption, but the success and longevity of adoption rely on corporations' ability to coordinate their internal capabilities (Song et al., 2025; Izavi et al., 2025). This hybrid view has several implications: planning tension between institutional compliance and proactive resource orchestration boosts the chances of achieving long-term sustainability performance. The policy should be designed to recognize that regulatory requirements are not enough; capacity-building projects are required to improve firms' ability to coordinate their resources, and research opportunities are available to investigate how digital innovations like AI and blockchain can interact to achieve greater green accounting adoption and effectiveness. Institutional theory explains legitimacy-seeking behaviour and external drivers of adoption, whereas natural resource orchestration explains internal strategic processes that transform these forces into effective, sustainable practices. The combination of these factors provides a strong theoretical foundation for advancing green accounting across contexts, enabling firms to respond to external pressure rather than merely react to it and to develop internal capacity to sustain both environmental and financial success (Song et al., 2025; Rizavi et al., 2025).

CSR and sustainability reporting frameworks also increase transparency and accountability by advancing the quality and persistence of environmental accounting information, the legitimacy of stakeholders, and the incorporation of environmental, social, and governance (ESG) measures in the financial disclosures (Ferreira et al., 2025; Pavithra et al., 2025; Adel et al., 2025; Dragu et al, 2019). However, the problem of sector specificity and regulatory heterogeneity makes it clear that a standard set of frameworks is necessary to assure comparability and reliability of cross-industrial and cross-regional results (Usatenko et al., 2025; Adel et al., 2025). Corporate green accounting is an interdisciplinary practice that incorporates economics, environmental science, and corporate governance principles to measure, manage, and report on the environmental impacts and financial performance (Phuoc et al., 2025; John et al, 2025; Usatenko et al., 2025). It widens conventional accounting by including costs, benefits, and risks in the environment into the decision-making processes to allow organizations to evaluate the economic impact of their actions regarding the environment, integrate non-financial measurements like emissions and resource utilization into corporate reporting, and improve transparency to build upon stakeholder trust and participation (John et

al., 2025; Chotaliya et al., 2022; Singh et al., 2019). Green accounting is closely associated with the concepts of corporate social responsibility (CSR) and sustainability reporting. It aids overall performance measurement and alignment with the environmental and social goals (Phuoc et al., 2025; Usatenko et al., 2025; Thanasas et al., 2022). Various systems in place facilitate the incorporation of environmental data into accounting practices. Environmental Management Accounting (EMA) is a system for connecting environmental and financial information to facilitate decision-making that is not necessarily linked to global sustainability problems (Schaltegger et al., 2018). The Corporate Environmental Accounting System (CEAS) provides an in-depth measurement of environmental impact at the corporate scale, but its implementation remains low in developing economies (Ullmann et al., 1976). Environmental Satellite Accounts, which are also associated with national accounts, provide a macro-level assessment of the environment but are complex and partially integrated in most settings, especially in resource-constrained ones (EI Serafy et al., 1997). The shortcomings of these constraints lead to a sense that more holistic frameworks integrating non-monetary valuation and active stakeholder participation (Lamberton et al., 2005; Jones et al., 2010) are necessary. The key principles of corporate green accounting are to integrate environmental considerations into financial systems to facilitate sustainable development. Institutional theory clarifies how external pressures influence the adoption process, while natural resource orchestration emphasises the importance of internal capacities and leadership in delivering sustainability outcomes. CSR and sustainability reporting systems are more transparent but need to be harmonised to overcome sectoral and regional differences. In conclusion, green accounting requires the coordination of both external institutional pressures and internal strategic resource management, aided by strong, standardised frameworks that mediate between financial and environmental performance (Song et al., 2025; Van et al., 2022; Rizavi et al., 2025).

Stakeholder Engagements and Corporate Green Accounting:

Corporate green accounting (CGA) is a key factor in the development and improvement of stakeholder participation in sustainability programs, serving as both a communication process and a strategic decision-making tool that integrates environmental metrics into financial reporting. CGA creates trust and credibility among the different stakeholder groups, including investors, regulators, customers, employees, and local communities, by including in corporate disclosure quality data that is verifiable and accurate on the environmental performance of a company, including emissions, resource consumption, and ecological impacts (Song et al, 2025; Lee, et al., 2025; Zhang, 2025; Monteiro, 2024). This transparency not only meets the growing need for accountability but also enhances stakeholders' willingness to cooperate towards the shared objective of ensuring sustainability. Based on the stakeholder theory, CGA helps organisations to pinpoint and prioritise the most pertinent sustainability concerns and stakeholder

groups, which means that the engagement activities become targeted, material, and consistent with the corporate strategy as well as the expectations of society (Hörisch et al., 2020; Arun et al., 2024). The experience of other industries, including agriculture, manufacturing, transport, and construction, shows that once CGA is integrated into corporate strategies, i.e., sustainability-based procurement, specific training, and integrated reporting, the stakeholders tend to engage in co-creation of the solutions, green practices, and long-term environmental goals (Arun et al., 2024; Charłampowicz et al., 2025). Additionally, CGA supports alignment of policies and adherence to international standards like the Global Reporting Initiative (GRI) and the European Green Deal that openly integrate stakeholder engagement in the context of sustainability reporting procedure (Monteiro, 2024; Charłampowicz et al., 2025). This is where alignment will be critical, because all stakeholders will not only hear the feedback but will also have it systematically incorporated into the fulfilment of regulatory and policy requirements, thereby strengthening the legitimacy and effectiveness of corporate sustainability actions. Outside compliance, CGA is a driver of both awareness and behaviour change, thereby making the environmental costs and benefits of corporate action transparent to stakeholders and triggering changes towards sustainable consumption, investment, and operational behaviour (Rahman & Hossain, 2024). This increased awareness can generate a positive feedback loop, in which informed stakeholders call for more robust sustainability interventions that embed additional environmental concerns into corporate governance (Rahman & Hossain, 2024). Notably, stakeholder involvement has been reported to moderate and strengthen the positive correlation between CGA and sustainability performance, especially in improving environmental, social, and governance (ESG) performance. It is a vital process that requires leadership commitment to establish an openness, innovation, and shared responsibility culture that helps strengthen stakeholders' relationships over time and enhance the success of sustainability efforts (Song et al., 2025). Practically, this implies that organisations that use CGA not only enhance the quality and comparability of their sustainability disclosures but also establish participatory platforms in which stakeholders can influence decision-making, jointly formulate sustainability policies, and track progress against agreed goals. The outcome is a more dynamic, trusting, and mutually reinforcing relationship between corporations and their stakeholders, in which CGA serves as the foundation for information and the strategic link between environmental responsibility and collective action. Overall, corporate green accounting will improve the stakeholder engagement by delivering the transparent, relevant, and actionable sustainability information; aligning corporate activities with stakeholder interests and regulatory frameworks; creating the awareness of stakeholders and influencing behavioural change; and creating the condition that the stakeholder collaboration will make the difference between the better ESG performance and long-term sustainable development (Song et al., 2025; Lee, et al., 2025; Monteiro, 2024; Hörisch, et al., 2020; Arun, et al., 2024;

Charłampowicz, et al., 2025; Rahman & Hossain, 2024).

Green Accounting in companies / Sectoral Applications of CGA:

In the actual application of corporate green accounting across industries, an eclectic environment is defined by industry forces, regulatory factors, and internal organisational capacities. Although the final objective is the same, i.e., the need to incorporate the environmental aspects in the financial decision-making, the means of reaching this aim differ greatly depending on the industries, i.e., agriculture, manufacturing, maritime, and energy. These differences depend on the quality of environmental effects, the maturity of sustainability structures, and the level of leadership commitment in organisations.

a) **Agriculture:** Green accounting has had a significant influence in the agricultural sector due to the industry's direct reliance on natural resources and its significant environmental impact. By adopting natural resource accounting and integrated reporting systems, it has been possible to make agricultural businesses more effective in measuring and managing their environmental, social, and governance (ESG) performance. It has been empirically demonstrated that such practices result in quantifiable improvements in sustainability performance, such as increased energy efficiency, reduced greenhouse gas emissions, and more efficient resource use (Song et al., 2025; Morato et al., 2024). Energy accounting and Agricultural Green Total Factor Productivity (AGTFP) models have been widely used in developed and developing countries, especially in China and the European Union. These tools offer a holistic evaluation of the sustainability of agriculture since they can measure the efficiency of the utilization of the resources as well as the environmental burden of the production (Skaf et al., 2019; Liu et al., 2023; Li et al., 2023). An example is energy accounting, which assesses the cumulative energy inputs needed to produce agricultural products, renewable and non-renewable, providing a more comprehensive view than carbon footprint models, which place more emphasis on emissions (Zhang et al., 2020; Coss et al., 2017). The consideration of leadership commitment is critical in the successful implementation of green accounting in the agricultural industry. Research suggests that effective leadership is not only a force behind the process of developing sustainability practices, but it also leads to the creation and development of an innovative and pro-environmental culture in employees (Kosasih et al, 2023; Roy et al, 2016; Yang et al, 2024). This culture change is imperative in entrenching green accounting into the business processes and making it viable in the long term.

b) **Manufacturing:** In manufacturing, green accounting has become an important strategic tool for improving financial and sustainability performance. The complex supply chains, energy consumption, and substantial emissions of the sector are among the reasons why the sector is an

ideal target for holistic environmental accounting systems. Manufacturing SME evidence indicates a positive correlation between adopting green accounting and firm performance, with leadership commitment as a key moderator (Kosasih et al., 2023). Manufacturers have used green accounting to identify opportunities to save costs by reducing energy use and waste, as well as streamlining processes. These enhancements not only reduce environmental impacts but also increase competitiveness by lowering operational costs and strengthening brand reputation (Rao et al., 2024). Green accounting has also been combined with lean manufacturing concepts; in certain instances, a synergistic effect has been achieved, driving both environmental and operational efficiency. The industry faces significant challenges, including decarbonization and supply chain complexity. The implementation of alternative fuels, carbon capture methods, and the principles of the circular economy has been disproportionate, with larger companies frequently able to take the first steps owing to greater access to capital and technical experience (Khan et al., 2025). On the other hand, SMEs often face challenges such as high implementation costs, a lack of technical expertise, and insufficient regulatory incentives (Chotisarn et al., 2025).

c) Balance between regulatory and operational difficulties in the Maritime and Energy Industries: Green accounting in the maritime industry has been informed to a large extent by international regulatory frameworks, including the emissions-reduction goals set by the International Maritime Organization (IMO). Green accounting in areas such as the Riau Islands has been put in place to monitor and regulate environmental costs. However, efforts appear ineffective, as it is challenging to build a comprehensive environmental management system (Munthe et al., 2024). These issues include data collection, technical deficiencies, and the need for industry-specific accounting frameworks for maritime environmental issues, such as ballast water control and marine biodiversity conservation.

d) Disclosures on sustainability performance have gained greater significance in the energy industry, especially among independent power producers, as a means of attracting investment and ensuring compliance with sector regulations (Ng, A. et al., 2012). In this sense, green accounting may be associated with the incorporation of environmental cost information into financial reporting to enable more accurate decisions about the energy mix, methods for reducing emissions, and investment in renewable energy. Although there is improvement, regulatory gaps and the absence of standard reporting frameworks remain prevalent in the energy sector. Though the disclosure requirements are mandatory, inconsistencies across jurisdictions in reporting standards have hampered comparability and, therefore,

reduced the ability of green accounting as a decision-making instrument (Ng, A. et al., 2012).

Comparative Assessment Backing: Energy and Carbon footprint models:

One of the most important lessons of cross-sectoral analysis is the relative ineffectiveness of various sustainability assessment approaches. Energy accounting provides a better analysis of sustainability because it examines the overall energy inputs into production (renewable and non-renewable). This methodology reflects the more ecological footprint of an activity and is especially useful in sectors with a complicated flow of resources, including agriculture and manufacturing (Zhang et al, 2020; Coss et al, 2017).

On the other hand, carbon footprint models place greater emphasis on greenhouse gas emissions and provide a more limited yet well-known measure of environmental impact. Although carbon footprinting is applicable in monitoring the progress of achieving the objectives of emissions reduction, it might not address other important areas of sustainability, including biodiversity loss, water consumption, and soil erosion. The decision in these approaches-or a combination of both- will be contingent on the particular sustainability goals and reporting demands of the company.

Digital Technologies in Corporate Green Accounting:

The application of technology in green accounting has been a radical change agent, redefining how organizations measure, manage, and report their environmental performance, putting sustainability at the heart of corporate governance and decision-making. New digital products and services—including artificial intelligence (AI), big data analytics, blockchain, robotic process automation (RPA), digital twins, and Industry 4.0/5.0 technologies--are providing new opportunities of accuracy, transparency, and timeliness in environmental accounting, and aligning these processes with the global sustainability reporting regimes such as the Global Reporting Initiative (GRI), Sustainability Accounting Standards Board (SASB), Task Force on Climate-related Financial Disclosures (TCFD), and the upcoming European Sustainability Reporting Standards (The key aspect of this change is AI and big data analytics which provide the capabilities of collecting real-time data, predictive modelling, and sophisticated risk assessment enabling firms to detect inefficiency, predict environmental outcomes, and optimize the utilization of resources(Aketer et., al 2024; Guimarães et al., 2023). For example, AI-based environmental risk assessments of the EU automotive and electronic sectors have enhanced green procurement and eco-design, and big data analytics have enhanced planning, fraud detection, and cost-driver identification (Ye & Tian, 2025). Blockchain enables these functions by providing secure, immutable, and transparent recording of transactions related to the environment, allowing reverse logistics and sustainable procurement, enabling the tracking of carbon credits, and eliminating the risk of fraud or data manipulation (Ye & Tian, 2025; Ahmad et al., 2025). Simultaneously, RPA will

automate repetitive accounting and auditing processes, freeing human resources to analyze strategic sustainability (Aketer et al., 2024). The advantages of Industry 4.0 technologies, such as the IoT, cloud computing, and digital twins, are seen to be extended through the provision of interconnected systems to monitor emissions, energy consumption, and waste in real time and feed directly into the systems of green accounting to track ongoing performance (Nguyen et al., 2024; Baah et al., 2021). Digital twins are specifically used to bridge the physical and cyber worlds and enable organizations to simulate and optimize environmental performance before implementation, a capability further augmented in Industry 5.0 by integrating with AI, cobots, and the Internet of Everything (Zuñiga-Collazos et al., 2025). Not only do these technologies enable a company to become more efficient, more environmentally friendly, but also help ensure that it satisfies all the requirements of more and more rigorous regulations, like the Corporate Sustainability Reporting Directive (CSRD) in the EU and the BRSR requirement in India, that require the standardization and machine-readable disclosures about the environmental impact (Bag et al., 2025; Adu et al., 2023). Nevertheless, the introduction of technology in green accounting does not pass without obstacles: High costs of implementation, complexity of integration, the absence of digital skills, the quality of data, and resistance to change are still significant challenges, especially among SMEs and organizations in developing economies (Nguyen et al., 2024; Baah et al., 2021). Close governance is also necessary for ethical issues such as the energy use of blockchain networks and the need for open and explainable AI systems (Guimarães et al., 2023; Saha et al., 2025). Nevertheless, the merging of digital transformation and sustainability requirements is forming an effective synergy: technology-based green accounting does not just increase the credibility and comparability of the sustainability reports; it also entrenches environmental accountability into the daily business activities of the organization, allowing the companies to stop being compliant and start becoming responsible towards the environment. Using these tools, companies would be able to make their processes and practices work together with the UN Sustainable Development Goals, enhance the level of trust in their stakeholders, and gain new possibilities of innovation and competitive advantage in a low-carbon economy (Guerrero et al., 2025; Baah et al., 2021; Runtuk et al., 2024). The future path implies even closer links between AI, blockchain, and Industry 5.0, with standard international reporting models backed by policy incentives and cross-sector collaboration, to eliminate existing barriers to implementation and realize the full potential of technology as a foundation for transparent, efficient, and meaningful green accounting.

Challenges and Limitations of Current Practices:

Corporate green accounting (CGA) has become an essential tool for incorporating environmental factors into financial decisions, but realizing this strategy is constrained by complex internal and external barriers, fragmented

regulations, and financial constraints, especially in developing economies and in green finance. These challenges have been analyzed in detail, in a structured manner, based on the recent empirical and conceptual research (Bhatnagar et al., 2025; Aketer et al., 2024; Guimarães et al., 2023; Nguyen etal, 2024).

Internal Barriers:

Internal obstacles originate within the organization and are usually resource-, cultural-, or capability-bound.

a) **Financial Constraints:** The issue of green technologies and the initial cost of implementing the same technology is another challenge faced by many firms, particularly SMEs, in terms of transitioning to the new system and the disposal of the hazardous waste (Adu et al., 2023; Guimarães et al., 2023). Limited economies of scale compound constraints on green products, low ROI on those investments compared to conventional investments, and the absence of subsidies or bank facilities.

b) **Gaps in Leadership and Management:** Insufficient interest or commitment by top and middle management hinders an organization's ability to execute sustainability initiatives effectively (Guimarães et al., 2023). Risk-averse behaviour, negative attitudes towards environmental procurement, and lack of a reward system or eco-literacy training are also other obstacles to adoption (Baah et al., 2021).

c) **Technical and Knowledge Deficits:** Most organizations lack the technical skills, tools, and governance mechanisms to incorporate environmental metrics into accounting systems (Nguyen et al., 2024). This involves inadequate training, poor data integration, and a lack of ability to measure and report environmental performance.

d) **Strategic Misalignment:** The inability to balance sustainability purposes and conventional business interests may result in incomplete or symbolic implementation of green accounting practices (Zuñiga-Collazos et al., 2025).

External Barriers:

The external barriers are based on the institutional, market, and regulatory environment.

a) **Regulatory Weaknesses and Disagreements:** Poor or unsuitable regulations, non-standardized performance measures, and the absence of sustainability performance metrics in supply chains create uncertainty and hinder comparability (Guimarães et al., 2023).

b) **Market Limitations:** Limited availability of green products, intense international competition, and low consumer demand lead to low motivation for firms to invest in green accounting (Bhatnagar et al., 2025).

c) **Stakeholder Misalignment:** The stakeholders have divergent interests that may hinder cooperation and the setting of standards in such spheres as green bonds (Nguyen et al., 2024) (e.g., issuers, investors, regulators, and civil society).

d) **Barriers to Technology and Infrastructure:** The lack of access to

clean technologies, digital infrastructure, and verification methods limits the expansion of green accounting, especially for resource-constrained countries (Saha et al., 2025; Runtuk et al., 2024).

e) **Fragmentation of Regulation and Costs of Compliance:** Fragmentation of regulation- environmental reporting standards differing between jurisdictions sets up complexity and high compliance costs for multinational businesses and cross-border operations (Guerrero et al., 2025).

f) **Multiple Standards:** Companies must deal with overlapping frameworks (e.g., GRI, ISSB, national ESG requirements), which create redundancy and additional administrative burden.

g) **Compliance Costs:** Carbon trading, disclosure, and compliance with current ESG demands may divert resources away from innovation and operations (Bag et al., 2025; Ye & Tian, 2025).

h) **Impact on Firm Performance:** Excessive regulations and related expenses have been found to result in low profitability and limited capacity to invest, particularly in high-polluting industries (Bag et al., 2025).

Emerging Economies

The problem of green accounting in the emerging economies is compounded by the poor institutions, small capital markets, and severe financial constraints (Aketer et al., 2024; Baah et .al, 2021).

a) **Institutional Weaknesses:** Normative and mimetic pressures can be imposed by coercive pressures (e.g., government mandates), but the absence of such pressures constrains depth and consistency.

b) **Data and Disclosure Gaps:** Lack of uniform environmental reporting standards and technical difficulties of finding ways to correspond environmental and financial statistics undermine empirical analysis and policy formulation (Aketer et al., 2024

c) **Capacity Constraints:** Emerging-market SMEs are numerous and, in most cases, lack governance, technical skills, and financial resources to adopt strong green accounting systems (Nguyen et al., 2024). Green finance - which connects financial flows to environmental goals - can reduce the cost barrier; however, it is prone to its own limitations (Ye & Tian, 2025; Ahmad et al., 2025; Nguyen et al., 2024).

d) **Financial Barriers:** Green finance instruments are not as appealing to investors due to high perceived risks, low returns, and long investment horizons (Bhatnagar et al, 2025; Ahmad et al., 2025).

e) **Irrelevant to green financial products:** Underdeveloped capital markets, limited access to green loans and insurance, and inconsistent green financial products hamper adoption.

f) **Capacity and Governance Issues:** Issuers do not necessarily have the internal governance, policies, and procedures to detect.

Practical Applications of Green Accounting:

Drawing on past research, the practical implications of corporate green

accounting and sustainability cut across practitioners, policymakers, and researchers and represent an interaction between institutional and technological innovation and industry reality. To practitioners, the implementation of an integrated reporting system combining environmental and financial information is critical for promoting transparency, stakeholder confidence, and long-term competitiveness in the ever-sustainability-focused markets (John et al., 2025; Usatenko et al., 2025; Adel et al., 2025). Green accounting enables companies to measure and manage environmental prices, benefits, and risks, thereby instilling sustainability into their strategies and operations. The emergence of leadership commitment is a clear, strong influence factor, where empirical evidence shows that it has a strong positive influence on adoption rates and firm performance since leaders instill the culture of innovation, pro-environmental behavior, and cross-functional collaboration (Song et al, 2025; Roy et al, 2016; Yang et al, 2024). Green accounting has helped achieve quantifiable progress of ESG performance, resource efficiency, and financial sustainability in manufacturing, agriculture, and energy sectors, especially where complemented by strong frameworks like the Environmental Management Accounting (EMA) and Corporate Environmental Accounting Systems (CEAS) (Schaltegger et al., 2018; Ullmann et al., 1976; Rao et al., 2024; Skaf et al, 2019). Green accounting is being transformed by digital transformation through AI, big data, blockchain, and robotic process automation (RPA), which enhances the quality of information in green accounting, enables predictive analytics, and helps in automating the process of compliance reporting(Nain et al., 2024; Bibri et al., 2025; Delke et al., 2023; Fei et al., 2025). The AI-based tools combine structured and unstructured data, help comply with international standards, such as IFRS S1/S2, and improve harmonization activities (Mustafa et al., 2025; Ahmad et al., 2023; Ciccola et al., 2025). However, these technologies come with issues of data privacy, compatibility with legacy systems, energy use, and ethical issues such as bias and transparency (Kaswan et al., 2025; Pulkkinen et al., 2025; Kuchtikova et al., 2024). To the policymaker, the key issue in harmonizing sustainability reporting standards is that it will address regulatory fragmentation, lower compliance costs, and increase comparability across jurisdictions (Tenorio-Salgueiro et al., 2025; Carungu et al., 2025; Rimmel et al., 2025). Coherent frameworks, including those advanced by the ISSB and the CSRD, can make reporting processes more efficient, build investor trust, and facilitate capital flows to sustainable projects abroad. The policymakers should also consider capacity building, especially in SMEs and developing nations, where the lack of technical skills, limited resources, and poor institutional structures cannot be overcome in the adoption process (Van der Paul et al., 2022; Duzgun et al, 2025; Puche et al., 2024; Al-Hazaima et al., 2025). Through educational programs that incorporate sustainability into accounting, as well as partnerships between the government and the business sector, a well-trained workforce with advanced green accounting skills can be developed. Financial innovation is also a supportive factor, as instruments such as green bonds and sukuk are used to

raise capital for sustainability projects. However, these need well-developed regulatory frameworks, market formation, and risk-reduction strategies to reduce the risks of greenwashing (Ulfah et al., 2024; Versal et al., 2022; Ali et al., 2024). The high compliance and adoption costs in emerging economies can be offset by targeted subsidies, tax incentives, and concessional funding. Sector-specific policies can be used to deal with industry-specific problems in manufacturing (decarbonization, complexity of supply chains) (Khan et al., 2025; Chotisarn et al., 2025; Hu et al.,2025), agriculture (resource efficiency, emissions reduction), and energy (standardization gaps, disclosure requirements). To the researchers, the changing environment opens up opportunities to empirically examine the effects of digital innovations and integrated structures on sustainability performance, financial performance, and stakeholder interactions (Sundarasen et al., 2024; Lampropoulos et al., 2024). Interdisciplinary research can examine how sustainability accounting can be incorporated into conventional cost and management accounting. In contrast, comparative studies across sectors and regions can identify best practices, situational challenges, and scalable solutions. The process of greenwashing mitigation through enhanced standards of assurance and regulatory control is a contemporary research agenda, as is the investigation into AI ethics, AI governance, and artificial sustainability reporting trust (Fre et al., 2025; Berniak-Wozny et al., 2025). The harmonization of standards, technological progress, and organizational change, guided by leadership, highlights the transformative potential of green accounting in realizing global sustainability objectives. In practice, companies that successfully introduced environmental metrics into mainstream accounting procedures not only improve compliance and transparency but also gain competitive advantages in innovation, operational efficiency, and reputational capital. It is possible to speed up the adoption of these technologies by policymakers who synchronize regulatory frameworks with technological capacity and market incentives, and by researchers who can offer strong empirical findings and theoretical clarification to steer both policy and practice towards more efficient, equitable, and effective sustainability outcomes. After all, the practice of corporate green accounting and sustainability has real-world implications that are indicative of a multi-stakeholder ecosystem that is dynamic, multi-stakeholder, where financial rigor and the stewardship of the environment mutually support each other, and where the orchestration of a resource, institutional pressures and technological tools can be used to achieve measurable progress toward the United Nations Sustainable Development Goals (Aljawarneh et al., 2025; Lamberton et al., 2025).

Future Prospective and Research in Green Accounting:

The future research directions of corporate green accounting and sustainability are based on the synthesis of earlier studies that identify a crossroads of technological innovation, regulatory harmonization, and the lack of empirical testing. The harmonization of sustainability

reporting frameworks is one such avenue. One such area is the review of regulations like the ISSB, IFRS S1/S2, and CSRD, which have struggled to reach the depth of inter-jurisdictional effect because of the necessary alignment, consequently leading to the reduction of regulatory fragmentation and compliance burdens (Carungu et al., 2025; Rimmel et al., 2025). Such comparative studies of the effectiveness of these frameworks should be done across different economic settings, especially in the emerging markets where institutions are weaker, and coercion pressures are more dominant (Van der Poll et al., 2022; Borgi et al., 2022). It covers the harmonization of standards and how these approaches can incorporate sector-specific metrics, non-monetary valuation, and mechanisms to engage stakeholders in a way that makes the comparability and reliability of information across industries possible (Usatenko et al., 2025; Jones et al., 2010). The empirical quantification of the effects of digital innovations is another priority - AI, big data, blockchain, and RPA are changing the concept of green accounting by improving the quality of data, predictive analytics, and efficiency of reporting (Nain et al., 2024; Kaur et al., 2024; Fei et al., 2025). However, the difference in results is considerably based on the quality of data, the nature of governmental frameworks, and economic statuses (Glavina et al., 2025; Song et al., 2025). To address the challenges of sustainability performance, financial performance, and stakeholder trust, future research ought to utilize a longitudinal and cross-sectoral design that would help to quantify the causal impacts of these technologies on sustainability performance, financial performance, and the high energy use of AI models (Kaswan et al., 2025; Kuchitikova et al., 2024). The ethical concerns of bias, openness, and confidence in AI-based reporting have to be integrated into the research agenda to reduce the threats of greenwashing and enhance the systems of sustainability assurance (Free et al., 2025). A second primary line of research is to increase sustainability accounting in traditional cost and management accounting areas to narrow the disconnect between environmental measures and the main financial decision-making process (Siddiqui et al, 2025; Lampropoulos et al, 2024; Rubino et al, 2020). This involves developing integrated models that connect environmental costs, benefits, and risks to operational and strategic planning, so firms do not need to look any further to internalize sustainability in resource allocation and performance management. Industry-specific research is critical in this case as sectors like agriculture, manufacturing, and energy have distinct challenges (some complicated in nature, e.g. supply chain issues) that require specific approaches to accounting (Raso et al., 2024; Ng et al., 2012). Also, the study ought to explore how leadership commitment and organization culture moderate the performance of green accounting adoption, especially in SMEs and in developing economies where a lack of technical skills and resources is common (Kosasih et al, 2023; AI-Hazima et al, 2025). The interplay between green finance instruments (e.g. green bonds, sukuk) and corporate green accounting presents another area to be investigated, and how these instruments can be used to raise capital to support sustainable projects and, at the same

time, provide strong verification and reporting criteria (Ulfah et al., 2024; Ali et al., 2024). Lastly, interdisciplinary engagement of accounting, environmental science, information systems, and policy studies will be essential in order to fill these research gaps, which are multifaceted. The combination of technological, regulatory, and organizational approaches to the corporate green accounting concept can contribute to the further development of green accounting in companies as one of the pillars of sustainable development, which implies that environmental stewardship should become an intrinsic part of the financial framework of international business (Aljawarneh et al, 2025; Lamberton et al, 2005).

Conclusion:

Corporate green accounting stands at a pivotal juncture where environmental responsibility, financial discipline, and strategic governance converge, emerging as a transformative mechanism that embeds sustainability in the core of corporate decision-making. The review underscores that green accounting effectively bridges the long-standing divide between conventional financial reporting and contemporary sustainability imperatives by systematically internalizing environmental costs, benefits, and risks within corporate performance metrics, thereby enhancing transparency, strengthening accountability, and supporting long-term value creation. Its successful adoption, however, is neither automatic nor uniform across contexts; somewhat, it is powerfully shaped by institutional environments and leadership commitment. In developed economies, mature regulatory systems, normative pressures, and stakeholder activism drive integration. In contrast, in developing economies, coercive regulatory forces often act as primary catalysts, even in the absence of strong institutional support structures. Beyond external pressures, the orchestration of internal resources—such as green intellectual capital, technological innovation, and managerial vision—plays a decisive role, with leadership functioning as a critical moderator in aligning sustainability goals with corporate strategy. Sectoral experiences across agriculture, manufacturing, energy, and supply chain systems demonstrate measurable gains in ESG performance, operational eco-efficiency, and financial resilience. However, industry-specific challenges such as decarbonization costs, technological investments, and regulatory uncertainty necessitate tailored approaches. Despite its promise, corporate green accounting faces persistent barriers, including limited technical expertise, insufficient managerial commitment, fragmented global regulations, high compliance costs, and cultural resistance, particularly in emerging markets. Overcoming these constraints requires harmonized global standards, institutional capacity-building, and innovative financial instruments to channel capital toward sustainable initiatives. The future trajectory of green accounting is closely intertwined with digital transformation; technologies such as artificial intelligence, big data analytics, blockchain, and robotic process automation offer unprecedented opportunities for enhancing data integrity, predictive capability, and reporting harmonization, while simultaneously

introducing challenges related to data privacy, legacy system integration, and organizational resistance. Greater convergence of reporting frameworks and rigorous empirical validation remains essential to ensure comparability, reliability, and global scalability. Ultimately, the widespread adoption of corporate green accounting has the potential to align economic growth with planetary boundaries and accelerate progress toward global sustainability objectives, provided that practitioners invest in leadership and digital systems, policymakers prioritize harmonization and supportive regulation, and researchers continue refining robust, universally applicable models.

Declarations:

Ethical approval: Not applicable.

Consent to Participate: Not applicable.

Consent to publish: This is not applicable.

Competing interests: The authors declare that they have no known competing financial interests or personal relationships that could be perceived to influence the work reported in this paper.

Artificial Intelligence (A.I.) statement: During the preparation of this study, the authors used the Grammarly tool to enhance linguistic quality and ScienceDirect AI for literature collection. After using this tool, the authors reviewed and edited the content as needed, assuming full responsibility for the published article.

References:

1. Adel, A., Al-Jomaily, J. A., Ahmed, D. K. I., & Salman, K. (2025). Corporate social responsibility and environmental sustainability. Environment and Social Psychology. https://doi.org/10.59429/esp.v10i10.3962
2. Ahmad, V., Goyal, L., Arora, M., & Chaudhary, S. (2023). AI impact on sustainability reporting. Proceedings of IC3I. https://doi.org/10.1109/IC3I59117.2023.10397863
3. Alakbarov, T., & Bayramova, E. (2024). Positive environmental effects of modern accounting technologies. Lecture Notes in Networks and Systems. https://doi.org/10.1007/978-3-031-81564-5_72
4. Al-Hazaima, H., Low, M., & Sharma, U. (2025). Education for sustainable development in accounting. Journal of Public Budgeting, Accounting & Financial Management. https://doi.org/10.1108/JPBAFM-06-2023-0105
5. Ali, Q., Rusgianto, S., Parveen, S., & Zin, R. M. (2024). Green sukuk and sustainable development. Environment, Development and Sustainability. https://doi.org/10.1007/s10668-023-03520-6
6. Aljawarneh, N. M., Alqmool, T. J., Abu Huson, Y. A., & AlQudah, M. (2025). Bibliometric analysis of accounting and corporate sustainability research. ABAC Journal. https://doi.org/10.59865/abacj.2025.8
7. Altarawneh, H. Y., Al-Hajaya, K., Eltweri, A., & Sawan, N. (2025). Green accounting disclosure and market value. Management and Sustainability. https://doi.org/10.1108/MSAR-11-2024-0210
8. Astawa, I. P., Ardina, C., Yasa, I. M. S., & Parnata, I. K. (2018). Achieving green accounting in hotels. Journal of Physics: Conference Series. https://doi.org/10.1088/1742-6596/953/1/012056

9. Atofarati, E. O., & Enweremadu, C. C. (2025). Industry 4.0 enabled calorimetry and heat transfer for renewable energy systems. iScience. https://doi.org/10.1016/j.isci.2025.112994
10. Baah, C., Opoku-Agyeman, D., Acquah, I. S. K., & Abdoulaye, F. A. M. (2021). Stakeholder pressure, green practices, and firm performance. Sustainable Production and Consumption. https://doi.org/10.1016/j.spc.2020.10.015
11. Bag, S., Routray, S., & Aytac, B. (2025). Linking digital transformation to ESG outcomes: A mixed-methods study on SRM capability and coopetition in supply networks. Journal of Environmental Management. https://doi.org/10.1016/j.jenvman.2025.126801
12. Berniak-Woźny, J. (2025). The role of AI in ESG reporting: A bibliometric study. Economics and Environment. https://doi.org/10.34659/eis.2025.94.3.1167
13. Bhattacharya, M., & Yan, E. (2025). Environmental accounting for climate change in India. In Encyclopedia of monetary policy, financial markets and banking. https://doi.org/10.1016/B978-0-44-313776-1.00006-4
14. Bibri, S. E., & Huang, J. (2025). AI-powered digital twins for smart, green, and zero-energy buildings: A systematic review. Environmental Science and Ecotechnology. https://doi.org/10.1016/j.ese.2025.100628
15. Bin-Nashwan, S. A., Li, J. Z., Jiang, H., & Ma'aji, M. M. (2025). Does AI adoption redefine financial reporting accuracy, auditing efficiency, and information asymmetry? An integrated model of TOE-TAM-RDT and big data governance. Computers in Human Behavior Reports. https://doi.org/10.1016/j.chbr.2024.100572
16. Birasnav, M., Chaudhary, R., Dunne, J. H., & Seaman, C. (2022). Green supply chain management: A theoretical framework and research directions. Computers & Industrial Engineering. https://doi.org/10.1016/j.cie.2022.108441
17. Borgi, H., & Tawiah, V. (2022). Determinants of XBRL adoption: An institutional perspective. International Journal of Accounting and Information Management. https://doi.org/10.1108/IJAIM-11-2021-0242
18. Boumsisse, I., Benhadou, M., & Haddout, A. (2025). Optimizing Green Lean Six Sigma using Industry 5.0 technologies. Cleaner Waste Systems. https://doi.org/10.1016/j.clwas.2025.100234
19. Cao, S. S., Jiang, W., Lei, L. G., & Zhou, Q. C. (2024). Applied AI for finance and accounting: Alternative data and opportunities. Pacific-Basin Finance Journal. https://doi.org/10.1016/j.pacfin.2024.102307
20. Carungu, J., Dimes, R., & Molinari, M. (2025). ISSB and EFRAG convergence challenges. Management Decision. https://doi.org/10.1108/MD-10-2024-2463
21. Challouf, K., Alhloul, A., & Nemeth, N. (2025). Mapping the role of Industry 4.0 technologies in green supply chain management: A bibliometric and structured text analysis. Discover Sustainability. https://doi.org/10.1007/s43621-025-01827-0
22. Chen, D., Jiang, D., Liang, S., & Wang, F. (2011). Selective enforcement of regulation. China Journal of Accounting Research, 4(2), 97–113. https://doi.org/10.1016/j.cjar.2011.04.002

23. Chotaliya, M. (2022). Green accounting in India as a measure of attaining sustainable development goals. In Springer Proceedings in Business and Economics. https://doi.org/10.1007/978-981-19-0357-1_4
24. Chotisarn, N., & Phuthong, T. (2025). Retail technology and sustainability practices. Sustainable Futures. https://doi.org/10.1016/j.sftr.2025.100674
25. Ciccola, R., Guidi, M., Chiucchi, M. S., & Giuliani, M. (2025). AI and sustainability reporting in practice. VINE Journal of Information and Knowledge Management Systems. https://doi.org/10.1108/VJIKMS-08-2025-0360
26. Coss, S., Rebillard, C., Verda, V., & Le-Corre, O. (2017). Sustainability assessment of energy services. Journal of Cleaner Production. https://doi.org/10.1016/j.jclepro.2016.08.134
27. Delke, V., Schiele, H., Buchholz, W., & Kelly, S. (2023). Industry 4.0 in supply management. Technological Forecasting and Social Change. https://doi.org/10.1016/j.techfore.2023.122847
28. Dragu, I. (2019). Corporate sustainability and CSR toward integrated reporting. In CSR, Sustainability, Ethics and Governance. https://doi.org/10.1007/978-3-030-01719-4_4
29. Duzgun, E., & Atay, E. (2025). Stakeholder involvement in green HRM and GSCM. Journal of Open Innovation. https://doi.org/10.1016/j.joitmc.2025.100562
30. El Serafy, S. (1997). Green accounting and economic policy. Ecological Economics, 21(3), 217–229. https://doi.org/10.1016/S0921-8009(96)00107-3
31. Ewis, H. F. M., & Ghanem, S. A. (2025). Green accounting in Middle Eastern financial institutions. Edelweiss Applied Science and Technology. https://doi.org/10.55214/25768484.v9i3.5519
32. Fei, Y.-M., Liou, J.-C., & Sun, P. J. (2025). AI, RPA, and sustainability performance. Cleaner Engineering and Technology. https://doi.org/10.1016/j.clet.2025.101106
33. Ferreira, D., Pereira, C., Queirós, M., & Monteiro, A. P. (2025). Impact of sustainability reporting on accounting information quality. Cogent Business & Management. https://doi.org/10.1080/23311975.2025.2468875
34. Free, C., Jones, S., & Tremblay, M.-S. (2025). Greenwashing and sustainability assurance. Journal of Accounting Literature. https://doi.org/10.1108/JAL-11-2023-0201
35. Glavina, A., Mišić, K., Baleta, J., & Mikulčić, H. (2025). Economic development and climate change. Cleaner Engineering and Technology. https://doi.org/10.1016/j.clet.2025.100939
36. Hammad, M. Y., Rahamaddulla, S. R., & Fauzi, M. A. (2025). Environmental and governance strategies in ESG for Industry 4.0: A systematic review. AIMS Environmental Science. https://doi.org/10.3934/environsci.2025025
37. Havardi-Burger, N., Mempel, H., & Bitsch, V. (2021). Sustainability assessment of value chains. Journal of Cleaner Production. https://doi.org/10.1016/j.jclepro.2021.129684
38. Hu, W., Zhang, X., & Lou, J. (2025). Environmental policy and performance outcomes. Energy Strategy Reviews.

https://doi.org/10.1016/j.esr.2025.101907
39. Hu, X., & Sinniah, S. (2024). The role of green risk management approaches in promoting green and sustainable supply chain management. Natural and Engineering Sciences. https://doi.org/10.28978/nesciences.1569144
40. John, J., & Mishra, R. (2025). A comprehensive analysis of environmental accounting practices in Indian companies: A key approach to ensuring environmental sustainability. In Studies in Systems, Decision and Control. https://doi.org/10.1007/978-3-031-87550-2_124
41. Jones, M. J. (2010). Accounting for the environment: A theoretical perspective. Accounting Forum, 34(2), 123–138. https://doi.org/10.1016/j.accfor.2010.03.001
42. Kalbouneh, A., Aburisheh, K., Shaheen, L., & Aldabbas, Q. (2023). Sustainability accounting literature structure. Cogent Business & Management. https://doi.org/10.1080/23311975.2023.2211370
43. Kaswan, K. S., & Kumar, A. (2025). Artificial intelligence and environmental sustainability. Proceedings of ICCSAI. https://doi.org/10.1109/ICCSAI64074.2025.11063908
44. Kaur, A., Kaur, G., Sandhu, R., & Dhillon, H. K. (2024). Digital innovation in strategic accounting. https://doi.org/10.4018/979-8-3373-5976-2.ch003
45. Khan, M. I., Yasmeen, T., Khan, M., & Al-Ghamdi, S. G. (2025). Industry 4.0 and sustainability integration. Sustainable Production and Consumption. https://doi.org/10.1016/j.spc.2024.12.012
46. Khan, N. R., Khan, M. R., Ahmad, W., & Jafar, R. M. S. (2023). Barriers in green concept implementation. https://doi.org/10.1108/978-1-80455-678-820231008
a. Kosasih, W., Pujawan, I. N., Karningsih, P. D., & Shee, H. (2023). Lean-green practices and supply chain sustainability. Cleaner and Responsible Consumption. https://doi.org/10.1016/j.clrc.2023.100143
47. Kuchtíková, N., & Maryška, M. (2024). Sustainable practices in AI and big data. Lecture Notes in Networks and Systems. https://doi.org/10.1007/978-3-031-73110-5_9
48. Lamberton, G. (2005). Sustainability accounting: A conceptual framework. Accounting Forum, 29(1), 7–26. https://doi.org/10.1016/j.accfor.2004.11.001
49. Lampropoulos, I. C., Aggelopoulos, E., Giannopoulos, V., & Kariofyllas, S. G. (2024). Performance management frameworks for sustainability. https://doi.org/10.4018/979-8-3373-5302-9.ch003
50. León-Bravo, V., Caniato, F., & Caridi, M. (2021). Sustainability assessment in food supply chains. Production Planning & Control. https://doi.org/10.1080/09537287.2020.1744761
51. Li, L., Han, J., & Zhu, Y. (2023). Farmland inflow and green productivity. Heliyon. https://doi.org/10.1016/j.heliyon.2023.e13750
52. Liu, C., Muravskyi, V., & Wei, W. (2024). Evolution of blockchain accounting literature from the perspective of CiteSpace (2013–2023). Heliyon. https://doi.org/10.1016/j.heliyon.2024.e32097
53. Liu, S., Lei, P., Li, X., & Li, Y. (2022). Agricultural green total factor

productivity in China. Science of the Total Environment. https://doi.org/10.1016/j.scitotenv.2022.155947

54. Longo, M. C. (2024). Sustainability reporting standards and guidelines. In Being a Sustainable Firm. https://doi.org/10.1016/B978-0-443-14062-4.00004-0
55. Majali, T., Alkaraki, M., Asad, M., & Aledeinat, M. (2022). Green transformational leadership, green entrepreneurial orientation, and SME performance: The mediating role of green product innovation. Journal of Open Innovation: Technology, Market, and Complexity. https://doi.org/10.3390/joitmc8040191
56. Marcis, J., Pinheiro de Lima, E., & Gouvea da Costa, S. E. (2019). Sustainability performance of agricultural cooperatives. Journal of Cleaner Production. https://doi.org/10.1016/j.jclepro.2019.06.170
57. Marota, R. (2024). Green accounting and environmental sustainability in companies. Journal of Sustainability Science and Management. https://doi.org/10.46754/jssm.2024.08.007
58. Munthe, I. L. S., Fatahurrazak, F., Husna, A., & Wahyuliza, S. (2024). Green accounting implementation in the maritime industry. BIO Web of Conferences. https://doi.org/10.1051/bioconf/202413403001
59. Mustafa, F., Smolarski, J., & Elamer, A. (2025). AI and sustainability reporting: A systematic review. Business Strategy and the Environment. https://doi.org/10.1002/bse.70090
60. Nain, A., Bohra, N. S., Ahmad, V., & Garg, D. (2024). AI-driven green accounting for sustainable development. Proceedings of the IEEE Conference. https://doi.org/10.1109/I3CEET61722.2024.10993586
61. Ng, A. W., & Nathwani, J. (2012). Sustainability performance disclosures. Renewable and Sustainable Energy Reviews. https://doi.org/10.1016/j.rser.2012.01.028
62. Okay, N. C., Sencer, A., & Taskin, N. (2024). Indicators for environmental and social sustainability. Environment, Development and Sustainability. https://doi.org/10.1007/s10668-024-05210-3
63. Pavithra, J., Verma, A., Harini, B., & Nazrine, N. A. (2025). CSR and financial reporting: A bibliometric analysis. Indian Journal of Information Sources and Services. https://doi.org/10.51983/ijiss-2025.IJISS.15.2.26
64. Phuoc, K.-C., Thihuyen, T.-N., Tuan, T.-A., & Thanh, L.-V. (2025). Overview of green accounting in the context of social responsibility and information disclosure: A bibliometric analysis. Quality – Access to Success. https://doi.org/10.47750/QAS/26.209.03
65. Puche, A. M., Jiménez-Zarco, A., & Izquierdo-Yusta, A. (2024). Circular ecological transition in Industry 5.0. https://doi.org/10.4018/979-8-3373-2523-1.ch006
66. Pulkkinen, J., Huttu, K., & Suhonen, M. (2025). Challenges in AI adoption in public organizations. Journal of Health Organization and Management. https://doi.org/10.1108/JHOM-06-2025-0309
67. Ramadan, A. (2025). Financing the future: Green investment, policy innovation and sustainable energy transitions in Egypt and Jordan. Management and Sustainability. https://doi.org/10.1108/MSAR-02-2025-0078

68. Rao, H. G. R., Madem, S., & Sravan Kumar, S. K. (2024). Leveraging green accounting for sustainable development in India. https://doi.org/10.4018/979-8-3693-5673-9.ch004
69. Rimmel, G., Ram, R., & Afolabi, H. (2025). ISSB and global sustainability reporting. https://doi.org/10.4324/9781003488446-16
70. Rizavi, S. S., Amir, M., Siddique, M., & Umal Banin, S. (2025). Going green strategies and sustainable firm success. Asia-Pacific Journal of Business Administration. https://doi.org/10.1108/APJBA-02-2024-0073
71. Roy, M., & Khastagir, D. (2016). Green management in the petrochemical industry. Journal of Cleaner Production. https://doi.org/10.1016/j.jclepro.2016.02.039
a. Rubino, F. E., & Veltri, S. (2020). Cost accounting for sustainability. In CSR, Sustainability, Ethics and Governance. https://doi.org/10.1007/978-3-030-41142-8_5
72. Sætra, H. S. (2024). Science fiction, sustainability, and scenario use: Comprehensive scenarios for improved strategy development and innovation. Technovation. https://doi.org/10.1016/j.technovation.2024.102976
73. Saif-Alyousfi, A. Y. H. (2025). Artificial intelligence and capital market efficiency. Research in International Business and Finance. https://doi.org/10.1016/j.ribaf.2025.103094
74. Sanz-Martín, L., Parra-Domínguez, J., Corchado Rodríguez, J. M., & Zafra Gómez, J. L. (2025). Recent evolution and growth of AI and advanced technologies in accounting and finance: Systematic review and bibliometric analysis. Revista Española de Financiación y Contabilidad. https://doi.org/10.1080/02102412.2025.2582120
75. Schaltegger, S. (2018). Environmental management accounting and planetary boundaries. Social and Environmental Accountability Journal. https://doi.org/10.1080/0969160X.2017.1395351
76. Siddiqui, S. A., & Keddie, S. L. (2025). Sustainability reporting's uneven integration into traditional accounting: A bibliometric analysis. Accounting Perspectives. https://doi.org/10.1111/1911-3838.12402
77. Singh, S., Singh, A., Arora, S., & Mittal, S. (2019). Revolution of green accounting: A conceptual review. Proceedings of PEEIC. https://doi.org/10.1109/PEEIC47157.2019.8976544
78. Skaf, L., Buonocore, E., Dumontet, S., & Franzese, P. P. (2019). Environmental accounting framework for sustainable agriculture. Journal of Cleaner Production. https://doi.org/10.1016/j.jclepro.2018.10.301
79. Song, M., Jin, T., Nie, Z., & Zheng, S. (2025). Green accounting transformation and sustainability performance in agricultural enterprises: An empirical analysis. Research on World Agricultural Economy. https://doi.org/10.36956/rwae.v6i4.2210
80. Song, Z., & Deng, Y. (2025). AI and green economy efficiency. Scientific Reports. https://doi.org/10.1038/s41598-025-03817-8
81. Srivastava, S., Iyer-Raniga, U., & Misra, S. (2024). Integrated approach for sustainability assessment and reporting for civil infrastructures projects: Delivering the UN SDGs. Journal of Cleaner Production. https://doi.org/10.1016/j.jclepro.2024.142400

82. Sun, X., Ping, Z.-B., Dong, Z.-F., & Xiong, W. (2021). Resources and environmental costs of China's rapid economic growth: From the SEEA framework to modeling practice. Journal of Cleaner Production. https://doi.org/10.1016/j.jclepro.2021.128126
83. Sundarasen, S., Rajagopalan, U., & Alsmady, A. A. (2024). Environmental accounting and sustainability: A meta-synthesis. Sustainability, 16(21), 9341. https://doi.org/10.3390/su16219341
84. Tenorio-Salgueiro, S., Vivel-Búa, M., Lado-Sestayo, R., & Martínez-Salgueiro, A. (2025). Sustainability and integration of ESG reporting: Regulatory frameworks and the role of the ISSB. https://doi.org/10.4018/979-8-3373-1902-5.ch006
85. Thanasas, G. L., Patra, E., & Lampropoulos, S. (2022). Corporate social responsibility and environmental accounting in Greece. Journal of European Economy. https://doi.org/10.35774/jee2022.01.082
86. Ulfah, I. F., Sukmana, R., Laila, N., & Sulaeman, S. (2024). Green sukuk literature review. Journal of Islamic Accounting and Business Research. https://doi.org/10.1108/JIABR-10-2022-0255
87. Ullmann, A. A. (1976). The corporate environmental accounting system. Accounting, Organizations and Society, 1(1), 71–83. https://doi.org/10.1016/0361-3682(76)90008-8
88. Usatenko, O., Pashkevych, M., Makurin, A., & Andrushko, R. (2025). Green accounting within the framework of corporate social responsibility and sustainable development. Grassroots Journal of Natural Resources. https://doi.org/10.33002/nr2581.6853.080118
89. van der Poll, H. M. (2022). Drivers and barriers of environmental management accounting adoption. Sustainable Development. https://doi.org/10.1002/sd.2312
90. van Wyk, M., & Els, G. (2023). Integrated reporting and ISSB standard setting. Frontiers in Sustainability. https://doi.org/10.3389/frsus.2023.1218985
91. Versal, N., & Sholoiko, A. (2022). Green bonds of supranational institutions. Investment Management and Financial Innovations. https://doi.org/10.21511/imfi.19(1).2022.07
92. Wang, D., Si, R., & Fahad, S. (2023). SME adoption of green practices. Environment, Development and Sustainability. https://doi.org/10.1007/s10668-022-02166-0
93. Wang, Y., Yu, Y., & Khan, A. (2025). Digital sustainability: Dimension exploration and scale development. Acta Psychologica. https://doi.org/10.1016/j.actpsy.2025.105028
94. Yang, Y., Din, A. U., Mohi Ud Din, Q., & Khan, I. U. (2024). Green leadership and organizational performance. Heliyon. https://doi.org/10.1016/j.heliyon.2024.e27831
95. Zhang, X., Xu, L., Chen, Y., & Liu, T. (2020). Emergy-based ecological footprint analysis. Ecological Indicators. https://doi.org/10.1016/j.ecolind.2019.106018
96. Zotorvie, J. S. T., van Rooyen, A. A., & Shuttleworth, C. C. (2024). Quadruple helix intervention for accounting education. International Journal of Learning, Teaching and Educational Research. https://doi.org/10.26803/ijlter.23.3.16