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A REVIEW OF THE EVOLVING ROLE OF ECONOMIC AND ACCOUNTING PRACTICES IN SUSTAINABLE CONSTRUCTION INDUSTRY

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Abstract

The construction industry occupies a paradoxical position in the global sustainability discourse, functioning simultaneously as a cornerstone of economic development, contributing approximately 6 percent to global GDP and employing roughly 100 million people, while constituting the largest consumer of raw materials and a primary generator of solid waste, accounting for approximately 40 percent of total waste by weight. Through systematic analysis of peer-reviewed publications spanning 2015 to 2025, four thematic areas of inquiry are identified: sustainability reporting frameworks and their sectoral application, financial performance implications of green management practices, specialized accounting methodologies including carbon accounting, environmental management accounting, and life cycle costing, and the economic dimensions of circular economy transitions. The review reveals that notwithstanding significant momentum in sustainability reporting, the literature remains fragmented, characterized by limited theoretical engagement and a conspicuous neglect of institutional perspectives. Green management practices demonstrate consistently positive associations with financial performance through mechanisms including operational cost reduction, revenue enhancement, and improved stakeholder relations. Specialized accounting tools have emerged as critical instruments for operationalizing sustainability, yet persistent methodological gaps remain in carbon accounting granularity and lifecycle assessment integration. The circular economy presents substantial economic opportunities alongside formidable accounting challenges, particularly concerning asset valuation, revenue recognition, and intertemporal accountability. The review concludes that integrating sustainability imperatives with economic and accounting practices constitutes both a critical challenge and opportunity for the construction industry. Addressing this exigency demands not only methodological innovation but also fundamental reconceptualization of accounting as a constitutive element of socio-ecological stewardship.

Keywords: *Sustainability accounting; construction industry; economic sustainability; carbon accounting; life cycle costing; ESG reporting; financial performance; & circular economy*

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Introduction

The built environment has emerged as a central battleground for addressing climate change, resource depletion, and environmental degradation. The construction and operation of buildings are responsible for approximately 30% of global final energy consumption, with embodied energy from materials like concrete, steel, and aluminium accounting for about 5% of global final energy consumption (UNEP, 2022; IEA, 2023). Beyond energy consumption, the construction industry accounts for the largest share of raw material consumption worldwide and is a primary source of solid waste, with an estimated 35% of construction, renovation, and demolition waste ending up in landfills (Ajayi et al., 2020; Okagbare et al., 2025). In the European Union, construction contributed approximately 9% of GDP in 2020 while its generated waste contributed 37.1% of total solid waste (Eurostat, 2022). Similarly, in the United States, construction waste constituted 67.3% of solid waste across all sectors (US EPA, 2023). The environmental impact of construction activities has necessitated urgent attention to sustainable practices, particularly in developing nations where rapid urbanization exacerbates these challenges (Onuzulike et al., 2025; Tiza et al., 2025).

However, the construction sector also plays a vital role in global economic development, contributing to around 6% of the global gross domestic product (GDP) and employing approximately 100 million people (Maqbool et al., 2022; UNEP, 2022). This dual identity as both a significant contributor to environmental degradation and a critical driver of economic prosperity, creates unique challenges for the integration of sustainability principles into industry practices. Economic sustainability in the construction sector has been less addressed despite its broad applicability, with economic sustainability focusing on making informed financial decisions that endure beyond the project's lifespan (Alaloul et al., 2022). The integration of sustainability principles across design, execution, and cost management has become imperative for achieving long-term environmental and economic benefits (Tyongi et al., 2026).

Research on sustainability reporting has become a key focus among diverse stakeholder groups, receiving substantial academic attention over the past three decades (Schaltegger et al., 2023; Hahn & Kühnen, 2013). However, research on sustainability reporting specifically in the Construction and Real Estate (CRE) sector remains in a nascent stage compared to other sectors such as mining, energy, and banking (Shahid et al., 2024). This gap is particularly concerning given the sector's environmental significance and the growing regulatory and stakeholder pressures demanding greater transparency and accountability. The need for sustainable concrete practices, alternative cementitious materials, and innovative construction methods has been increasingly recognized as essential for reducing the environmental footprint of the construction industry (Okagbare et al., 2025; Tiza et al., 2025).

This review addresses this gap by synthesizing recent literature on the evolving role of economic and accounting practices in the sustainable construction industry. Drawing on systematic reviews, conceptual analyses, bibliometric studies, and empirical research published in peer-reviewed journals between 2015 and 2025, the paper examines how economic and accounting frameworks are being reconfigured to address sustainability challenges. The review is structured around four thematic areas: (1) sustainability reporting frameworks and their application in the construction sector, (2) the financial performance implications of green management practices, (3) specialized accounting practices including carbon accounting and life cycle costing, and (4) the economic dimensions of circular economy transitions.

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Emergence of Sustainability Reporting Frameworks

Sustainability reporting (SR) has emerged as a cornerstone of corporate accountability in the construction sector, translating global sustainability imperatives, particularly the Sustainable Development Goals (SDGs), into sector-specific performance metrics and management strategies (Shahid et al., 2024; Rosati & Faria, 2019). SR is considered a process of publicly disclosing a company's environmental, social, and economic (ESE) performance and has become a means to communicate information about sustainability strategies and impacts, contributing to the achievement of Sustainable Development Goals (KPMG, 2022; GRI, 2021).

The Global Reporting Initiative (GRI) and the Environmental, Social, and Governance (ESG) approach have emerged as the most influential frameworks guiding sustainability disclosures in the industry (Cortés et al., 2024; Eccles et al., 2014). Well-known and widely used guidelines are the GRI standards, which cover a large number of non-financial topics and aim at transparent reporting (GRI, 2021). These frameworks operationalize multidimensional sustainability commitments encompassing environmental, social, and economic dimensions. The Sustainability Accounting Standards Board (SASB) has also identified specific sustainability issues likely to drive competitiveness within the Engineering and Construction Services industry, including managing environmental impacts during project design and construction, ensuring structural integrity and safety, creating a safety culture, managing exposure to carbon-intensive projects, and implementing internal procedures to reduce corruption and bribery risks (SASB, 2023).

Cortés et al. (2024), in a systematic literature review of 67 articles, examined companies' motivations for SR, the design and content of reports, and the use of information in corporate sustainability management. The review revealed that literature predominantly suggests sustainability disclosure is driven mainly by instrumental or social/political motives, and that reports vary greatly in terms of content and quality (Cortés et al., 2024). Similarly, Shahid et al. (2024), in a conceptual literature review of 49 articles from Scopus and Web of Science, identified four dominant perspectives in the literature on sustainability reporting in the CRE sector: (1) disclosure diversity, (2) practical barriers, (3) rationales, and (4) drivers of sustainability reporting. This conceptual mapping reveals that the literature is interdisciplinary, appearing in both accounting and non-accounting journals, and addresses "what," "why," and "how" questions regarding sustainability disclosures (Shahid et al., 2024). The integration of sustainability principles across design, execution, and cost management has been highlighted as essential for achieving comprehensive sustainability outcomes (Tyongi et al., 2026).

Challenges of sustainability reporting

Despite the proliferation of sustainability reporting, significant challenges persist. A major concern identified across multiple studies is the lack of homogeneity in reporting approaches, definitions, and objectives (Hahn & Kühnen, 2013; KPMG, 2022). The diversity of reporting frameworks and the voluntary nature of many disclosures make it difficult to compare the sustainability performance of different construction firms (Eccles et al., 2014; Cortés et al., 2024).

The extant literature identifies several barriers to effective sustainability reporting in the construction sector, including costs, lack of regulation, and cultural resistance (Shahid et al., 2024). Enablers include regulations, stakeholder pressure, and reputational benefits (Hahn & Kühnen, 2013). However, sustainability reporting in construction is often treated as a compliance or marketing tool rather than as a strategic instrument for transformation and accountability (Schaltegger et al., 2023). Consequently, reporting practices are superficial, difficult to compare,

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and poorly integrated with the SDGs (Rosati & Faria, 2019). Furthermore, the uneven incorporation of the SDGs within sustainability reporting frameworks highlights a discrepancy between global sustainability agendas and local implementation realities (Rosati & Faria, 2019). The way construction companies prioritise and disclose SDG-related information is influenced by variations in regulatory environments, market maturity, and stakeholder expectations, compromising the comparability and aggregation of sustainability data at regional and global scales (Shahid et al., 2024). Environmental sustainability and impact reduction in civil engineering practices require robust reporting mechanisms that capture the full spectrum of environmental impacts (Onuzulike et al., 2025).

Economic Case for Sustainable Construction

The economic dimension of sustainability in construction has received comparatively less attention in the literature despite its broad applicability (Alaloul et al., 2022). Economic sustainability focuses on making informed financial decisions that endure beyond the project's lifespan, involving reducing construction costs, boosting operational efficiency, and investing in durable materials (Alaloul et al., 2022). The goal is to deliver projects that are affordable to build, maintain, and operate without compromising quality or the environment (Ahn et al., 2020). Tyongi et al. (2026) emphasize that integrating sustainability in construction design, execution, and cost management requires a holistic approach that balances environmental, social, and economic considerations throughout the project lifecycle.

Alaloul et al. (2022) conducted a comparative analysis of the construction sectors in the USA, China, and the UK, highlighting the significant role of economic sustainability in stabilizing and advancing national economies. Their study emphasized the importance of integrating circular economy principles to enhance economic performance and resilience in the construction industry (Alaloul et al., 2022).

Empirical research has documented substantial economic benefits associated with sustainable construction practices. Studies indicate savings of 25-30% in energy consumption, 20-30% in water consumption, 50% less waste generation, 35% reduced carbon emissions, and 30% reduction in building operating expenses (Ahn et al., 2020; Zhang et al., 2021). Commercial buildings achieving sustainability certifications can command rental premiums of 1.9% to 2% (Eichholtz et al., 2010; Kok et al., 2011). These findings challenge the persistent misconception that sustainable construction necessarily entails higher costs, demonstrating instead that sustainability can generate significant long-term economic value. The use of sustainable concrete practices and alternative cementitious materials has been shown to reduce both environmental impact and long-term costs (Okagbare et al., 2025; Tiza et al., 2025).

Green Management and Financial Performance

Kalya et al. (2024) conducted a systematic review examining the impact of green management on the financial performance of construction firms. The review synthesized findings from multiple studies employing various methodological approaches, including case studies, interviews with industry experts, and comprehensive literature reviews (Kalya et al., 2024). The findings reveal a consistent pattern: proactive adoption of green management practices by construction companies is associated with long-term benefits in financial performance (Kalya et al., 2024). Key mechanisms include: (1) firms investing in pollution prevention initiatives significantly reduce costs and improve financial performance (Porter & van der Linde, 1995; Ambec & Lanoie, 2008); (2) firms engaging in sustainable practices attract environmentally conscious consumers, enhancing revenue

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streams and market share (Cheng et al., 2020; Eccles et al., 2014); and (3) employees in firms that prioritize environmental sustainability exhibit higher levels of motivation and job satisfaction, translating into improved operational performance (Skerlos et al., 2021). The analysis of key financial performance indicators—Return on Assets (ROA), Return on Equity (ROE), and profit margins—reveals that green management practices can positively influence these metrics (Kalya et al., 2024). By reducing operational costs and enhancing asset efficiency, sustainable practices can lead to higher profitability relative to the firm's asset base (Ambec & Lanoie, 2008). However, the review also identifies challenges for medium-sized enterprises, which may struggle more with the financial burdens of adopting green practices compared to larger firms (Kalya et al., 2024).

Cost of Sustainability: Initial Investment versus Long-Term Returns

A common barrier to sustainable construction is the perception that it entails higher costs (Ahn et al., 2020). While initial capital costs for sustainable materials and technologies may be higher, these materials often offer benefits such as lower maintenance requirements and longer lifespans (Zhang et al., 2021). For instance, using recycled steel or low-emission concrete can lead to significant cost savings over time due to reduced upkeep and replacement needs (Ajayi et al., 2020). The review of cement and alternative cementitious materials demonstrates that supplementary cementitious materials such as fly ash, slag, and calcined clay can significantly reduce both cost and environmental impact while maintaining structural performance (Tiza et al., 2025). Construction firms that prioritize energy-efficient designs and equipment often see reductions in operational costs and improvements in client satisfaction (Cheng et al., 2020). Despite these documented benefits, industry actors continue to hold diverse perceptions regarding the costs and benefits of sustainable construction (Zhang et al., 2021), underscoring the need for better communication of the economic case and development of tools that can accurately quantify lifecycle economic benefits (Onuzulike et al., 2025).

Specialized Accounting Practices

Carbon Accounting in the Construction Industry

Carbon accounting has emerged as a critical specialized practice within the construction sector. Zhao et al. (2025) conducted a comprehensive bibliometric review, analyzing 282 articles from the Web of Science spanning 1992–2022, examining research trends and themes in Carbon Emissions of the Construction Industry (CECI). The study identified significant methodological gaps: research remains concentrated at the macro (national) and micro (building) scales, with city-level analyses critically underrepresented; 74.8% of studies fail to distinguish between building types; and few studies account for emissions from demolition or the disposal and recycling of construction waste (Zhao et al., 2025). Research hotspots identified included "carbon emission," "life cycle assessment," "energy efficiency," "construction industry," and "input-output analysis" (Zhao et al., 2025). The study concluded that there is an urgent need for more lifecycle-based, detailed, and methodologically diverse approaches to carbon accounting in the construction industry (Zhao et al., 2025).

The international focus on reducing emissions from building construction and operation has crystallized around two key categories: operational carbon (OC) and embodied carbon (EC) (International Energy Agency, 2023). While OC has been the traditional focus through building energy codes and efficiency standards, EC has gained attention as the industry aims to achieve net-zero targets (Lützkendorf & Balouktsi, 2021). Embodied carbon includes emissions from raw material extraction, manufacturing, transportation, and end-of-life disposal (Röck et al., 2020).

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Whole Life Carbon (WLC) accounting, which includes both OC and EC, has become the most rigorous and comprehensive approach (Pomponi et al., 2023). Sustainable concrete practices, including the use of alternative cementitious materials, can significantly reduce embodied carbon in construction (Okagbare et al., 2025; Tiza et al., 2025).

Environmental Management Accounting (EMA)

Environmental Management Accounting (EMA) has emerged as a specific tool for tracing and recognizing environmental costs and physical material flows (Schaltegger et al., 2023). EMA is defined as the identification, collection, estimation, analysis, internal reporting, and use of materials and energy flow information, environmental cost information, and other cost information for both conventional and environmental decision-making within an organization (International Federation of Accountants, 2005). Research in Malaysia by Omar et al. (2020) indicates that construction companies demonstrate a high stage of environmental responsiveness and that both internal and external factors significantly influence the implementation of EMA, with regulatory pressures, stakeholder expectations, and organizational commitment identified as key drivers. EMA provides several benefits for construction firms, including improved cost control, better identification of environmentally related costs, enhanced environmental performance, and support for decision-making regarding cleaner production (Schaltegger et al., 2023). However, implementation challenges include lack of awareness, inadequate training, and the absence of standardized methodologies (Omar et al., 2020). The integration of environmental considerations into cost management practices has been identified as essential for achieving sustainable construction outcomes (Tyongi et al., 2026).

Life Cycle Costing (LCC)

Life Cycle Costing (LCC) has become an essential accounting tool for evaluating the economic sustainability of construction projects (Ristimäki et al., 2013). LCC is a method of economic evaluation that sums all relevant costs over a building's entire life cycle, including initial investment, operating costs, maintenance costs, and end-of-life costs (Swarr et al., 2011). Unlike conventional cost accounting, which focuses primarily on initial construction costs, LCC provides a comprehensive assessment of the economic implications of design decisions throughout a building's lifespan (Lützkendorf & Balouktsi, 2021). Hochschorner et al. (2020) demonstrated the integration of LCC with Life Cycle Assessment (LCA) in the construction sector, showing that combining economic and environmental assessment tools enables more informed decision-making. The European Commission (2020) has promoted the use of LCC in public procurement as a means of achieving cost-efficient and sustainable construction outcomes. However, challenges in LCC implementation include uncertainty in future cost projections, lack of standardized methodologies, and limited availability of reliable data (Swarr et al., 2011), though LCC has been recognized as a critical tool for supporting sustainable investment decisions (Ristimäki et al., 2013).

Circular Economy and Economic Sustainability

The circular economy (CE) has emerged as a transformative economic paradigm for addressing resource depletion and waste generation in the construction sector (Ghisellini et al., 2016). CE is based on the principles of designing out waste, keeping materials in use at their highest value, and regenerating natural systems (Ellen MacArthur Foundation, 2021). In the construction context, CE involves strategies such as design for disassembly, material reuse, remanufacturing, and recycling (Pomponi et al., 2023). Ghisellini et al. (2016) conducted a comprehensive review of CE implementation in the built environment, identifying significant economic opportunities associated

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with circular strategies, including reduced material costs, new business opportunities, and enhanced resource efficiency. Alaloul et al. (2022) emphasized the importance of integrating circular economy principles to enhance economic performance and resilience in the construction industry, revealing that CE adoption can contribute to economic sustainability by reducing dependency on virgin materials, creating new markets for secondary materials, and fostering innovation in building design and construction methods. The review of alternative cementitious materials demonstrates the potential of industrial by-products to contribute to circular economy goals in the construction sector (Tiza et al., 2025).

A particularly forward-looking area of research examines the role of accounting in facilitating the transition to a circular economy, specifically through innovative business models such as Product-as-a-Service (PaaS) (Greene et al., 2024). These models, which retain provider responsibility for materials over time, challenge conventional assumptions about ownership, valuation, and asset depreciation (Bocken et al., 2016). Greene et al. (2024) conducted a longitudinal study of PaaS models in the Netherlands, highlighting the friction between CE aspirations and existing linear financial and accounting infrastructures. The study revealed that accounting is not a neutral reporting function but a "dynamic, contested site where ecological, material and financial futures are recursively negotiated and reconfigured" (Greene et al., 2024, p. 45). Key challenges identified include estimating residual value, ensuring intertemporal accountability, and adapting governance structures to support long-term material stewardship (Greene et al., 2024). Rashid et al. (2024) similarly examined the economic viability of circular business models in the construction sector, noting that the shift to circular business models requires substantial changes to accounting practices, particularly regarding asset valuation, depreciation, and revenue recognition, calling for a reconfiguration of financial and legal infrastructures.

Several economic barriers to circular economy adoption in the construction sector have been identified. Ghisellini et al. (2016) identified high upfront costs, uncertain economic returns, lack of market demand for recycled materials, and insufficient financial incentives as major economic barriers. Additionally, the fragmentation of the construction value chain, where designers, contractors, and operators often have conflicting economic interests, poses a significant barrier to circular implementation (Pomponi et al., 2023). Conversely, economic enablers include policy incentives such as tax breaks for material reuse, green public procurement, extended producer responsibility schemes, and the development of secondary material markets (Alaloul et al., 2022; Ellen MacArthur Foundation, 2021). The economic case for circularity is also strengthened by increasing resource scarcity, rising raw material prices, and growing regulatory pressure (Ghisellini et al., 2016). Sustainable concrete practices that incorporate recycled materials and industrial by-products can contribute significantly to circular economy goals while reducing environmental impact (Okagbare et al., 2025).

Conclusion

This review examined the evolving role of economic and accounting practices in the sustainable construction industry, synthesizing recent literature across four thematic areas. The review reveals that sustainability accounting in construction is undergoing a significant transformation, moving from a focus on financial reporting to an expanded role in supporting sustainability transitions. However, the literature remains characterized by fragmented frameworks, limited theoretical engagement, and methodological gaps that constrain its utility for decision-making and stakeholder engagement (Shahid et al., 2024). The review demonstrates that while sustainability reporting has gained momentum in the construction sector, challenges of fragmentation and lack of standardization persist (Shahid et al., 2024). Green management practices show promise in

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generating positive financial outcomes, though challenges remain for smaller enterprises (Kalya et al., 2024). Specialized accounting practices such as carbon accounting, EMA, and LCC have emerged as critical tools, but methodological gaps regarding granularity and system boundaries remain (Zhao et al., 2025). The circular economy presents significant opportunities for economic sustainability, but also poses substantial accounting challenges regarding asset valuation and intertemporal accountability (Greene et al., 2024).

The review makes several contributions to the literature. First, it provides a comprehensive synthesis of recent research on sustainability accounting in the construction sector, identifying key themes, challenges, and gaps. Second, it offers a critical assessment of theoretical and methodological approaches in the literature, highlighting the need for more theoretically grounded, longitudinal, and multi-level research. Third, it provides practical recommendations for industry practitioners, policymakers, and accounting professionals seeking to advance sustainability in the construction sector.

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