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Eco-Innovation and Sustainable Business Performance in Africa: A Systematic Review of Emerging Evidence

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ABSTRACT

This study systematically reviews how eco-innovation influences sustainable business performance (SBP) in Africa. Searches across six databases (Emerald, EBSCOhost, ScienceDirect, Wiley, Springer, and Google Scholar) from 2000 to March 2024 yielded 182 records, with 14 studies meeting inclusion after PRISMA 2020 screening and CASP quality appraisal. Using Tranfield's three-stage protocol and thematic synthesis, we analyzed eco-innovation types, sectoral distribution, and SBP outcomes. Evidence is concentrated in manufacturing and seven countries, with most studies published since 2020. Eco-process and eco-product innovations dominate, consistently delivering environmental benefits, while economic gains often lag due to high upfront costs, and social outcomes are seldom assessed. Eco-organizational and eco-marketing innovations, along with agriculture and services sectors, remain underexplored. Most studies adopt cross-sectional designs, limiting causal insights. The review calls for longitudinal and mixed-method approaches, broader sectoral and geographic coverage, and supportive policy measures such as green finance, targeted tax incentives, and local innovation hubs. Findings offer practical guidance for researchers, managers, and policymakers seeking to scale eco-innovation and achieve balanced, sustainable performance in African contexts.

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Introduction

In today's changing global landscape, the expectations of what makes a business successful are being redefined. The combination of climate instability, unsustainable resource use, and growing social inequality is putting pressure on firms to broaden their value proposition beyond profit alone (IPCC, 2023; Sachs et al., 2022). In this setting, eco-innovation has become an increasingly important approach. It involves the intentional development or adjustment of products, services, business models, or operational practices in ways that reduce environmental harm while adding economic value. Once seen as a niche strategy, eco-innovation is now viewed as a central feature of long-term business competitiveness. Recent data illustrates this growing trend: global filings for low-carbon technologies have doubled since 2015 (IEA, 2024), and

green bonds worth over USD 1 trillion were issued in 2023 (Climate Bonds Initiative, 2024). This reflects a wider shift in how innovation is perceived, from purely a driver of growth to a key response to systemic risks threatening ecological and economic systems.

Africa is deeply affected by this global shift, though the realities shaping eco-innovation on the continent differ from those in industrialized regions. Africa faces rising urbanization, expanding population, and intensifying industrial demand, all of which increase pressure on land, water, and energy systems. At the same time, African economies are highly exposed to climate risks and often rely on vulnerable sectors such as agriculture, fisheries, forestry, and extractives. These sectors are already seeing the effects of extreme weather events, land degradation, and resource scarcities. Yet despite these vulnerabilities, a growing number of African governments are adopting a more proactive stance toward sustainability. Key policy frameworks like the African Continental Free Trade Area (AfCFTA) and the African Green Stimulus Programme (AGSP) show a strategic shift toward integrated, green industrial growth (UNECA, 2023). Similarly, initiatives from the African Development Bank and AGRA indicate continent-wide recognition of the role innovation can play in shaping climate-smart development (AfDB, 2025; AGRA, 2023).

Despite these policy commitments, actual adoption of eco-innovation in African firms remains uneven. Some businesses are integrating environmental goals into their strategies, but others are hindered by lack of access to finance, limited infrastructure, weak enforcement of regulations, and limited market incentives. Beyond these structural challenges lies a more foundational issue: the lack of a coherent, empirically grounded understanding of how eco-innovation contributes to sustainable business performance (SBP) in Africa. SBP is a multidimensional concept that reflects a firm's ability to meet economic, environmental, and social goals in a balanced way. Economic performance refers to aspects such as revenue growth, cost savings, and market competitiveness. Environmental performance includes emissions reduction, resource efficiency, and waste minimization. Social performance reflects employee well-being, community engagement, and inclusive value creation (Yang & Han, 2023; Yu & Hwang, 2024). These dimensions are often treated separately, but in practice they are deeply interconnected. Innovations that improve environmental efficiency may also reduce costs or strengthen brand value, while socially inclusive practices can foster loyalty and market access.

Clarity in definitions is especially important in this area. Although terms like green innovation, environmental innovation, and ecological innovation are often used alongside eco-innovation, their meanings differ subtly. Green innovation often refers to improvements in products or technologies that reduce environmental impacts. Environmental innovation tends to align with compliance measures, such as pollution control. Ecological innovation is more aligned with nature-based solutions and systems thinking. Eco-innovation, as used in this review, encompasses a broader and more strategic range, it includes not only technological changes but also organizational routines and marketing strategies that reduce environmental harm and add business value (Díaz-García et al., 2015; Klewitz & Hansen, 2014; Oduro, 2024). This definition fits the realities of African enterprises well, where firms must often be highly adaptive and resource-efficient to remain viable.

As interest in eco-innovation has grown, more structured typologies have been proposed. Four core categories have become widely recognized: eco-product innovation e.g. recyclable packaging, eco-process innovation e.g. water-saving technologies, eco-organizational innovation e.g. environmental auditing and green supply chain practices, and eco-marketing innovation e.g. green branding and eco-labeling. In African settings, two more types are increasingly important. Digital eco-innovation uses tools such as AI, IoT, and blockchain to increase sustainability for example, by using remote sensors in agriculture to track water use. Circular eco-innovation involves redesigning production systems to eliminate waste entirely, such as repurposing organic waste into fertilizer or energy (Baah et al., 2022; Omonijo & Zhang, 2024). These categories reflect the expanding toolkit firms can draw on to achieve sustainability goals while remaining competitive.

Understanding why and how firms pursue eco-innovation requires multiple theoretical lenses. The Resource-Based View (RBV) suggests that internal capabilities such as knowledge, technology, and management commitment are key drivers of innovation. However, in many African countries, external factors are just as influential. Institutional Theory explains how formal rules, informal norms, and external pressures influence firm behavior. In addition, Stakeholder Theory highlights how actors such as customers, communities, and civil society organizations shape corporate actions. The Dynamic Capabilities perspective is also useful, especially in explaining how firms respond and adapt to changing conditions. Finally, the Triple Bottom Line framework helps capture the full scope of sustainability emphasizing the equal importance of environmental, economic, and social outcomes (Buzzao & Rizzi, 2021; Çelik et al., 2024; Kump et al., 2019).

Although scholarly interest in eco-innovation in Africa is rising, the evidence base remains limited in several ways. First, the literature often focuses on manufacturing and formal businesses, neglecting sectors like agriculture, ICT, and the informal economy, which are central to many African countries. Second, many studies use cross-sectional survey designs, which are useful but do not capture change over time or allow for causal conclusions. Third, and most critically, there is limited attention to the social outcomes of eco-innovation. Issues such as job creation, skill development, gender inclusion, and community benefits are mentioned in passing, but are rarely measured or analyzed in depth. As a result, the current understanding of eco-innovation's contribution to sustainable development in Africa is partial and fragmented.

Previous reviews have helped build foundational understanding of eco-innovation, but major gaps remain especially in relation to African contexts. Early global syntheses (e.g. Díaz-García et al., 2015; Rennings, 2000) provided conceptual clarity but focused heavily on Europe and East Asia. They typically treated eco-innovation as a single construct and reported performance outcomes in aggregate terms. SME-focused reviews such as Munodawafa and Johl (2019) narrow the scope but still overlook sectors central to African economies, such as agri-food, extractives, tourism, and informal enterprises. Africa-specific reviews (e.g. Malesios et al., 2021) examine general sustainability practices but do not fully disaggregate the six dominant types of eco-innovation, product, process, organizational, marketing, digital, and circular – nor systematically relate them to the triple-bottom-line outcomes of economic, environmental, and social performance. Even the most recent meta-analysis by Oduro (2024) includes too few African studies to draw region-specific conclusions and often combines sustainability into a single composite

outcome. To address these gaps, this review systematically maps peer-reviewed studies from 2020 to 2024 that examine eco-innovation and sustainable performance in Africa, offering a more detailed, contextualized analysis that can inform policy, research, and practice across the continent.

To help address these gaps, this study presents a systematic review of peer-reviewed research on eco-innovation and sustainable business performance in Africa, covering literature published between 2020 and 2024. The review applies PRISMA 2020 guidelines and follows Tranfield et al.'s (2003) three-stage protocol for evidence synthesis, including planning, conducting, and reporting the review. The study is guided by the following four objectives: (i) To identify key themes, sectoral coverage, and geographic patterns in the existing literature on eco-innovation in Africa; (ii) To examine the types of eco-innovation being adopted by African firms and assess their reported effects on economic, environmental, and social performance; (iii) To identify methodological and conceptual gaps in the literature, such as underrepresented sectors, lack of longitudinal research, or insufficient attention to social performance; and (iv) To suggest a future research and policy agenda that promotes wider and more inclusive uptake of eco-innovation across different African contexts.

In doing so, the review aims to offer practical insights for multiple audiences. Policymakers can use the findings to refine regulatory incentives and align support mechanisms with firm needs. Development partners and funders can better understand where to target capacity-building or financing. Business leaders, especially those managing small and medium enterprises, can draw lessons on which types of eco-innovation are both viable and impactful in their setting. Researchers can identify promising areas for further inquiry and develop more holistic approaches to studying innovation. As African economies strive to build resilience and inclusive growth under conditions of environmental constraint, eco-innovation offers a potentially transformative pathway. But to realize this potential, there is a need for clearer evidence, more robust measurement, and context-specific learning. The sections that follow present the review methods, key findings across the three SBP dimensions, and the implications for future research, practice, and policy in Africa.

Literature review

Theoretical underpinnings

The eco-innovation – SBP relationship is strongly grounded in three complementary theoretical frameworks. The RBV and its natural extension, the Natural Resource-Based View (NRBV), explain how firms derive competitive advantage from developing valuable, rare, inimitable, and non-substitutable eco-oriented resources and capabilities (Barney et al., 2021; Hart, 1995). Dynamic Capabilities Theory adds a temporal dimension, emphasizing the need to integrate, reconfigure, and adapt these resources in response to changing environmental and market pressures (Teece et al., 1997). Institutional Theory helps explain cross-country variation by highlighting how firms respond to coercive, normative, and mimetic pressures from regulators, industry bodies, and societal expectations (DiMaggio & Powell, 1983). Finally, the Triple Bottom Line (TBL) framework anchors the performance outcomes in economic, environmental, and

social dimensions, clarifying how eco-innovation can create value across multiple stakeholder groups (Elkington, 1997). Integrating these perspectives provides a richer basis for understanding both the mechanisms and contingencies that shape the eco-innovation – SBP nexus.

Eco-innovation typology

Eco-innovation has gained prominence as firms seek to balance economic competitiveness with environmental responsibility. While the concept is defined differently across disciplines, a shared understanding has emerged: eco-innovation refers to the development or application of products, processes, services, or organizational systems that reduce environmental harm while creating business value (Rennings, 2000; OECD/Eurostat [OECD], 2005 (Al-Hanakta et al., 2023); Al-Hanakta et al., 2023). The Observatory (2013) emphasizes that eco-innovation must reduce ecological impacts across the entire lifecycle of a product or service. Anu et al. (2023) extend this by highlighting efficiency gains, such as energy and material savings, as core outcomes. Recent studies have broadened the definition to include non-technological and systemic changes, including shifts in business models, consumer behavior, and institutional practices (Bonsu et al., 2024; Esangbedo et al., 2024).

Several typologies have emerged to capture this diversity. A widely accepted framework distinguishes between four classical forms of eco-innovation: eco-product, eco-process, eco-organizational, and eco-marketing innovation (Klewitz et al., 2012; Szutowski, 2021). Scholars are also increasingly examining emerging types such as digital eco-innovation, which integrates technologies like AI, blockchain, and IoT into sustainability practices (Mishra et al., 2024; Shen et al., 2022), and circular eco-innovation, which emphasizes regenerative design and closed-loop systems (Abdallah et al., 2024; Khan et al., 2024). Together, these categories offer a comprehensive view of how firms embed sustainability across different dimensions of their operations and strategy.

Eco-product innovation

Eco-product innovation

refers to the creation or significant redesign of products that minimize environmental harm over their lifecycle, through measures such as recyclable or biodegradable materials, lower hazardous content, enhanced durability, or improved energy efficiency (Oduro, 2024; Salo et al., 2020). Guided by life-cycle thinking and product stewardship principles, it aims to reduce emissions, material waste, and toxicity while delivering consumer value (Rennings, 2000). From a Resource-Based View perspective, eco-product innovation develops distinctive product design capabilities and green brand capital that are difficult for rivals to imitate, while under Dynamic Capabilities Theory, it reflects a firm's capacity to sense sustainability-driven market shifts and reconfigure offerings accordingly (Barney, 1991; Teece et al., 1997). Global studies emphasize that environmental and market gains are greatest when paired with eco-process and eco-organizational reforms. For example, Cheng et al. (2014) show that eco-product innovation often mediates the effect of process improvements on performance, creating

a reinforcing cycle between operational upgrades and market offerings. In Malaysia's tech sector, Ch'ng et al. (2021) find process and product innovations work in tandem, with the latter boosting economic and social outcomes and enhancing customer appeal. Evidence from Mexico's automotive sector shows supply chain collaboration strengthens product innovation payoffs Maldonado Guzmán and Pinzón Castro (2023), while Ghisetti and Montresor (2019) highlight that firms integrating design into strategy and securing commercialization support achieve stronger returns.

In Africa, eco-product innovation is gaining traction through dematerialization strategies such as solar-powered devices, low-energy lighting, and biodegradable packaging (Ozor & Nyambane, 2021; Sichoongwe, 2024). Oduro (2024)'s meta-analysis confirms positive effects of eco-product innovation on SMEs' sustainable performance, particularly economic and social dimensions though it is often outperformed by process and organizational innovations in resource-constrained settings. In Ethiopia, Nigatu et al. (2024) show that green marketing orientation and green investment, both key drivers of product innovation, enhance economic performance via green innovation. In Egypt, Mady et al. (2022) find that eco-product innovation alone rarely sustains competitive advantage without complementary operational reforms, especially in weak regulatory environments where firms self-regulate to build legitimacy. Cross-regional evidence from Ecuador Michalski et al. (2023) points to common adoption barriers limited environmental R&D funding, weak university – industry collaboration, and low technical know-how that also affect African SMEs. Meanwhile, Nwagu (2024) cautions that high development costs and uncertain paybacks can dampen uptake in Nigerian FMCG multinationals. Despite these hurdles, eco-product innovation remains strategically valuable: when integrated with process efficiency, organizational alignment, and market-oriented design, it not only meets rising sustainability demand but also strengthens competitive positioning and brand reputation in domestic and export markets.

Eco-process innovation

Eco-process innovation involves introducing or significantly improving production methods, logistics systems, and operational procedures that lower environmental impact while sustaining or enhancing productivity. Typical measures include adopting cleaner technologies, optimizing energy use, implementing closed-loop systems, reducing waste, and improving resource efficiency in manufacturing and distribution (Oduro, 2024; OECD, 2005). From an RBV perspective, such innovations create distinctive operational competencies and technical know-how that are valuable, rare, and difficult to imitate. Under Dynamic Capabilities Theory, they reflect a firm's capacity to integrate environmental technologies, learn continuously, and adapt processes in response to ecological and market pressures (Hafeez et al., 2024; Teece et al., 1997). Global evidence consistently shows that eco-process innovation delivers direct and measurable environmental benefits often more so than eco-product innovation because it targets the production systems where most resource use and emissions occur (Ch'ng et al., 2021). It can also act as a platform for product innovation, with process improvements feeding into greener product development (Cheng et al., 2014).

In Africa, eco-process innovation is often the most immediately impactful eco-innovation type because it improves efficiency and reduces costs in resource-

constrained settings. Oduro (2024)'s meta-analysis confirms strong positive effects across environmental, economic, and social performance in African SMEs. In Ethiopia's leather, textile, and garment sectors, green manufacturing practices a core form of process innovation significantly enhance both economic outcomes and green innovation capacity (Nigatu et al., 2024). Evidence from Egypt shows that, alongside eco-organizational change, process innovation underpins sustainable competitive advantage more reliably than product innovation alone, particularly in weak regulatory contexts where firms self-regulate to build legitimacy (Mady et al., 2022). However, challenges remain: high upfront investment, uncertain payback, and limited technical expertise can slow adoption (Nwagu, 2024). Despite these barriers, African case evidence suggests eco-process innovation is a foundational lever for embedding sustainability into core operations and enabling other eco-innovation types to achieve scale and impact.

Eco-organizational innovation

Eco-organizational innovation involves reshaping internal structures, policies, and routines so that environmental objectives are embedded into daily management and decision-making. Typical measures include implementing environmental management systems (EMS), providing targeted eco-training and environmental audits, allocating R&D budgets to green priorities, and enabling cross-department knowledge sharing on eco-innovation (Mady et al., 2022; Rodríguez-Rebés et al., 2021). From a Resource-Based View (RBV) perspective, these practices strengthen a firm's stock of valuable, rare, and hard-to-imitate resources such as green culture, environmental know-how, and absorptive capacity that underpin long-term advantage (Barney et al., 2021; Wernerfelt, 1984). As a Dynamic Capability (DCT), eco-organizational innovation also enables firms to sense sustainability opportunities, align internal processes, and reconfigure resources quickly, thereby supporting the effective deployment of eco-process and eco-product innovations (Çelik et al., 2024; Kump et al., 2019). From an Institutional Theory perspective, these changes also help firms respond to coercive, normative, and mimetic pressures by embedding environmental objectives into their formal structures and routines, enhancing legitimacy with regulators, industry peers, and stakeholders (DiMaggio & Powell, 1983; Delmas & Toffel, 2004). Evidence from Malaysia's technology sector shows that while process and product changes drive most environmental performance gains, eco-organizational practices primarily enhance economic and social outcomes, becoming particularly valuable in turbulent markets for fostering communication, coordination, and employee buy-in (Ch'ng et al., 2021). Similarly, a strong green culture and organizational ambidexterity can energize green innovation, which in turn mediates the impact of eco-organizational practices on sustainability performance (Hafeez et al., 2024).

In Africa's context especially in weaker regulatory environments eco-organizational innovation also plays an important self-regulatory role, consistent with Institutional Theory's emphasis on legitimacy-seeking. Here, internal systems compensate for gaps in enforcement, signaling environmental responsibility to customers, suppliers, and policy actors (Delmas & Toffel, 2004; Lin & Sheu, 2012; Mady et al., 2022). Research on Egyptian manufacturing SMEs shows that internal factors such as strategic environmental orientation, organizational capabilities, and absorptive capacity are more decisive

for eco-innovation adoption than either regulatory pressure or green market demand. In such settings, eco-organizational and eco-process innovations, rather than eco-product changes, form the backbone of sustainable competitive advantage (Mady et al., 2022). Acting like an operating system, eco-organizational innovation accelerates idea flow, shortens time-to-implementation, and enables solution reuse across business units allowing eco-process and eco-product initiatives to deliver the bulk of environmental results while benefiting from a stable, capability-rich foundation (Nsiah et al., 2022; Xie et al., 2019).

Eco-marketing innovation

Eco-marketing innovation involves embedding environmental priorities into the marketing mix designing, pricing, promoting, and distributing products and services in ways that reduce ecological harm while enhancing market value (Maziriri, 2020; Nwagu, 2024). Common approaches include eco-labeling, recyclable packaging, targeted green advertising, and sustainable distribution systems (Majid, 2024). From a Resource-Based View (RBV) perspective, these capabilities help firms leverage unique, hard-to-imitate assets such as brand credibility, green know-how, and stakeholder trust to achieve sustained advantage (Barney, 1991; Munodawafa & Johl, 2019). Empirical evidence across regions shows that eco-marketing not only supports economic gains through differentiation and customer loyalty, but also stimulates green innovation by aligning market commitments with operational change (Nigatu et al., 2024). A meta-analysis confirms consistent positive effects across environmental, social, and economic dimensions, with particularly strong impacts on social performance such as reputation and community relations (Oduro, 2024).

In the African context, eco-marketing plays a distinctive role in overcoming institutional and market constraints. In Ethiopia's leather, textile, and garment industries, a green marketing orientation significantly improved both economic performance and green innovation, with innovation partially mediating this link (Nigatu et al., 2024). In Egypt's manufacturing SMEs, where environmental regulation is weaker, eco-marketing serves as a self-regulatory tool that enhances legitimacy and positions firms for emerging green demand especially when combined with eco-process and eco-organizational innovations (Mady et al., 2022). These findings suggest that in Africa, eco-marketing is most effective when embedded within an integrated eco-innovation strategy, where credible environmental claims are reinforced by tangible process and product improvements, amplifying their impact in resource-constrained and trust-sensitive markets.

Sustainable business performance

Climate change, environmental degradation, and rapid population growth have intensified concerns over the depletion of natural resources, prompting urgent calls for sustainable business practices. Stakeholders including governments, investors, customers, and communities, now expect firms not only to deliver profits but also to safeguard environmental integrity and promote social well-being (Comin et al., 2020; Dyllick & Muff, 2016; Larbi-Siaw et al., 2022). Historically, most businesses emphasized economic performance while treating environmental and social

dimensions as secondary priorities (Malesios et al., 2021). Over time, however, the concept of sustainable business performance (SBP) has emerged as a comprehensive framework requiring firms to integrate and balance economic, environmental, and social objectives (Afum, Agyabeng-Mensah, et al., 2020; Zheng & Iatridis, 2022). SBP is grounded in the principle that long-term value creation depends on minimizing negative impacts on the environment and society while achieving strong financial outcomes. It reflects the triple bottom line approach, where firms are evaluated not only on profitability but also on their contributions to ecological sustainability and social welfare (Edeigba & Arasanmi, 2022; Žak, 2015).

Economic performance (EP)

Focuses on a firm's ability to optimize financial results and maintain competitiveness over time. Common indicators include profitability, sales growth, return on assets, return on investment, and return on equity (Carballo-Penela et al., 2023; Wagner, 2010). In African contexts, EP also incorporates resource efficiency and inclusive economic participation, especially for SMEs operating in sectors where capital constraints and infrastructure challenges are prevalent (Suleman et al., 2024). Strong EP enables firms to reinvest in innovation, scale sustainable initiatives, and withstand market fluctuations.

Social performance (SP)

captures a firm's role in enhancing societal well-being. It includes employee welfare, fair labor practices, gender equity, workplace safety, customer satisfaction, and broader community engagement (Zhai et al., 2023; Zhu & Jin, 2023). In many African SMEs, SP practices are implemented informally but remain central to sustaining community trust and a license to operate. These practices can improve staff retention, foster consumer loyalty, and strengthen stakeholder relationships, all of which indirectly contribute to economic resilience (Agyabeng-Mensah et al., 2020; Maziriri, 2020).

Environmental performance (EnP)

Measures the extent to which a firm reduces its ecological footprint. This may involve lowering greenhouse gas emissions, minimizing waste, optimizing energy and water use, and preventing environmental incidents (Ali et al., 2023; Zhu & Jin, 2023). While many firms in Africa adopt incremental environmental improvements due to financial and infrastructural constraints, there is increasing evidence of proactive approaches, particularly in manufacturing and agriculture, where sustainability practices are linked to market access and regulatory compliance (Esangbedo et al., 2024).

Together, these three dimensions form an integrated SBP framework, where progress in one area can reinforce gains in others. For example, investments in cleaner production processes (EnP) can reduce operating costs (EP) and improve brand reputation (SP). Conversely, neglecting one dimension can undermine the overall sustainability agenda, such as when cost-cutting measures compromise environmental safeguards or worker welfare.

Eco-innovation and sustainable business performance

Eco-innovation contributes to SBP when it's treated as a portfolio of mutually reinforcing capabilities rather than a set of stand-alone projects. Anchored in RBV/NRBV, firms gain advantage when eco-oriented routines, skills, and assets are valuable, rare, and hard to imitate, and when they are continually recombined (dynamic capabilities) (Barney et al., 2021; Makhoulfi et al., 2022; Teece et al., 1997). From an Institutional Theory perspective, the adoption and configuration of these capabilities are also shaped by coercive pressures from regulators, normative influences from industry and professional networks, and mimetic tendencies to follow leading peers factors that influence how eco-innovation is prioritized and linked to performance outcomes across different contexts (DiMaggio & Powell, 1983; Delmas & Toffel, 2004). Empirically, interdependence across innovation types matters: in Taiwanese industry data, eco-organizational practices strengthen business performance directly and also work through eco-process and eco-product pathways (mediation), pointing to a system in which structures and culture enable cleaner operations and greener offerings (Cheng et al., 2014). Broad syntheses echo this integrative view: Oduro et al. (2022)'s systematic review shows growing evidence that portfolios blending organizational, process, and product changes deliver financial, environmental, and social gains, with management and strategy themes e.g. systems, culture, collaboration repeatedly flagged as the backbone of outcomes.

Across African contexts, links to SBP are evident but shaped by institutional realities. In Egyptian manufacturing SMEs, internal capabilities organizational and absorptive drive the adoption of eco-organizational and eco-process innovation, which in turn sustain competitive advantage more reliably than product changes alone in weakly regulated markets (Mady et al., 2022). In South Africa's agricultural sector, process-oriented innovations and external knowledge acquisition including precision agriculture and sensors are associated with improved environmental outcomes such as water stewardship and soil fertility environmental pillars that underpin longer-run competitiveness (Buchana, 2023). In Ghana's mining industry, green innovation mediates the effect of green HRM on SBP: it fully channels gains to environmental performance and partly to economic and social performance, highlighting innovation capability as the mechanism that turns green intent into results (Suleman et al., 2024). Results are not universally positive or immediate: evidence from FMCG multinationals in South-West Nigeria shows green product and marketing innovations support economic sustainability, while process and organizational changes can depress near-term economic metrics consistent with high upfront costs and implementation frictions (Nwagu, 2024). Outside Africa, barriers identified in Ecuador, limited financing for environmental R&D, weak university-industry ties, and coordination gaps explain why potential SBP gains sometimes stall (Michalski et al., 2023), whereas firms that elevate design and de-risk commercialization invest more and capture greater value from eco-innovations (Ghisetti & Montresor, 2019).

Synthesizing these strands, three cross-cutting points clarify how eco-innovation improves SBP without repeating type-specific effects. First, capability sequencing: organizational systems like EMS, green training, knowledge-sharing lay the groundwork; process changes deliver measurable environmental efficiencies; and eco-design translate gains to markets and stakeholders (Cheng et al., 2014; Oduro et al., 2022). Second, mediation and complements: HRM, learning, and external knowledge networks such

as universities, research bodies, suppliers are the conduits through which eco-innovation lifts SBP especially where formal regulation is weak and legitimacy must be built via self-regulation (Buchana, 2023; Mady et al., 2022; Suleman et al., 2024). Third, context contingencies: in resource-constrained African settings, payoffs depend on financing, skills, and collaboration infrastructure; short-run economic dips from process or organizational shifts are plausible, but portfolios that pair these with market-facing product or branding moves, and that leverage external knowledge and prudent design or commercialization support, show stronger, more balanced SBP trajectories (Ghisetti & Montresor, 2019; Michalski et al., 2023; Nwagu, 2024).

Research on eco-innovation and SBP in Africa is expanding but remains fragmented and largely synthesized, making it difficult to draw robust, generalizable conclusions. Most evidence is concentrated in a few sectors and innovation types, with limited comparative analysis across industries or countries. The pace and trajectory of the field's development in the region are also unclear. A systematic review is therefore warranted to consolidate findings, examine how different eco-innovation types relate to SBP, trace the evolution of research, and identify gaps that can inform future scholarship and policy. Addressing these gaps will provide a coherent synthesis of African evidence, clarify the linkages between eco-innovation and SBP, and establish a clear research agenda for both scholars and practitioners. To guide this synthesis, Table 1 defines the core constructs, lists representative studies, and identifies the theoretical frameworks most often applied in the literature.

Methodology

This review followed PRISMA 2020 (Page et al., 2021) and Tranfield et al. (2003). PRISMA guided transparent reporting and the sequence of identification, screening, eligibility, and inclusion, while Tranfield's three-stage model guided planning (protocol and criteria), conduct (searching, selection, and appraisal), and synthesis (theme development and reporting) (Denyer & Tranfield, 2009).

Review protocol and timeframe

We prepared a written protocol before data collection (Boell & Cecez-Kecmanovic, 2015). It specified the objectives, databases, search procedures, screening steps, inclusion and exclusion criteria, quality appraisal approach, and the thematic synthesis plan. We limited inclusion to studies published from 2000 to March 2024 to capture developments since Rennings (2000) and the recent surge in empirical work linking eco-innovation and sustainability in developing economies; this 24-year window also aligns with growing policy attention to green growth and sustainability transitions in Africa (UNEP, 2019; African Union, 2021). Final searches were completed in March 2024.

Database selection and justification

We searched Emerald Insight, EBSCOhost (relevant Business/Academic collections), ScienceDirect, Wiley Online Library, and SpringerLink. Google Scholar was used as a supplementary source to surface regionally indexed items not consistently covered

Table 1. Construct Definitions, Representative Articles, and Linked Theoretical Lenses.

Construct	Definition	Representative Articles	Linked Theoretical Lens
Sustainable Business Performance (SBP)	The ability to harmonize economic, environmental, and social objectives in the performance of a firm's core mandate to maximize long-term value.	Suleman et al. (2024); Obeng et al. (2023); Bindeeba et al., (2025)	TBL, RBV
Economic Performance (EP)	Concerned with a firm's profitability and financial outcomes, including indicators such as revenue growth, return on investment, and efficiency gains.	Nsiah et al. (2022); Chukwukadiba et al. (2023)	RBV
Environmental Performance (EnP)	A firm's ability to reduce environmental harm through its actions, products, and resource use, while complying with environmental standards and regulations.	Zhou et al. (2023); Suleman et al. (2024)	TBL
Social Performance (SP)	The firm's engagement in activities that promote social well-being, such as employee welfare, community development, and social equity.	Suleman et al. (2024); Masocha (2018)	TBL, Institutional Theory
Eco-Innovation (EI)	New or improved processes, organizational forms, products, and technologies that create firm value while minimizing negative environmental impacts.	Rennings (2000); Klewitz and Hansen (2014); Bonsu et al. (2024)	RBV, Institutional Theory, TBL
Eco-Process Innovation	Environmentally friendly changes in production systems, operations, or methods to improve environmental outcomes.	Oduro (2024); Klewitz and Hansen (2014)	RBV
Eco-Product Innovation	Enhancing products with eco-friendly features, recyclable materials, and cleaner production techniques to reduce ecological impact.	Afum, Agyabeng-Mensah, et al. (2020); Chege and Wang (2020)	RBV, TBL
Eco-Organizational Innovation	Adoption of novel organizational practices or management systems that support ecological goals and sustainability objectives.	Oduro (2024); Klewitz and Hansen (2014); Mady et al. (2022)	RBV, Institutional Theory
Eco-Marketing Innovation	Efforts to design, promote, and distribute products in ways that communicate environmental value and appeal to sustainability-oriented consumers.	Oduro (2024)	Institutional Theory, TBL
Digital Eco-Innovation (emerging)	Use of digital technologies (e.g. IoT, AI, blockchain) to enable eco-friendly processes, resource efficiency, and transparent sustainability reporting.	Bonsu et al. (2024); Esangbedo et al. (2024)	RBV, Dynamic Capabilities
Circular Eco-Innovation (emerging)	Innovation aimed at closing resource loops through reuse, remanufacturing, recycling, and regenerative design.	Oduro (2024); Esangbedo et al. (2024)	TBL, Circular Economy Theory

elsewhere; only peer-reviewed journal articles were eligible. Together, these sources offer strong coverage of management, innovation, sustainability, and African business journals, and using multiple databases helps reduce publication bias (vom Brocke et al., 2009; Okoli & Schabram, 2010).

Search Strategy and Sample search string

We used a structured search with Boolean operators aligned to three themes eco-innovation, SBP, and the African context running queries across title, abstract, and keyword fields and limiting results to peer-reviewed, English-language journal articles published from 2000 to March 2024. A generic string applied across databases was: (“eco-innovation” OR “green innovation” OR “ecological innovation” OR “environmental innovation”) AND (“sustainable business performance” OR “sustainability performance”

OR “economic performance” OR “social performance” OR “environmental performance”) AND (“Africa” OR “Sub-Saharan Africa” OR “East Africa” OR “West Africa” OR “North Africa” OR “Southern Africa”). We adapted the syntax to each database, documented the full strings, screened reference lists of included papers to catch omissions, and completed the final searches in March 2024, following recommended practice for transparent and replicable search protocols (Kitchenham, 2004).

Eligibility and quality assessment

We included empirical, peer-reviewed studies conducted in or explicitly focused on Africa that examined at least one type of eco-innovation (product, process, organizational, or marketing), reported at least one SBP dimension (economic, environmental, or social), and were published in English between 2000 and March 2024; we excluded conceptual papers without data, studies conducted entirely outside Africa, and articles lacking an explicit eco-innovation – SBP link. Methodological quality was assessed with the Critical Appraisal Skills Programme (CASP, 2018) checklists across five domains: clarity of aims, appropriateness of design, sampling, rigor of analysis, and transparency of reporting. To operationalize CASP for selection, we applied a simple yes/no rubric with a 6/10 inclusion threshold (CASP does not prescribe numeric scoring); all ratings were recorded in a review matrix to support consistent decisions and enable comparison across studies.

Screening process and inter-coder reliability

We used a two-stage screening process to reduce bias and ensure consistency (see PRISMA 2020 flow diagram, Figure 1). We identified 182 records and removed 62 duplicates, leaving 120 for title and abstract screening, where 69 were excluded. We assessed 51 full texts against the eligibility criteria and the CASP threshold, excluding 37 (no empirical data, outside Africa, or no eco-innovation – SBP link), for a final sample of 14 studies. This sample size is comparable to other systematic reviews and meta-analyses in related domains, such as Melo et al. (2020), which reviewed 19 studies on design for reverse logistics; Öztürk et al. (2024), which conducted a meta-analysis of 23 studies on green entrepreneurial orientation and sustainable firm performance; and Kuzma et al. (2020), which synthesized 15 studies on the relationship between innovation and sustainability performance. Two reviewers screened independently and resolved disagreements by discussion to consensus; no third-party adjudication was required. Inter-coder reliability for full-text decisions was Cohen’s $\kappa = 0.81$, indicating substantial agreement (Landis & Koch, 1977).

Data extraction and thematic synthesis

We used a structured template to extract author, year, country or region, sector, eco-innovation type(s), theory, SBP dimensions, study design, sample, and key findings from each included study. The synthesis followed a hybrid thematic approach: deductive coding drew on established frameworks (e.g. Kemp & Pearson, 2008; Rennings, 2000), while inductive coding captured context-specific themes emerging from the African

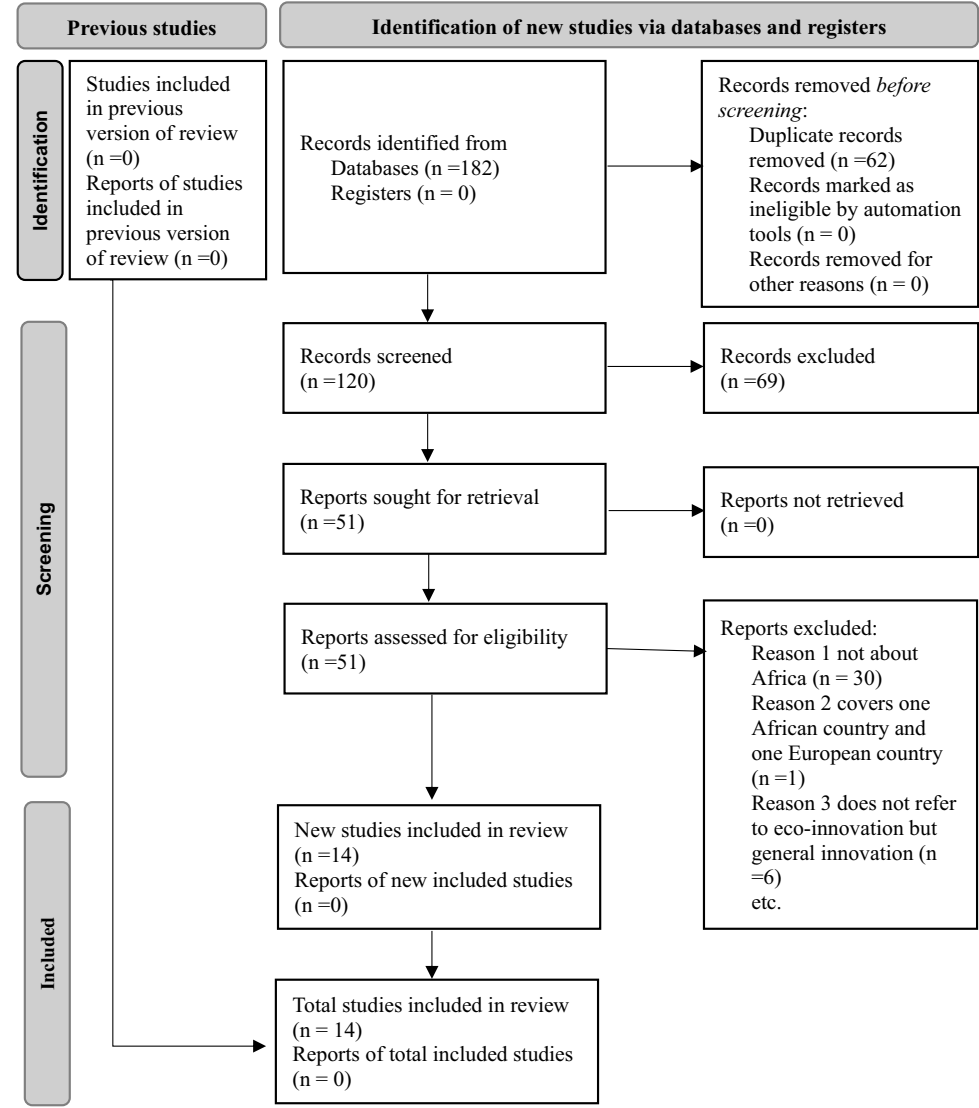


Figure 1. PRISM flow diagram of study selection process.

evidence. Two reviewers iteratively refined the codebook, compared interpretations, and resolved differences by discussion, which strengthened consistency and analytical depth. This procedure aligns with guidance for thematic synthesis in multi-dimensional sustainability reviews (Thomas & Harden, 2008).

Country- and sector-level coverage

The final sample comprises 14 empirical studies from seven countries Ghana, Nigeria, South Africa, Ethiopia, Egypt, Tunisia, and Kenya reflecting a modest but diverse geographic spread. By sector, manufacturing dominates (8/14), consistent

Table 2. Journal Outlets.

Journal	Author
International Journal of Business, Technology, and Organizational Behavior	Nsiah et al. (2022),
Journal of Business-to-Business Marketing	Esangbedo et al. (2024)
Environmental Science and Pollution Research	Ben Amara and Chen (2020)
International Journal of Innovation Science	Mady et al. (2022)
Journal of Applied Accounting Research	Bonsu et al. (2024)
Sustainability	Frempong et al. (2021)
IIARD International Journal of Economics and Business Management	Nwagu (2024)
Advance Journal of Business & Entrepreneurship Development	Chukwukadiba et al. (2023)
Business and Society Review	Obeng et al. (2023)
International Journal of Emerging Markets	Zhou et al. (2023)
Asia-Pacific Journal of Business Administration	Suleman et al. (2024)
Heliyon	Nigatu et al. (2024)
Innovation and Development	Buchana (2023)
International Journal of Education and Research	Nzomo et al. (2023)

with its clear environmental footprint and established measurement practices. The remaining studies cover agriculture (2/14), mining (1/14), services (1/14), and multinational or mixed-sector operations (2/14). This pattern shows where eco-innovation evidence is concentrated and where gaps persist, particularly outside manufacturing. A detailed country-by-sector breakdown appears in [Table 2](#) of the Results.

Results

Journal outlets

The reviewed studies were published across 14 different journals, with each journal contributing one paper, as shown in [Table 2](#). This reflects a relatively dispersed publication landscape, likely due to the emerging and interdisciplinary nature of eco-innovation research in Africa. Journals span fields such as business, innovation, sustainability, and organizational behavior, indicating growing scholarly interest from various domains. Notably, recent entries (2022–2024) dominate the list, signaling a surge in attention to eco-innovation and sustainable business in African contexts.

Publications trends

[Figure 2](#) shows a steady increase in publications on eco-innovation and sustainable business performance in Africa between 2020 and 2024. Only one study was published in each of 2020 and 2021, followed by two in 2022. This number rose sharply to five studies in both 2023 and 2024, indicating that over 70% of the reviewed papers were published in just the last two years. The trend reflects a growing academic interest in how eco-innovation contributes to sustainability goals within African business contexts. This shift may be driven by broader policy and development agendas such as the SDGs, AfCFTA, and the African Green Stimulus Programme. The data highlight a relatively new but expanding research focus, suggesting the field is gaining momentum and deserves further attention.

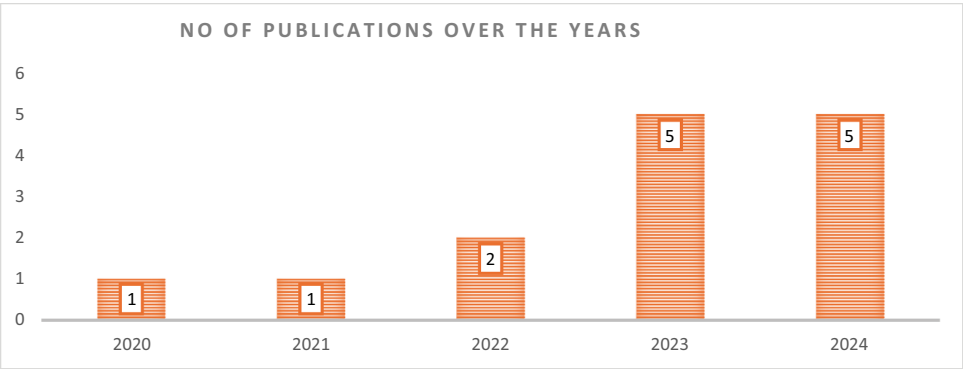


Figure 2. Publications Trends.

Table 3. Main Characteristics of Reviewed Studies.

Paper Content	Elements	No. of Studies	Contributing Papers
Theory	Resource-Based View (RBV)	9	Zhou et al. (2023); Nsiah et al. (2022); Bonsu et al. (2024); Suleman et al. (2024); Obeng et al. (2023); Esangbedo et al. (2024); Buchana (2023); Nzomo et al. (2023); Krubally et al. (2021)
	Dynamic Capability Theory	1	Mady et al. (2022)
	Modern Ecological Theory	1	Chukwukadiba et al. (2023)
	Stakeholder Theory	1	Frempong et al. (2021)
	Triple Bottom Line Theory	1	Nzomo et al. (2023)
	Porter Hypothesis	1	Ben Amara and Chen (2020)
	Schumpeterian Theory of Innovation and Entrepreneurship	1	Nwagu (2024)
	Continuous Improvement Theory	1	Nwagu (2024)
	Manufacturing	8	Zhou et al. (2023); Nsiah et al. (2022); Bonsu et al. (2024); Frempong et al. (2021); Mady et al. (2022); Obeng et al. (2023); Nigatu et al. (2024); Nzomo et al. (2023)
Industry Type	Agriculture	2	Ben Amara and Chen (2020); Buchana (2023)
	Services	1	Chukwukadiba et al. (2023)
	Mining	1	Suleman et al. (2024)
	Multinational Corporations	1	Nwagu (2024)
Research Design	Quantitative	12	Zhou et al. (2023); Nsiah et al. (2022); Nwagu (2024); Bonsu et al. (2024); Ben Amara and Chen (2020); Frempong et al. (2021); Suleman et al. (2024); Mady et al. (2022); Obeng et al. (2023); Esangbedo et al. (2024); Nigatu et al. (2024); Nzomo et al. (2023)
Country	Mixed Methods	2	Buchana (2023); Chukwukadiba et al. (2023)
	Ghana	4	Bonsu et al. (2024); Frempong et al. (2021); Suleman et al. (2024); Obeng et al. (2023)
	Nigeria	3	Chukwukadiba et al. (2023); Esangbedo et al. (2024); Nwagu (2024)
	South Africa	2	Nsiah et al. (2022); Buchana (2023)
	Ethiopia	2	Zhou et al. (2023); Nigatu et al. (2024)
	Tunisia	1	Ben Amara and Chen (2020)
	Egypt	1	Mady et al. (2022)
	Kenya	1	Nzomo et al. (2023)

Characteristics of studies' contents

As summarized in Table 3, most of the reviewed studies (9 out of 14) applied the Resource-Based View (RBV) to explore the relationship between eco-innovation and sustainable business performance. This heavy reliance on RBV reflects a strong interest in internal firm capabilities as drivers of innovation and performance outcomes (Nsiah et al., 2022; Nzomo et al., 2023). However, other theoretical perspectives, such as Dynamic Capabilities, Stakeholder Theory, the Triple Bottom Line, Modern Ecological Theory, and the Porter Hypothesis, were each used only once. This limited theoretical diversity suggests that external, institutional, or ecological drivers of eco-innovation remain underexplored, narrowing the scope of explanation for how sustainability outcomes emerge in different African contexts.

Sector-wise, 8 of the 14 studies focused on manufacturing, likely due to the sector's clear environmental footprint and structured production processes. Agriculture was addressed in only two studies, while services, mining, and multinational corporations were each represented by one. This imbalance points to a gap in understanding eco-innovation in sectors central to African economies, especially agriculture and services. Methodologically, 12 studies employed quantitative designs, often focusing on measurable economic and environmental outcomes. Only two studies used mixed methods, revealing a limited engagement with qualitative or context-sensitive insights that might explain underlying motivations, challenges, or pathways of eco-innovation adoption.

Geographically, the studies spanned only seven countries, mostly concentrated in Ghana, Nigeria, and South Africa. East and Central Africa were largely absent, despite their growing involvement in sustainability and industrial policy reforms. This regional concentration raises concerns about the generalizability of findings and highlights the need for broader empirical coverage. While most studies reported positive links between eco-innovation and performance outcomes, few critically examined contradictory findings or explored when, where, and why eco-innovation may fall short, an important gap for future research to address.

Disaggregation of eco-innovation and performance dimensions

As shown in Figure 3, many of the reviewed studies assess eco-innovation and sustainable business performance in broad terms, often without disaggregating specific types of innovation or performance dimensions. This includes work by (Esangbedo et al., 2024; Frempong et al., 2021; Obeng et al., 2023; Suleman et al., 2024), where eco-innovation is treated as a single, unified construct. While such studies are useful for understanding general trends, they tend to obscure the distinctive pathways through which different innovation strategies, such as eco-product, eco-process, eco-organizational, or eco-marketing, may influence particular sustainability outcomes.

Within the disaggregated studies, eco-product and eco-process innovations dominate empirical focus. These forms are commonly linked to economic performance outcomes, especially revenue growth, cost efficiency, and productivity gains (Buchana, 2023; Chukwukadiba et al., 2023; Mady et al., 2022; Nsiah et al., 2022). By contrast, studies assessing the environmental implications of these innovations, such as reduced emissions or improved resource use, are fewer, and the social dimension is almost entirely

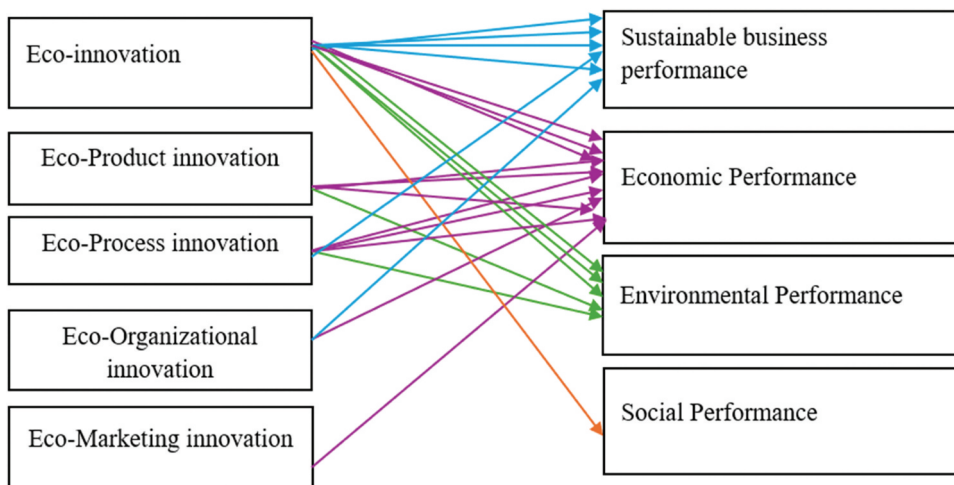


Figure 3. Summary of the utilized concepts and relationships between eco-innovation and sustainable business performance from the reviewed studies.

overlooked. Suleman et al. (2024) stands out as one of the few that explicitly examine how eco-innovation contributes to social outcomes, including employee well-being and community engagement.

This uneven coverage reveals two core gaps. First, eco-organizational and eco-marketing innovations remain understudied, despite their potential to influence internal governance structures and consumer behavior. Second, the neglect of social performance limits the scope of sustainability assessment. As a result, the literature offers only a partial view of eco-innovation's role in promoting inclusive, holistic development. A more balanced research agenda is needed, one that broadens both the forms of innovation studied and the sustainability outcomes considered, especially within African economies navigating complex social and environmental challenges.

Empirical effects of eco-innovation on sustainability outcomes

The reviewed evidence suggests that eco-innovation generally supports positive sustainability outcomes among firms in Africa. Studies from Ghana, Nigeria, and Tunisia consistently report that adopting eco-innovative practices correlates with improved environmental stewardship, financial outcomes, and in rare cases social impact (Ben Amara & Chen, 2020; Esangbedo et al., 2024; Frempong et al., 2021; Obeng et al., 2023). Common benefits include improved resource efficiency, reduced environmental harm, better stakeholder engagement, and reputational gains. These effects are especially prominent where firms receive external policy support or embed sustainability in their strategic planning.

When disaggregated by innovation type and performance dimension, the effects become more varied. Eco-process innovations, aimed at enhancing production efficiency and minimizing waste, are linked to improved sustainability in some contexts (Chukwukadiba et al., 2023; Mady et al., 2022). However, in countries like South Africa and Nigeria, studies

Table 4. Reported Effects of Eco-Innovation Types on Dimensions of Sustainable Business Performance in Africa.

	Sustainable business performance			Social Performance	
		Environmental performance	Economic Performance		
Eco-innovation	Positive relationship Suleman et al. (2024), Esangbedo et al. (2024), Ben Amara and Chen (2020), Frempong et al. (2021), Obeng et al. (2023)	Positive relationship Suleman et al. (2024), Bonsu et al. (2024), Zhou et al. (2023),	Positive relationship Suleman et al. (2024), Nigatu et al. (2024),	Positive relationship Suleman et al. (2024),	Positive relationship Suleman et al. (2024)
Eco-Process innovation	Positive relationship Mady et al. (2022), Chukwukadiba et al. (2023)		Negative relationship Nsiah et al. (2022), Nwagu (2024)		
Eco-product innovation	Positive relationship Chukwukadiba et al. (2023)		Positive relationship Nwagu (2024)		
			Negative relationship Nsiah et al. (2022), Buchana (2023)		
Eco-organizational innovation	Positive relationship Mady et al. (2022)		Negative relationship Nsiah et al. (2022), Nwagu (2024)		
Eco-marketing innovation			Positive relationship Nwagu (2024)		

report that the high cost of implementing these innovations can undermine short-term economic performance (Nsiah et al., 2022; Nwagu, 2024). Similarly, while eco-product innovation shows promise in terms of market differentiation and revenue generation (Nwagu, 2024), other studies document increased production costs that diminish profitability (Buchana, 2023; Nsiah et al., 2022), especially for smaller firms with limited capital.

Eco-organizational and eco-marketing innovations show a similarly mixed pattern. Mady et al. (2022) report positive impacts of eco-organizational innovation on overall sustainability among Egyptian SMEs, while Nsiah et al. (2022) and Nwagu (2024) note negative economic outcomes in larger or multinational firms. On the other hand, eco-marketing innovation appears to enhance economic performance by improving brand loyalty and customer engagement, although the number of studies in this area remains limited (Nwagu, 2024) (Table 4).

Research gaps and future directions on eco-innovation and sustainability in Africa

Recent scholarship on eco-innovation and sustainable business performance in Africa points to several important directions for future research. One major gap lies in the geographic concentration of existing studies, which tend to focus heavily on countries like Ghana, Nigeria, and South Africa. Scholars including Bonsu et al. (2024), Nsiah et al. (2022), and Obeng et al. (2023) stress the need to broaden coverage across the continent to reflect Africa's diverse institutional and policy contexts. Cross-country comparative studies, as recommended by Zhou et al. (2023) and Chukwukadiba et al. (2023), would support stronger generalization and shed light on how local regulatory environments and governance structures shape eco-innovation outcomes.

A second research gap concerns the limited sectoral coverage. Most studies emphasize manufacturing, with minimal attention given to other key sectors like agriculture, banking, hospitality, and transport. As highlighted by Frempong et al. (2021), Nzomo et al. (2023), and Buchana (2023), this narrow focus overlooks sector-specific dynamics that may significantly influence how eco-innovation is adopted and sustained. Expanding the scope to underexplored industries can uncover unique opportunities and constraints that inform more targeted interventions. Scholars such as Mady et al. (2022) and Esangbedo et al. (2024) further suggest examining the role of institutional settings in shaping eco-innovation across various service and informal sectors.

Finally, researchers are increasingly calling for deeper conceptual and methodological approaches. Several studies have proposed examining mediators and moderators, such as green financing, environmental beliefs, leadership style, and organizational learning, that may influence the link between eco-innovation and sustainability outcomes (Nigatu et al., 2024; Nwagu, 2024; Obeng et al., 2023). Methodologically, there is a strong push to move beyond cross-sectional surveys. Scholars like Suleman et al. (2024) and Bonsu et al. (2024) advocate for longitudinal, experimental, and mixed-method research to better capture causal relationships and contextual factors that shape eco-innovation's impact over time. Table 5 summarizes these thematic research directions and the contributing studies.

Table 5. Thematic Directions for Future Research on Eco-Innovation and Sustainable Business Performance in Africa.

Theme	Elaboration	Contributing Authors
1. Expanding Sectoral and Geographic Scope	Most studies focus on manufacturing and a few African countries. Future research should explore underrepresented sectors (e.g. agriculture, services, banking, hospitality, transport) and conduct comparative studies across other regions to enhance generalizability.	Chukwukadiba et al. (2023); Buchana (2023); Nsiah et al. (2022); Frempong et al. (2021); Nzomo et al. (2023); Esangbedo et al. (2024); Obeng et al. (2023); Mady et al. (2022)
2. Social and Integrated Sustainability Outcomes	Research often prioritizes economic and environmental performance. More work is needed on the social dimension and studies that assess all three ESG pillars holistically.	Nigatu et al. (2024); Nsiah et al. (2022); Suleman et al. (2024)
3. Moderators and Mediators of Eco-Innovation Outcomes	Future studies should explore how green leadership, environmental beliefs, organizational learning, and financing mechanisms mediate or moderate eco-innovation's impact.	Nigatu et al. (2024); Zhou et al. (2023); Bonsu et al. (2024); Nsiah et al. (2022); Esangbedo et al. (2024)
4. Methodological Expansion and Design Rigor	Most studies use cross-sectional quantitative designs. Researchers should incorporate longitudinal, experimental, or mixed-method designs to capture causal and dynamic processes.	Suleman et al. (2024); Bonsu et al. (2024); Obeng et al. (2023); Frempong et al. (2021); Mady et al. (2022)
5. Institutional and Regulatory Influences	The role of policy, regulatory environments, and institutional contexts in enabling or hindering eco-innovation remains underexplored.	Buchana (2023); Esangbedo et al. (2024); Nzomo et al. (2023)
6. Multi-Level and Comparative Analyses	Comparative and multi-level studies (e.g. SME vs. MNC, sectoral differences, cross-country designs) are needed to unpack contextual variation.	Zhou et al. (2023); Mady et al. (2022); Obeng et al. (2023)

Discussion

This review examined how, when, and for whom eco-innovation enhances sustainable business performance (SBP) in Africa. The overall picture is encouraging: eleven of the fourteen empirical studies report at least one statistically significant, positive association between a green practice and an environmental, economic, or social outcome, in line with global meta-evidence on a moderate but real payoff (Oduro, 2024; Zheng & Iatridis, 2022). At the same time, the evidence is early-stage, concentrated in a few countries and sectors, dominated by a single theoretical lens, and largely cross-sectional, which limits what we can claim about causality and context.

A clear takeaway is that eco-innovation is seldom wasteful. Composite indices that bundle multiple green practices tend to correlate with stronger SBP (Amara & Chen, 2020; Frempong et al., 2021; Obeng et al., 2023; Suleman et al., 2024; Esangbedo et al., 2024; Ben). Environmental gains are the most consistent, especially where firms cut energy, water, or material use. Social benefits such as safer workplaces, stronger community ties, and higher customer satisfaction appear regularly when measured, echoing evidence that eco-innovation often links more strongly to “soft” outcomes than to profit (Oduro, 2024). Economic effects are mixed and sometimes negative for SMEs facing high upfront costs and weak demand for green products. These contrasts reinforce the need to disaggregate both innovation types and SBP dimensions.

Across typologies, eco-process innovation dominates and shows the clearest environmental improvements. Cleaner boilers, closed-loop water systems, and energy management tools are reducing emissions in Egypt and Nigeria (Chukwukadiba et al., 2023; Mady et al., 2022). Two studies also note short-term profit dips due to long payback periods for efficiency investments (Nsiah et al., 2022; Nwagu, 2024). Similar patterns in European SMEs (López Pérez et al., 2024) point to the value of concessional loans, energy-efficiency grants, and accelerated depreciation to shift the economics for African adopters. Evidence on eco-product innovation is mixed. In Nigeria, green-labeled beverages and textiles can attract price premiums (Nwagu, 2024), while in South African agro-processing, certification fees and low willingness to pay can erode margins (Nsiah et al., 2022). Moderator tests in Oduro (2024) suggest that demand conditions, cultural preferences, and export-standard compliance shape performance, underscoring the need for Africa-based work that segments customers and trade profiles.

Eco-organizational innovation, including EMS certification, environmental training, and green leadership, yields the widest spread of outcomes. These practices support competitive advantage in Egypt (Mady et al., 2022) yet appear to weaken profitability in some South African and Nigerian samples (Nsiah et al., 2022; Nwagu, 2024). Firm size likely moderates these effects: fixed costs are harder for SMEs to absorb, whereas larger firms may recover costs through reputation and supply-chain access. These patterns fit a dynamic capabilities view, although that framework is underused in Africa-focused SBP research. Eco-marketing innovation is scarcely covered; one Nigerian study links green branding to loyalty and revenue (Nwagu, 2024). Given modest capital needs and the rise of digital commerce, this is an obvious research opportunity.

Theoretical coverage is narrow. Nine of fourteen papers rely on the resource-based view (RBV), which usefully highlights intangible assets and routines in capital-constrained settings (Oduro, 2024). RBV, however, underplays external conditions that are salient in African markets. Institutional theory can explain how policy volatility, informal practices, and regulatory capacity shape adoption and returns. Stakeholder theory can illuminate social performance, including pressure from workers, communities, buyers, and civil society. Dynamic capabilities can capture how firms sense, seize, and reconfigure in response to shocks such as currency swings or extreme weather. Such integration is common outside Africa (Munodawafa & Johl, 2019) but rare in this literature; using it here would likely yield richer explanations.

Sector and geography also skew the evidence. Manufacturing prevails, which is understandable given measurable footprints and clearer sampling frames. Yet agriculture, tourism, logistics, construction, and digital services employ large workforces and face material environmental risks. Precision input use, regenerative practices, and solar-powered cold chains in agriculture, or credible eco-certification in tourism, are strong candidates for study and policy support. Geographically, Ghana, Nigeria, and South Africa dominate. Countries with active sustainability policies, including Kenya, Rwanda, Ethiopia, and Morocco, are thinly covered. Multi-country designs could test how institutional differences influence uptake and returns, for example whether stricter waste rules or clean-energy incentives shorten payback on process upgrades.

Methods need to match the research questions. Twelve of the fourteen studies use single-wave surveys, which are fine for correlation but weak on timing and causality, even though many benefits unfold over years through cost savings, reputation, and supply-

chain diffusion. Longitudinal panels and quasi-experiments, such as difference-in-differences around policy shifts like South Africa's 2019 carbon tax, would help. Qualitative case studies can unpack how practices stick inside firms and communities. Measurement also needs work. Social performance is often captured with generic items that miss African priorities such as gender inclusion, youth employment, and livelihood resilience. Drawing on social enterprise and development research would support sharper, context-relevant metrics.

The few negative economic effects reported, mostly for eco-process and eco-organizational changes, underscore the importance of boundary conditions. Likely moderators include firm size, export orientation, access to finance, input prices, and policy settings. Mediators may include green leadership, workforce engagement, and supply-chain partnerships. A process upgrade, for instance, may only pay if paired with brand communication that customers value, or if leadership aligns staff and suppliers around the change. Moderated-mediation models, as suggested by Nigatu et al. (2024), could clarify these pathways.

Policy should move from barrier removal to market shaping. Tax breaks and faster approvals help but are not sufficient. Green public procurement can create steady demand for eco-labeled goods. Blended finance and partial credit guarantees can improve the risk-return for investors, while accelerated depreciation can lower the cost of clean equipment. Innovation hubs in special economic zones can offer shared testing, LCA services, and mentorship. Regulatory sandboxes can let SMEs pilot circular models with proportionate oversight. These ideas align with continental efforts such as the AfDB's Sustainable Energy Fund and the AU's Green Recovery Action Plan. Evaluating such tools with rigorous designs would build the evidence needed for smarter, targeted policy.

Implications

Practical implications

Managers should treat eco-innovation as a staged portfolio, not a one-off project. Start with low-cost eco-process "housekeeping" that pays quickly, such as energy audits, leak repairs, and waste segregation, then reinvest the savings. Lock in these gains with eco-organizational moves like ISO 14001, green KPIs, and regular staff training. Once operations improve, turn outcomes into revenue through eco-marketing that uses credible eco-labels and clear digital storytelling to win price premiums and loyalty. Because returns often arrive over several years, build multi-year business cases with explicit payback points. Track progress with a simple SBP dashboard that covers environmental, economic, and social metrics, for example kWh per unit, scrap rates, injury frequency, and customer Net Promoter Score.

SMEs can cut costs by acting together through shared certification schemes, pooled testing facilities, and joint procurement of efficient equipment, while blended finance tools such as credit guarantees and concessional loans help with upfront capital. Tailor strategies to the sector: manufacturers should focus on energy and water efficiency; agribusinesses on precision inputs and regenerative practices; tourism SMEs on pairing operational greening with credible eco-certification and targeted demand-side

marketing. Align early with buyer and export standards. The same routines that strengthen compliance, traceability systems, life-cycle assessment, and environmental management systems, also reduce rework and open access to higher-value supply chains, consistent with broader evidence of moderate but real performance payoffs (Oduro, 2024; Zheng & Iatridis, 2022).

Policy implications

The evidence points to the need for policymakers to move from simply removing barriers toward actively shaping ESG-oriented markets. Demand-side levers such as mandatory green public procurement, harmonized eco-labeling, and standardized disclosure frameworks, can create predictable markets that reward ESG-aligned goods and services. Finance mechanisms should be tailored to SME realities, including blended-finance facilities with partial credit guarantees, concessional loans for clean-technology retrofits, and accelerated depreciation or ESG-linked tax credits to shorten payback periods. Strengthening governance ecosystems is equally important. Regional ESG innovation hubs could provide shared life-cycle assessment services, compliance support, governance training, and buyer matchmaking. Regulatory sandboxes could allow SMEs to pilot circular-economy models under proportionate compliance requirements, with successful approaches scaled nationally.

At the regional level, harmonizing ESG-related standards under the AfCFTA would reduce certification duplication and lower transaction costs. Policymakers should prioritize high-impact sectors such as agriculture and tourism through targeted ESG programmes, for example, precision irrigation grants, sustainable lodge certification linked to destination marketing, and community benefit agreements. Robust monitoring, reporting, and verification (MRV) systems for public support programmes, combined with independent ESG performance evaluations, can ensure accountability and continuous learning. Taken together, these measures can accelerate eco-innovation adoption, embed ESG performance into African SMEs' competitive strategies, and strengthen their long-term contribution to the Sustainable Development Goals.

Conclusions

Eco-innovation in Africa is not simply a firm-level tactic; it is a strategic lever for advancing Agenda 2063 and the Sustainable Development Goals by linking cleaner growth with resilient livelihoods and access to emerging green value chains. The synthesis indicates consistent environmental and social gains, while economic outcomes remain context-dependent, underscoring the need for theoretical and methodological approaches that reflect Africa's institutional realities. The Resource-Based View should be complemented with Institutional Theory to account for regulatory and informal-norm constraints, Stakeholder Theory to capture legitimacy pressures from buyers, communities, and workers, and Dynamic Capabilities Theory to explain how firms adapt under conditions of volatility. Empirically, this calls for a shift from one-off cross-sectional surveys toward longitudinal and mixed-method designs capable of tracing learning curves, payback horizons, and causal pathways. On the policy front, governments and regional bodies should focus on de-risking adoption costs through blended

finance, targeted tax credits, and accelerated depreciation; stimulating market demand through green public procurement and harmonized standards and labels across Regional Economic Communities and the AfCFTA; and building capability ecosystems via innovation hubs, supplier upgrading programs, and targeted skills development, anchored in transparent and consistently enforced regulatory frameworks.

Limitations

This review has several limitations that temper interpretation. First, the evidence base is small and geographically concentrated (primarily Ghana, Nigeria, and South Africa), with sectoral bias toward manufacturing; findings may not generalize to agribusiness, tourism, services, or under-studied regions. Second, most studies are cross-sectional, rely on self-reported outcomes, and seldom address endogeneity, making causal inference weak and economic effects especially uncertain. Third, constructs are measured heterogeneously, eco-innovation types and social performance indicators vary widely, limiting comparability and meta-analytic synthesis. Fourth, publication and language bias likely exclude null results and non-English or gray literature, while firm samples often omit informal enterprises and micro-SMEs, introducing survivorship bias. Finally, short observation windows understate lagged payoffs, and few designs model contextual moderators (e.g. green finance access, energy prices, regulatory stringency). Future work should broaden sectoral and regional coverage, use longitudinal and quasi-experimental designs with audited performance data, standardize measurement, and explicitly test moderated – mediation mechanisms.

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Data availability statement

No new data were created or analyzed in this study

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