

Rewiring Accounting for Sustainable Value Creation under Geopolitical Uncertainty: Integrating ESG, Digital Innovation, and Ethical Governance at PT PP London Sumatra Indonesia Tbk

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ABSTRACT: Accounting is increasingly required to move beyond retrospective financial reporting toward an information architecture capable of supporting sustainable value creation. This qualitative literature review examines how environmental, social, and governance (ESG) integration, digital innovation, and ethical governance can transform accounting under conditions of geopolitical, regulatory, climatic, and market uncertainty. Drawing primarily on peer-reviewed journal literature published between 2020 and 2026, the study synthesizes developments in sustainability accounting, ESG performance, integrated reporting, assurance, accounting digitalization, geopolitical risk, and sustainable palm-oil governance. PT PP London Sumatra Indonesia Tbk (Lonsum) is employed as an embedded corporate case to contextualize the conceptual synthesis. Six interdependent transformation mechanisms emerge: multi-capital value measurement, geopolitical-risk integration, ESG-embedded management accounting, digital traceability and analytics, ethical governance and assurance, and resilience-oriented strategic control. The Lonsum case demonstrates important foundations in sustainability governance, certification, supply-chain traceability, climate-risk management, renewable-energy initiatives, and external assurance. However, further value can be created by connecting ESG indicators more directly with capital budgeting, financial forecasting, supplier economics, climate scenarios, and performance management. The paper develops a Sustainable Value Accounting Architecture explaining how ESG information, digital infrastructure, governance safeguards, and managerial capabilities can jointly strengthen resilience and long-term enterprise value.

KEYWORDS: sustainability accounting; ESG integration; sustainable value creation; geopolitical uncertainty; digital accounting; artificial intelligence; ethical governance; sustainability assurance; palm oil; Lonsum

JEL Classification: M41; M14; G34; O33; Q56

1. INTRODUCTION

1.1 The Changing Boundary of Accounting

The boundary of accounting is expanding. Conventional financial accounting remains indispensable for transaction recognition, stewardship, performance measurement, accountability, and the communication of financial position and results. Nevertheless, contemporary enterprises increasingly create and destroy value through processes that are only partially captured by traditional financial statements. Climate exposure, natural-resource dependence, labor conditions, human capital, biodiversity, stakeholder trust, supply-chain resilience, technological capability, and institutional legitimacy can materially influence an organization's future cash flows and strategic viability without immediately meeting conventional recognition criteria. Sustainability reporting and integrated reporting have consequently developed as attempts to broaden the information set available to managers, investors, regulators, employees, communities, and other stakeholders. The

economic consequences of sustainability reporting also depend on firm incentives, enforcement, and institutional complementarities rather than disclosure mandates alone (Miles and Ringham, 2020; Papoutsis and Sodhi, 2020; Eugster and Wagner, 2020; Christensen et al., 2021).

This transformation is not simply an expansion in the number of corporate disclosures. The more consequential development is the gradual movement from **reporting sustainable performance** toward **managing sustainable value**. Research on integrated reporting has emphasized connections among financial and non-financial value drivers, although evidence regarding the capital-market effects of integrated reporting remains contingent on implementation quality and organizational context. Voluntary adoption alone does not guarantee higher firm value, whereas more informative disclosure about intellectual and other strategic capitals can improve stakeholders' understanding of how value is generated over time (Wahl et al., 2020; Salvi et al., 2020). Accordingly, contemporary accounting must

increasingly explain not only how much profit has been earned, but also what organizational, ecological, technological, and relational capacities enable that profit to remain sustainable.

The concept of sustainable value also changes the temporal orientation of accounting. Financial statements are necessarily anchored in recognized past transactions and existing reporting periods. Sustainability management, however, requires information regarding future climate exposure, regulatory change, resource scarcity, transition costs, stakeholder expectations, and strategic opportunities. Integrated thinking therefore requires organizations to connect past performance with forward-looking assessments of the capitals, capabilities, and stakeholder relationships needed to continue creating value (Dameri and Ferrando, 2022; Steenkamp and Roberts, 2022).

This broader accounting role has become particularly important as ESG considerations influence investment, financing, innovation, reputation, and corporate valuation. Empirical research generally identifies meaningful relationships between ESG performance and financial outcomes, although these relationships are not universal and should not be interpreted as mechanically causal. Aydoğmuş et al. (2022) report positive relationships between aggregate ESG performance, firm value, and profitability, while Zhou et al. (2022) identify financial performance as an important pathway between ESG performance and market value. Yu and Xiao (2022) similarly document a positive relationship between ESG and firm value using an alternative ESG-scoring approach. These findings imply that ESG can become economically significant when sustainability capabilities reduce risks, strengthen stakeholder relationships, improve access to resources, and support operational adaptation.

1.2 Geopolitical Uncertainty as an Accounting Challenge

The need for transformed accounting is intensified by geopolitical uncertainty. Contemporary firms operate in an environment characterized by strategic rivalry, trade restrictions, sanctions, protectionism, supply-chain reconfiguration, resource nationalism, changing sustainability regulations, volatile energy and agricultural markets, and uncertainty regarding international cooperation. These conditions influence accounting through exchange rates, input costs, financing costs, inventory decisions, asset utilization, impairment risk, capital expenditure, revenue expectations, and market access. They also interact with ESG considerations because trade and regulatory systems increasingly attach environmental and social requirements to products and supply chains.

Recent empirical research demonstrates that geopolitical risk is relevant to corporate ESG behavior. Abdullah et al. (2024) find that geopolitical risk is, on average, negatively associated with firm-level ESG performance across a large multinational sample and identify investment, cash holdings, and the cost

of capital as relevant channels. Jiang et al. (2024) also report that global geopolitical risk can weaken corporate ESG performance through financing constraints and reduced competitiveness. Guo et al. (2024) show that broader environmental uncertainty can influence ESG performance and that the institutional roles of government and investors are important.

The relationship, however, is not uniformly negative. Geopolitical shocks can also motivate firms to strengthen ESG practices where sustainability acts as a source of legitimacy, stakeholder trust, strategic differentiation, or risk mitigation. Cheng et al. (2025) demonstrate that investor attention and government support can influence the relationship between geopolitical risk and ESG performance, while Erzurumlu et al. (2025) identify differentiated corporate ESG responses to political and geopolitical risk. Fiorillo et al. (2024) further show that stronger ESG performance can mitigate geopolitical-risk-related stock-price crash risk. These findings collectively imply that ESG can function either as discretionary expenditure vulnerable to cost cutting or as a resilience capability protected during periods of uncertainty. Which interpretation dominates depends substantially on whether ESG has been embedded into strategy, accounting, risk management, and capital allocation.

1.3 Why Palm Oil Provides a Critical Setting

Palm oil is particularly suitable for analyzing this accounting transformation because economic value in the sector is deeply connected with land, biological assets, weather, water, energy, fertilizer, forests, biodiversity, labor, smallholders, local communities, logistics, international markets, and regulatory legitimacy. Economic expansion has generated substantial income and employment, while also creating difficult environmental and social trade-offs. Purnomo et al. (2020) demonstrate that sustainable palm-oil development requires reconciliation between value-chain development and environmental conservation. Xin et al. (2022) similarly show that long-term palm-oil demand must be reconciled with forest and peatland protection.

Sustainability certification has therefore become a major governance mechanism. Non-state certification can improve practices, but independent smallholders may face technical, financial, and institutional constraints that make compliance difficult without external support (Apriani et al., 2020). Ernah et al. (2020) show that teaching sustainability standards to smallholders can generate economic and environmental benefits, although the effectiveness of implementation depends on the support model. Santika et al. (2021) demonstrate that palm-oil certification can influence village welfare and poverty outcomes but that impacts differ across livelihood contexts.

Palm-oil governance is also institutionally complex. Brandi (2021) shows that private and public standards such as RSPO

and ISPO have evolved through both competition and coordination. Choiruzzad et al. (2021) identify continuing ambiguities in Indonesian sustainability certification arising from regulatory and governance transformations. Putri et al. (2022) emphasize broader sustainability-policy challenges, whereas Grabs and Garrett (2023) demonstrate that ambitious private sustainability commitments can generate paradoxes when environmental, economic, and social objectives conflict.

At the same time, traceability is becoming increasingly important. Ramli et al. (2020) demonstrate the value of analytical technologies for verifying geographical origin and authenticity in sustainable palm-oil systems. International regulations that connect deforestation risk with market access further increase the economic importance of provenance and geolocation information (Gilbert, 2024). ESG transparency has therefore become potentially relevant not only to legitimacy but also to financing and firm valuation in the palm-oil sector (Chong and Loh, 2023).

1.4 The Lonsum Case

PT PP London Sumatra Indonesia Tbk provides an appropriate organizational case through which to interpret these developments. Lonsum is a long-established Indonesian plantation company with activities involving cultivation, harvesting, processing, agricultural research, and commodity production. Palm products represent its principal business exposure, placing the company at the intersection of commodity-market volatility, land-use governance, sustainability certification, climate risk, international market expectations, and supply-chain transparency.

The company's 2025 sustainability disclosures indicate an established sustainability-management infrastructure. Lonsum reports extensive estate-level ISPO certification, a stated commitment toward full certification, supply-chain traceability arrangements, environmental management, climate-related risk analysis, sustainability governance, and engagement with smallholders and suppliers. Its reporting architecture also reflects the increasing convergence of GRI-based sustainability reporting, climate-risk management, governance oversight, and external assurance (PT PP London Sumatra Indonesia Tbk, 2026a).

Lonsum therefore represents a valuable case not because it is assumed to have completed the accounting transformation described in this article, but because it possesses many of the institutional building blocks through which such a transformation could occur. The analytical question is how sustainability data, operational technology, accounting, enterprise risk management, governance, and assurance can be connected more systematically to support sustainable value creation.

1.5 Research Questions and Objectives

This article addresses seven research questions. Together, the questions connect accounting transformation with geopolitical exposure, ESG integration, digital capability, ethical governance, and the practical implications of these relationships for an emerging-market plantation company.

1. RQ1 asks: How is accounting evolving from conventional financial stewardship toward sustainable value measurement and management? This question establishes the conceptual basis for examining accounting as a forward-looking value-creation architecture.
2. RQ2 asks: How does geopolitical uncertainty alter the accounting and ESG information required by internationally exposed agribusiness firms? This question focuses attention on how external shocks change information needs, risk estimates, and the financial materiality of sustainability issues.
3. RQ3 asks: How can ESG variables be integrated into management accounting, capital allocation, risk management, and performance evaluation? This question addresses the internal decision processes through which sustainability information can influence resource allocation.
4. RQ4 asks: How can digital technologies strengthen the reliability, timeliness, traceability, and decision usefulness of sustainability information? This question examines digitalization as an information capability rather than as a stand-alone technological objective.
5. RQ5 asks: How can ethical governance and assurance reduce greenwashing, selective disclosure, data manipulation, and technological opacity? This question considers the institutional safeguards needed to make digitally enabled ESG information credible and accountable.
6. RQ6 asks: How do ESG integration, digital innovation, and ethical governance interact to strengthen resilience and sustainable value creation? This question examines complementarity among the three transformation pillars rather than treating them as independent initiatives.
7. RQ7 asks: What lessons can the Lonsum case provide for plantation and natural-resource-based businesses in emerging economies? This question translates the literature synthesis into organizational implications while recognizing the limitations of a public-disclosure-based case analysis.

The objectives are consequently to synthesize contemporary literature, construct an integrated accounting framework, interpret that framework using the Lonsum case, and identify theoretical and practical implications for sustainable value accounting. These objectives are designed to move the

analysis beyond disclosure toward the information, control, and governance mechanisms through which sustainability can influence long-term enterprise value.

2. LITERATURE REVIEW AND THEORETICAL FOUNDATIONS

2.1 From Sustainability Reporting to Sustainable Value Accounting

Sustainability reporting and sustainable value accounting are related but distinct. Sustainability reporting communicates environmental, social, and governance information to stakeholders. Sustainable value accounting goes further by embedding relevant sustainability information within systems for planning, costing, control, forecasting, investment appraisal, risk analysis, performance evaluation, and strategic decision-making.

This distinction is important because publication does not necessarily demonstrate integration. Papoutsis and Sodhi (2020) show that sustainability reports can contain information meaningfully associated with actual sustainability performance, yet the existence of informative disclosure does not guarantee that sustainability indicators determine internal resource allocation. Miles and Ringham (2020) likewise demonstrate that reporting boundaries can vary depending on organizational accountability and stakeholder considerations. A firm can therefore produce a technically sophisticated sustainability report while maintaining a largely conventional internal management-accounting system.

Sustainable value accounting requires organizations to consider multiple forms of capital. Financial and manufactured capital remain central, but enterprise viability can also depend on intellectual capital, human capabilities, social and relationship capital, and natural capital. Salvi et al. (2020) show that disclosure relating to intellectual capital can be value relevant. Eugster and Wagner (2020) similarly demonstrate the importance of connecting financial and non-financial value drivers in explaining value creation. From a managerial perspective, this suggests that the accounting system should track the resources and relationships that determine future performance even when not all of them qualify as recognized financial-statement assets.

Materiality is central to this transition. Machado et al. (2021) show that materiality assessments in sustainability reports frequently lack sufficient transparency, making it difficult to determine how topics were selected and prioritized. Jørgensen et al. (2022) highlight the tension between financial materiality and broader impact-oriented materiality, while Baumüller and Sopp (2022) show how double materiality expands the reporting lens to connect enterprise effects with corporate impacts. Abhayawansa (2022) cautions that competing materiality concepts can also create conceptual and implementation tensions. Under a narrow

financial-materiality approach, sustainability information is prioritized when it affects enterprise value, whereas an impact-oriented approach treats information as material when corporate activities significantly affect people or the environment. These perspectives may appear different, but over longer horizons they can converge because environmental degradation, unsafe work, community conflict, biodiversity loss, or opaque supply chains may become financially significant through litigation, regulation, market exclusion, disrupted operations, financing constraints, or reputational damage.

Dameri and Ferrando (2022) argue for a stakeholder-oriented conception of value creation that extends beyond a narrowly investor-focused interpretation. Steenkamp and Roberts (2022) demonstrate that advanced integrated-reporting organizations require internal processes to identify, communicate, collect, process, and govern information concerning material value-creation matters. Recent management-accounting scholarship similarly emphasizes the need to connect sustainability metrics with performance measurement, incentives, governance, and forward-looking decision processes (Cheng et al., 2023; Christ et al., 2024). Sustainable value accounting can therefore be understood as the management infrastructure that makes integrated thinking operational rather than merely communicative.

2.2 Disclosure Quality, Greenwashing, and Information Integrity

The growth of sustainability reporting introduces an information-quality problem. Greater disclosure does not automatically mean greater accountability. Sustainability information can be weakened through selective boundaries, non-comparable indicators, favorable baselines, omission of supply-chain impacts, insufficient explanation of methodologies, or an excessive emphasis on positive narratives.

Khan et al. (2021) distinguish between symbolic and substantive sustainability reporting and demonstrate how regulatory expectations and standardized reporting frameworks can influence reporting quality. Their findings are relevant beyond the banking context because they underscore the importance of assessing the quality and authenticity of sustainability disclosure rather than simply its presence.

This issue is particularly significant when ESG indicators are incorporated into executive incentives, investment products, credit decisions, or external ratings. Poor-quality data can generate a false impression of sustainability performance and can cause capital to be allocated on the basis of inaccurate information. Accounting's traditional strengths—definition discipline, evidence, reconciliation, internal control, documentation, and professional skepticism—therefore become increasingly important to the ESG domain.

A transformed accounting function should consequently treat ESG indicators as controlled management information rather than public-relations metrics. Each material indicator requires a documented definition, reporting boundary, responsible data owner, source system, frequency, calculation procedure, review control, and audit trail. Where estimates or models are used, assumptions should be documented and subjected to validation.

2.3 Sustainability Assurance as an Accountability Mechanism

Assurance is one mechanism for improving sustainability-information credibility. Farooq and de Villiers (2020) demonstrate that the scope of assurance engagements matters significantly. Narrow engagements may provide only limited credibility enhancement because assurance providers evaluate selected indicators rather than the broader reporting architecture. Ruiz-Barbadillo and Martínez-Ferrero (2020) show that national institutional conditions also shape the level of sustainability assurance.

The research base has expanded substantially. Hazaea et al. (2022) identify increasing scholarly attention to sustainability assurance while emphasizing unresolved questions concerning internal audit, governance, provider independence, and assurance quality. Oware and Mouly (2023) similarly show that sustainability assurance has become a rapidly developing research field, driven partly by stakeholder demand for reliable information.

Contemporary sustainability assurance also challenges traditional audit methodologies. Harrer and Lehner (2024) emphasize that auditors are increasingly asked to evaluate forward-looking sustainability risks and long-term claims that may be more uncertain than historical financial information. This creates the danger of what may be described as pseudo-assurance: a report appears verified even though the underlying sustainability constructs remain difficult to measure.

The Indonesian context illustrates additional implementation challenges. Kurniawan and Basuki (2024) identify issues in sustainability-report assurance practice relating to institutional development, stakeholder expectations, professional capability, and assurance practice. These challenges matter for companies such as Lonsum because external assurance is most valuable when it is supported by mature internal ESG controls.

Recent international evidence also suggests that assurance can affect organizational behavior. Gipper et al. (2025), examining ESG assurance in major US companies, show substantial growth in third-party assurance and find associations with improved ESG disclosure and institutional-investor participation. Assurance should therefore be interpreted not merely as verification after reporting, but as a possible catalyst for better internal measurement systems.

2.4 Ethical Governance and ESG Accountability

Governance determines how sustainability information is used. Agency theory suggests that managers may have incentives to emphasize favorable ESG narratives while obscuring poor performance or delaying costly corrective action. Stakeholder theory emphasizes accountability to parties whose interests are affected by corporate activity. Legitimacy theory explains why firms seek social approval through sustainability disclosure, while institutional theory helps explain convergence toward reporting standards, assurance practices, and certification systems.

The empirical literature supports the significance of governance characteristics. Arif et al. (2021) find that audit-committee attributes influence the quality and quantity of ESG disclosure. Songini et al. (2022) identify relationships between board characteristics and integrated-reporting quality. In Indonesia, Tjahjadi et al. (2021) demonstrate that corporate-governance characteristics are associated with different dimensions of economic, environmental, and social sustainability performance. Wu et al. (2023) further show that effective governance can mitigate the adverse effect of ESG controversies on firm value.

These findings imply that the governance pillar should not be treated merely as one-third of the ESG acronym. Governance is also the mechanism through which environmental and social commitments become credible. Board oversight, audit committees, enterprise risk management, internal audit, incentive design, codes of conduct, whistleblowing systems, assurance, and transparent decision processes determine whether ESG information affects actual behavior.

3. DIGITAL TRANSFORMATION OF ACCOUNTING AND ESG INFORMATION

3.1 Changing Accounting Roles

Digitalization changes the information-processing capacity of the accounting function. Möller et al. (2020) argue that digitalization can transform management accounting and control by changing data availability, business models, and the role of controllers. Andreassen (2020) finds that technology can move management accountants away from narrow data-production tasks toward broader analytical and business-partner roles.

Artificial intelligence strengthens this transition. Leitner-Hanetseder et al. (2021) show that AI-based accounting reallocates tasks among accountants, technologies, and other organizational actors. Evidence from auditing also indicates that AI can improve aspects of audit quality and efficiency, although adoption changes skill requirements and the organization of audit work (Fedyk et al., 2022). At the same time, AI introduces ethical issues involving opacity, bias, responsibility, privacy, and professional judgment that require explicit governance safeguards (Munoko et al., 2020). Routine processing therefore becomes increasingly

automated, while interpretation, judgment, communication, control design, and interdisciplinary problem solving become more important. For sustainability accounting, this transition is particularly significant because ESG information combines financial, operational, environmental, scientific, geographic, and social data.

Big-data analytics can also improve audit and control processes. De Santis and D'Onza (2021) demonstrate that data analytics is gradually gaining legitimacy in auditing, although adoption is constrained by standards, organizational readiness, and professional expectations. In ESG applications, analytics can test large datasets for unusual emissions patterns, supplier inconsistencies, duplicated certifications, abnormal energy consumption, unexpected changes in labor indicators, or unexplained land-use patterns.

3.2 Blockchain, Traceability, and Assurance

Blockchain has been extensively discussed as an accounting technology because of its potential to create distributed, verifiable, and difficult-to-alter records. Appelbaum and Nehmer (2020) identify important implications for auditing cloud-based blockchain accounting systems, emphasizing both potential efficiency gains and new control risks. Bakarich, Castonguay and O'Brien (2020) specifically connect blockchain with sustainability reporting and assurance, highlighting transparency, trust, and traceability. Research also cautions against technological determinism. Desplebin et al. (2021) show that blockchain can change accounting and auditing practices but does not eliminate the need for professional interpretation. Maffei et al. (2021) emphasize unresolved risks and institutional issues associated with blockchain adoption. Dyball and Seethamraju (2021) find that blockchain can alter audit-risk assessments and evidence strategies rather than simply reducing audit risk.

Systematic reviews reinforce this mixed interpretation. Lombardi et al. (2022) identify substantial potential for blockchain to disrupt auditing but also numerous unresolved questions. Garanina et al. (2022) show that blockchain research in accounting remains dominated by emerging conceptual and normative themes. Secinaro et al. (2022) document the multidisciplinary growth of blockchain research across accounting, auditing, and accountability, while Bellucci et al. (2022) identify implications for accounting practice, business models, supply chains, and audit design.

Pizzi et al. (2022) are particularly relevant to sustainability accounting because they examine blockchain as an infrastructure for sustainability reporting. Their work suggests that blockchain can reduce information asymmetry by strengthening evidence integrity. Nevertheless, a blockchain can only verify that data were recorded and preserved; it cannot independently establish whether the metric is conceptually appropriate or whether the original input was accurate. This is the classic “garbage in, garbage

out” problem in a more sophisticated technological environment.

3.3 Digital ESG Accounting as an Integrated Information System

The strongest potential for digital transformation therefore lies not in any single technology but in integrated architecture. IoT devices can collect physical data, geospatial technologies can identify locations and land-use patterns, enterprise resource planning systems can capture transactions, supplier platforms can maintain provenance information, and AI can identify patterns and forecast outcomes. Accounting can connect these data streams through common identifiers and controlled definitions.

For plantation companies, this architecture could integrate rainfall, soil conditions, crop age, harvesting volume, fertilizer use, energy consumption, GHG emissions, worker incidents, supplier origin, certification status, biodiversity indicators, transport, and financial performance. Digitalization would then make possible questions that conventional accounting systems cannot readily answer, such as the carbon intensity per tonne of CPO by estate, the economic value at risk from non-traceable supply, the return from climate-resilient planting material, or the relationship between supplier certification and procurement stability.

4. ESG PERFORMANCE, INNOVATION, AND SUSTAINABLE VALUE

ESG creates value through several pathways. One is risk reduction. Another is improved access to financial and human capital. A third is innovation. Long et al. (2023) show that stronger ESG performance can support green innovation, although the relationship varies by country characteristics and innovation capacity. Lian et al. (2023) similarly identify financing constraints and human capital as mechanisms linking ESG performance with green innovation.

At the corporate level, Zhang and Liu (2023) find that ESG performance improves green innovation among Chinese listed companies and identify financing and human-capital channels. Fu et al. (2023), using international evidence, also find a positive connection between ESG and green innovation. These results indicate that ESG may generate strategic value when sustainability strengthens access to knowledge, financing, talent, stakeholder support, or complementary technologies.

Digital transformation can reinforce this process. Dai and Zhu (2024) demonstrate that digital transformation strengthens the relationship between ESG performance and green innovation, while He (2024) finds that AI adoption and digital transformation can mediate the relationship between ESG performance and corporate innovation. Firm-level evidence also indicates that digital transformation can strengthen ESG performance through internal-control improvement and green innovation and can contribute to productivity through direct

and ESG-related channels (Lu et al., 2024; Ding et al., 2024). The broader implication is that ESG and digitalization should not be managed as separate transformation agendas. Environmental and social challenges generate information and innovation requirements that digital capabilities can address.

For palm-oil companies, this interaction is highly relevant. Digital monitoring can reduce pesticide use, improve fertilizer efficiency, strengthen fire prevention, optimize logistics, monitor supplier compliance, and improve traceability. Innovation generates sustainable value when these improvements simultaneously reduce environmental pressures and improve productivity, cost control, market access, or risk management.

5. METHOD

5.1 Qualitative Literature Review Design

This study employs a **qualitative literature review (QLR)** rather than a systematic literature review. The purpose is interpretive synthesis rather than exhaustive identification and statistical aggregation. A QLR is suitable because the research problem crosses multiple fields—accounting, ESG, governance, digital technology, geopolitical risk, assurance, agribusiness, and palm-oil sustainability—that use different theoretical traditions, methodological approaches, and outcome measures.

The review focuses principally on peer-reviewed journal articles published from 2020 onward. This temporal boundary was chosen to reflect contemporary developments in ESG integration, sustainability assurance, digital accounting, geopolitical risk, and post-2020 sustainability governance. The review does not claim that earlier foundational literature is unimportant; rather, established theories are interpreted through current research.

5.2 Literature Identification

Search concepts included combinations of sustainability accounting, sustainable value, integrated reporting, ESG performance, materiality, sustainability assurance, digital accounting, artificial intelligence accounting, blockchain accounting, ESG innovation, geopolitical risk, palm oil sustainability, ISPO, RSPO, traceability, smallholder certification, and sustainable supply chains. The literature base prioritized peer-reviewed work in reputable accounting, management, sustainability, finance, and environmental journals, with emphasis on studies published from 2020 onward.

Journal quality, conceptual relevance, methodological credibility, direct relevance to the research questions, and publication recency were used as selection principles. Citation chaining was employed where a contemporary article identified another recent study directly relevant to the conceptual synthesis.

Because this study is not an SLR, it does not employ PRISMA flow counts or claim comprehensive database coverage. The objective is theoretical saturation across the principal themes rather than exhaustive enumeration of all studies.

5.3 Thematic Analysis

The selected literature was organized into six thematic domains. The thematic structure was designed to preserve differences among the underlying research streams while enabling an interpretive synthesis around sustainable value creation.

The first theme examines the transition from financial reporting to sustainable value accounting; the second examines geopolitical risk and the changing materiality of ESG information; and the third focuses on ESG integration into management accounting and strategic control. The fourth theme addresses digital accounting, AI, analytics, and traceability; the fifth covers ethical governance, disclosure credibility, and assurance; and the sixth considers value-chain sustainability and resilience in the palm-oil sector.

The thematic findings were subsequently integrated into a conceptual Sustainable Value Accounting Architecture. This synthesis provides the analytical basis for the results, discussion, and organization-specific interpretation developed in the remainder of the article.

5.4 Embedded Corporate Case

The literature synthesis is contextualized through PT PP London Sumatra Indonesia Tbk. The case relies on publicly available corporate reporting, principally the company's 2025 Sustainability Report and 2025 Annual Report. The corporate case does not constitute a causal empirical test. It is used to identify how the theoretical components identified in the literature appear within an actual plantation company's sustainability, risk-management, governance, and reporting architecture.

6. RESULTS: THEMATIC FINDINGS

6.1 Theme 1 — Accounting Is Becoming a Sustainable Value Architecture

The first thematic finding is that accounting increasingly performs a connective rather than merely recording function. Sustainable value accounting connects environmental and social events with economic implications and strategic decisions. Its role is not to monetize every ecological or social phenomenon, which may be conceptually inappropriate, but to ensure that material sustainability effects become visible within organizational decision processes.

This requires a distinction between accounting **for reporting** and accounting **for management**. Reporting-oriented systems assemble data after events have occurred. Management-oriented sustainable accounting generates information early enough to influence behavior. For example, an annual GHG figure is useful for disclosure, but operational

decisions require more granular information concerning emissions sources, energy efficiency, process alternatives, investment costs, avoided emissions, and expected financial effects.

Integrated thinking therefore depends on internal accounting capabilities. Sustainable value information must move from sustainability departments into budgeting, procurement, engineering, plantation management, treasury, finance, enterprise risk management, internal audit, and executive decision processes. Contemporary sustainability management accounting research likewise emphasizes forward-looking, multi-issue information that supports organizational transformation rather than only retrospective disclosure (Cheng et al., 2023; Christ et al., 2024). When this occurs, ESG ceases to be a parallel reporting system and becomes part of how the business is managed.

6.2 Theme 2 — Geopolitical Uncertainty Changes ESG Materiality

The second finding is that materiality is dynamic. A sustainability issue considered peripheral under stable conditions can become financially critical after a regulatory, geopolitical, market, or climate shock. Deforestation-related traceability provides a clear example. When major markets

require evidence concerning land origin and deforestation risk, the value of geospatial and supplier data rises sharply. Information that once served mainly reputational objectives can become necessary for preserving market access.

The same applies to energy efficiency. Under low and stable energy prices, renewable-energy investment may appear primarily environmental. Under geopolitical disruptions affecting energy markets, the same investment can become a resilience mechanism. Fertilizer efficiency similarly becomes more valuable when international supply or prices are disrupted.

The implication is that sustainability materiality should not be assessed only annually for external reporting. Accounting and risk-management teams need continuous materiality monitoring capable of identifying how external shocks change the financial importance of ESG variables.

Figure 1 summarizes this transformation. External geopolitical, regulatory, climatic, and market pressures alter the information required by management. ESG integration defines which impacts and dependencies matter; digital innovation improves their visibility; and ethical governance determines whether the information is credible and responsibly used.

Figure 1. Accounting Transformation for Sustainable Value Creation under Geopolitical Uncertainty

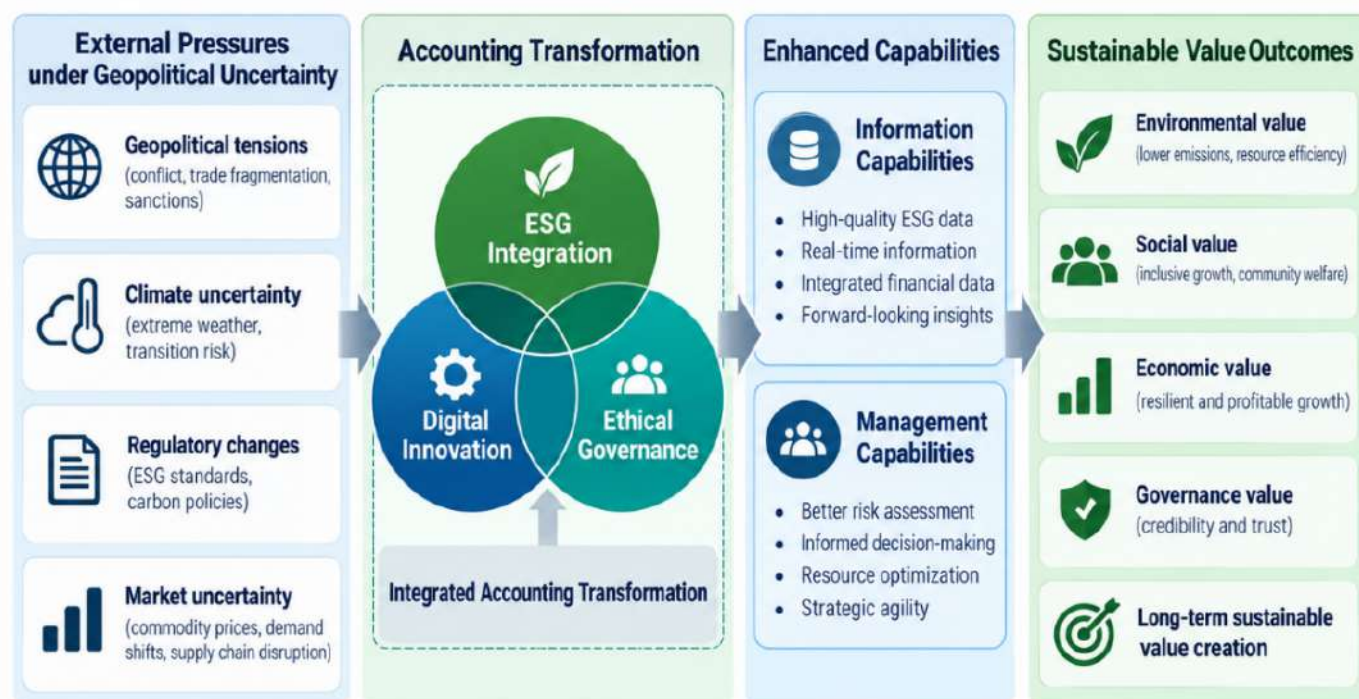


Figure 1. Accounting Transformation for Sustainable Value Creation under Geopolitical Uncertainty

Figure 1 emphasizes that accounting transformation is not synonymous with sustainability disclosure. The transformation is achieved when ESG information enters the decision infrastructure through which management allocates resources and responds to uncertainty.

6.3 Theme 3 — ESG Must Become Embedded in Management Accounting

The third finding concerns the movement from ESG disclosure to ESG-embedded management control. Studies linking ESG with financial performance and valuation demonstrate that sustainability can have economic consequences, but accounting is required to make those consequences visible within firm-level decisions (Aydoğmuş et al., 2022; Zhou et al., 2022; Yu and Xiao, 2022).

An ESG-embedded management-accounting system would connect environmental and social information to costs, margins, risks, investment decisions, and performance indicators. Examples for plantation businesses include energy cost per tonne of output, carbon intensity by mill, fertilizer efficiency per hectare, water risk by location, certification cost per supplier, traceability expenditure per tonne, occupational incident costs, and the expected financial effect of extreme weather.

Capital budgeting should similarly incorporate sustainability variables. A methane-capture installation may generate direct energy savings, reduce emissions, lower future regulatory exposure, and create potential carbon-related value. Conventional discounted-cash-flow analysis can remain the principal financial framework, but the cash flows and risk assumptions should incorporate material sustainability consequences.

The transformation also affects performance evaluation. Managers should not be rewarded merely for improving output if the improvement generates unsustainable environmental or social costs. Conversely, sustainability managers should not be evaluated using indicators disconnected from economic viability. Integrated performance management requires balanced indicators that capture productivity, cost, environmental efficiency, social outcomes, compliance, and risk reduction.

6.4 Theme 4 — Digital Technologies Expand Accounting Visibility

The fourth finding is that digital technologies can dramatically increase visibility across complex sustainability systems. Plantation businesses generate large quantities of physical information that historically remained disconnected from accounting. Remote sensing, drones, GIS platforms, IoT devices, meteorological data, ERP systems, mobile applications, and supplier databases can create an integrated operational evidence base.

Digital visibility, however, is only valuable when the underlying data architecture is governed with the same discipline applied to financial information. Data lineage, access rights, validation rules, model documentation, exception handling, and periodic reconciliation are necessary to prevent automated systems from scaling measurement errors or creating false precision. Audit and analytics research consequently suggests that technology should complement, rather than displace, professional skepticism and control design (De Santis and D'Onza, 2021; Feddyk et al., 2022; Munoko et al., 2020).

For plantation operations, this governance requirement extends from the enterprise system to field-level and supplier-level evidence. Geospatial records, remote-sensing outputs, supplier provenance data, certification status, and operating metrics should be linked through stable identifiers so that ESG indicators can be reconciled with financial and operational records. Such integration strengthens both traceability and decision usefulness while supporting more credible assurance of sustainability claims (Ramli et al., 2020; Pizzi et al., 2022; Lu et al., 2024).

Figure 2 illustrates the digital ESG accounting information chain. Data capture is only the first step; information must be validated, integrated, analyzed, used in decisions, assured, and ultimately subjected to stakeholder feedback.

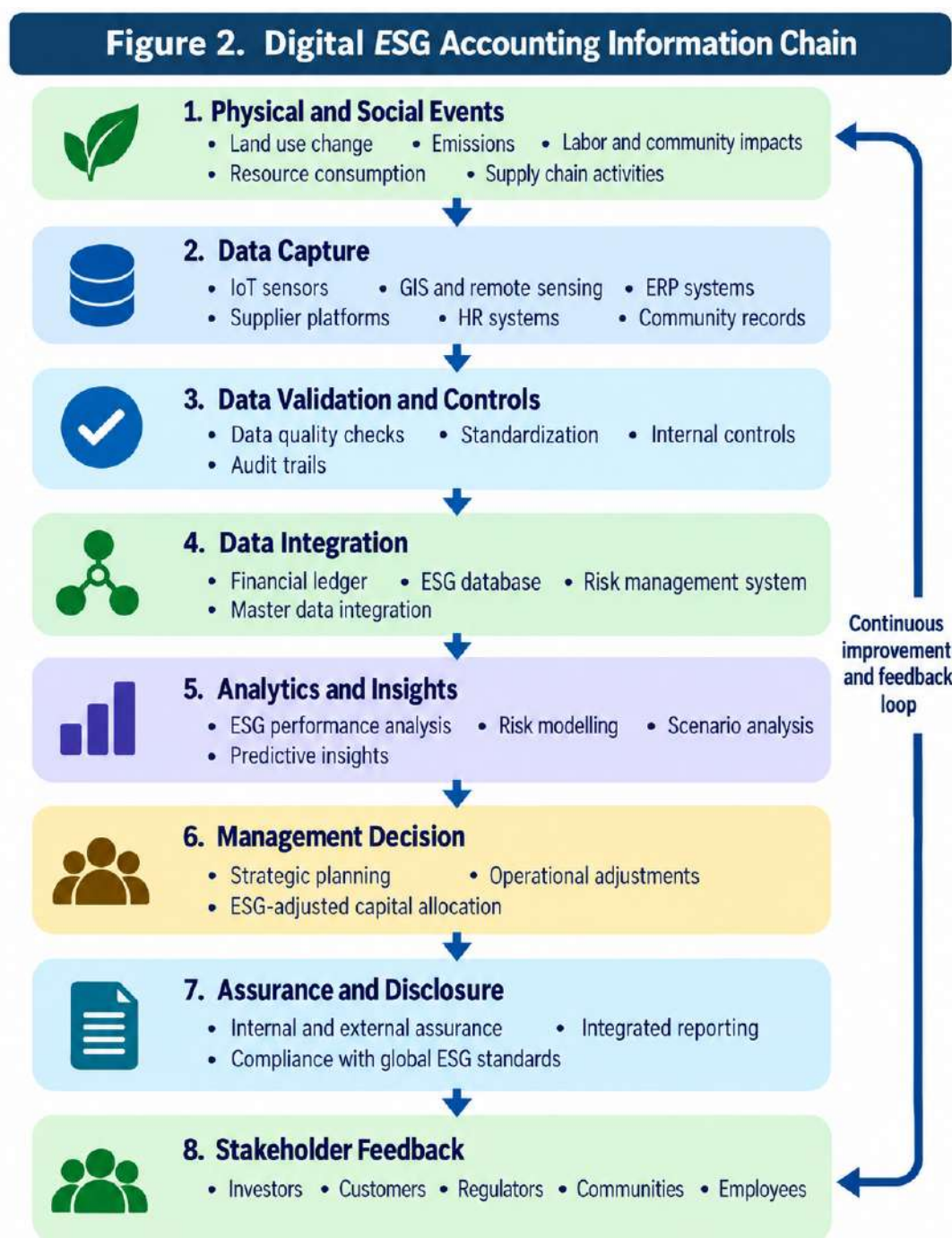


Figure 2. Digital ESG Accounting Information Chain

The significance of Figure 2 lies in its emphasis on controls. Digital sustainability data become accounting information only when definitions, responsibilities, reconciliation procedures, and audit trails are established. Without those mechanisms, real-time data can generate real-time misinformation.

6.5 Theme 5 — Ethical Governance Determines Credibility

The fifth theme is that technology does not eliminate governance problems; indeed, it can amplify them. Algorithms may reproduce biased assumptions, dashboards

may create false precision, and automated systems may obscure the origin of estimates. Research on AI in auditing similarly identifies ethical risks relating to transparency, responsibility, bias, privacy, and professional judgment, showing why technology adoption requires explicit governance safeguards (Munoko et al., 2020). Ethical governance therefore becomes more important as accounting becomes more digital.

Board oversight should ensure that material ESG risks are integrated with corporate strategy. Audit committees should understand the processes through which sustainability

information is generated. Internal audit should evaluate ESG controls. Executive incentives should avoid rewarding superficial indicators. Whistleblowing and grievance systems should be connected with governance reporting, while external assurance should focus on material indicators rather than only easily verifiable metrics.

The relationship among the three transformation pillars is represented in Figure 3. The figure emphasizes that ESG integration, digital innovation, and ethical governance are complementary capabilities whose value depends on their interaction rather than on isolated implementation.



Figure 3. ESG–Digital Innovation–Ethical Governance Triangle

ESG provides the substantive content of sustainability management, digital innovation provides the information infrastructure, and ethical governance provides accountability. Weakness in any one pillar can undermine the others because technologically sophisticated systems still require credible definitions, responsible incentives, and effective oversight. This interpretation is consistent with evidence that digitalization capabilities can reinforce ESG strategy and sustainability performance when they operate within supportive institutional and governance arrangements (Lu et al., 2024; Lee et al., 2024).

6.6 Theme 6 — Sustainable Palm Oil Requires Value-Chain Accounting

The final thematic finding is that sustainability accounting must increasingly extend beyond legal organizational boundaries. Palm-oil companies depend on smallholders, transporters, contractors, buyers, communities, ecosystems, and regulators. Material risks can therefore originate outside consolidated financial-reporting entities.

Smallholder inclusion provides a useful illustration. Certification programs may require investments in training, documentation, land legality, agricultural practices, and audits. These expenditures can appear as costs when viewed narrowly. However, they may protect sourcing continuity, market access, traceability, social legitimacy, and long-term productivity. Accounting systems should therefore evaluate both the direct expenditures and the strategic value created by supplier development.

This value-chain perspective is consistent with the palm-oil literature showing that sustainability outcomes depend on institutional cooperation, certification design, supplier capabilities, and governance relationships rather than on company-owned plantations alone (Apriani et al., 2020; Ernah et al., 2020; Santika et al., 2021; Brandi, 2021; Choiruzzad et al., 2021; Grabs and Garrett, 2023). It follows that management accounting for sustainable palm oil must recognize selected costs, risks, dependencies, and value-creation opportunities beyond the legal boundary of the reporting entity.

7. CASE ANALYSIS: PT PP LONDON SUMATRA INDONESIA TBK

7.1 Existing Foundations

Lonsum already possesses several components required for sustainable value accounting. Its sustainability reporting addresses certification, environmental management, climate change, supply-chain traceability, labor, communities, governance, and responsible sourcing. The company reported that 94% of its total estate area was officially ISPO-certified in the 2025 reporting cycle and maintained its objective of achieving full certification in accordance with applicable requirements (PT PP London Sumatra Indonesia Tbk, 2026a). Traceability is particularly important. The company's sustainability disclosures describe systems connecting processed fresh fruit bunches with plantations and suppliers. From an accounting perspective, traceability creates an information bridge between physical commodity flows and sustainability attributes. Once those flows are digitally identifiable, financial and ESG data can theoretically be linked at the estate, supplier, mill, shipment, or product level. Lonsum also reports the continued refinement of its enterprise-risk-management approach following the adoption of the TCFD framework, including risk assessment relating to climate issues (PT PP London Sumatra Indonesia Tbk, 2026b). This is significant because it moves sustainability information closer to the company's core risk-management architecture.

These foundations suggest that the next transformation is not necessarily to create more sustainability indicators. The higher-value opportunity is to connect existing sustainability information more explicitly with financial decision processes.

7.2 Sustainable Value of Traceability

Traditional reporting can describe traceability as a percentage. Sustainable value accounting would additionally quantify the economic significance of that traceability.

Management could identify revenue associated with customers or markets requiring verified origin data; estimate revenue at risk if compliance requirements were not met; calculate the cost of traceability by supplier category; measure the effect of supplier support on compliance; and evaluate the cost of replacing suppliers unable to meet sustainability requirements. These measures would allow traceability expenditures to be assessed against protected revenue, avoided disruption, and reduced compliance or reputational exposure rather than treated only as overhead.

This transforms traceability from a disclosure metric into a strategic asset. It also enables a more precise capital-allocation question: how much should the company invest in supplier mapping, digital platforms, smallholder support, geospatial verification, and assurance when compared with the value of protected market access and reduced reputational risk?

7.3 Climate Scenario Accounting

Climate risk represents another major opportunity for deeper integration. Physical risks such as drought, flood, fire, extreme rainfall, and temperature change can affect biological productivity and infrastructure. Transition risks can include new emissions rules, climate-related disclosure expectations, financing requirements, and technology change.

Climate-risk accounting should translate these risks into financial scenarios. For example, a severe drought scenario can estimate lower FFB yield, changes in mill utilization, working-capital effects, higher water-management costs, and changes in replanting economics. A flood scenario can estimate infrastructure damage, transport disruption, lost harvesting days, and repair expenditure.

The objective is not to predict climate outcomes precisely. It is to make strategic exposure visible enough for management to compare adaptation investments with expected losses.

7.4 ESG-Adjusted Capital Budgeting

Lonsum's capital budgeting could further incorporate ESG variables through an adjusted investment-appraisal framework. The aim would be to retain rigorous financial evaluation while explicitly incorporating material sustainability-related cash flows, avoided losses, transition risks, and resilience benefits.

Projects involving renewable energy, methane capture, water management, precision agriculture, climate-resilient planting material, digital traceability, mechanization, or biodiversity protection can be evaluated across financial, resource-efficiency, risk, environmental, social, and strategic-resilience dimensions. A multidimensional appraisal would consider conventional financial cash flows alongside resource-efficiency gains, avoided operating losses, avoided compliance or market-access risks, environmental outcomes, social implications, and the project's contribution to operational resilience.

The financial analysis should remain rigorous. Sustainability should not be used to justify economically undisciplined projects. Instead, material sustainability consequences should be incorporated into cash-flow estimates and risk assumptions that conventional analysis might otherwise omit.

7.5 Integrating Smallholder Economics

The smallholder dimension is important because sustainability performance can be constrained by the least-capable parts of the supply chain. Research shows that certification and sustainable-practice adoption by smallholders require training, financing, institutional support, and credible economic incentives (Apriani et al., 2020; Ernah et al., 2020).

Lonsum could therefore develop a smallholder sustainable-value dashboard incorporating productivity, income resilience, certification progress, training, compliance, traceability, input efficiency, and supply reliability. The

accounting objective would be to measure not only how much support costs but what strategic value it produces.

7.6 Assurance and Data Governance

External assurance is most valuable when internal systems are assurance-ready. Each high-value ESG indicator should therefore possess the same basic characteristics expected of well-controlled financial data: an agreed definition, reporting boundary, responsible owner, source evidence, calculation procedure, review control, and change history.

This would allow assurance to evolve from periodic checking of selected sustainability indicators toward more continuous monitoring of material ESG information. Data analytics could identify exceptions before reporting periods close, while internal audit could test the highest-risk indicators throughout the year.

8. DISCUSSION

8.1 A Sustainable Value Accounting Architecture

The combined literature supports a five-layer architecture. These layers connect external uncertainty with organizational transformation, information quality, managerial action, and sustainable-value outcomes.

The first layer consists of external forces, including geopolitical uncertainty, climate risk, regulatory change,

commodity markets, stakeholder pressure, and technological development. The second layer consists of the transformation mechanisms through which firms respond to those forces: ESG integration, digital innovation, and ethical governance.

The third layer consists of information capabilities such as accuracy, traceability, timeliness, comparability, connectivity, and assurance. The fourth layer consists of management capabilities, including risk sensing, scenario analysis, cost management, capital allocation, operational control, innovation, and strategic adaptation.

The fifth layer consists of sustainable-value outcomes, including financial resilience, resource efficiency, natural-capital protection, social value, innovation, stakeholder trust, market access, and long-term enterprise viability. Together, the five layers clarify the transmission mechanism through which external uncertainty can be translated into accounting responses and ultimately into strategic outcomes.

Figure 4 applies this architecture specifically to geopolitical-risk transmission. It traces how geopolitical shocks pass through trade, financing, logistics, energy, fertilizer, and buyer-requirement channels before affecting operating exposure, ESG decisions, accounting responses, and long-term organizational resilience.

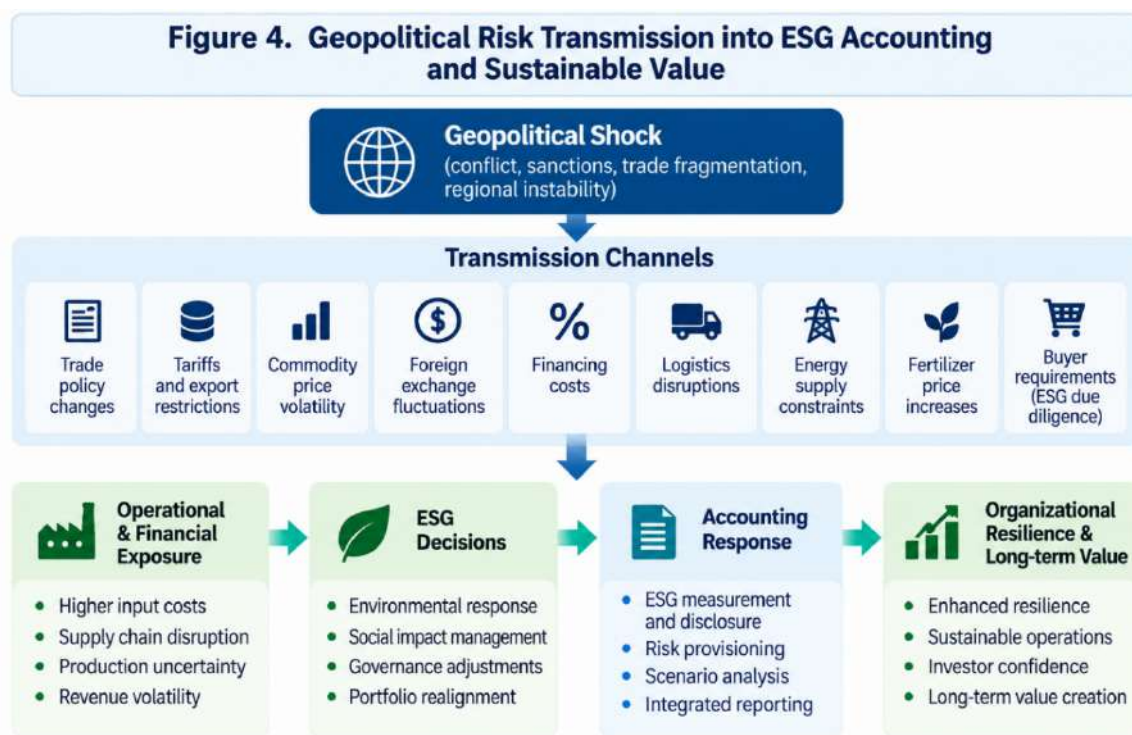


Figure 4. Geopolitical Risk Transmission into ESG Accounting and Sustainable Value

This model helps explain why empirical studies find different relationships between geopolitical risk and ESG performance. When sustainability is peripheral, uncertainty may lead companies to cut ESG expenditures. When sustainability is embedded in core accounting and risk

systems, firms are more likely to recognize ESG as part of their resilience strategy (Abdullah et al., 2024; Fiorillo et al., 2024; Jiang et al., 2024; Cheng et al., 2025; Erzurumlu et al., 2025).

8.2 Dynamic Materiality and Strategic Accounting

A key theoretical implication is the concept of dynamic materiality. Sustainability issues should not be treated as permanently material or immaterial because their significance changes as technology, regulation, climate, stakeholder expectations, and geopolitical conditions evolve. This interpretation is consistent with contemporary debates over double and single materiality, which show that the relevance of sustainability information depends partly on the reporting objective and on how corporate impacts interact with enterprise value (Baumüller and Sopp, 2022; Abhayawansa, 2022).

For example, supplier geolocation data may initially be collected to support sustainability disclosure. Once a customer or regulator requires deforestation due diligence, the same data become financially material. Similarly, renewable energy can shift from an emissions-reduction initiative to an energy-security strategy when fuel markets become volatile.

Management accounting can operationalize dynamic materiality by linking external signals to risk thresholds. A change in regulation, commodity prices, rainfall, financing conditions, or supplier compliance can trigger a re-evaluation of relevant ESG assumptions.

8.3 The Future Role of the Accountant

The proposed framework also implies a changed professional identity. Accountants will remain responsible for financial integrity, but sustainable value accounting requires broader capabilities in data governance, sustainability concepts, risk, technology, and scenario analysis.

The accountant's comparative advantage is not ownership of every sustainability metric. Environmental specialists, agronomists, engineers, HR professionals, and community teams possess knowledge that accountants do not. The accountant's contribution is to create a controlled information architecture connecting those specialized data with economic decisions.

This role includes challenging assumptions, designing controls, linking operational indicators to financial consequences, evaluating investments, reconciling datasets, and supporting assurance. It is therefore closer to a strategic information steward than a traditional transaction processor, consistent with the transformations identified by Möller et al. (2020), Andreassen (2020), and Leitner-Hanetseder et al. (2021).

8.4 Ethical Governance as the Integrating Institution

The framework further suggests that ethical governance should be treated as the integrating institution rather than simply one sustainability dimension. Governance establishes responsibilities, approves metrics, determines incentives, resolves trade-offs, oversees risk, and holds managers accountable.

This becomes particularly important where environmental, social, and financial goals conflict. Grabs and Garrett (2023) show that sustainability governance can generate paradoxes. A strict environmental requirement may unintentionally exclude vulnerable smallholders. Aggressive productivity targets may encourage environmental shortcuts. Rapid digitalization may improve traceability while imposing disproportionate costs on small suppliers.

Ethical governance requires these trade-offs to be explicit. Accounting can support such deliberation by quantifying financial consequences without pretending that all ethical questions can be reduced to monetary values.

8.5 ESG and Innovation as Complementary Capabilities

Another implication concerns innovation. The ESG literature increasingly shows that strong sustainability performance can support green innovation through financing, human capital, organizational capability, and digital transformation (Long et al., 2023; Lian et al., 2023; Zhang and Liu, 2023; Fu et al., 2023).

Dai and Zhu (2024) and He (2024) extend this insight by demonstrating the importance of digital transformation. ESG identifies problems and strategic objectives, while digitalization expands the capacity to generate, connect, and analyze the information needed to address them. Recent evidence also indicates that digitalization capability can strengthen the relationship between ESG strategy and triple-bottom-line performance and that digital transformation can improve ESG performance through internal controls and green innovation (Lu et al., 2024; Lee et al., 2024). In plantation businesses, this complementarity may include precision fertilizer application, remote sensing, climate-resilient seed development, mechanization, renewable energy, predictive maintenance, and digital supplier management.

Accounting provides the economic evaluation layer that enables management to distinguish promising innovation from technological novelty. By linking innovation projects to costs, productivity, risk reduction, market access, and sustainability outcomes, accounting can help decision makers compare technological alternatives on a consistent value-creation basis.

9. PROPOSED SUSTAINABLE VALUE ACCOUNTING ARCHITECTURE FOR LONSUM

Based on the synthesis, Figure 5 presents an organization-specific architecture for Lonsum. It places plantations, mills, suppliers, smallholders, and communities upstream of an integrated digital ESG data hub, which then feeds sustainable value accounting. Governance, risk management, audit, and assurance provide oversight before the resulting information is used to support strategy and sustainable-value outcomes. Architecturally, the proposed digital ESG data hub is intended to reduce the separation between sustainability

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reporting, operational systems, enterprise risk management, and financial control. A common information layer would allow material ESG indicators to be traced back to source systems and linked with cost centers, assets, suppliers, and investment projects, thereby improving both managerial decision usefulness and the auditability of sustainability information (Cheng et al., 2023; Christ et al., 2024; Lu et al., 2024). This integration is especially important where operational data are generated continuously but financial consequences emerge with a delay.

Implementation should nevertheless be incremental and control-led rather than technology-led. High-materiality indicators can be prioritized according to financial exposure, stakeholder significance, regulatory relevance, and data-quality risk, after which control ownership, validation procedures, and assurance protocols can be strengthened before broader automation is introduced. Such sequencing is consistent with evidence that credible ESG assurance

depends on mature internal measurement and governance arrangements rather than on external verification alone (Kurniawan and Basuki, 2024; Gipper et al., 2025).

The architecture also deliberately extends attention beyond company-owned operations because sustainable value in palm oil is partly shaped by suppliers, smallholders, and institutional governance across the value chain. Linking supplier-development expenditure, certification progress, traceability, and sourcing continuity within one accounting framework can make these interdependencies more visible without assuming that every social or environmental outcome must be monetized (Apriani et al., 2020; Brandi, 2021; Grabs and Garrett, 2023). Figure 5 therefore represents an information-and-governance architecture rather than a proposal for a single comprehensive monetary valuation model.

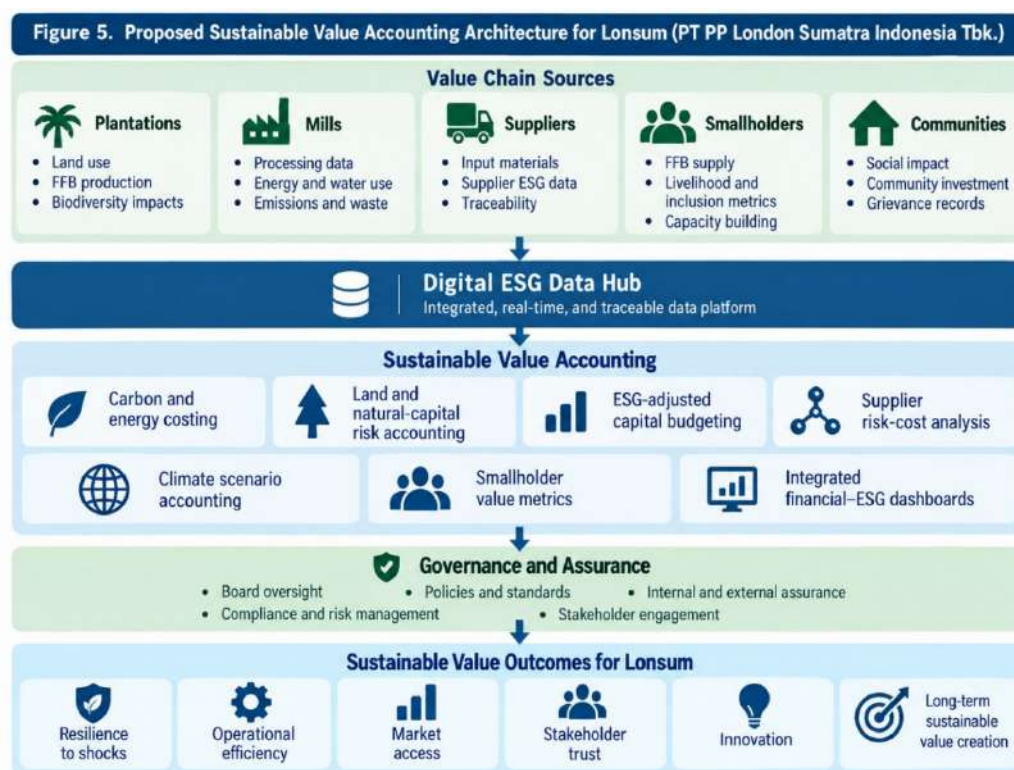


Figure 5. Proposed Sustainable Value Accounting Architecture for PT PP London Sumatra Indonesia Tbk

The architecture is deliberately pragmatic. It does not require the company to place monetary values on every environmental or social phenomenon. Rather, it identifies the points at which sustainability information materially affects business decisions and should therefore enter accounting processes.

10. MANAGERIAL RECOMMENDATIONS

The first recommendation is to establish a **unified ESG–financial data architecture**. Material ESG metrics should

use standardized identifiers capable of linking them with estates, mills, suppliers, assets, projects, and cost centers. Data ownership and control responsibilities should be formally documented.

Second, Lonsum should develop **ESG-adjusted capital budgeting**. Material environmental and social effects should be included in project cash-flow estimates, risk adjustments, or scenario analysis where credible measurement is possible. Third, the company should institutionalize **geopolitical and regulatory scenario accounting**. Scenarios could include

changes in sustainability-based market access, fertilizer-cost shocks, commodity-price volatility, severe climate events, changing carbon-related requirements, and supply-chain disruptions.

Fourth, management should develop **traceability economics**. Traceability should be evaluated in relation to protected revenue, supplier risk, customer requirements, compliance expenditure, and assurance costs.

Fifth, the company should strengthen **smallholder sustainable-value accounting**. Support programs should be evaluated through productivity, income resilience, certification progress, sourcing continuity, traceability, and environmental compliance.

Sixth, the company should move progressively toward **continuous ESG assurance**. High-risk indicators can be monitored using data analytics and exception reporting, reducing dependence on year-end manual verification.

Seventh, executive and managerial performance systems should include **balanced sustainability metrics**. Indicators should reward genuine value creation rather than easily achievable disclosure targets.

Finally, scenario analysis should be integrated into the dialogue among finance, sustainability, operations, ERM, internal audit, and senior management. Sustainable value accounting should become a cross-functional management process rather than the responsibility of a single sustainability unit.

11. IMPLICATIONS FOR THE INDONESIAN PALM-OIL INDUSTRY

The proposed framework has implications beyond Lonsum. Sustainability regulation increasingly requires data at plantation, supplier, or plot level, while conventional accounting remains largely entity based. This creates a structural mismatch between sustainability accountability and financial-reporting boundaries.

Industry-level digital traceability can help close this gap, but the design of traceability systems should account for smallholder capacity. Exclusionary compliance systems can improve formal traceability while generating adverse social consequences. Certification studies demonstrate that smallholders often require technical and financial support (Apriani et al., 2020; Ernah et al., 2020; Santika et al., 2021). Interoperability among corporate systems, certification systems, public regulation, and buyer due diligence is therefore strategically important. The interaction between private and public governance identified by Brandi (2021) and Choiruzzad et al. (2021) suggests that greater alignment can reduce duplication and improve credibility.

Accounting professionals can contribute by helping define standardized sustainability metrics, control procedures, audit trails, and cost-benefit approaches. In this sense, accounting

can act as institutional infrastructure connecting sustainability policy with firm-level implementation.

12. RESEARCH CONTRIBUTIONS, LIMITATIONS, AND FUTURE RESEARCH

This article makes four principal theoretical contributions. Collectively, they reposition sustainability accounting as an integrated information-and-governance architecture for decision making under uncertainty rather than as an extension of external disclosure alone.

First, the article reframes sustainability accounting as sustainable value accounting, emphasizing internal management and decision usefulness rather than disclosure alone. Second, it incorporates geopolitical uncertainty directly into sustainability-accounting design by showing how external shocks can alter both risk exposure and the financial materiality of ESG information.

Third, the article conceptualizes digital transformation as an information capability whose contribution to sustainable value depends on data governance, integration, interpretation, and connection with decisions. Fourth, it positions ethical governance as the accountability infrastructure that links ESG information, digital capability, and credible organizational behavior.

The study also has limitations that should guide interpretation. The QLR is intentionally interpretive and does not claim exhaustive database coverage, while the Lonsum case relies on publicly available corporate disclosures and therefore cannot directly observe internal accounting routines, management deliberations, or unreported operational practices. The proposed framework should consequently be treated as an analytically grounded architecture for future empirical testing rather than as evidence of causal effects within Lonsum.

Future research can empirically test the proposed architecture. Comparative studies could examine whether companies with integrated ESG-financial systems demonstrate stronger resilience during geopolitical or commodity shocks. Researchers could develop an ESG-accounting maturity index covering data integration, governance, materiality, scenario analysis, assurance, and capital budgeting.

Further studies could investigate whether digital traceability produces measurable financial benefits, whether ESG assurance reduces financing costs in emerging markets, how smallholder sustainability investments affect supply continuity, and how climate-scenario accounting influences plantation capital expenditure. Such research would help establish which components of sustainable value accounting create measurable decision and resilience benefits across different institutional settings.

A particularly useful research design would compare Indonesian plantation companies with different levels of

certification, digital maturity, and ESG governance. Longitudinal research could then examine whether more integrated sustainable value accounting produces superior risk-adjusted outcomes.

13. CONCLUSION

Accounting for sustainable value is becoming a strategic necessity rather than a reporting option. Firms operating in natural-resource-intensive sectors face interconnected financial, climatic, environmental, social, technological, and geopolitical risks. Managing these risks requires information systems capable of connecting operational realities with economic consequences.

The literature reviewed in this study demonstrates that ESG performance can influence firm value, innovation, risk, and stakeholder relationships, but the benefits are neither automatic nor universal. Sustainable value is created when ESG information is integrated into decisions, when digital technologies improve visibility without weakening judgment, and when governance mechanisms provide credible accountability.

PT PP London Sumatra Indonesia Tbk provides an instructive case. Its sustainability governance, ISPO certification, traceability systems, climate-risk management, environmental programs, and reporting infrastructure constitute important foundations for a more integrated model. The principal transformation opportunity is to connect these foundations more directly with management accounting, capital budgeting, financial forecasting, supplier economics, scenario analysis, and assurance.

The Sustainable Value Accounting Architecture proposed in this article therefore extends conventional accounting rather than replacing it. Financial accounting remains essential, but it becomes part of a broader architecture capable of explaining how financial outcomes depend on natural resources, human relationships, technological capabilities, governance quality, supply-chain integrity, and resilience.

In a geopolitically uncertain world, the most valuable accounting systems will not merely record whether an organization created profit in the past. They will help decision makers understand how that profit was created, what forms of capital made it possible, what risks threaten its continuation, what impacts the organization generates, and what investments are required to preserve sustainable value into the future.

REFERENCES

1. Abdullah, M., Tiwari, A.K., Hossain, M.R. and Abakah, E.J.A. (2024) ‘Geopolitical risk and firm-level environmental, social and governance (ESG) performance’, *Journal of Environmental Management*, 363, 121245. Available at: <https://doi.org/10.1016/j.jenvman.2024.121245>
2. Abhayawansa, S. (2022) ‘Swimming against the tide: back to single materiality for sustainability reporting’, *Sustainability Accounting, Management and Policy Journal*, 13(6), pp. 1361–1385. Available at: <https://doi.org/10.1108/SAMPJ-07-2022-0378>
3. Andreassen, R.-I. (2020) ‘Digital technology and changing roles: a management accountant’s dream or nightmare?’, *Journal of Management Control*, 31, pp. 209–238. Available at: <https://doi.org/10.1007/s00187-020-00303-2>
4. Appelbaum, D. and Nehmer, R.A. (2020) ‘Auditing cloud-based blockchain accounting systems’, *Journal of Information Systems*, 34(2), pp. 5–21. Available at: <https://doi.org/10.2308/isyss-52660>
5. Apriani, E., Kim, Y.-S., Fisher, L.A. and Baral, H. (2020) ‘Non-state certification of smallholders for sustainable palm oil in Sumatra, Indonesia’, *Land Use Policy*, 99, 105112. Available at: <https://doi.org/10.1016/j.landusepol.2020.105112>
6. Arif, M., Sajjad, A., Farooq, S., Abrar, M. and Joyo, A.S. (2021) ‘The impact of audit committee attributes on the quality and quantity of environmental, social and governance disclosures’, *Corporate Governance*, 21(3), pp. 497–514. Available at: <https://doi.org/10.1108/CG-06-2020-0243>
7. Aydoğmuş, M., Gülay, G. and Ergun, K. (2022) ‘Impact of ESG performance on firm value and profitability’, *Borsa Istanbul Review*, 22(S2), pp. S119–S127. Available at: <https://doi.org/10.1016/j.bir.2022.11.006>
8. Bakarich, K.M., Castonguay, J. and O’Brien, P.E. (2020) ‘The use of blockchains to enhance sustainability reporting and assurance’, *Accounting Perspectives*, 19(4), pp. 389–412. Available at: <https://doi.org/10.1111/1911-3838.12241>
9. Baumüller, J. and Sopp, K. (2022) ‘Double materiality and the shift from non-financial to European sustainability reporting: review, outlook and implications’, *Journal of Applied Accounting Research*, 23(1), pp. 8–28. Available at: <https://doi.org/10.1108/JAAR-04-2021-0114>
10. Bellucci, M., Cesa Bianchi, D. and Manetti, G. (2022) ‘Blockchain in accounting practice and research: systematic literature review’, *Meditari Accountancy Research*, 30(7), pp. 121–146. Available at: <https://doi.org/10.1108/MEDAR-10-2021-1477>
11. Brandi, C. (2021) ‘The interaction of private and public governance: the case of sustainability standards for palm oil’, *European Journal of Development Research*, 33, pp. 1574–1595.

- Available at: <https://doi.org/10.1057/s41287-020-00306-8>
12. Cheng, M.M., Perego, P. and Soderstrom, N.S. (2023) ‘Sustainability and management accounting research’, *Journal of Management Accounting Research*, 35(3), pp. 1–11. Available at: <https://doi.org/10.2308/JMAR-2023-054>
13. Cheng, P., Wang, M., Li, K., Choi, B. and Chen, W. (2025) ‘The impact mechanism of geopolitical risks on ESG performance: the moderating effects of investor attention and government subsidies’, *PLoS ONE*, 20(1), e0311659. Available at: <https://doi.org/10.1371/journal.pone.0311659>
14. Choiruzzad, S.A.B., Tyson, A. and Varkkey, H. (2021) ‘The ambiguities of Indonesian Sustainable Palm Oil certification: internal incoherence, governance rescaling and state transformation’, *Asia Europe Journal*, 19, pp. 189–208. Available at: <https://doi.org/10.1007/s10308-020-00593-0>
15. Chong, T. and Loh, L. (2023) ‘Innovating ESG integration as sustainable strategy: ESG transparency and firm valuation in the palm oil sector’, *Sustainability*, 15(22), 15943. Available at: <https://doi.org/10.3390/su152215943>
16. Christ, K.L., Dijkstra-Silva, S., Burritt, R.L. and Schaltegger, S. (2024) ‘Sustainability management accounting – enabling macro-level sustainability transformation towards the United Nations Sustainable Development Goals’, *Meditari Accountancy Research*, 32(3), pp. 923–944. Available at: <https://doi.org/10.1108/MEDAR-03-2023-1952>
17. Christensen, H.B., Hail, L. and Leuz, C. (2021) ‘Mandatory CSR and sustainability reporting: economic analysis and literature review’, *Review of Accounting Studies*, 26(3), pp. 1176–1248. Available at: <https://doi.org/10.1007/s11142-021-09609-5>
18. Dai, J. and Zhu, Q. (2024) ‘ESG performance and green innovation in a digital transformation perspective’, *The American Journal of Economics and Sociology*, 83(1), pp. 263–282. Available at: <https://doi.org/10.1111/ajes.12541>
19. Dameri, R.P. and Ferrando, P.M. (2022) ‘Value creation disclosure: the International Integrated Reporting Framework revisited in the light of stakeholder theory’, *Meditari Accountancy Research*, 30(3), pp. 739–761. Available at: <https://doi.org/10.1108/MEDAR-11-2020-1103>
20. De Santis, F. and D’Onza, G. (2021) ‘Big data and data analytics in auditing: in search of legitimacy’, *Meditari Accountancy Research*, 29(5), pp. 1088–1112. Available at: <https://doi.org/10.1108/MEDAR-03-2020-0838>
21. Desplebin, O., Lux, G. and Petit, N. (2021) ‘To be or not to be: blockchain and the future of accounting and auditing’, *Accounting Perspectives*, 20(4), pp. 743–769. Available at: <https://doi.org/10.1111/1911-3838.12265>
22. Ding, X., Sheng, Z., Appolloni, A., Shahzad, M. and Han, S. (2024) ‘Digital transformation, ESG practice, and total factor productivity’, *Business Strategy and the Environment*, 33(5), pp. 4547–4561. Available at: <https://doi.org/10.1002/bse.3718>
23. Dyball, M.C. and Seethamraju, R. (2021) ‘The impact of client use of blockchain technology on audit risk and audit approach—an exploratory study’, *International Journal of Auditing*, 25(2), pp. 602–615. Available at: <https://doi.org/10.1111/ijau.12238>
24. Ernah, Parvathi, P. and Waibel, H. (2020) ‘Will teaching sustainability standards to oil palm smallholders in Indonesia pay off?’, *International Journal of Agricultural Sustainability*, 18(2), pp. 196–211. Available at: <https://doi.org/10.1080/14735903.2020.1744899>
25. Erzurumlu, Y.O., Gozgor, G., Lau, C.K.M., Soliman, A.M. and Turkkan, M. (2025) ‘The effects of geopolitical and political risks on corporate ESG practices’, *Journal of Environmental Management*, 386, 125747. Available at: <https://doi.org/10.1016/j.jenvman.2025.125747>
26. Eugster, F. and Wagner, A.F. (2020) ‘Value reporting and firm performance’, *Journal of International Accounting, Auditing and Taxation*, 40, 100319. Available at: <https://doi.org/10.1016/j.intaccudtax.2020.100319>
27. Farooq, M.B. and de Villiers, C. (2020) ‘How sustainability assurance engagement scopes are determined, and its impact on capture and credibility enhancement’, *Accounting, Auditing & Accountability Journal*, 33(2), pp. 417–445. Available at: <https://doi.org/10.1108/AAAJ-11-2018-3727>
28. Fedyk, A., Hodson, J., Khimich, N. and Fedyk, T. (2022) ‘Is artificial intelligence improving the audit process?’, *Review of Accounting Studies*, 27, pp. 938–985. Available at: <https://doi.org/10.1007/s11142-022-09697-x>
29. Fiorillo, P., Meles, A., Pellegrino, L.R. and Verdoliva, V. (2024) ‘Geopolitical risk and stock price crash risk: the mitigating role of ESG performance’, *International Review of Financial Analysis*, 91, 102958. Available at: <https://doi.org/10.1016/j.irfa.2023.102958>

30. Fu, Q., Zhao, X. and Chang, C.-P. (2023) ‘Does ESG performance bring to enterprises’ green innovation? Yes, evidence from 118 countries’, *Oeconomia Copernicana*, 14(3), pp. 795–832. Available at: <https://doi.org/10.24136/oc.2023.024>
31. Garanina, T., Ranta, M. and Dumay, J. (2022) ‘Blockchain in accounting research: current trends and emerging topics’, *Accounting, Auditing & Accountability Journal*, 35(7), pp. 1507–1533. Available at: <https://doi.org/10.1108/AAAJ-10-2020-4991>
32. Gilbert, C.L. (2024) ‘The EU Deforestation Regulation’, *EuroChoices*, 23(3), pp. 64–70. Available at: <https://doi.org/10.1111/1746-692X.12436>
33. Gipper, B., Ross, S. and Shi, S.X. (2025) ‘ESG assurance in the United States’, *Review of Accounting Studies*, 30, pp. 1753–1803. Available at: <https://doi.org/10.1007/s11142-024-09856-2>
34. Grabs, J. and Garrett, R.D. (2023) ‘Goal-based private sustainability governance and its paradoxes in the Indonesian palm oil sector’, *Journal of Business Ethics*, 188, pp. 467–507. Available at: <https://doi.org/10.1007/s10551-023-05377-1>
35. Guo, X., Cheng, P. and Choi, B. (2024) ‘Impact of corporate environmental uncertainty on environmental, social, and governance performance: the role of government, investors, and geopolitical risk’, *PLoS ONE*, 19(8), e0309559. Available at: <https://doi.org/10.1371/journal.pone.0309559>
36. Harrer, T. and Lehner, O.M. (2024) ‘Assuring the unknowable: a reflection on the evolving landscape of sustainability assurance for financial auditors’, *Current Opinion in Environmental Sustainability*, 67, 101413. Available at: <https://doi.org/10.1016/j.cosust.2023.101413>
37. Hazaea, S.A., Zhu, J., Khatib, S.F.A., Bazhair, A.H. and Elamer, A.A. (2022) ‘Sustainability assurance practices: a systematic review and future research agenda’, *Environmental Science and Pollution Research*, 29, pp. 4843–4864. Available at: <https://doi.org/10.1007/s11356-021-17359-9>
38. He, X. (2024) ‘Can ESG performance drive firm innovation? The mediating role of AI adoption and digital transformation—evidence from China’, *International Journal of Innovation Management*, 28(5–6), 2450019. Available at: <https://doi.org/10.1142/S1363919624500191>
39. Jiang, Y., Klein, T., Ren, Y.-S. and Duong, D. (2024) ‘Global geopolitical risk and corporate ESG performance’, *Journal of Environmental Management*, 370, 122481. Available at: <https://doi.org/10.1016/j.jenvman.2024.122481>
40. Jørgensen, S., Mjøs, A. and Pedersen, L.J.T. (2022) ‘Sustainability reporting and approaches to materiality: tensions and potential resolutions’, *Sustainability Accounting, Management and Policy Journal*, 13(2), pp. 341–361. Available at: <https://doi.org/10.1108/SAMPJ-01-2021-0009>
41. Khan, H.Z., Bose, S., Mollik, A.T. and Harun, H. (2021) “‘Green washing’ or ‘authentic effort’”? An empirical investigation of the quality of sustainability reporting by banks’, *Accounting, Auditing & Accountability Journal*, 34(2), pp. 338–369. Available at: <https://doi.org/10.1108/AAAJ-01-2018-3330>
42. Kurniawan, P.S. and Basuki, B. (2024) ‘Sustainability reporting assurance practice in Indonesia: assuror and academician perspective’, *Accounting Research Journal*, 37(5), pp. 481–499. Available at: <https://doi.org/10.1108/ARJ-05-2023-0132>
43. Lee, M.-J., Pak, A. and Roh, T. (2024) ‘The interplay of institutional pressures, digitalization capability, environmental, social, and governance strategy, and triple bottom line performance: a moderated mediation model’, *Business Strategy and the Environment*, 33(6), pp. 5247–5268. Available at: <https://doi.org/10.1002/bse.3755>
44. Leitner-Hanetseder, S., Lehner, O.M., Eisl, C. and Forstenlechner, C. (2021) ‘A profession in transition: actors, tasks and roles in AI-based accounting’, *Journal of Applied Accounting Research*, 22(3), pp. 539–556. Available at: <https://doi.org/10.1108/JAAR-10-2020-0201>
45. Lian, Y., Li, Y. and Cao, H. (2023) ‘How does corporate ESG performance affect sustainable development: a green innovation perspective’, *Frontiers in Environmental Science*, 11, 1170582. Available at: <https://doi.org/10.3389/fenvs.2023.1170582>
46. Lombardi, R., de Villiers, C., Moscarillo, N. and Pizzo, M. (2022) ‘The disruption of blockchain in auditing—a systematic literature review and an agenda for future research’, *Accounting, Auditing & Accountability Journal*, 35(7), pp. 1534–1565. Available at: <https://doi.org/10.1108/AAAJ-10-2020-4992>
47. Long, H., Feng, G.-F., Gong, Q. and Chang, C.-P. (2023) ‘ESG performance and green innovation: an investigation based on quantile regression’, *Business Strategy and the Environment*, 32(7), pp. 5102–5118. Available at: <https://doi.org/10.1002/bse.3410>
48. Lu, Y., Xu, C., Zhu, B. and Sun, Y. (2024) ‘Digitalization transformation and ESG

- performance: evidence from China’, *Business Strategy and the Environment*, 33(2), pp. 352–368. Available at: <https://doi.org/10.1002/bse.3494>
49. Machado, B.A.A., Dias, L.C.P. and Fonseca, A. (2021) ‘Transparency of materiality analysis in GRI-based sustainability reports’, *Corporate Social Responsibility and Environmental Management*, 28(2), pp. 570–580. Available at: <https://doi.org/10.1002/csr.2066>
50. Maffei, M., Casciello, R. and Meucci, F. (2021) ‘Blockchain technology: uninvestigated issues emerging from an integrated view within accounting and auditing practices’, *Journal of Organizational Change Management*, 34(2), pp. 462–476. Available at: <https://doi.org/10.1108/JOCM-09-2020-0264>
51. Miles, S. and Ringham, K. (2020) ‘The boundary of sustainability reporting: evidence from the FTSE100’, *Accounting, Auditing & Accountability Journal*, 33(2), pp. 357–390. Available at: <https://doi.org/10.1108/AAAJ-05-2018-3478>
52. Munoko, I., Brown-Liburd, H.L. and Vasarhelyi, M. (2020) ‘The ethical implications of using artificial intelligence in auditing’, *Journal of Business Ethics*, 167, pp. 209–234. Available at: <https://doi.org/10.1007/s10551-019-04407-1>
53. Möller, K., Schäffer, U. and Verbeeten, F.H.M. (2020) ‘Digitalization in management accounting and control: an editorial’, *Journal of Management Control*, 31, pp. 1–8. Available at: <https://doi.org/10.1007/s00187-020-00300-5>
54. Oware, K.M. and Moulya, V.H. (2023) ‘The outlook of sustainability assurance in global trends: a bibliometric review and research agenda’, *South Asian Journal of Marketing*, 4(2), pp. 110–127. Available at: <https://doi.org/10.1108/SAJM-06-2022-0039>
55. Papoutsis, A. and Sodhi, M.S. (2020) ‘Does disclosure in sustainability reports indicate actual sustainability performance?’, *Journal of Cleaner Production*, 260, 121049. Available at: <https://doi.org/10.1016/j.jclepro.2020.121049>
56. Pizzi, S., Caputo, A., Venturelli, A. and Caputo, F. (2022) ‘Embedding and managing blockchain in sustainability reporting: a practical framework’, *Sustainability Accounting, Management and Policy Journal*, 13(3), pp. 545–567. Available at: <https://doi.org/10.1108/SAMPJ-07-2021-0288>
57. Purnomo, H., Okarda, B., Dermawan, A., Ilham, Q.P., Pacheco, P., Nurfatriani, F. and Suhendang, E. (2020) ‘Reconciling oil palm economic development and environmental conservation in Indonesia: a value chain dynamic approach’, *Forest Policy and Economics*, 111, 102089. Available at: <https://doi.org/10.1016/j.forpol.2020.102089>
58. Putri, E.I.K. et al. (2022) ‘The oil palm governance: challenges of sustainability policy in Indonesia’, *Sustainability*, 14(3), 1820. Available at: <https://doi.org/10.3390/su14031820>
59. Ramli, U.S. et al. (2020) ‘Sustainable palm oil—the role of screening and advanced analytical techniques for geographical traceability and authenticity verification’, *Molecules*, 25(12), 2927. Available at: <https://doi.org/10.3390/molecules25122927>
60. Ruiz-Barbadillo, E. and Martínez-Ferrero, J. (2020) ‘What impact do countries have on levels of sustainability assurance? A complementary-substitutive perspective’, *Corporate Social Responsibility and Environmental Management*, 27(5), pp. 2329–2341. Available at: <https://doi.org/10.1002/csr.1967>
61. Salvi, A., Vitolla, F., Giakoumelou, A., Raimo, N. and Rubino, M. (2020) ‘Intellectual capital disclosure in integrated reports: the effect on firm value’, *Technological Forecasting and Social Change*, 160, 120228. Available at: <https://doi.org/10.1016/j.techfore.2020.120228>
62. Santika, T. et al. (2021) ‘Impact of palm oil sustainability certification on village well-being and poverty in Indonesia’, *Nature Sustainability*, 4, pp. 109–119. Available at: <https://doi.org/10.1038/s41893-020-00630-1>
63. Secinaro, S., Dal Mas, F., Brescia, V. and Calandra, D. (2022) ‘Blockchain in the accounting, auditing and accountability fields: a bibliometric and coding analysis’, *Accounting, Auditing & Accountability Journal*, 35(9), pp. 168–203. Available at: <https://doi.org/10.1108/AAAJ-10-2020-4987>
64. Songini, L., Pistoni, A., Tettamanzi, P., Fratini, F. and Minutiello, V. (2022) ‘Integrated reporting quality and BoD characteristics: an empirical analysis’, *Journal of Management and Governance*, 26, pp. 579–620. Available at: <https://doi.org/10.1007/s10997-021-09568-8>
65. Steenkamp, N. and Roberts, R. (2022) ‘Managing material value creation matters in integrated reporting’, *Meditari Accountancy Research*, 30(3), pp. 661–675. Available at: <https://doi.org/10.1108/MEDAR-11-2020-1095>
66. Tjahjadi, B., Soewarno, N. and Mustikaningtiyas, F. (2021) ‘Good corporate governance and corporate sustainability performance in Indonesia: a triple bottom line approach’, *Heliyon*, 7(3), e06453. Available at: <https://doi.org/10.1016/j.heliyon.2021.e06453>

67. Wahl, A., Charifzadeh, M. and Diefenbach, F. (2020) ‘Voluntary adopters of integrated reporting—evidence on forecast accuracy and firm value’, *Business Strategy and the Environment*, 29(6), pp. 2542–2556. Available at: <https://doi.org/10.1002/bse.2519>
68. Wu, Z., Lin, S., Chen, T., Luo, C. and Xu, H. (2023) ‘Does effective corporate governance mitigate the negative effect of ESG controversies on firm value?’, *Economic Analysis and Policy*, 80, pp. 1772–1793. Available at: <https://doi.org/10.1016/j.eap.2023.11.018>
69. Xin, Y., Sun, L. and Hansen, M.C. (2022) ‘Oil palm reconciliation in Indonesia: balancing rising demand and environmental conservation towards 2050’, *Journal of Cleaner Production*, 380, 135087. Available at: <https://doi.org/10.1016/j.jclepro.2022.135087>
70. Yu, X. and Xiao, K. (2022) ‘Does ESG performance affect firm value? Evidence from a new ESG-scoring approach for Chinese enterprises’, *Sustainability*, 14(24), 16940. Available at: <https://doi.org/10.3390/su142416940>
71. Zhang, J. and Liu, Z. (2023) ‘Study on the impact of corporate ESG performance on green innovation performance—evidence from listed companies in China A-Shares’, *Sustainability*, 15(20), 14750. Available at: <https://doi.org/10.3390/su152014750>
72. Zhou, G., Liu, L. and Luo, S. (2022) ‘Sustainable development, ESG performance and company market value: mediating effect of financial performance’, *Business Strategy and the Environment*, 31(7), pp. 3371–3387. Available at: <https://doi.org/10.1002/bse.3089>

Corporate Case Sources

1. PT PP London Sumatra Indonesia Tbk (2026a) *Sustainability Report 2025*. Jakarta: PT PP London Sumatra Indonesia Tbk. Available at: <https://www.londonsumatra.com/DownloadFile/Read/587>
2. PT PP London Sumatra Indonesia Tbk (2026b) *Annual Report 2025*. Jakarta: PT PP London Sumatra Indonesia Tbk. Available at: <https://www.londonsumatra.com/DownloadFile/588>