

From Readiness to Responsibility: Board-Level Accountability for AI-Driven Regenerative Governance in ASEAN

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DOI: <https://doi.org/10.47772/IJRISS.2026.100800916>

Received: 25 August 2026; Accepted: 30 August 2026; Published: 21 September 2026

ABSTRACT

However, corporate governance continues to disclose, rather than address, socio-ecological crises: GRI, SASB, TCFD, and ISSB frameworks measure harm avoided but not good restored, whereas Malaysian and ASEAN policy increasingly demands the design of industries to be "restorative or regenerative". The thesis of this paper is that the gap resulting from such a mismatch should be viewed not as one of data but of accountability, and that its closure should rely on the shift of corporate boards from preparedness to deploying AI-powered RegTech platforms to accountability for the fiduciary duty to account for what the platforms promise to deliver. By integrating theories of corporate governance, regenerative development, and circular economy with RegTech-readiness literature, the paper reinterprets four key board-level dimensions (data governance, algorithmic explainability, control ownership, and regulatory mapping) in terms of a regenerative accountability threshold and identifies two failure modes that are regenerative washing (unvalidated net-positive impact claims) and the regenerative fiduciary duty (the extended director liability beyond the company's boundaries). Grounding itself in Malaysia's regenerative economy framework and non-delegable directorial liability system (Companies Act 2016), the paper concludes with five propositions for ASEAN and emerging markets' experimentation. The core of the paper's argumentation is that preparedness is a prerequisite of accountability but not an alternative to it.

Keywords: Regenerative Economy, Board Accountability, Artificial Intelligence, Circular Economy, ASEAN

INTRODUCTION

Corporate boards face mounting regulatory and market pressure over socio-ecological crises. Boards are seen as largely reactive, focusing on sustainability disclosure against GRI, SASB, TCFD and ISSB baselines that track harm avoided, rather than good produced. Regeneration requires a different approach, where directors actively manage toward a net-positive ecological impact. This idea traces from ecological design theory Reed's (2007) spectrum from degenerative growth to regeneration, Mang and Reed's (2012) regenerative development as an ongoing process within living systems, and Du Plessis's (2012) call for "co-creative partnership with nature" (p. 7) to political economy, where Fullerton (2015) and Raworth (2017) argue industrial production must operate within planetary boundaries. Board mandates are often static and backward-looking, making them poorly suited to measuring outcomes in these dynamic terms. Meanwhile, boards are adopting RegTech platforms that use AI and distributed-ledger tooling for automated compliance and auditability. A growing literature also explores AI's capacity to optimise circular material flows (Munonye et al., 2025). Research should also consider whether boards are prepared to use these platforms for restoration, rather than just risk management. This gap is particularly visible in Malaysia, where regenerative-economy policy has outpaced available governance tools.

That paper has five objectives. These objectives include distinguishing sustainability, circularity, and regeneration at the board level and identifying where governance theory falls short of socio-ecological responsibility. Also, redefining RegTech readiness dimensions against a regenerative accountability threshold and then integrates them into a single framework. The Malaysia/ASEAN research agenda has a threefold

contribution: theoretically, redefining "algorithmic agency" as an instrument of ecological accountability, not just compliance; practically, an evaluation framework that distinguishes regenerative accountability from ESG monitoring; and empirically, context-specific groundwork for implementing circular-economy policy through governance technology in Southeast Asia. Section 2 provides the theoretical and comparative ASEAN grounding for this claim. Sections 4 and 5 build the accountability framework. Section 6 turns this into testable propositions; Section 7 examines the tensions it creates. Last but not least, Sections 8 and 9 close with their practical implications and limits before Section 10 concludes.

Theoretical Foundations and Positioning

From Sustainability to Regeneration

Regenerative business draws on living-systems theory and ecological design. Mang and Reed (2012) argue that sustainable development must move beyond mitigation toward design that fosters the co-evolutionary capacity of social and ecological systems. Reed (2007) systematises the resulting taxonomy, contrasting conventional sustainability's focus on minimising externalities with regeneration's focus on net-vitality in local ecosystems. Du Plessis (2012) locates the epistemological break precisely where mainstream corporate sustainability treats nature as a stock of resources within a mechanistic frame, while ecological restoration demands nested, adaptive systems thinking. Management scholarship has begun to absorb this. Hahn and Tampe (2021) frame the regenerative enterprise as a continuum along which companies actively restore ecological well-being, and Konietzko, Das and Bocken (2023) formalise a three-tier typology sustainable (efficiency, impact minimisation), circular (closed material loops), and regenerative (self-renewing positive value) that this paper adopts as its governing hierarchy. Fullerton (2015) and Raworth (2017) supply the macro-level warrant that economic activity must be bounded to fit within planetary limits. Further, circular-economy scholarship (Ellen MacArthur Foundation, 2013) targets industrial ecology and waste reduction. However, Geissdoerfer et al. (2017) show that closing technical loops does not guarantee positive ecological impact. Genuine regeneration additionally requires that organisational choices cohere with local living systems (Muñoz & Branzei, 2021). Conventional RegTech operates at the sustainability tier (ESG disclosure) and, at best, the circularity tier (resource tracking). Neither equips boards with tools for the regenerative tier this paper addresses.

Corporate Governance Theory and the Regenerative Aspiration Gap

Mainstream governance theory remains firm-centred, tracing back to the original diagnosis of the separation of ownership and control (Berle & Means, 1932). Agency theory (Jensen & Meckling, 1976; Fama & Jensen, 1983; Eisenhardt, 1989) formalised that diagnosis into control mechanisms that align executive behaviour with shareholder gain. Resource dependence theory (Pfeffer & Salancik, 1978) treats the environment as a source of strategic resources. Stewardship theory (Donaldson & Davis, 1991) assumes executive-firm goal alignment. Even stakeholder theory (Freeman, 1984), which broadens organisational responsibility, still treats ecosystems as passive stakeholders rather than active participants. None of these traditions was built to carry socio-ecological complexity, producing an institutional disconnect between corporate law, regulatory technology and ecological strategy that this paper's accountability reframing is designed to address.

This disconnect is where the paper's "algorithmic agency" contribution sits. Classical agency theory frames a two-party problem, which is a principal (shareholders) monitoring an agent (managers) whose interests may diverge. Once an AI-driven RegTech platform sits between board and outcome, a third, non-human party enters the relationship, one that cannot itself be a fiduciary, cannot be sued, and cannot bear the duty of care the classical model assumes only humans hold. Algorithmic agency names this reconfigured relationship where the board remains the accountable principal, the platform becomes a delegated-but-non-fiduciary agent, and the resulting governance question is not whether the algorithm can be trusted, but what evidentiary and procedural conditions must hold before the board is entitled to rely on it. This reframes control ownership (Section 4.3) as an agency-theory problem in its own right rather than a purely technical safeguard. It gives the regenerative fiduciary function (Section 4.6) its theoretical warrant; if the algorithm cannot hold the duty, the duty must expand to cover what the algorithm is asked to do.

ASEAN Comparative Policy Landscape: Convergence, Divergence and Governance Issues

Malaysia is not an outlier; regenerative and circular-economy policy is accelerating across ASEAN, unevenly, and that unevenness is itself a governance issue this paper's framework must confront. Singapore's Green Plan 2030, launched in February 2021 across five ministries, embeds circularity and net-zero targets within a comparatively mature, taxonomy-linked disclosure environment (Government of Singapore, 2021). Thailand's Bio-Circular-Green (BCG) Economy Action Plan 2021–2027, endorsed as a national agenda by the cabinet, treats the circular economy as one of five strategic sectors backed by direct public investment (Royal Thai Government, 2021). Indonesia's Ministry of National Development Planning has moved from a 2021 benefits study to a full Circular Economy Roadmap and National Action Plan spanning 2025–2045 (Bappenas, 2024). The Philippines has gone furthest toward binding obligation by enacting Extended Producer Responsibility legislation (Republic Act No. 11898, 2022) that imposes escalating, independently audited plastic-recovery targets directly on large enterprises. At the regional level, the ASEAN Taxonomy for Sustainable Finance (ASEAN Taxonomy Board, 2025) attempts to harmonise these national efforts into one classification system.

This landscape sharpens, rather than merely illustrates, the regulatory-mapping problem in Section 4.4, where a RegTech platform built to Malaysia's MITI/KPKT categories cannot, without further engineering, correctly classify a claim against Singapore's taxonomy-linked targets, Thailand's sector-based action plan, Indonesia's rolling roadmap, or the Philippines' audited statutory scheme – four structurally different instruments a single "regional" governance layer must reconcile. It is also a capacity issue, not only a technical one. The Philippines' statute already requires third-party audits of recovery claims, giving boards an external verification backstop most of the region lacks. Jurisdictions relying on non-binding roadmaps and strategic plans place the entire regenerative-washing verification burden identified in Section 4.2 on the board itself. Board-level regenerative accountability is accordingly not a uniform ASEAN condition but a spectrum running from aspiration to audited obligation, and Malaysia's current instruments, still at the framework and blueprint stage rather than statutory, sit closer to Thailand's and Indonesia's end of that spectrum than to the Philippines'.

RegTech Readiness and the Board Oversight Problem

RegTech automates compliance, risk management, and statutory reporting (Grassi & Lanfranchi, 2022; Arner et al., 2016). Board readiness is a question of organisational capability, not simply implementation. Four criteria relevant to board oversight of RegTech platform capabilities concerning data governance, algorithmic explainability, control ownership, and regulation mapping, specifically for financial institutions' compliance, have been identified by Ibiyeye, Ibiyeye and Oke (2025). All four criteria have been redefined in this paper in the context of environmental results because the issue facing the board is analogous in both cases: the board has to oversee a complex system which it did not design and cannot audit line by line.

Artificial Intelligence and Circular Intelligence

The related field of "circular intelligence" literature utilises machine learning, digital product passports, and system dynamics modelling to coordinate the transition toward circularity at the macro level and within the supply chain (Munonye et al., 2025). This literature is very technical in terms of the ability of AI to make predictive models but says nothing about how company boards of directors should assess, debate, or respond to those predictions.

ESG Integration and the Sustainability Ceiling

The adoption of ESG principles by corporations is today a well-established practice within both corporate governance and academia (Gillan et al., 2021), affording boards access to a sophisticated language and means of communication surrounding ESG. This sophistication constitutes a risk factor in itself since ESG systems of thinking are risk-based and are orientated towards harm minimisation. This sophistication allows a board to believe in its capacity for regeneration through compliance.

Blockchain, Traceability and the Limits of Verification

Blockchain technology, which was originally designed as a peer-to-peer innovation (Nakamoto, 2008), provides transparency and integrity of auditing when used to govern industrial value chains (Yermack, 2017; Saberi et al., 2019). It is very useful for providing proof about the origin of materials used and material flows, but it solves a more limited issue than the problem of accountability. It is one thing to know the origin of a material and another thing to be certain that an intervention made by a company has a positive impact on ecology.

Positioning and Originality: The Readiness–Accountability Distinction

The contribution hinges upon a distinction which the literature on readiness does not draw. Ibiyeye et al. (2025) query whether the board of a company may operate a RegTech platform. This study asks whether the board of that company should be responsible for the claims made by that platform. Readiness is necessary but not sufficient. The board could have the full capacity to manage the operation of an AI-based ecological impact dashboard, yet it would not be able to vouch for, justify, or take responsibility for the net-positive impacts it claims. The geographical location of the literature on readiness highlights the fact that its models have been designed for dispersed ownership and arms-length Western markets, whereas the ownership structure in ASEAN, which features concentration and links to families or the state, affects the nature of accountability, as a board has to be accountable not to the market but to the controlling shareholder. Two concepts result: Regenerative washing is the phenomenon of the inability to vouch for net-positive impacts, and the concept extends the SEC enforcement "AI-washing" (Arnold & Porter, 2024; DLA Piper, 2025); regenerative fiduciary function is the extension of the non-delegable duty of care of directors to effects that extend.

Positioning and Review Approach

It is a conceptual synthesis rather than a PRISMA-based systematic review. It takes into account triangulation of three lines of evidence. They comprise regeneration-development research, RegTech/AI, corporate governance research, and the actual policy in Malaysia and broader ASEAN (Malaysia's Circular Economy Policy Framework and KPKT Blueprint 2025-2035; Singapore's Green Plan 2030; Thailand's BCG Economy Action Plan; and Indonesia's Bappenas). The Circular Economy Roadmap, the Philippines' EPR Act 2022, and the ASEAN Taxonomy for Sustainable Finance at the regional level, reviewed in Section 2.3, have been chosen for their theoretical rigour and practical applicability rather than completeness of databases. The timeframe of analysis includes scholarly literature written in English from 2020 to 2025. This paper attempts to make testable propositions (Section 6) rather than empirical generalisations as theoretical research. The suggested framework and propositions are presented here as the basis for further systematic testing of the same using a PRISMA-based review.

Reframing Board-Level Readiness as Regenerative Accountability

Traditional RegTech readiness considers whether the board can run an automated compliance system. Re-envisioned for regeneration, however, the standard is higher, as the board will have to show evidence of actual ecological regeneration and not simply regulatory compliance. The board is already under conditions of information asymmetry, supervising the company only through data coming from much lower in the hierarchy. Regeneration, biodiversity regeneration, and throughput of resources do not come in a standardized format. ESG data does, which means that the board will have to create a direct data integrity channel to the audit and risk committee and treat the unstructured ecological data itself as risk.

Explainability will allow the board to interrogate rather than submit to the recommendation of the AI model (Rudin, 2019). Just as regulators now police "AI-washing" of financial disclosures (Arnold & Porter, 2024; DLA Piper, 2025), the board will have to police "regenerative washing" of net-positive claims that come from an algorithm without any independent validation. Fiduciary duties cannot be delegated to an algorithm. Once AI outputs are shaping the ecosystem outside of the firm, the output becomes non-linear and potentially irreparable, requiring additional controls, including independent scientific validation of the claims before being presented to the board.

Regulatory-Mapping Capacity: Localising Regeneration in Malaysia and ASEAN

Malaysian industrial policy already requires economic models to be "restorative or regenerative by design" (MITI, n.d.; KPKT, 2024), a policy category conventional Western-configured RegTech platforms do not capture. As Section 2.3 shows, this is not a Malaysia-only mapping problem. The platform must also reconcile Singapore's taxonomy-linked targets, Thailand's sector-based BCG plan, Indonesia's rolling roadmap, and the Philippines' audited statutory scheme, four structurally different instruments at different points on the aspiration-to-obligation spectrum. Effective governance stacks must encode this regional regulatory taxonomy and its jurisdictional variation directly into their mapping engines rather than folding it into a generic sustainability tag.

Synthesis: A Regenerative Accountability Matrix

Table 1 sets the compliance-era baseline against the regenerative threshold this paper proposes, bounded by ASEAN and Malaysian institutional conditions.

Table 1. Board-level RegTech readiness reframed for regenerative accountability

Dimension	Compliance-Era Baseline	Regenerative Threshold	ASEAN/Malaysian Condition	Boundary
Data Governance	Board as data consumer of ESG-standardised inputs (GRI, SASB, TCFD, ISSB)	Ecological-materiality data (biodiversity, material flows) with no equivalent standard; lineage tracking beyond financial/ESG data	Concentrated ownership can silo the socio-ecological data a regeneration claim depends on.	
Algorithmic Explainability	Layer-decomposed explainability to avoid AI-washing liability	Higher threshold against regenerative washing: Unverifiable net-positive claims lack disclosure infrastructure.	Institutional AI literacy limits may increase reliance on vendor-generated regeneration scores.	
Control Ownership	Independent algorithmic audits; human-in-the-loop charter protocols	Regenerative-impact audit extending to the underlying restoration claim, often irreversible and extra-firm	CA 2016 s.213 non-delegable director liability sharpens the accountability question.	
Regulatory Mapping Capacity	Maps GRI/SASB/TCFD/ISSB baselines, largely Western-configured	Must encode "restorative or regenerative by design" as a distinct policy category	MITI, KPKT (2025–2035) and the ASEAN Circular Economy Framework (2021) are unmapped by Western-baseline platforms.	

Operationalising the Regenerative Fiduciary

The creation of the “regenerative fiduciary” role does not have to wait for changes in legislation. Even while it is up for discussion whether the Companies Act 2016 s.213 should be amended, boards can make their moves independently with charter revisions, committee mandates, and governance practices. The idea behind the regenerative fiduciary duty lies in the implementation of the existing obligation of directors to act in good faith into a much more extended time perspective in terms of the socio-ecological well-being of the region rather than short-term maintenance of the financial position of the company, thus switching from passively measuring ESG

impact to proactively assessing the contribution of a company to the socio-ecological systems of the region. There are three main ways to do that right away.

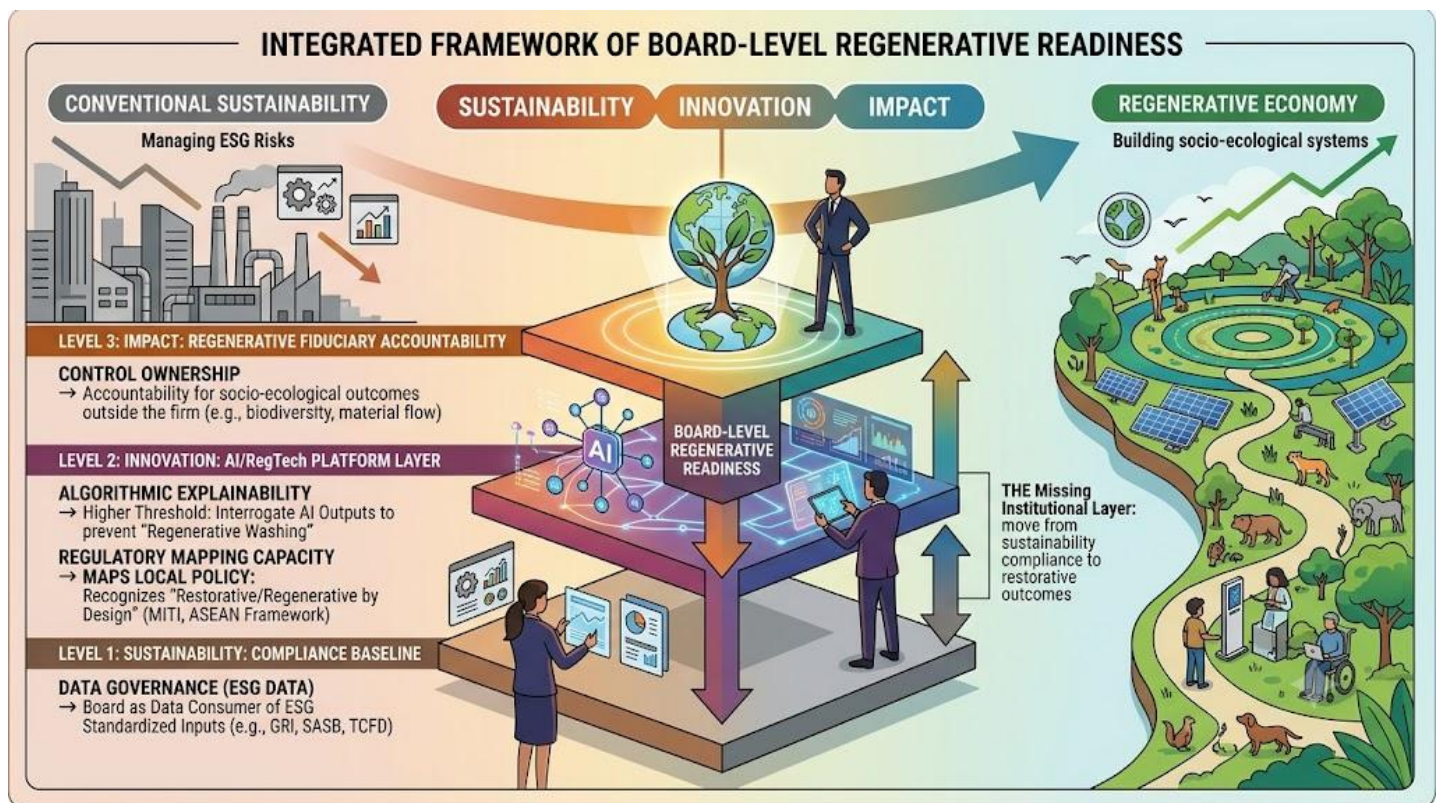


Figure 2. Integrated framework of board-level regenerative accountability. The three readiness dimensions (data governance, algorithmic explainability, and regulatory mapping) form the diagnostic base; control ownership at the impact tier is where readiness converts into accountability.

Toward an Integrated Model: Sustainability, Innovation, Impact

As shown in Figure 2, the structure consists of three layers. Readiness is established on the layer of sustainability. Environmental, social, and governance risk disclosure is a necessary tool for regulatory purposes, but it is focused on avoiding a negative effect on the ecosystem, not regeneration of the environment. Innovation is the AI/RegTech layer with AI analytics, system dynamics models, and digital product passports included in the decision dashboard of the board to examine resource flows and interdependence within ecosystems. Impact is a regenerative fiduciary responsibility – the layer that turns technical readiness into legal and ecological responsibility. This connection between all three layers is what fills the gap.

Propositions for ASEAN and Emerging Markets

These five propositions can be used for empirical examination as the use of AI becomes more prevalent in regional boardrooms. P1 (Data Quality and Claim Credibility). Boards that use governance platforms with untested ecological data pipeline are more prone to making false claims of being net positive than boards that use tested pipelines. P2 (Explainability and Risk of Washing). Reduced algorithmic explainability of AI-based ecological metrics increases the risk of regenerative washing to emerge during independent governance reviews. P3 (Control Ownership and Legal Liability). Boards that operate in strict liability jurisdictions (e.g., Malaysian Companies Act 2016 s.213) are more prone to adopting controls over AI-based recommendations than boards working under the business judgement rule. P4 (Regulatory Mapping). Governance platforms incorporating region-specific frameworks (e.g., MITI/KPKT) have lower compliance gaps compared to platforms that solely utilise Western ESG frameworks. P5 (Composite Readiness and Performance). High composite readiness for all four reframed aspects is related to low frequency of disclosure restatements and governance failures in sustainability claims.

DISCUSSION

Tensions and Boundary Conditions

Tensions follow logically from the design of the framework itself and not simply by virtue of the over-claiming accusation; an initiative to raise the bar on accountability without accounting for the cost of raising the bar would itself fall into over-claiming.

First, there are the legal tensions, especially in regard to extending fiduciary duty to outcomes beyond the corporation that are nonlinear and ecological (Section 4.3). Such an extension to fiduciary duty conflicts with the long history of the business-judgement rule and its deference to good faith business judgements made by directors. Regenerative fiduciary duty could be interpreted as an aspirational goal with no teeth or one so rigid that the traditional protection of the business judgement rule would be impossible to apply.

The second type is the distributive one, the higher accountability threshold will be easiest to fulfil by well-capitalised companies who are capable of conducting their own scientific reviews and utilising high-tech platforms such as RegTech, while the most difficult ones will be for the smaller firms owned and controlled by families, which is typical for the ASEAN business environment which this paper discusses. Unless specifically designed for that purpose, this framework would perpetuate just this very advantage of the concentrated ownership. The regional comparison of Section 2.3 has already recognised it as a governance problem, not the solution.

The third is scientific-ecological materiality. There is a legitimate dispute among ecologists regarding what constitutes a verified positive outcome for biodiversity or a particular ecosystem, not merely that there is a lack of standardisation when it comes to reporting on corporate claims. The data governance threshold defined in Section 4.1 assumes an element of scientific consensus in respect of ecological measurement, which is simply not there for every claim that might come out of a board meeting in the future. Some regenerative claims will continue to be legitimate disputes, even where a board has followed all the recommendations outlined here.

The fourth is behavioural, closer examination of net-positive claims may drive the boards away from making any restorative claims to avoid the risk of a regenerative-washing finding and the phenomenon known as greenhushing, which has already been observed in relation to increased ESG disclosure liability. A framework designed to increase accountability may end up driving out any ambition to pursue such claims. None of these challenges invalidates the argument about the need to move from readiness to accountability. They simply highlight the areas where propositions set out in Section 6 have to be tested.

Implications

Empirical verification is needed for this conceptual framework through future studies and PRISMA-based reviews as evidence from the field accumulates. Directors should note that net-positive claims have much higher auditability requirements than traditional ESG reporting, and boards should confirm AI governance-platform transparency before these indicators are communicated to the market. RegTech developers will find that standard Western templates are not enough, since regional policy frameworks, such as the ASEAN circular economy framework, must be built into the compliance engine, rather than added on later. Regulators should match government mandates for regenerative industry with guidance on using AI to support board decision-making and on how to validate the governance software that boards use, and, per Section 7, with proportionate compliance pathways so that the accountability bar is not just cleared by large firms.

Limitations

As a conceptual synthesis rather than an empirical or systematic review, this framework requires systematic empirical validation using primary data on board-level regenerative-AI integration across ASEAN, which remains scarce. Restricting the search to English-language publications may exclude relevant regional scholarship. The two constructs introduced here, regenerative washing and the regenerative fiduciary function, are proposed rather than established terminology and require further conceptual and operational refinement

before empirical use. The distributive, scientific and behavioural tensions raised in Section 7 are, at this stage, reasoned conjectures rather than demonstrated effects.

CONCLUSION

There is a need for the integration of technology, policy, and governance in a regenerative economy, and policy seems to be the furthest ahead of the two in the case of Southeast Asia. The industry is asked to regenerate, but the board continues to be assessed based on the least damage caused. As has been discussed in this paper, this can only be regarded as an accountability gap and not a data standardisation gap. Being ready to manage the platform does not imply being accountable for the promises made through the platform. Regenerative claims review and audit through independent mechanisms is currently available, provided the distributional and behavioural risks highlighted in Section 7 are being designed around rather than ignored. The five hypotheses in Section 6 are meant to put forward an argument that can be tested. That the Malaysian government's mandate to become "restorative or regenerative by design" provides the ideal setting for such testing cannot be denied.

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