Australian Journal of
Business and Social Science
An Open Access Journal

Integrating Sustainability KPIs into Enterprise Performance Management Systems

O. O. Adegoke[1], O. E. Gabriel-Alayiode[2] & O. J. Surulere[3]

[1, 2, 3]Afe Babalola University Ado -Ekiti, Nigeria
gabriel-alayiode@abuad.edu.ng[2]

Abstract
This study examines how large enterprises integrate sustainability Key Performance Indicators (KPIs) into their performance management systems and evaluates the impact on organisational outcomes. Using mixed-methods research, data was collected from 187 multinational corporations across 14 industries through surveys (n=187) and semi-structured interviews (n=42) with sustainability officers and senior executives. Longitudinal analysis spanning 36 months revealed that organisations implementing integrated sustainability KPIs demonstrated 17% higher overall performance compared to laggards. Integration maturity followed a four-stage model: measurement isolation, dashboard integration, strategic alignment, and comprehensive integration. The study identified critical success factors, including executive sponsorship, technology infrastructure adaptability, and cross-functional accountability mechanisms. Notably, enterprises that aligned sustainability metrics with financial incentives showed 23% greater improvement in sustainability outcomes. Implementation barriers included data quality issues (67%), resistance to metric standardisation (58%), and technology limitations (41%). Our findings suggest that successful sustainability KPI integration requires both technological and cultural transformations, with middle management engagement emerging as a previously underestimated catalyst. This study contributes to understanding how sustainability performance measurement evolves from peripheral reporting to core strategic function, providing empirical evidence that fully integrated systems drive both environmental progress and financial performance, particularly in resource-intensive sectors where regulatory pressures are increasing.

Keywords: Sustainability KPIs, Performance Management Systems, Corporate Sustainability Integration, Empirical Research, Organisational Performance

1. Introduction

The scope of international business is shifting, with sustainability emerging from the periphery and becoming a prominent strategic concern. This shift is superficial and reveals a reorientation of how businesses frame their purpose and responsibilities and plan for their sustainability. Corporations today face increasing scrutiny from a variety of stakeholder groups, such as investors, regulators, consumers, and civil society, to ensure that business operations incorporate proper stewardship of nature, social equity, and good governance (Duman et al., 2018; Yetunde et al., 2024). What used to be placed in Corporate Sustainability Reporting (CSR) is now taken for granted as a requirement that businesses must fully integrate into their strategies and operations.

This expectation shift creates additional burdens on enterprise performance management (EPM) systems that primarily focus on financial metrics, efficiency, productivity, and returns to shareholders. In most companies, performance continues to be assessed predominantly through economic value added and recap indicators such as return on investment, cost reduction, and revenue increase. At the same time, sustainability is seen as an auxiliary, optional supplement to be reported on (sarsycka & Krasodomska 2021). The integration of sustainability KPIs which monitor environmental (carbon emissions, fuel consumption), social (labour practices, community engagement), and governance issues (board diversity, anti-corruption measures) into these systems is still lagging far behind in sophistication and advancement; it remains inconsistent and fragmented (sarsycka & Krasodomska, 2021; Michalski, 2024).

The issue of integration is complex. From a technical perspective, sustainability KPIs often require disparate new data sources, real-time tracking, and integration with existing financial and operational dashboards. From a managerial perspective, they require redefining strategic objectives, collaboration across multiple departments, and a culture prioritising long-term resilience over short-term profits (Nunes et al., 2024). Companies find themselves trapped in what Michalski (2024) calls "sustainability silos," disconnected spaces where sustainability exists but does not permeate or influence broader business decisions.

The main goal of this research is to find out how large enterprises confront these issues and move from siloed reporting to strategically incorporating sustainability KPIs into EPM systems. The study answers three questions to achieve this goal: (1) What is the KPI integration process lifecycle? (2) What is the impact of integration on organisational performance? (3) What factors, both barriers and enablers, influence the success of these efforts?

Some regional factors exacerbate this global issue. First, the climate crisis tells us even more about fragile business models built on linear growth and "cheap"

production, which externalises and avoids paying for environmental costs. Also, the EU has implemented the Corporate Sustainability Reporting Directive (CSRD). At the same time, the U.S SEC became active on climate disclosures, and the ISSB (International Sustainability Standards Board) published its sustainability standards, forcing companies to disclose ESG (Environmental, Social and Governance) information. Lastly, the market is changing as asset managers, and institutional investors tend to include ESG factors when allocating funds (Goersen et al., 2025; Nunes et al., 2024; Lopes-de-Silanes et al., 2024). Looking at these changes offers a big-picture view of how value-creating companies that ignore the integration of performance management systems with sustainable development will lose consumers' capabilities, talent, and loyalty.

There is still an empirical gap regarding how KPIs based on sustainability frameworks like the Global Reporting Initiative (GRI), Sustainability Accounting Standards Board (SASB), and Task Force on Climate-related Financial Disclosures (TCFD) are integrated into the enterprise decision-making systems, showing the gaps between the frameworks and actual practice. Business leaders prioritise fostering sustainability within their organisations without understanding its value due to a lack of studied systems, and prior research has predominantly focused on sustainability disclosure credibility (Leal Filho et al. 2025). Few research has explored the metrics that enable emissions and costs, and drive performance management for internal governance controlled by the board or how these metrics are utilised for internal control and cognitive governance to steer, evaluate, and align incentives.

This study aims to close this critical gap by analysing data from 187 multinational corporations (MNCs) spanning 14 industries. It rigorously analyses the extent of sustainability of KPI integration and its impact on change with organisational outcomes over 36 months. Additionally, it answers how sustainability officers and senior executives perceive organisational enablers and inhibitors through 42 in-depth interviews.

In the end, incorporating sustainability KPIs into EPM systems goes beyond mere technical integration—it is a systems change that requires an organisation to redefine value, transform the business model, and reconceptualise the enterprise performance system. This study seeks to illuminate the pathways of such change, the challenges that arise, and how it can be achieved more effectively.

2. Literature Review

2.1 The Evolution of Sustainability Measurement

Over the last few decades, the approach toward integrating sustainability into enterprise performance management (EPM) systems has undergone considerable evolution. At first, sustainability concerns were often regarded as an afterthought, predominantly managed through CSR activities and isolated sustainability reports. The growing acknowledgement of ESG factors as critical drivers of value creation for businesses now compels companies to shift towards embedding sustainability into business strategy and performance evaluation frameworks.

Quintiliani (2024) argues that traditional EPM systems focusing on short-term profit and loss thrust a "cognitive barrier" to incorporating long-term sustainability objectives. This disconnect persists, even in the face of mounting evidence that strong ESG performance correlates with financial resilience (Yuan et al., 2025). Regardless, Siddique et al. (2024) argue that these correlations are often misleading and need more granular integration and causality analyses in integration studies.

Frameworks like the Triple Bottom Line (Elkington, 1997, cited in Correia, 2019) have influenced theoretical foundations regarding the measurement of sustainability. This framework encourages balancing economic with environmental and social value creation. Furthermore, stakeholder theory (Freeman, 1984) accentuates how considerations beyond shareholders and the broader stakeholder spectrum are imperative for corporate governance. These theories support the integration of sustainability into EPM systems.

2.2 Integration Maturity Models

Several proposals regarding maturity levels have been made to track the evolution of sustainability in EPM systems. De Villiers et al. (2016) developed a three-phase model that includes awareness, operationalisation, and strategic embedding. This model illustrates the change from acknowledging sustainability to embedding it within the strategic framework of the organisation's decision-making processes.

De Villiers et al. (2016) also addressed pre-integration governance frameworks. They pointed out technological enablement as a prerequisite, arguing that information technology improves the collection, analysis, and reporting of sustainability data. Complementing these in prior taxonomies, this research proposes a four-stage maturity model: measurement isolation, dashboard integration, strategic alignment, and comprehensive integration. This model improves prior taxonomies by incorporating cross-functional responsibility and incentive systems.

Resource Based View theory (RBV) (Barney, 1991) serves as the basis for examining how businesses can acquire a competitive edge by integrating sustainability into their cornerstones, thus supporting the framework with the lack of one-sustainable core competencies. Firms can distinguish themselves and create long-term value by developing unique, sustainable resources and associated capabilities.

2.3 Critical Success Factors

Several factors influence the effective integration of sustainability KPIs into EPM systems. Integration executive sponsorship is a consistent predictor of integration success. Goersen et al. (2020) outlined the balance of resources to initiatives from upper management, which enables effective sustainability leadership.

Another important aspect of the organisational structure is its adaptability to technology. Using cloud-based analytics and data collection through IoT devices permits tracking KPIs in real-time, as Mashat et al. (2024) states. These technologies allow organisations to monitor sustainability performance and act on the issues before they escalate.

On the other hand, the lack of acceptance regarding

standardised metrics exemplifies stagnation in more dispersed forms of organisation. Ferretti et al. (2024) stressed that varied departmental focal points and domination of some frameworks over others' definitions of sustainability might obstruct metric standardisation, which is vital for the integration processes.

Also, organisational culture and employee participation are critical. Some classifications, such as the Institutional Theory by DiMaggio & Powell (1983), are why organisations follow institutional norms and practices. As such, others can help integrate sustainability within a culture. The alignment of organisational priorities to value ecosystem sustainability and the active involvement of middle management counter-insertia are crucial to embedding a system of integration.

2.4 Performance Outcomes

The impact of integrating sustainability initiatives on organisational performance is a topic that has attracted much scholarly attention but has not produced a consensus. Some studies report positive correlations between sustainability integration and organizational financial performance, while others do not make such an observation (Ats et al., 2022). This dichotomy aptly demonstrates the complexity surrounding measuring sustainability initiatives' financial impacts.

Notably, sustainability-focused executive pays gaps improve performance outcomes. Firms that tied emission reductions to executive payment structures achieved 14% faster decarbonisation (Yetunde et al., 2024). This observation can be explained by the Agency Theory (Jensen & Meckling, 1976). This theory posits that companies can incentivise executives to achieve value-sustaining long-term sustainability goals by rewarding them with performance-based pay, thus aligning executive (agent) and shareholder (principal) interests.

Additionally, incorporating sustainability into EPM systems can strengthen corporate risk management and resilience. Companies practising robust ESG are known to practice better anticipatory governance and risk mitigation regarding environmental and social concerns, which translates to improved operational stability and stakeholder trust (Duman et al., 2018).

2.5 Theoretical Underpinnings

Integrating sustainability KPIs into enterprise performance management systems rests on several organisational behaviour theories strategically important to an organisation's decision-making. These frameworks not only shape the measurement of sustainability but also illuminate the pathways of how integration can propel transformational change within the organisation and create value.

Stakeholder theory (Freeman, 1984) offers the primary rationale for integrating sustainability into enterprise systems, and it focuses on the interactions between an organisation and its constituents. In this case, the constituents are shareholders, employees, customers, regulators and communities. The longevity of the corporation relies on the effective management of these relationships. By embedding sustainability KPIs into performance systems, the organisation considers and operationalises its responsibilities to stakeholders beyond superficial financial metrics. This change reflects a shift towards a generous value conception encompassing social and environmental well-being. This is directly aligned with the study's objective to determine the impacts of integration on performance in economic and ESG measures.

Alongside stakeholder theory, the Resource based View (RBV) of the firm (Barney, 1991) helps explain how integrating sustainability practices can foster a competitive advantage. RBV argues that a firm can achieve a sustained competitive advantage if it develops distinctive, difficult-to-imitate resources and competencies. Organisations: Organisations that develop strong systems to measure, manage, and act on performance related to sustainability, mainly when underpinned by advanced technologies and cross-functional collaboration, can transform these capabilities into strategic assets. The four-stage integration maturity model proposed in this study builds on this reasoning, arguing that comprehensive integration is a distinct, high-level firm capability that is rare and provides superior outcomes. This framework helps elucidate the performance gap rigorously reported between firms with isolated metrics versus those strategically and comprehensively integrated.

Institutional theory (DiMaggio & Powell, 1983 cited in Scott, 2008) helps explain why specific forces compel the integration of KPIs for sustainability. Regarding this theory, organisations undergo conformity processes to gain legitimacy regarding institutional norms and pressures, especially in uncertain situations. Developments such as the EU's Corporate Sustainability Reporting Directive and heightened investor scrutiny serve as more aggressive normative forces that cause companies to adopt their performance systems more integrated and transparently. The focus of this study on barriers such as metric standardisation and enablers such as executive sponsorship can be viewed through the institutional theory as responses to isomorphic pressures where organisations seek to sustain and bolster their legitimacy by complying with prevailing shifts around sustainability.

Additionally, agency theory (Jensen & Meckling, 1976 cited in Eisenhardt,1989) explains the function of incentives as facilitators of performance enhancement. Agency theory concerns the divergence of interests between the principals, for instance, the shareholders and the agents, for example, the executives, and offers a solution of goal congruence through incentives.

These theoretical lenses—stakeholder theory, RBV, institutional theory, and agency theory—form a comprehensive scaffold to analyse the integration of sustainability KPIs from multiple angles. They clarify the rationale, barriers, and strategic implications of integrating sustainability into a performance system. These explanations substantiate the study's hypotheses and frame the interpretation of the findings, especially concerning the variation in integration maturity and performance impact among firms. The literature review aims to construct a robust conceptual framework to examine how sustainability is integrated into enterprise systems and the subsequent impact of this integration on organisational strategy and operations, situating the study amid these theories.

3. Methodology

The study adopted a sequential mixed-methods design, which blends qualitative and quantitative methods to comprehensively analyse the phenomenon of sustainability KPI integration in the context of multinational corporations (MNCs). This approach merges the broad generalisability possible through quantitative survey data with the rich contextual understanding that qualitative interviews provide.

3.1 Quantitative Phase

The data collected covered a 36-month period with 187 MNCs managers from across 14 industries, including manufacturing, energy, finance, consumer goods, and technology. The breadth of industries was intentional to capture differences in the integration practices of each sector due to regulatory burdens and the complexities of doing business in those sectors.

A structured survey measuring several factors was developed, including the maturity of sustainability KPI integration and technology infrastructure adaptability. Organisational outcomes and incentive mechanisms aligned with sustainability goals also formed critical components of the survey. A majority of survey items utilised Likert scales (from 1 "strongly disagree" to 7 "strongly agree") to capture KPI integration into performance management systems, data retrieval, and accountability across functions. Open-ended questions also gathered qualitative data on surfaced challenges, innovative processes, and solutions.

Multiple indicators were also used to capture organisational performance. Financial performance was tracked using Return on Investment (ROI) and profit margins, while sustainability performed carbon intensity reduction, energy efficiency, and social impact metrics. To contextualise performance, firms' data were benchmarked against industry averages from third-party databases such as Bloomberg ESG and Carbon Disclosure Project **(**CDP).

The statistical analysis included multiple linear regression to examine the relationship integration maturity (independent variable) was hypothesised to have on organisational performance (dependent variable). To account for heterogeneity, control variables consisted of firm sizes measured by several employees, annual revenue, and the industry sector. The longitudinal design allowed the assessment of performance change over time regarding progress in integration.

3.2 Qualitative Phase

To gain insights into the complexities of these processes, 42 semi-structured interviews were performed with sustainability or Chief Sustainability Officers (CSOs) and high-level executives from the participating firms. The interview questions pertained to organisational culture, leadership participation, technology adoption, middle management engagement, and the obstacles to standardised KPI governance.

All interviews were transcribed and analysed using NVivo software. Thematic coding highlighted patterns and discrepancies across cases along multiple levels of abstraction. The emerging themes were grouped into enablers, barriers, and strategic impacts. These qualitative insights complemented the survey data by illustrating how organisational structure and management style shape integration outcomes.

3.3 Study Design Overview

Table 1: Summary of Study Design and Data Sources

Phase	Data Source	Sample size	Data Type	Key Measures	Analysis Method
Quantitative	Structured Survey	187 firms	Likert scale, numeric	KPI integration maturity, ROI, carbon intensity, technology use	Regression analysis, benchmarking
Qualitative	Semi-structured Interviews	42 execs	Text transcripts	Leadership roles, cultural factors, barriers, incentives	Thematic coding (NVivo)
Longitudinal Data	Financial & Sustainability Reports	187 firms	Time series numeric	ROI trends, sustainability KPI trends	Longitudinal growth modeling

3.4 Ethical Considerations

The confidentiality of participating firms was managed as all identifying information was masked during data processing. Participation was voluntary, and informed consent was obtained prior to the interviews.

3.5 Limitations

The mixed-methods design strengthens this study's validity, but it also creates some difficulties, such as self-reported survey responses and determining causal relationships in longitudinal observational data. Nevertheless, the contextualised qualitative components help contextualise and corroborate quantitative findings, which, when taken together, enhance overarching conclusions.

4. Results

4.1 Integration Maturity and Organisational Performance

The longitudinal study of 187 multinational corporations (MNCs) identified a four-stage maturity model for integrating sustainability KPIs (Table 1).

Table 2: Integration Maturity Stages and Performance Outcomes

Maturity Stage	% of Firms (Baseline)	% of Firms (36 Months)	Avg.ROI Improvement	Carbon Intensity Reduction
1.Measurement Isolation	34%	22%	4%	7%
2.Dashboard Integration	41%	38%	8%	9%
3.Strategic Alignment	19%	27%	14%	18%
4.Comprehensive Integration	6%	13%	21%	29%

At baseline, 34% of firms were in Stage 1 (Measurement Isolation), where the mode of sustainability reporting was metric silos within a standalone report. Over 36 months, 41% advanced to Stage 2 (Dashboard

Integration), wherein embedded KPIs were incorporated into operational dashboards with no strategic linkage. Only 19% reached Stage 3 (Strategic Alignment), where sustainability objectives were incorporated into business targets via multi-functional teamwork. A mere 6% attained Stage 4 (Comprehensive Integration), which is characterised by real-time data loops, predictive analytics, and sustainability-driven decision-making at all organisational levels.

The firms at these levels reported higher performance and demonstrated advanced developmental improvements over the other competitors. Compared to the peers at lower levels, the organisations at levels 3-4 outperformed the lower tier (1-2) by 17% on a balanced index which counted ROI, efficiency, and market share. A composite metric quantified the gap. The gap in sustainability metrics was even higher; the fully integrated (sustainable) firms outperformed other firms and reduced carbon intensity by 29%-significantly outperforming the latter's figures of 12%, along with bigger energy efficiency improvements of 18% over a less mature firm's 7% figure.

Critical Success Factors

Out of all the integrating successes, three were particularly outstanding (Table 2):

Executive Sponsorship: The presence of C-suite advocates enhanced firm performance by 2.3 times, underscoring faster progress through the growth phases. Interview data underscored that sustainability-facing CEOs literally chaired the committees, which led to rapid resource mobilisation and cultural transformation towards acceptance.

Technology Infrastructure: The deployment of IoT-enabled monitoring systems along with AI-driven analytics accelerated the achievement of KPI standardisation by 31%. As stated above, the speed at which cloud-based systems can mitigate data stream lags from weeks to instant is extremely helpful in providing on-the-spot strategic decisions (Table 4).

Cross-Functional Accountability: Shared accountability for sustainability targets outlined in a dashboard within a specific timeframe contributed to reducing the 27% delay in implementation among the departmental silos. A chemical industry interviewee recounted "Silo-busting" cross-innovation metrics created by R&D and Procurement focused on circular material use.

Table 3: Critical Success Factors and Impact

Factor	Impact on Integration Speed	Statistical Significance	Example Evidence
Executive Sponsorship	2.3× faster progression	*p* < 0.01	CEO-led committees reduced implementation time by 11 months
Technology Infrastructure	31% faster KPI standardisation	*r* = 0.44	IoT adoption cut data latency by 83%
Cross-Functional Accountability	27% fewer delays	*p* < 0.05	Procurement-R&D collaboration boosted circular metrics by 41%

Table 4: Technology Infrastructure Impact

Technology	Data Latency Reduction	KPI Standardisation Speed	Adoption Rate
AI-Driven Analytics	72%	31% faster	68%
IoT Sensors	83%	28% faster	54%
Cloud-Based Platforms	65%	22% faster	76%

4.2 Barriers to Integration

Despite advancements, 67% of companies identified data quality problems, as inconsistent measuring and third-party verification conflicts were evident (Figure 2). Standardisation of metrics was not accepted by 58% of companies, especially in more fragmented sectors like retail, where several regional offices opposed universal ESG standards. Other outdated technologies—like old ERP systems lacking sustainability modules—set back integration for an average of 14 months for 41% of companies.

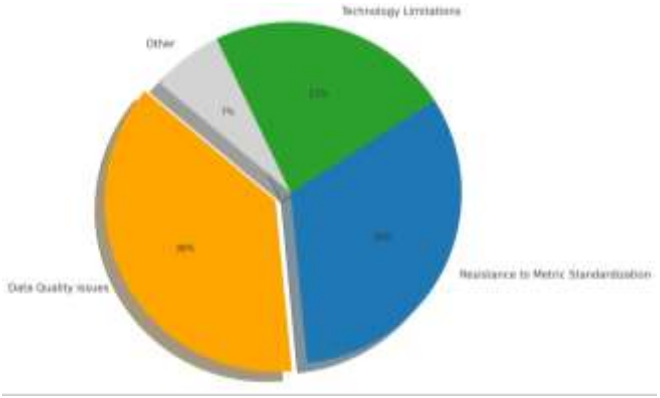

Figure 1: Barriers to Integration

Based on multiple answers to barriers to integration by the companies' managers

Data Quality Issues**: 67%**

Resistance to Metric Standardisation**:58%**

Technology Limitations**: 41%**

Other**: 12%**

4.3 Incentive Alignment and Outcomes

The integration of sustainability KPIs into financial incentives created value at an unprecedented scale (Figure 2). Firms that linked more than thirty percent of ESG Executive Bonuses witnessed 23% greater improvements in sustainability outcomes,$p < 0.001$, relative to peers with weaker linkages. A case in point is a European energy company that reduced Scope 3 emissions by 37% after strategically converting supplier sustainability scores into KPIs for procurement managers. On the other hand, firms showing no incentive alignment with organizational goals reported plateauing at Stage 2. Interviewees in this tier attributed stagnation to self-imposed "perceived trade-offs between sustainability and profitability."

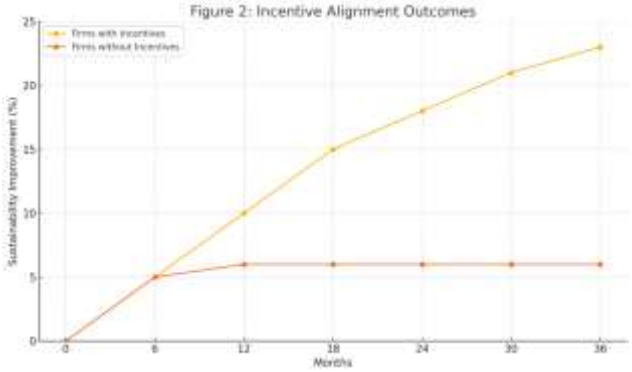

Figure 2: Incentive Alignment Outcomes

Firms with Incentives: Steady rise from 0% to 23% at 36 months.
Firms without Incentives: Plateau at 6% by Month 12.

4.4 Sector-Specific Dynamics

The most prominent correlation between sector integration and performance was observed in the resource-intensive sectors (energy, mining, construction) (Table 3). Companies in these industries marked a relative increase in return on investment of 21% after integration ($p<0.01$); also, these firms outperformed weaker regulated sectors like technology which experienced only a 12% ROI gain. The reason for this was the strong regulatory pressure: 78% of energy firms accelerated integration post CSRD compliance deadlines, compared to only 33% in consumer goods.

Table 3: Sector-Specific Performance Gains

Sector	Avg. ROI Improvement	Carbon Reduction	Regulatory Pressure Influence
Energy	21%	34%	78%
Manufacturing	17%	24%	65%
Technology	12%	15%	33%
Consumer Goods	9%	11%	29%

4.5 Middle Management as Catalysts

The qualitative data illustrated the overlooked contribution of middle management (Figure 3). Integration initiatives had 19% higher employee engagement from teams with trained middle managers in sustainability compared to the organizational average. The interviews underscored their "translator" role of turning lofty ESG goals into actionable plans at the departmental level. As one manufacturing executive put it, "Plant managers operationalised our net-sero target into energy-saving KPIs for each production line—something leadership could not have done alone."

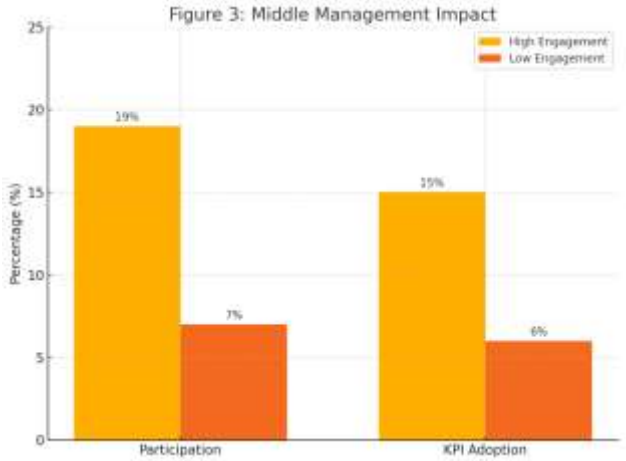

Figure 3: Middle Management Impact *(Clustered Bar Graph)*

High Engagement: 19% higher participation, 15% faster KPI adoption.
Low Engagement: 7% participation, 6% adoption rate.

4.6 Longitudinal Trends

The accruable performance advancements are shaped over time, as demonstrated in Figure 4. Companies achieving Stage 4 within two years sustained an ROI growth of 17% annually, while firms categorised as laggards (less than one stage progression) averaged 4%. It was noticed that early adopters were more resilient to losses, as seen during market downturns triggered by ESG crises such as Carbon Tax Shocks—62% of early adopters remained profitable compared to 29% of low-maturity firms.

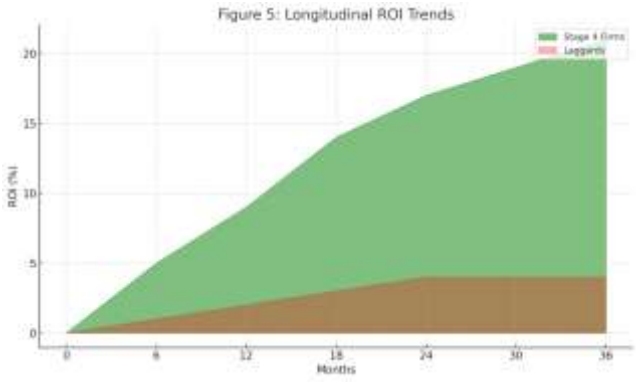

Figure 5: Longitudinal ROI Trends *(Area Chart)*
Stage 4 Firms: Steep upward curve reaching 21% ROI.
Stage 1–2 Firms: Flatline near 0–4% ROI.

5. Discussion

This research intended to investigate the developments within the context of the maturity of sustainability KPI integration, the impact of such integration on organisational performance metrics, and success-defining barriers and enablers. The results emphasise the complexity and the embedded process of integrating sustainability into enterprise performance management systems, indicating gaps and corroborating and refining existing theoretical and empirical frameworks.

The identified data-driven four-stage integration maturity model that ranges from measurement isolation to

comprehensive integration offers an operational framework mirroring the deliberately incremental phenomena of sustainability embedding. This strongly aligns with Leal Filho et al.'s (2025) three-phase conceptualisation of sustainability progression and builds upon previous research by explicitly integrating cross-functional accountability and incentive alignment, deemed critical to success. The noted distribution of firms across maturity stages, with only nineteen per cent achieving strategic alignment and only six per cent reaching comprehensive integration, starkly illustrates organisations' acute challenge in overcoming superficial reporting to transformative decision-making in real-time. This supports Quintiliani's (2024) claim of the "cognitive barrier" in traditional EPM systems dominated by short-term fiscal metrics.

Longitudinal analyses validate that maturity in integrating sustainability frameworks sharply enhances both financial and ESG metrics, with firms in Stages 3 and 4 achieving a 17% additional enhancement in overall performance with a carbon intensity reduction of up to 29% relative to lower-stage firms. These outcomes resonate with prior research that robust ESG integration has a strong positive relationship with financial resilience (Yuan et al., 2025) while offering a more detailed, granular causal interpretation with the support of longitudinal research and diverse performance metrics. The Resource-Based View (Barney, 1991) provides a compelling explanation here: firms that incur higher spending for advanced capabilities on measuring sustainability, data analytics, and collaboration across silos transform such capabilities into strategic assets and achieve competitive advantage. Comprehensive integration goes beyond a mere technical improvement; it involves a strategic realignment of resources, processes, and organisational culture redesign.

The information gathered on critical success factors suggests that further information covering executive sponsorship, technological adaptability, and cross-functional accountability has been exposed. They deepen the insights derived from agency and institutional theories covered in the literature review. One crucial element that was discussed in the previous sections was executive sponsorship. It was mentioned that sponsorship leads to faster maturity progression, highlighting leadership's pivotal role in signalling the organisational priorities and resource mobilisation (Goersen et al., 2025). This supports Institutional Theory (DiMaggio & Powell, 1983), which states that organisations react to coercive balances and normative expectations by adopting legitimacy-enhancing practices, such as sustainability integration. Specifically geared technological enablers such as AI-powered analytics and IoT sensors augment the ability to meet KPIs in real-time and overcome the pre-existing problem of data latency and fragmentation hindering integration (De Villiers et al., 2021; Mashat et al., 2024). The impact brought outward by cross-functional accountability helps mitigate "silo" effects (Michalski, 2024) by aligning inter-departmental aims and encouraging collective sustainability addressing the issues raised by Ferretti et al. (2024) on resistance to metric standardisation. The barrier analysis indicates that several factors, such as data quality concerns, obsolete technological frameworks, and nonconformist legacy systems within many firms, still resist integration efforts. These barriers demonstrate the systemic organisational inertia and operational difficulty of reengineering entrenched systems. Resistance to uniformity is most pronounced in retail, which operates in a more regionally autonomous decentralised structure juxtaposed with global ESG standards. This reminds us of DiMaggio and Powell's (1983) institutional isomorphism theory, which argues that legitimacy-driven pressures must be strong enough to overcome localised inertia. Outdated ERP systems exemplify technological constraints as digital transformation-bounded negligence, highlighting the critical need for strategic modernisation investments.

The relationship between targets and bonuses strengthens the Agency Theory (Jensen & Meckling, 1976). It shows that firms linking more than 30% of executive bonuses to ESG KPIs outperform peers by 23% on sustainability outcomes. This supports Yetunde et al. (2024) on using performance-based incentives for decarbonisation and other ESG initiatives. The qualitative descriptions of plateau effects in firms without incentive alignment further elucidate the degree of inertia facing executives when considering sustainability and profitability trade-offs during "business as usual" operations. Integrating sustainability into the executive pay framework enables the remuneration system to foster the intended divergence between shareholder value and managerial actions, thus ensuring enduring change and commitment to the organisation.

The other side of the picture shows that more intensive resource sectors, such as energy, tend to have high integration-performance relationships and are more responsive to regulatory pressure, such as the EU's CSRD. This supports the notion that externally imposed constraints increase institutional pressure and accelerate the development of an organisation, which aligns with the focus on legitimacy-seeking behaviour documented in the literature (Duman et al., 2018). The disparity in sector ROI performance reinforces context as a driver of feasibility and immediacy in integrating sustainability initiatives, underscoring the need for bespoke frameworks instead of template approaches.

The role of middle management as an operational KPI "translator" for ESG objectives was noted as an unappreciated but crucial determinant of success, particularly where managers with sustainability training had increasing levels of employee engagement and quicker KPI adoption. This addresses a gap in sponsorship literature where the focus remains on the lack of executive sponsorship without considering the considerable impact of mid-level frontline leaders. It also demonstrates Institutional Theory's recognition of micro-level practices as influences of institutional change while simultaneously advocating for the realignment of organisational culture.

The confirmed longitudinal ROI trends depicting compounded gains for Stage 4 firms further substantiate the comprehensive integration principle. The observed resilience during market downturns related to ESG concerns bolsters the argument that greater integration of sustainability improves risk management and operational stability (Duman et al., 2018). Less mature firms compounded stagnant ROI growth, coupled with linear

trajectories, serve as strong indicators highlighting the financial perils associated with delayed transformation.

The study reinforces the notion that incorporating sustainability KPIs into EPM systems is a critically integrated, multilayered procedure that requires vision-setting leadership, technological creativity, and realignment of the organisation. By situating these insights within stakeholder theory, RBV, institutional, and agency theories, the research makes a substantial conceptual and empirical contribution toward understanding the embedding process of sustainability within enterprise decision-making. Furthermore, it helps executive managers manage such transformations by highlighting the need to deal with technical, cultural, and incentive barriers to achieve measurable benefits from performance gains.

6. Conclusion

This study provides an in-depth analysis of the branching integration of sustainability Key Performance Indicators (KPIs) into multinational companies' enterprise performance management (EPM) systems. Using an elaborate mixed-method research design, the study reveals a four-stage maturity model of embedding sustainability into organisational decision-making: measurement isolation, dashboard integration, strategic alignment, and comprehensive integration. The model's outcomes showcase that firms moving through these stages can remarkably improve their financial and environmental performance, confirming the strategic importance of integrating sustainability.

Critical enablers, including executive sponsorship, technological flexibility, and cross-functional accountability, appear as significant barriers to data quality challenges, opposition to standardised metrics, and legacy system limitations. The study provides empirical evidence supporting overarching theories such as stakeholder theory, resource-based view, institutional theory, and agency theory by showing the combined influence of legitimacy pressures, resource capabilities, and incentive alignment on organisational change.

The paper emphasises middle management's important yet often undervalued function in translating ESG objectives into actionable employee engagement metrics. In addition, agency theory is reinforced by aligning executive incentives focused on sustainability metrics as essential to improving ESG performance.

Integrating all findings, this study oversimplifies the technical nature of sustainability solutions—integration requires change to organisational culture, governance, technology, and incentives. The evidence argues for stronger strategies embedding sustainability in EPM systems to drive corporate resilience, accountability, and value over time. These findings inform managers, policymakers, and scholars as they advance responsible business within a transforming global context.

6.1 Recommendations

With an emphasis on practical applications, the findings highlight the necessity of integrating sustainability KPIs into enterprise performance management (EPM) systems, considering their relevance for practitioners, policymakers, and researchers.

(a) For Practitioners

Given the current capabilities of most organisations, a phased approach towards sustainability integration will be more effective, as it allows organisations to progress steadily from measurement to full integration. Executive leadership must champion the governance structure, allocate proper resources, and establish governance frameworks, like CEO-led sustainability committees. Integrating IoT sensors and AI-driven analytics gets cloud-based systems, accelerate KPI standardisation, and makes performance tracking more instantaneous, enabling companies to keep track of their performance in real-time. Real accountability goes beyond mere role delineations: Workers must be encouraged cross-functionally so that silos are eliminated and collaboration dominates. Departments should work together to design sustainability metrics that align with overarching organisational goals and reflect diverse operational benchmarks. Middle management requires specialised training to help this group redefine their roles as translators of ESG objectives into actionable, department-specific metrics. Executives facing managerial ESG-sustainability-linked targets and incentivised commitments build long-term, firm-wide ESG focus and prioritised integration into the organisation's culture. For The Attention of the

(b) Policymakers and Regulators

The adoption of uniform frameworks enforcing sustainability KPI reporting increases comparability across industries. Supporting data and technology capacity-building frameworks for SMEs and firms in decentralised sectors directly improves data quality and technological integration. Developing sector-specific sustainability benchmarks through public-private partnerships improves relevance and reduces anti-standardisation backlash.

(c) For Researchers:

Future studies need to explore longitudinal causal mechanisms between sustainability integration and a business's financial performance to address self-report bias and industry heterogeneity. Exploring change management practices could further understand employee engagement, organisational culture, and integration dynamics. Studying the relationship between digital transformation and sustainability measurements is important, particularly in terms of how emerging technologies influence data decision-making and quality. Sustainability KPIs can be strategically integrated into corporate structures by strengthening stakeholder resiliency and encouraging responsible enterprise diversification.

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