Navigating Sustainability Transitions in Emerging Economies: The Temporal Impacts of Environmental Innovations and the Role of Quality Management Systems

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Abstract

Environmental innovation plays a critical role in advancing sustainability transitions in agriculture. However, the implementation of such innovations often introduces short-term operational inefficiencies before delivering long-term environmental and economic benefits. Existing research primarily focuses on cross-sectional analyses of environmental innovation, overlooking the short-term complexities of its adoption, particularly in the agricultural sector. This study employs a multiple-case study approach to examine how agricultural firms navigate sustainability transitions and mitigate initial setbacks. Drawing on corporate responsibility reports from six agricultural firms in emerging economies, this research investigates the temporal effects of environmental innovation and the moderating role of Quality Management Systems in mitigating the transition challenges. This study contributes to the literature by bridging the gap between environmental innovation theory and its practical, short-term implementation challenges in agriculture. The insights provide policy recommendations for designing effective support mechanisms that encourage agricultural firms in emerging economies to sustain their commitment to environmental innovation, despite early adaptation costs.

Keywords: environmental innovation, sustainability transitions, quality management systems (QMS), multiple-case study, agriculture, corporate responsibility

1. Introduction

Agricultural activities play a critical role in global food security and economic development, but also significantly contribute to environmental degradation, emissions, and climate change (Tilman et al., 2002; Nesheim et al., 2015; IPCC, 2019). In response to escalating climate concerns and the need for sustainable development, the Food and Agriculture Organization of the United Nations (FAO, 2024) outlined a transformative agenda centered on three interrelated objectives: (1) sustainably increasing agricultural productivity and incomes, (2) adapting and building resilience to climate change, and (3) reducing and/or removing greenhouse gas emissions where possible.

Achieving these goals necessitates a paradigm shift in how agricultural firms operate. Central to this transformation is the integration of environmental innovations — technologies, practices, and systems designed to enhance resource efficiency and mitigate environmental impacts while maintaining or improving productivity (FAO, 2013, 2017). These innovations include precision agriculture, climate-smart practices, water-saving technologies, and renewable energy integration. While the long-term benefits of such innovations are widely acknowledged, their implementation is often fraught with operational complexity, technical uncertainty, and a lack of internal capabilities in emerging economy contexts (McKinsey & Company, 2022). As a result, firms may abandon these initiatives prematurely, missing out on their long-term environmental and economic benefits (Long et al., 2016; FAO, 2013, 2017).

These hurdles are particularly intensified during the transition period — the critical phase following the adoption of environmental innovations — when firms undergo organizational restructuring, experience temporary performance dips, and confront increased operational risks. Contrary to the dominant narrative in empirical literature that frames environmental innovation as a driver of immediate performance improvement, this study argues for a more temporal and dynamic perspective. Specifically, it contends that sustainability transitions are nonlinear processes wherein short-term inefficiencies, increased emissions, or even financial stress may precede the realization of long-term

environmental and economic gains (FAO, 2017; Sunar & Swaminathan, 2022). Recognizing this lag effect is vital for both scholars and practitioners seeking to understand the real-world implications of innovation-led sustainability efforts (Durach et al., 2023).

Amidst this complex transition landscape, this study explores the role of Quality Management Systems (QMS) in mitigating the transitional shocks that accompany innovation implementation. QMS Frameworks such as ISO 14001 provide structured, process-oriented approaches for implementing environmental innovations, ensuring compliance, and systematically tracking performance and embedding environmental performance within core operational practices (Ali et al., 2022; Johnstone, 2020). Firms with robust QMS are more likely to successfully institutionalize sustainability practices, reduce uncertainty, and navigate transitional inefficiencies with greater agility (Tari et al., 2012; Bravi et al., 2020).

This study, therefore, seeks to explore two interrelated research questions: (1) Do environmental innovations in agricultural firms within emerging economies lead to short-term adverse effects on performance and trigger transitional shocks? and (2) What role do Quality Management Systems play in buffering these shocks and facilitating effective, long-term sustainability transitions? By addressing these questions, the study contributes to a more nuanced understanding of the temporal dynamics of sustainability and highlights the strategic importance of institutional infrastructure in navigating transitions in resource-constrained settings.

This study adopts a broader perspective on environmental impacts, extending beyond greenhouse gas emissions to encompass resource conservation, biodiversity preservation, waste reduction, and sustainable land management. To investigate the dynamics of these dimensions, we employ a multiple-case study approach based on corporate responsibility reports from agricultural firms. This approach provides in-depth insights into the complex, context-specific processes involved in implementing environmental innovations over time. The cases selected for this study are drawn from emerging economies, covering diverse agricultural sectors and geographic regions.

This study makes several contributions. First, it extends the literature on sustainability transitions by demonstrating the temporal dynamics of environmental innovation in agriculture. Second, it introduces QMS as a strategic facilitator, illustrating how structured management practices can mitigate early adoption challenges. Third, it provides practical insights for policymakers and industry leaders in emerging economies, guiding the development of frameworks that support agricultural firms in achieving long-term sustainability goals.

The remainder of the paper is structured as follows. Section 2 reviews the relevant literature on sustainability transitions, environmental innovation, and Quality Management Systems and identifies research gaps. Section 3 details the methodological approach, including case selection and data analysis techniques. Section 4 presents the findings from the case analysis. Section 5 discusses theoretical and practical implications, followed by limitations and future research directions in Section 6.

2. Literature Review and Research Gaps

2.1 Environmental Innovation and Its Temporal Impacts in Agriculture

Environmental innovation is a critical driver of sustainability transitions in agriculture, encompassing developing and implementing new products, processes, and organizational practices to reduce environmental impacts (Kirschke & Newig, 2017). These innovations address issues such as soil degradation, water conservation, greenhouse gas emissions, and biodiversity loss. Unlike traditional incremental improvements, environmental innovation involves systemic changes that require long-term adaptation and iterative learning processes (Weiss et al., 2020).

A wealth of recent literature has examined the impacts of sustainability innovation in various industries (Durach & Wiengarten, 2017; Martins & Pato, 2019; Asif et al., 2020; Dzhengiz & Niesten, 2020; Kamble et al., 2020). Empirical studies confirm the positive effects of environmental innovation on firm performance. For example, Montabon et al. (2007) analyzed corporate reports from 45 manufacturing firms and identified a strong correlation between product and process innovation and firm performance. Geng et al. (2017) conducted a meta-analysis confirming that eco-design improves sustainability outcomes in the manufacturing sector. Chu et al. (2018) found that third-party logistics firms facing customer and competitive pressure were more likely to engage in green innovation, improving financial performance. Similarly, Imran et al. (2021) reported that green product and process innovation enhances environmental performance in service firms. More recently, Luo et al. (2024) demonstrated that environmental innovation positively impacts both environmental and operational performance in manufacturing firms. Huang et al. (2025) revealed that green technology innovation significantly enhances environmental and social outcomes using data from Chinese listed companies. Zhang and Jiang (2025) examined 618 Chinese manufacturing firms from 2015 to 2021 and found that stronger green innovation leads to better firm performance.

While these studies provide compelling evidence of the benefits of environmental innovation, they predominantly rely on cross-sectional survey data from manufacturing, logistics, and service industries. Such approaches provide a static perspective that overlooks the evolving nature of environmental innovation implementation. Agricultural firms face unique challenges that require long-term adaptation, systemic changes, and iterative learning processes. They must integrate environmental innovations across multiple interdependent system components (Pretty, 1995; Lewis et al., 1997). For example, adopting biological pest control methods requires adjusting crop management strategies, monitoring ecological interactions, and reconfiguring supply chains to accommodate new production processes. These systemic changes often introduce temporary inefficiencies, increasing costs, and operational shocks during the initial adoption phase (Röling & Wagermakers, 1997; Kesavan & Swaminathan, 2008).

An important gap in the literature is the temporal dynamics of environmental innovation. Existing research predominantly assumes that sustainability initiatives bring immediate environmental and economic benefits (Durach & Wiengarten, 2017). However, adopting environmental innovations in agriculture can lead to setbacks before improvements are realized (Dong, 2021). For example, studies have shown that precision agriculture technologies, while ultimately improving resource efficiency, often require significant upfront investments and a steep learning curve for farmers (Sunar & Swaminathan, 2022). Similarly, firms transitioning to organic farming face temporary yield reductions and increased operational costs before achieving long-term soil fertility and sustainability gains (FAO, 2017).

This delayed impact underscores the need for longitudinal research to fully capture the short-term challenges and long-term benefits of sustainability transitions in agriculture. Recent studies highlight the importance of adaptation and continuous learning in overcoming the transition phase (Durach et al., 2023). Without a structured approach to managing these transitions, agricultural firms risk abandoning sustainability initiatives prematurely due to early-stage inefficiencies.

2.2 The Role of Quality Management Systems (QMS)

Grounded in the Plan-Do-Check-Act (PDCA) principles (International Organization for Standardization, 2015), QMS provides a systematic framework for organizations to enhance continuous improvement and ensure that innovations are systematically managed. This approach is particularly beneficial for environmental innovation in agriculture, where adopting new technologies and processes can be disruptive.

By providing a structured framework, QMS facilitates organizations to systematically manage their environmental impacts through an iterative cycle of planning, implementation, review, and continuous improvement. These systems support the establishment of clear environmental objectives, structured monitoring mechanisms, and effective identification of operational inefficiencies. Consequently, strong QMS frameworks help firms proactively adjust processes, reduce uncertainties inherent in sustainability transitions, and ensure ongoing regulatory compliance (Tari et al., 2012; Bravi et al., 2020). Moreover, robust QMS structures support employee training, workflow refinement, and comprehensive management of sustainability performance, thus enhancing firms' capacity to effectively integrate environmental innovations and mitigate potential operational disruptions.

Firms facilitated by strong QMS frameworks are better equipped to handle initial inefficiencies, as they have established mechanisms for training employees, refining workflows, and managing sustainability performance (ISO, 2015). These firms can leverage QMS principles to implement precision agriculture practices to minimize operational disruptions, whereas firms without structured frameworks struggle to maintain consistency in their sustainability efforts.

2.3 Research Gaps

Despite the growing body of research on environmental innovation, this study identifies three key gaps in the literature:

Short-term and Long-term Effects: Most studies assume immediate benefits from sustainability transitions, whereas agricultural firms face initial setbacks before achieving long-term improvements.

Sector-Specific Insights: Prior research has primarily focused on manufacturing and logistics, with limited empirical studies examining agricultural firms undergoing sustainability transitions.

Role of QMS: While QMS has been widely studied in corporate sustainability governance, its role in mitigating the transition challenges of environmental innovation in agriculture remains underexplored.

This study addresses these gaps by examining the longitudinal effects of environmental innovation in agriculture and assessing how QMS frameworks facilitate sustainability transitions. By focusing on multiple case studies, this research

provides a nuanced understanding of how firms navigate the complexities of sustainability adoption, bridging the gap between theory and practice in environmental management.

3. Method

3.1 Case Collection

This study employs a multiple-case study approach to examine how agricultural firms in emerging economies navigate sustainability transitions. We only searched for agricultural firms in emerging economies that have multiple-year Corporate Responsibility Reports (CRRs) on ResponsibilityReports.com, a publicly available repository of CRRs. CRRs serve as official disclosures of a company's environmental, social, and governance (ESG) practices, providing valuable insights into sustainability commitments, operational challenges, and financial implications of sustainability adoption. These reports are often used to demonstrate compliance with ESG regulations, attract sustainability-focused investors, and communicate sustainability performance to stakeholders. Six companies met the criteria, covering diverse agricultural sectors and providing a longitudinal perspective on corporate sustainability: AUGA group AB, BrasilAgro, CHS Inc, Industrias Bachoco, MHP Group, and Tiger Brands. The key information of the six companies is summarized in Table 1.

Table 1. Summarized information of the case companies

Firm	Country	Nature of Business	Years of Corporate Responsibility Reports included in this study	Key Environmental Practices
AUGA Group AB	Lithuania	Organic farming & agriculture	2020-2022	Organic farming, renewable energy, biogas
MHP Group	Ukraine	Agribusiness, poultry production	2020-2023	Renewable energy, waste reduction
CHS Inc. (Brazil)	Brazil	Agribusiness, agricultural trading	2021-2022	Deforestation-free sourcing, water management
BrasilAgro	Brazil	Agriculture, land management	2020-2023	Precision agriculture, land restoration
Tiger Brands	South Africa	Food production & processing	2015-2022	Sustainable packaging, ethical sourcing
Industrias Bachoco	Mexico	Poultry and food production	2015-2023	Solar energy, biodegradable packaging

Given that CRRs are self-reported disclosures, they may exhibit biases such as selective reporting, omission of negative sustainability outcomes, and overstatement of ESG achievements. To mitigate these potential biases and ensure that the findings extend beyond corporate narratives — providing a realistic, empirically grounded evaluation of sustainability transitions in emerging economies — we integrated several methodological safeguards into our analysis. (1) Comparative Longitudinal Analysis – since sustainability transitions take multiple years, firms were assessed across time to determine whether their sustainability claims translated into long-term operational and financial benefits. Changes in reported sustainability metrics were analyzed for signs of unrealistic claims or lack of follow-through on commitments. (2) Triangulation with External Sources – CRR disclosures were cross-referenced with third-party sustainability rankings, financial reports, and regulatory compliance databases to validate claims regarding sustainability impact.

3.2 Case Analysis Method

This study adopts a multiple-case study methodology as outlined by Eisenhardt (1989) and Yin (2014) to examine corporate responsibility and sustainability practices in agricultural firms. A multiple-case approach allows for cross-case comparisons, enhancing the robustness and generalizability of findings. Following Yin's (2014) approach, the cases are analyzed individually (within-case analysis) and then compared systematically (cross-case analysis) to identify patterns and insights. To ensure conceptual clarity, we define the following terms based on existing literature and case study methodologies.

Environmental Innovations: Environmental innovations refer to new or improved technologies, processes, or practices that reduce environmental harm while maintaining or improving efficiency within a firm. These innovations may include clean technologies, energy-efficient production methods, pollution control systems, and waste reduction strategies.

Quality Management System (QMS): A Quality Management System (QMS) is a formalized framework of policies, procedures, and processes designed to ensure product and service quality, operational efficiency, and regulatory compliance. It focuses on standardization, continuous improvement, and performance monitoring, often aligning with recognized standards such as ISO 9001.

Environmental Impacts: Environmental impacts refer to the direct and indirect effects of a firm's activities on natural ecosystems, including air, water, land, and biodiversity. These impacts result from resource consumption, emissions, waste generation, and land use changes, influencing sustainability performance.

Operational Impacts: Operational impacts refer to the effects of internal business activities on efficiency, productivity, and resource utilization. These include energy consumption, waste management, process optimization, workforce engagement, and regulatory compliance, shaping the firm's overall performance and sustainability outcomes.

Financial Performance: Financial performance refers to a firm's economic viability, profitability, and cost efficiency. We examine both qualitative narratives from CRRs and quantitative financial indicators when available.

4. Analysis

4.1 Short-term Shock From Environmental Innovations

Environmental innovations often bring initial disruptions to environmental, operational, and financial performance. While all firms implemented sustainability initiatives tailored to their industry and geographical contexts, their diverse approaches consistently triggered initial short-term disruptions. In the agricultural sector, AUGA Group AB and BrasilAgro prioritized organic farming, regenerative land use, and precision agriculture, initially leading to substantial upfront investments, reduced yields, and productivity declines due to soil adjustment periods and technology integration difficulties.

Firms involved in agribusiness supply chains, such as CHS Inc., faced significant disruptions driven by initial supplier resistance and logistical inefficiencies when implementing deforestation-free sourcing and supply chain traceability systems. The initial resistance among suppliers — especially smaller entities within emerging economies — created prolonged integration challenges, temporarily increasing operational and financial strain.

Similarly, producing firms such as Tiger Brands and Industrias Bachoco encountered initial productivity slowdowns and financial burdens associated with implementing water conservation measures, sustainable packaging, and waste reduction initiatives. These operational changes required extensive process redesign and infrastructure investments, contributing to short-term disruptions. Collectively, these observations lead to the following proposition:

Proposition 1: Environmental innovations initially lead to short-term negative impacts on environmental, operational, and financial performance, resulting from a transition-period shock.

4.2 QMS as a Mitigating Factor

The empirical evidence also indicates variation in the severity and duration of these shocks. For instance, Tiger Brands experienced prolonged operational disruptions and financial instability in 2017-2019, highlighting severe difficulties in early-stage adaptation, whereas AUGA Group AB stabilized its operations quickly in 2018 despite initial productivity declines. This variation suggests that internal organizational differences significantly influence adaptation capabilities during sustainability transitions.

Further analysis reveals the mitigating influence of Quality Management Systems (QMS) on these short-term shocks. Firms with well-integrated and comprehensive QMS frameworks, such as AUGA Group AB, systematically monitored emissions, efficiently managed resource usage, and effectively enforced supplier compliance. These

capabilities allowed them to navigate initial disruptions more effectively, resulting in quicker stabilization of their operational and financial performance.

In the context of complex agricultural supply chains, QMS also proved essential for CHS Inc. and MHP Group, where structured monitoring systems and supplier compliance audits facilitated smoother transitions and reduced resistance from suppliers. By embedding clear environmental performance metrics into supplier management processes, these firms significantly lowered the risks of reputational damage linked to unethical sourcing and deforestation.

Conversely, firms initially lacking robust QMS structures, such as Tiger Brands prior to its crisis in 2018, experienced heightened operational inefficiencies, extended periods of disruption, and financial volatility. Tiger Brands' subsequent improvements to its QMS underscored the system's importance as an effective tool for managing operational and financial shocks induced by environmental innovations. Table 2 summarizes the challenges faced by the case companies and the role of QMS in mitigating the challenges.

Table 2. Summary of challenges faced by the case companies and the practices and impacts of QMS

Firm	Challenges Faced	QMS Practices and Impacts
AUGA Group AB	High upfront investment, slower yield during transition	Facilitates monitoring of emissions, compliance tracking, and resource usage
MHP Group	Supplier resistance, high operational costs	Supplier auditing. Ensures compliance and efficiency
CHS Inc. (Brazil)	Supplier non-compliance, logistics inefficiencies	Streamlines supplier audits and emissions tracking
BrasilAgro	Technology integration, financing barriers	Helps monitor land productivity and compliance tracking
Tiger Brands	Supply chain disruptions, maintaining operational efficiency	Enhances traceability and compliance post-crisis
Industrias Bachoco	Initial cost burden, operational adjustments	Supports compliance and operational alignment

In summary, although firms encountered industry-specific challenges, structured QMS frameworks and technological integration consistently enabled more efficient sustainability transitions, underscoring the critical role of process standardization and proactive management. Collectively, these case analysis findings lead to the following proposition:

Proposition 2: The Quality Management System (QMS) mitigates the transition-period shock, reducing the duration and severity of short-term negative environmental impacts associated with environmental innovation.

5. Contributions and Implications

5.1 Theoretical Contributions

Following Eisenhardt (1989) and Yin (2014), this study employs a multiple-case study approach to systematically analyze firms' sustainability practices, their challenges, and the role of Quality Management Systems (QMS). The case analyses offer empirical insights into how firms navigate financial, operational, and environmental risks while integrating sustainability into their business models. This research contributes to the literature on sustainability transitions and QMS in emerging economies by demonstrating that structured management systems are instrumental in mitigating transition-period shocks, facilitating compliance, and optimizing investment in environmental innovation.

One of the key theoretical contributions of this study is the reconceptualization of sustainability adoption—not merely as a regulatory or ethical compliance measure but as a strategic asset that enhances long-term financial performance. While prior research has extensively explored the environmental and reputational benefits of sustainability, this study bridges a gap by showing that firms can leverage structured governance frameworks to minimize financial volatility and operational inefficiencies during sustainability transitions.

Furthermore, the findings reveal that firms with pre-existing QMS frameworks experience a more structured sustainability transition, lower financial volatility, and faster crisis recovery compared to firms that adopt sustainability reactively or without structured governance mechanisms. This underscores the role of internal process governance in determining the financial and operational outcomes of sustainability investments. The findings align closely with the argument by Teece et al., 1997; Hart, 1995), emphasizing how structured internal governance frameworks such as QMS enhance firms' adaptive capacities. Moreover, the findings resonate with the Resource-Based View (Barney, 1991; Hart, 1995), which emphasizes the strategic importance of environmental management practices as unique firm resources that create competitive advantages by enhancing operational efficiencies and mitigating environmental risks. By providing systematic and proactive management of sustainability practices, QMS frameworks significantly reduce both the severity and duration of initial environmental innovation shocks.

5.2 Industrial Implications

The findings of this study provide critical insights for industry practitioners, policymakers, and business leaders navigating sustainability transitions in emerging economies. As firms increasingly face regulatory pressures, evolving consumer expectations, and financial risks associated with environmental factors, it becomes essential to integrate sustainability into core business processes while maintaining operational efficiency and financial stability. This study identifies several key industrial implications—particularly in the agricultural, agribusiness, and food production sectors—highlighting the role of Quality Management Systems (QMS) in mitigating sustainability-related shocks.

1). Structured Sustainability Implementation Through QMS

This study demonstrates that firms with structured QMS frameworks experience more predictable sustainability transitions. QMS provides a systematic mechanism to track sustainability investments, monitor environmental performance, and ensure regulatory compliance. Firms operating in emerging markets should embed sustainability metrics into their QMS frameworks, allowing for gradual integration of environmental initiatives while maintaining cost control and operational efficiency.

For firms in resource-constrained environments, a phased investment strategy—where sustainability initiatives are implemented incrementally rather than through full-scale transformations—can help balance capital expenditure and operational profitability. Additionally, firms should explore government incentives, ESG-focused investment funds, and carbon credit mechanisms to offset the financial burden of sustainability transitions.

2). Environmental Innovation and Managing Transition-Period Shocks

The case study findings confirm that environmental innovation often leads to short-term operational inefficiencies and financial setbacks before delivering long-term sustainability benefits. Firms such as AUGA Group AB and BrasilAgro faced initial productivity losses when implementing carbon-neutral farming and precision agriculture, but these setbacks were eventually offset by enhanced resource efficiency and regulatory compliance advantages.

To shorten the transition period and mitigate negative impacts, firms should integrate real-time monitoring, process optimization, and automated risk assessment tools within their QMS frameworks. The predictive capabilities of AI-driven monitoring and data analytics can help firms anticipate potential operational disruptions, adjust sustainability strategies dynamically, and optimize resource allocation for faster adaptation and cost recovery.

3). Regulatory Alignment and Policy Engagement in Emerging Economies

Emerging markets often face shifting regulatory landscapes, with sustainability laws evolving rapidly. Firms that anticipate and proactively align with upcoming regulations can avoid compliance penalties, maintain operational continuity, and strengthen relationships with policymakers. The case of CHS Inc. illustrates the importance of preemptive regulatory compliance, as both companies integrated deforestation-free sourcing and emissions monitoring before government enforcement intensified.

Businesses should engage with regulatory bodies, sustainability-focused industry coalitions, and ESG standard-setting organizations to stay ahead of compliance risks. By actively participating in policy discussions and aligning sustainability efforts with global standards, firms can reduce regulatory uncertainty and position themselves as proactive industry leaders rather than reactive compliance adopters.

In conclusion, this study provides clear actionable insights for industry practitioners, emphasizing that sustainability should not be viewed as a cost center but as an facilitator of long-term business competitiveness. By integrating sustainability into QMS frameworks, supply chain management, and financial planning, firms can reduce operational risks and enhance market positioning.

For companies operating in emerging economies, this study reinforces the importance of early supplier engagement, phased investment approaches, real-time compliance monitoring, and sustainability-driven brand differentiation. Firms that treat sustainability as a strategic resource rather than a compliance necessity will not only achieve long-term financial stability but also secure a competitive advantage in an evolving global business environment.

6. Limitations and Future Research

While this study provides valuable insights into how agricultural firms in emerging economies navigate sustainability transitions, it has certain limitations that should be addressed in future research.

One key limitation is the qualitative nature of the multiple-case study approach, which, while offering in-depth contextual insights, limits generalizability to broader industries and markets. Future studies could incorporate quantitative analysis using financial performance metrics, sustainability indices, and firm-level ESG data to validate the relationship between sustainability investments and various performance.

Another limitation is the focus on agricultural firms, which may not capture industry-specific sustainability challenges in other sectors. Future research could extend this analysis to manufacturing, logistics, and energy-intensive industries to explore whether similar patterns emerge regarding the role of Quality Management Systems (QMS). Additionally, this study primarily relies on Corporate Responsibility Reports (CRRs), which, despite being valuable sources of self-reported sustainability strategies, may introduce reporting bias. Future research could complement this data with interviews, surveys, and third-party sustainability audits to gain a more comprehensive understanding of sustainability transitions and risk management.

Lastly, future studies could apply advanced econometric models to test the moderating role of QMS in sustainability-driven financial performance, further strengthening the theoretical link between sustainability, risk management, and firm-level competitive advantage in emerging economies. Expanding the dataset to include more longitudinal cases would also allow researchers to assess the long-term impacts of sustainability transitions.

Despite these limitations, this study provides a strong foundation for further exploration of sustainability as a strategic resource, emphasizing the need for structured governance, proactive risk management, and financial planning in sustainability transitions across emerging markets.

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