Information Management and Business Review (ISSN 2220-3796)
Vol. 17, No. 3(S), pp. 1-13, 2025

Beyond Executive Mandates: Financial Resources and Environmental Orientation as Core Drivers of Sustainability in Malaysian Manufacturing

*Erna Masfiza Mohamed Ramli[1], Mohamed Said Aly Amin[2], Nabawiyah Binti Abdul Hadi[3], Noor Idayu Ismail[1]
[1]Open University Malaysia (OUM), Malaysia
[2]Asia Pacific University of Technology & Innovation (APU), Malaysia
[3]UNITAR University College Kuala Lumpur, Malaysia
Email: *erna_masfiza@oum.edu.my, TP079177@mail.apu.edu.my, nabawiyah.abdulhadi@klmuc.edu.my, idayu_ismail@oum.edu.my
Corresponding Author: Erna Masfiza Mohamed Ramli

Abstract: Malaysia's manufacturing sector faces mounting pressure to integrate sustainable practices amid rising environmental concerns, resource constraints, and regulatory demands. Despite government initiatives, many firms struggle to align profitability with environmental and social responsibility, hindered by limited resources, uneven managerial commitment, and varying levels of internal environmental orientation. This study examines the key drivers of sustainable manufacturing in this context, focusing on the influence of financial resources, managerial support, and internal environmental orientation on sustainability performance. Grounded in the Natural Resource-Based View (NRBV) theory, it investigates how these determinants shape environmental, social, and economic outcomes. A quantitative approach was adopted, using a cross-sectional survey of senior executives from medium and large manufacturing firms, yielding 330 valid responses. Partial Least Squares Structural Equation Modelling (PLS-SEM) was applied to test the proposed relationships. The findings reveal that financial resources and internal environmental orientation significantly enhance sustainability performance, whereas managerial support does not show a significant effect. This suggests that while resource allocation and a sustainability-oriented culture are critical enablers, the practical impact of managerial support may be constrained by organizational or cultural barriers. The study extends NRBV theory to the Malaysian manufacturing context, providing empirical evidence on strategic drivers of sustainability and highlighting the need for targeted investments and internal capability development.

Keywords: *Sustainability performance, manufacturing, green supply chain management*

1. Introduction

Malaysia's manufacturing sector is vital to the economy. It makes up 24% of GDP and nearly 80% of exports (MITI, 2023a, 2023b). This sector includes electronics, petroleum, chemicals, rubber, and food processing, and employs over 2.5 million workers (DOSM, 2024). Table 1 presents the key statistics of Malaysia's manufacturing sector. While this growth is impressive, it comes with serious environmental costs. Factories are a leading source of greenhouse gases, waste, and the overuse of natural resources, with carbon dioxide levels in the country hitting new highs in 2023 (DOSM, 2024). This issue is even more urgent in Malaysia's export-driven economy, where buyers around the world now expect proof of sustainable practices from suppliers. As a result, Malaysian companies face both pressure and a chance to make sustainability a core part of their operations. Green supply chain management (GSCM) is a strong solution, helping firms combine good profit with good planet care by weaving eco-friendly practices through production and supply chain processes (Ramli et al., 2022).

Although more Malaysian consumers are demanding greener products (Shafie et al., 2024), manufacturers are still held back by hurdles like high costs, weak leadership, and complicated supply chains (Gonçalves et al., 2024; Nath et al., 2023). Using the Natural Resource-Based View (NRBV) framework (Hart, 1995), this study investigates three key organizational determinants -financial resources, management support, and a strong internal environmental focus- and how they affect environmental, social, and economic sustainability performance.

The study has two main objectives. First, to explore how these determinants shape sustainability practices in manufacturing, and second, to evaluate how they connect to sustainability performance across Malaysia's industrial sector. By tackling these objectives, the research aims to deliver practical, data-driven recommendations that can help Malaysian manufacturers strengthen their sustainable strategies in a fast-changing and greener global market.

Table 1: Key Statistics of Malaysia's Manufacturing Sector

Indicator	Value	Source
Contribution of manufacturing to GDP	24%	MITI (2023a)
Share of total exports	approximately 80%	MITI (2023b)
Employment in the manufacturing sector	>2.5 million people	DOSM (2024)
CO_2 emissions trend	Record high in 2023	DOSM (2024)

Source: MITI (2023a, 2023b); Department of Statistics Malaysia (DOSM, 2024)

2. Literature Review

Sustainability Performance

Sustainable performance refers to an organisation's ability to produce lasting and balanced outcomes across economic, environmental, and social dimensions. Such outcomes illustrate the firm's capacity to generate value while simultaneously reducing ecological harm and advancing social well-being, thus forming an essential goal for manufacturing firms that aim to lessen their environmental and social liabilities without compromising profitability (Saad & Manshor, 2024). The topic of sustainability is imperative for ensuring a liveable planet and advancing human well-being for future generations. Achieving this end requires a systematic approach that intentionally aligns economic, environmental, and social factors to create lasting value while curtailing negative impacts (Goyal et al., 2022; Kannan et al., 2023). While the sustainability literature has devoted much attention to environmental safeguards (Aldaas et al., 2022; Bouchmel et al., 2024), a balanced focus on economic performance and social impact is equally vital for a full understanding of sustainable manufacturing practices. Only an integrated and holistic framework will enable manufacturing firms to cultivate and sustain enduring sustainable value. The pursuit of such value thus requires deliberate attention to all three pillars of sustainability, ensuring that progress in one area does not engender regress in another, and that manufacturing systems can remain resilient and responsible across generations.

Financial Resources

Financial resources are essential for organisations aiming to integrate sustainable practices because substantial capital is needed to fund environmentally focused initiatives (Shaharudin et al., 2022). Within industrial operations, environmental practices enable critical activities like green procurement, selection of alternative raw materials, ecological certification, and waste reduction across product lifecycles. These initiatives reduce resource consumption, carbon emissions, and waste, thereby supporting broader sustainability goals and improving environmental, economic, and social outcomes (Asif et al., 2020). However, the scholarly literature consistently highlights that the successful execution of these strategies requires considerable financial investment, particularly for purchasing green technologies, upgrading infrastructure, and modifying operations (Shaharudin et al., 2022). As a result, organisations endowed with greater financial capacity are better positioned to embed environmental practices into their operations and to realise their sustainability targets.

Internal Environmental Orientation

Internal environmental orientation refers to the purposeful integration of environmentally focused processes within an organisation, designed to cultivate a workforce and operational structure that consistently advances the firm's ecological objectives (Malimi, 2017; Vijayvargy et al., 2017). For environmentally proactive practices to yield measurable outcomes, a robust internal environmental orientation is indispensable (Malimi, 2017). This goes beyond surface-level compliance, requiring that sustainability becomes a focal point of every operational process (Malimi, 2017; Rao & Holt, 2005). Central to this orientation are several interrelated activities: training and mentoring personnel to meet environmental targets and to enhance corporate reputation (McMurray et al., 2014), establishing internal audit and reporting mechanisms (Silva et al., 2021), and adopting the ISO 14001 framework, which instills a disciplined approach to embedding green practices throughout the enterprise (Rasit et al., 2019). Collectively, these elements render internal environmental orientation a decisive enabler of enduring, sustainable operations that not only confer competitive advantage but also align the enterprise with wider ecological and societal imperatives (Huma et al., 2024).

Management Support

Support from management plays a crucial role in helping manufacturing companies improve their

sustainability performance (Harun & Senawi, 2024). Alkaf et al. (2023) point out that these backing shapes the overall organisational direction, direct resources to where they're needed, and build a workplace culture that takes environmental responsibility seriously. Their research shows that strong executive leadership is linked to the effective launch and continuing success of sustainability programmes. The same idea is echoed by Shahzad et al. (2023), who highlight that management roles lift the entire organisation's drive toward sustainable practices. When leaders show clear commitment to environmental goals, the organisation often records better results in sustainability and ecological balance. Management participation not only helps carry projects from plan to execution but also fuels a stronger internal resolve for long-term progress. Furthermore, management support brings in a wide range of knowledge and viewpoints that can correct potential strategic missteps. In sustainability planning, leaders from diverse fields are more attuned to environmental and social challenges, enabling wiser decision-making (Zhou et al., 2022). Finally, Nangpiire et al. (2024) conclude that weaving sustainability into the corporate strategy is key for winning employee commitment and ensuring that green initiatives endure.

Natural Resource-Based View Theory

The Natural Resource-Based View (NRBV) framework offers a rigorous platform for analysing how firms cultivate competitive advantage via environmental capabilities. Hart's seminal exposition (1995) posits that enterprises leveraging rare, inimitable, and non-substitutable resources, chiefly eco-efficient technologies and renewable feedstocks, can simultaneously fortify market standing and elevate ecological performance. Within the manufacturing sphere, the NRBV foregrounds the necessity of embedding ecological considerations into strategic design and operational routines. This is operationalised through green procurement policies, capital allocation to eco-efficient technologies, and the cultivation of an employee culture that prioritises pollution reduction throughout the supply chain (Andersén, 2021). The comprehensive institutionalisation of such practices restrains ecological discharge while concurrently yielding strategic paybacks, manifest in lowered operational costs, enhanced corporate reputation, and improved economic performance. Recent empirical investigations indicate that decisive leadership, adequate capital investment, and a pervasive internal orientation toward environmental stewardship are pivotal enablers of sustainable manufacturing performance. Collectively, these variables drive superior environmental, economic, and social outcomes and simultaneously foster operational efficiencies and resilient supply chain alliances (Nazir et al., 2024). Firms whose practices resonate with NRBV tenets are accordingly poised to woo ethically minded consumers and to secure enduring profitability through diminished costs, optimised resource flows, and a strengthened brand reputation in progressively competitive arenas.

Critical Evaluation of Current Literature

Recent empirical studies consistently highlight that financial resources constitute a prerequisite for the effective enactment of sustainable practices (Bouchmel et al., 2024; Saher & Siddique, 2023). Within the context of industrial enterprises characterised by limited internal funding, financial capability acquires particular significance, as these firms must direct capital toward the establishment of sustainable infrastructures, the integration of clean technologies, and the re-engineering of production processes. Such capital expenses are indispensable for the execution of material recovery, product reprocessing, renewal cycles, and component resourcing. Nonetheless, some literature raises caution by evidencing instances in which financial support of sustainability initiatives fails to generate the anticipated benefits. Lin et al. (2020) articulate that, in certain situations, monetary commitment can, unexpectedly, constrain ecological gains, especially when spending is dissociated from coherent sustainability objectives. Hence, a thorough understanding of how financial capacity moderates the trajectory of sustainability performance in the Malaysian manufacturing sector remains a paramount academic and managerial imperative.

Furthermore, leadership commitment emerges as a decisive factor shaping sustainability outcomes in industrial firms. Empirical evidence indicates that top-management resolve is indispensable for directing resources, establishing sustainability-oriented strategic trajectories, and nurturing a pervasive organisational sustainability culture (Nangpiire et al., 2024; Wijaya et al., 2023). Nevertheless, the efficacy of such leadership is often moderated by entrenched corporate cultures, intragroup contextual dynamics, and industry-specific constraints that attenuate its broader impact (Gao et al., 2021). Govindan and Jha (2024) suggest that multiple barriers, including insufficient engagement in environmental initiatives related to green supply chains, can cause a gap that accordingly undermines the broader programme of sustainability advancement.

Additionally, an internal environmental orientation serves as a crucial platform for operationalising sustainability aims. This orientation refers to the systematic embedding of environmental considerations into corporate norms and daily processes, thereby determining the salience of sustainability initiatives at every organisational tier (Malimi, 2017). Comparative studies indicate that firms with a strong internal environmental orientation are significantly more inclined to deploy green operational practices, to engage personnel at multiple organisational levels, and to streamline resource consumption, collectively yielding superior environmental performance (Rasit et al., 2019). In the manufacturing sector, these results are reinforced by harmonised protocols that ensure compliance with environmental regulations, thereby translating regulatory conformity into measurable gains in environmental performance. (Sun, 2020). Nonetheless, scholars continue to question the effectiveness of internal environmental orientation, citing multiple conditional variables: notably, gaps in employee environmental literacy that may inhibit optimal performance results (Choudhary & Sangwan, 2019). Therefore, Table 2 summarizes the identified gaps in the literature.

Table 2: Summary of Gaps in Literature

Focus Area	Existing Finding	Research Gap	Relevance
Financial Resources	Financial investment is critical for supporting green practices and processes (Shaharudin et al., 2022; Bouchmel et al., 2024).	Lack of studies examining the role of financial resources in driving sustainability outcomes in Malaysian manufacturing firms.	Investigating how financial resources influence sustainability outcomes and improve performance in Malaysian firms.
Internal Environmental Orientation	Internal environmental orientation improves the adoption of green practices by implanting sustainability into the organizational culture (Malimi, 2017; Rasit et al., 2019).	Inadequate research on the influence of sustainability outcomes in Malaysian manufacturing firms and the challenges of implementing internal environmental orientation effectively.	Exploring how IEO influences sustainability and identifying barriers to its implementation in Malaysian manufacturing firms.
Management Support	The sustained involvement of management is critical for advancing environmental initiatives throughout the organization (Nangpiire et al., 2024; Wijaya et al., 2023)	Limited research regarding the importance of managerial functions and supportive structures in realizing sustainability objectives among Malaysian manufacturing enterprises	Identifying how management support can be strengthened to drive sustainability within Malaysian firms.

Source: Based on the literature reviewed in this study (Bouchmel et al., 2024; Malimi, 2017; Nangpiire et al., 2024; Rasit et al., 2019; Shaharudin et al., 2022; Wijaya et al., 2023).

Research Hypotheses

Based on insights gained from the literature review, this study formulates the following hypotheses:
H1: Financial resources are positively associated with sustainability outcomes.
H2: Internal environmental orientation is positively associated with sustainability outcomes
H3: Management support is positively associated with sustainability outcomes.

3. Methodology

Research Design

This study adopted a cross-sectional survey approach targeting medium and large manufacturing firms in Malaysia, as these organizations generally possess the financial and operational capacity to implement sustainability initiatives. The unit of analysis was the individual firm, and the sampling frame was derived from the Federation of Malaysian Manufacturers Directory (2018). Survey respondents consisted of senior executives and supply chain managers directly involved in sustainability-related decision-making.

A stratified random sampling method was applied to ensure balanced representation across the sector. The population was divided into strata based on firm size (medium and large, as classified by SME Corporation Malaysia), industry sub-sector (e.g., electronics, petroleum, chemicals, rubber, food processing, and others), and geographic region (northern, central, southern, and East Malaysia). Within each stratum, firms were

randomly selected to participate. This approach minimized sampling bias and ensured that key industry segments were proportionately represented in the dataset.

Following Krejcie and Morgan's (1970) sample size determination guidelines, a minimum of 330 completed responses was targeted. Invitations were sent to both SMEs within the medium-size classification and larger firms, reflecting the study's emphasis on organizations with relatively greater resources for sustainability practices. Data were collected through digitally administered questionnaires distributed via email and online survey platforms. Multiple follow-ups and personalized reminders were used to encourage participation. A total of 330 valid responses were collected, which meets the minimum sample size requirements recommended by Krejcie and Morgan (1970) and is considered sufficient for PLS-SEM analysis in organizational research.

The survey instrument comprised two sections: organizational demographics and core research variables. Demographic data covered firm location, industry classification, respondent position, tenure, company size, and ownership type. Core study constructs were measured using validated scales: financial resources (five indicators adapted from Govindan & Jha, 2024; Leppelt et al., 2013; Zhan et al., 2018), management support (Dubey et al., 2015), and sustainability performance across economic (De Giovanni & Esposito, 2012; Zhan et al., 2018), environmental (Zhu et al., 2005) and social dimensions (Dubey et al., 2015; Wang & Dai, 2018).

Data Analysis

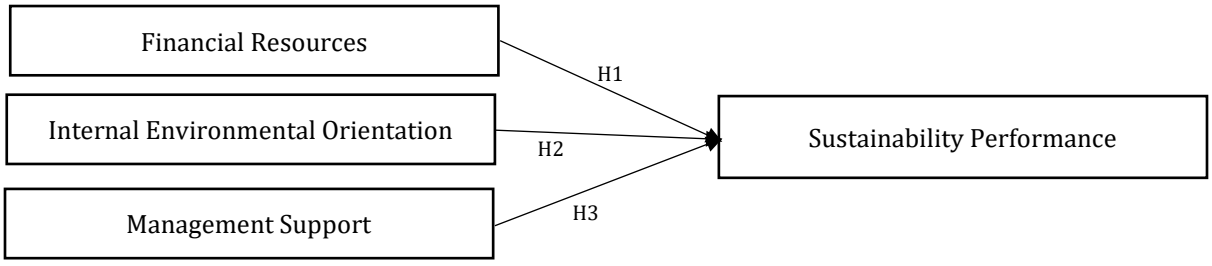
Data analysis was conducted using PLS-SEM with SmartPLS 4.0, a choice justified by its robustness in handling latent constructs, tolerance for smaller sample sizes, and ability to accommodate intricate causal architectures (Henseler et al., 2009). The analysis progressed through sequential stages: first, convergent and discriminant validity were scrutinised; next, composite reliability was computed; thereafter, path coefficients were evaluated; and final estimates of predictive accuracy were derived from R^2 and Q^2 indices (Hair et al., 2014).

Theoretical Background

The research is guided by the Natural Resource-Based View (NRBV), a theoretical framework that elucidates how corporations can elevate sustainability performance into a source of strategic value. Evolving from Hart's (1995) foundational corpus, the NRBV stretches the classical resource-based perspective by positing that distinctive environmental competences, such as proprietary clean technologies, recyclable material streams, and anticipatory managerial oversight, can constitute non-imitable bases for sustained competitive advantage. Translating this theoretical lens to the Malaysian manufacturing setting, the NRBV posits that enterprises must internalise sustainability within the core of their strategic operations. This involves standardised capital allocation to eco-efficient practices and vigorous endorsement from the upper levels. The resulting integration simultaneously tightens the ecological footprint and yields operational gains, including heightened efficiency and enhanced profit margins.

Earlier research indicates that targeted financial investment and strong managerial commitment form critical pillars for the development of environmental competencies within the natural-resource-based view (NRBV) framework. Such practices strengthen both organisational performance and wider sustainability goals, encompassing environmental, social, and economic dimensions (Sarwar et al., 2021). When firms proactively integrate NRBV views, they simultaneously strengthen competitive positioning, satisfy escalating stakeholder demands, and foster sustained value generation via enhanced resource utilisation, cost reductions, and increased brand legitimacy. These relationships are illustrated in Figure 1, which presents the conceptual framework guiding this study.

Figure 1: The framework of this study



Source: Adapted from the Natural Resource-Based View (NRBV) theory (Hart, 1995) and the literature review on Financial Resources. Internal Environmental Orientation and Management Support for Sustainable Manufacturing.

4. Findings and Results

Measurement Model

Before analyzing the structural component of the model, the investigation first validated the measurement properties of the latent variables. Construct reliability was assessed via Cronbach's alpha, composite reliability, and average variance extracted, while discriminant validity was ascertained by means of item loadings and the heterotrait-monotrait (HTMT) ratio. The details of the item loadings, Cronbach's alpha, CR, and AVE for the sample are shown in Table 3. The findings indicate that each item demonstrated a standardized loading exceeding 0.8, which exceeds the conventional cutoff of 0.7 suggested by Henseler et al. (2015). Correspondingly, composite reliability values were all greater than 0.6, attesting to the constructs' strong convergent validity (Hair et al., 2020). Finally, average variance extracted for each construct exceeded the 0.5 criterion, thereby confirming the reliability of the latent variables (Hair et al., 2020).

Table 3: Construct reliability test outcomes

CONSTRUCT	ITEMS	LOADINGS	A	CR	AVE	VIF
Financial Resources	FI1	0.918	0.942	0.943	0.811	4.482
	FI2	0.910				4.626
	FI3	0.917				2.917
	FI4	0.871				3.061
	FI5	0.885				3.097
Internal Environment Orientation	IEO1	0.876	0.912	0.918	0.738	2.940
	IEO2	0.859				2.386
	IEO3	0.814				3.602
	IEO4	0.879				3.029
	IEO5	0.868				4.620
Top Management Support	TM1	0.900	0.815	0.824	0.730	4.614
	TM2	0.895				5.403
	TM3	0.935				4.377
	TM4	0.911				2.502
	TM5	0.839				1.846
Sustainable Performance	LV scores - ENV	0.823	0.939	0.940	0.803	1.656
	LV scores - ES	0.849				2.237
	LV scores - SS	0.889				4.482

Note: α=Cronbach's alpha, CR= composite reliability, AVE= Average variance explained.

Discriminant validity was established through the HTMT ratios shown in Table 4, where every value remained beneath the critical cutoff of 0.85, meeting the standard specified by Hair et al. (2020).

Table 4: Outputs of the HTMT Ratio

CONSTRUCT	HTMT	SRMR
IEO <-> FI	0.628	0.053
Sust_Perfm <-> FI	0.586	
Sust_Perfm <-> IEO	0.552	
TM <-> FI	0.682	
TM <-> IEO	0.746	
IEO <-> FI	0.628	

Hypothesis testing

Once the constructs demonstrated solid reliability and validity, the analysis shifted to partial least squares (PLS) to formally test the proposed hypotheses. To gauge the structural model's overall robustness, metrics like R^2, VIF, SRMR, and Q^2 were examined. These results are shown in Tables 3, 4, and 5. The R^2 value of 0.32 indicates that the predictors account for a modest proportion of the variance in the endogenous variable (Hair et al., 2020). All VIF scores remained below the threshold of 10, alleviating any concerns related to multicollinearity (Hall & Sammons, 2013). SRMR satisfied the threshold, remaining below 0.08, and Q^2 of 0.299 substantiates the model's forecasting relevance, corroborating its appropriateness for structural inquiry (Shmueli et al., 2019

Table 5: The outcomes of model accuracy assessment

CONSTRUCT	R2	Q2
Sustainable Performance	0.628	00.053

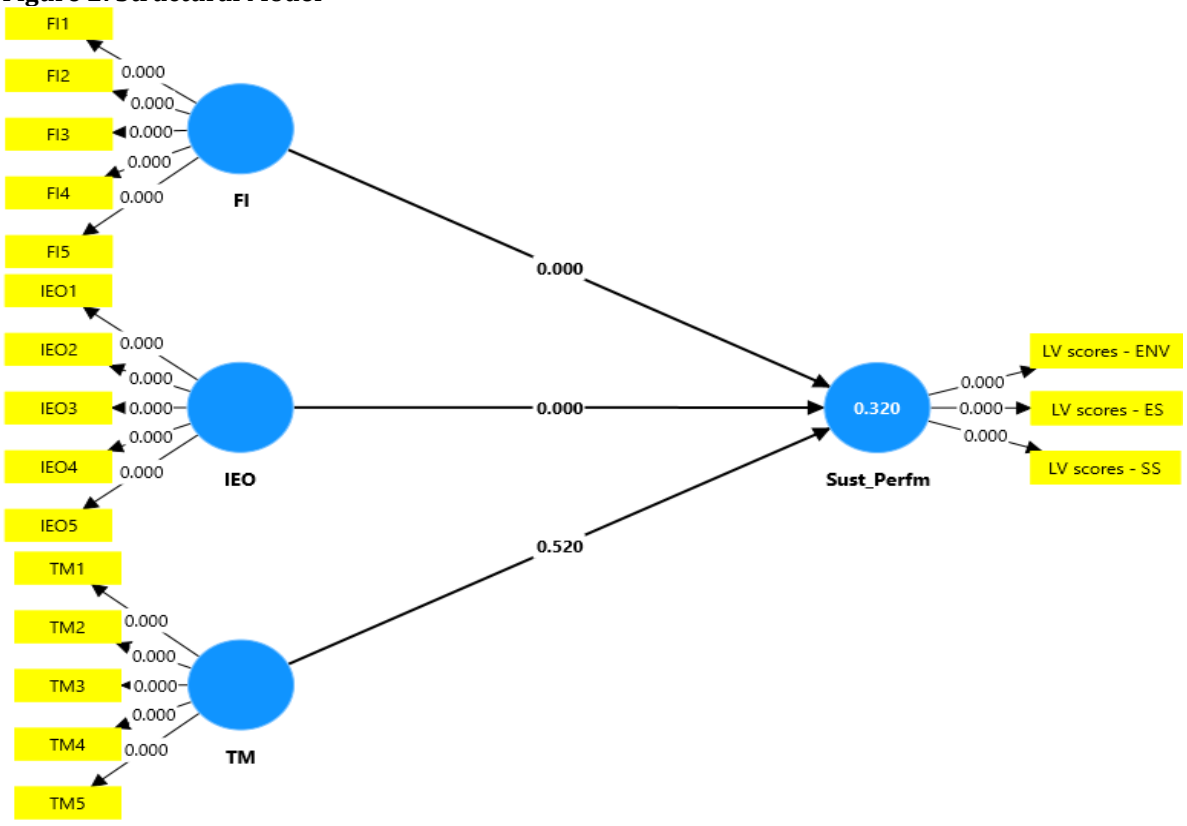
The outcomes of the hypothesis testing are summarized in Table 6 and visualized in Figure 1. The data support Hypothesis 1, with β = 0.344, t = 5.270, and p = 0.000, confirming a strong and positive effect of financial support on sustainability performance. Hypothesis 2 is likewise supported, evidenced by β = 0.247, t = 3.609, and p = 0.000, indicating that a strong internal environmental orientation significantly bolsters sustainability performance. In contrast, Hypothesis 3 is not supported, with β = 0.050, t = 0.644, and p = 0.520, reflecting that green procurement does not exhibit a meaningful relationship with sustainability performance.

Table 6: Outcomes of hypothesis testing

H	Path	β	t	p
H1	Financial Support -> Sustainable Performance	0.344	5.270	0.000
H2	Internal Environment Orientation -> Sustainable Performance	0.247	3.609	0.000
H3	Top Management Support-> Sustainable Performance	0.050	0.644	0.520

Note: β=coefficients, t=t-statistics, p=p-value

Figure 2: Structural Model



Discussion

This research contributes significantly to our comprehension of how financial resources, management support, and an internal environmental orientation interact to shape sustainability outcomes in Malaysian manufacturing firms. The hypotheses examined positioned these three elements as critical drivers. The results underscore the nuanced interconnectedness of the drivers, demonstrating that their influence and interplay vary widely in the industry.

The first hypothesis, H1, tested whether financial resources drive better sustainability results and found a clear and significant link. This finding echoes earlier work by Saher and Siddique (2023) and by Yang et al. (2023), which argued that funding allows companies to roll out greener practices, thus lifting their environmental, social, and economic scores. Within a supply chain, financial backing can show up as purchases of better machinery, upskilling staff, or joining forces on sustainability projects. Such investments create a virtuous circle of shared knowledge and practice, further raising sustainability levels all around (Yang et al., 2023). Directing funds to areas like waste reduction, eco-friendly packaging, cutting-edge technology, and R&D is especially important when the goal is to lock in sustainability over the long haul. Green investments are characterized as expenditures aimed specifically at lowering emissions while sustaining production levels, strengthening environmental outcomes, and enhancing the firm's reputation with investors and other stakeholders (Saher & Siddique, 2023). Moreover, spending on sustainability often yields attractive returns when the initial investment is eventually recouped. This practice centers on reclaiming worth from materials that are no longer needed or that have finished their first life. By reducing waste and using resources more efficiently, companies can generate financial gains while also reinforcing the argument for sustainable operations (Rizki & Augustine, 2022).

Hypothesis 2 (H2) explored how a firm's commitment to internal environmental values relates to tangible sustainability benefits and found a robust positive link. This finding validates prior research by Li et al. (2024) and Huma et al. (2024), who argued that a strong internal environmental orientation weaves sustainability into the corporate culture and elevates environmental, social, and financial metrics (Hanumsari, 2021). Firms that prioritize ecological stewardship can translate that commitment into bottom-line gains, since greener operations not only reduce ecological footprints but also enhance profitability. Manufacturers that embed sustainability into core processes are more likely to outperform rivals, for the green initiatives they cultivate effectively chart a long-term, resource-efficient strategic course (Li et al., 2024). Moreover, a well-rooted internal environmental orientation keeps staff updated on evolving green standards for products and technologies, thereby ensuring compliance while curtailing energy, waste, and hazardous substances. Given the dual pressures of tightening regulations and intensifying market rivalry, firms often embed the internal orientation before adopting more visible external measures, such as meeting regulatory benchmarks or securing ISO 14001 recognition (Akhtar et al., 2023).

Hypothesis 3 (H3) explored whether managerial support impacts sustainability performance and found no significant relationship. This finding diverges from research by Nangpiire et al. (2024) and Wijaya et al. (2023), both of which highlighted top management as a critical driver of sustainability initiatives. Although managerial backing frequently signals a company's readiness to invest in green programs, its mere presence may fall short of translating intent into lasting practice. Akhtar et al. (2023) found that management pledge correlates with organizational preparedness to go green but does not independently catalyze the enactment of environmentally sound procedures. Such evidence suggests an understated interplay in which managerial endorsement, while necessary, lacks the potency to generate significant results by itself. Furthermore, contemporary studies pinpoint the absence of management engagement as a pressing obstacle in effective manufacturer–supplier partnerships toward sustainability; a lack of active leadership can hinder the rollout of eco-friendly practices (Govindan & Jha, 2024). In the Malaysian setting, resistance toward change and a limited commitment from senior-level executives weaken the operational influence of supposedly supportive leadership, even if its theoretical value is recognized (Awan & Khan, 2021).

Implications

This study extends the application of the Natural Resource-Based View (NRBV) by empirically validating the different impacts of financial resources and internal environmental orientation on sustainability outcomes in a developing country context, while finding no significant relationship between management support and

sustainability performance. It challenges the assumption that all internal capabilities contribute equally, showing that financial investment and internal environmental orientation have a more direct influence on advancing sustainable manufacturing than management support alone. For industry practitioners, the findings highlight the importance of strategically allocating financial resources towards green technologies, process innovation, and sustainable procurement. Policymakers and industrial executives ought to prioritize the creation of financial instruments and incentive structures that mitigate the upfront costs of transitioning to sustainable practices. Simultaneously, internal environmental orientation should be actively cultivated to drive long-term sustainability success. Ultimately, the design of leadership training programs and associated performance indicators must focus on converting managerial commitment into measurable environmental results. This is particularly prominent in sectors where leadership support is insufficient to drive systemic transformation.

5. Conclusion and Recommendations

This study explored how financial resources, management backing, and internal environmental orientation affect sustainability results in Malaysian manufacturing firms. Designed in response to the rising demand to align industrial expansion with environmental care, the research used the Natural Resource-Based View (NRBV) to examine how firms' internal strengths lead to balanced performance across environmental, economic, and social dimensions. Results show that financial resources and internal environmental orientation have a significant positive effect on sustainability outcomes. The data highlight that robust financial backing is crucial for adopting green technology, sustainable sourcing, and innovative, eco-friendly processes. Additionally, a strong internal environmental orientation is key to embedding a sustainability-minded culture across all levels. In contrast, management support failed to show a significant impact, indicating that management affirmation may not be enough by itself unless it is matched by coherent systems and a culture that genuinely supports sustainability.

This research enriches the sustainability conversation by pinpointing the most influential organizational factors in Malaysian manufacturing. From an academic standpoint, it strengthens NRBV theory by revealing the uneven effects of internal resources. Practically, it delivers guidance for policymakers and industry leaders to prioritize resource allocation and strengthen the implementation of sustainability strategies. Ultimately, the study enhances understanding of how Malaysian firms can move beyond intention to action, positioning themselves for long-term competitiveness in a sustainability-driven global economy.

Future Direction/Limitations

Future research should consider exploring comparative studies across different industries, as well as small enterprises, to enhance the generalizability of the findings. This study focused on medium and large manufacturing firms, which typically possess greater capacity and resources to adopt green practices. However, future research could investigate small firms, as prior studies have identified that they often face resource constraints and encounter challenges in adopting new technologies and sustainable practices (Rahman
et.al 2024). Additionally, examining sustainability practices in other sectors, such as services or agriculture, would provide valuable insights into how these factors vary across different contexts. Incorporating objective sustainability performance indicators and examining potential mediating variables, such as green innovation and employee engagement, would also contribute to a more comprehensive knowledge of the factors influencing sustainability outcomes.

Funding

This research was supported by a grant from Open University Malaysia (OUM) [Grant No. OUM-IRF-2025-003]. The authors gratefully acknowledge the institution's financial assistance and support.

References

Akhtar, F., Huo, B., & Wang, Q. (2023). Embracing green supply chain collaboration through technologies: the bridging role of advanced manufacturing technology. Journal of Business & Industrial Marketing, 38(12), 2626-2642. https://doi.10.1108/JBIM-01-2022-0051

Aldaas, R., Mohamed, R., Ali, M. H., & Ismail, N. A. (2022). Green supply chain management and SMEs' environmental performance: green HRM practices as antecedents from the service sector of an emerging economy. In International Journal of Emergency Services, 11, (3), 422. https://doi.org/10.1108/IJES-12-2021-0085

Alkaf, A. R., Yusliza, M. Y., Ehido, A. J., Saputra, J., & Muhammad, Z. (2023). Top management support, green intellectual capital, and green HRM: a proposed framework for sustainability. Journal of Environmental Management & Tourism, 14(5), 2308-2318. https://doi.org/10.14505/jemt.v14.5(69).12

Andersén, J. (2021). A relational natural-resource-based view on product innovation: The influence of green product innovation and green suppliers on differentiation advantage in small manufacturing firms. In Technovation, 104, 102254. https://doi.org/10.1016/j.technovation.2021.102254

Ardakani Andalib, D., Soltanmohammadi, A., & Seuring, S. [2023]. The impact of customer and supplier collaboration on green supply chain performance. Benchmarking: An International Journal, 30[7], 2248-2274. https://doi.org/10.1108/bij-12-2020-0655

Asiedu, A., Frimpong, S. E., Opoku, R. K., & Agyapong, G. K. Q. [2023]. Sustainable procurement practices and sustainable performance: evidence from small and medium-sized manufacturing enterprises in an emerging economy. In International Journal of Procurement Management l [1], 1. https://doi.org/10.1504/IJPM.2024.137794

Asif, M. S., Lau, H., Nakandala, D., Fan, Y., & Hurriyet, H. (2020). Adoption of green supply chain management practices through a collaboration approach in developing countries–From literature review to conceptual framework. Journal of Cleaner Production, 276, 124191. https://doi.org/10.1016/j.jclepro.2020.124191

Awan, U., & Khan, S. A. R. (2021). Mediating role of sustainable leadership in buyer-supplier relationships: an supply chain performance: an empirical study. LogForum, 17(1) https://doi.org/10.17270/J.LOG.2021.546

Bouchmel, I., Ftiti, Z., Louhich, W., & Omri, A. [2024]. Financing sources, green investment, and environmental performance: Cross-country evidence. In Journal of Environmental Management, 353, 120230. https://doi.org/10.1016/j.jenvman.2024.120230

Choudhary, K., & Sangwan, K. S. (2019). Adoption of green practices throughout the supply chain: an empirical investigation. Benchmarking: An International Journal. https://doi.org/10.1108/BIJ-09-2018-0293

De Giovanni, P., & Vinzi, V. E. (2012). Covariance versus component-based estimations of performance in green supply chain management. International Journal of Production Economics, 135[2], 907-916. https://doi.org/10.1016/j.ijpe.2011.11.001

Department of Statistics Malaysia (DOSM). (2024, July 3). Gross Domestic Product (GDP) by State, 2023 [Press release]. Putrajaya: DOSM. (Manufacturing sector accounted for ~24% of GDP) – retrieved from MIDA website: https://www.mida.gov.my/mida-news/services-manufacturing-made-up-82-6-per-cent-of-economy-in-2023/

Department of Statistics Malaysia. (2025). Special Report on Impact of Floods in Malaysia, 2024. [https://www.dosm.gov.my/uploads/release-content/file_20250319122430.pdf]

Dubey, R., Gunasekaran, A. & Ali, S. (2015). Exploring the relationship between leadership, operational practices, institutional pressures, and environmental performance: a framework for green supply chain. International Journal of Production Economics, 160, 120-132. https://doi.org/10.1016/j.ijpe.2014.10.001

Federation of Malaysian Manufacturers. (2018). FMM Directory of Malaysian Industries 2018.

Gao, S., Lim, M. K., Qiao, R., Shen, C., Li, C., & Xia, L. (2021). Identifying critical failure factors of green supply chain management in China's SMEs with a hierarchical cause–and–effect model. In Environment, Development and Sustainability, 24 (4), 5641. https://doi.org/10.1007/s10668-021-01675-8

Gonçalves, H., Magalhães, V. S. M., Ferreira, L. M. D. F., & Arantes, A. (2024). Overcoming barriers to sustainable supply chain management in small and medium-sized enterprises: A multi-criteria decision-making approach. Sustainability, 16(2), 506. https://doi.org/10.3390/su16020506.

Govindan, K., & Jha, P. C. (2024). Modelling of barriers in implementing sustainable manufacturer-supplier

collaboration and coping strategies. Journal of Cleaner Production, 434, 139635. https://doi.org/10.3390/su16020506

Goyal, A., Vaish, D. C., Agrawal, R., Choudhary, S., & Nayak, R. (2022). Sustainable manufacturing through systematic reduction in cycle time. Sustainability, 14(24), 16473. https://doi.org/10.3390/su142416473

Hair Jr, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. Journal of Business Research, 109, 101-110. https://doi.org/10.1016/j.jbusres.2019.11.069

Hair, J., Hult, T., Ringle, C., & Sarstedt, M. (2014). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). Thousand Oaks, CA: Sage Publications, Inc. ISBN: 978-1-5443-9633-0

Hall, J., & Sammons, P. (2013). Mediation, moderation & interaction. Handbook of quantitative methods for educational research, 267-286. ISBN: 978-94-6209-404-8

Hanumsari, F. A., Liestyana, Y., & Utami, Y. (2021). The effect of green supply chain management practices on sustainability performance. Jurnal REKOMEN (Riset Ekonomi Manajemen), 5(1), 1-16. https://doi.org/ 10.37058/rekomen.v5i2.1481

Hart, S. L. (1995). A natural-resource-based view of the firm. Academy of Management Review, 20(4), 986–1014. https://doi.org/10.5465/amr.1995.9512280033

Harun, S., & Senawi, A. R. (2024). An Integrated Circular Supply Chain Framework to Enhance Malaysian Business Performance. Information Management and Business Review, 16(3), 130-136.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the academy of marketing science, 43, 115-135. https://doi.org/ 10.1007/s11747-014-0460-y

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In New challenges to international marketing (Vol. 20, pp. 277-319). Emerald Group Publishing Limited. https://doi.org/ 10.1108/S1474-7979(2009)0000020016

Huma, S., Ahmed, W., & Zaman, S. U. (2024). The impact of supply chain quality integration on a firm's sustainable performance. The TQM Journal, 36(2), 385-404. https://doi.org/ 10.1108/TQM-10-2022-0310

IFRC GO. (2023, October). Emergency - MYS: Other - 2023-10 - Haze # 1. Retrieved from https://go.ifrc.org/emergencies/6667/details

Kannan, D., Gholipour, P., & Bai, C. (2023). Smart manufacturing as a strategic tool to mitigate sustainable manufacturing challenges: A case approach. Annals of Operations Research, 331(1), 543. https://doi.org/ 10.1007/s10479-023-05561-1

Krejcie, R.V., & Morgan, D.W. (1970). Determining Sample Size for Research Activities. Educational and Psychological Measurement, 30, 607-610. https://doi.org/10.1177/001316447003000308

Leppelt, Thomas, Kai Foerstl, Carsten Reuter, and Evi Hartmann. (2013). Sustainability management beyond organizational boundaries–sustainable supplier relationship management in the chemical industry." Journal of Cleaner Production 56. 94-102. https://doi.org/ 10.1016/j.jclepro.2012.03.013

Li, Z., Rasool, S., Cavus, M. F., & Shahid, W. (2024). Sustaining the future: How green capabilities and digitalization drive sustainability in modern business. Heliyon, 10(1). https://doi.org/ 10.1016/j.heliyon.2023.e23030

Lin, C. Y., Alam, S. S., Ho, Y. H., Al-Shaikh, M. E., & Sultan, P. (2020). Adoption of green supply chain management among SMEs in Malaysia. Sustainability, 12(16), 6454. https://doi.org/10.3390/su12166454

McMurray, A. J., Islam, M. M., Siwar, C., & Fien, J. (2014). Sustainable procurement in Malaysian organizations: Practices, barriers, and opportunities. Journal of Purchasing and Supply Management, 20(3), 195-207.

Malimi, K. (2017). The Influence of Capital Adequacy, Profitability, and Loan Growth on Non-Performing Loans: A Case of Tanzanian Banking Sector. International Journal of Economics, Business and Management Studies. 4(1), 38-49. https://doi.org/10.20448/807.4.1.38.49

Ministry of Investment, Trade and Industry (MITI). (2023a). Circular Economy Policy Framework for the Manufacturing Sector in Malaysia. Putrajaya: MITI. Retrieved from https://www.miti.gov.my/miti/resources/CIRCULAR%20ECONOMY%20POLICY%20FRAMEWORK.pdf

Ministry of Investment, Trade and Industry (MITI). (2023b, January 18). Trade Performance for Year 2022 and December 2022 [Media statement]. Retrieved from https://www.miti.gov.my/miti/resources/Trade_Performance_Press_Release_December_2022.pdf

Nangpiire, C., Gyebi, F. O., & Nasse, T. (2024). Sustainable procurement practices and organizational performance of small and medium enterprises in Ghana. International Journal of Economics and Financial Issues, 14(1), 95-106. https://doi.org/10.32479/ijefi.15570

Nath, S. D., Eweje, G., & Barua, S. [2023]. Drivers and barriers for implementing social sustainability in supply chains: A qualitative investigation of a developing country's multi-tier suppliers. International Journal of Logistics Management, 35[4], 1332. https://doi.org/10.1108/IJLM-10-2022-0402

Nazir, S., Zhaolei, L., Mehmood, S., & Nazir, Z. (2024). Impact of green supply chain management practices on the environmental performance of manufacturing firms considering institutional pressure as a moderator. Sustainability, 16(6), 2278. https://doi.org/10.3390/su16062278

Ramli, E. M. M., Islam, R., Abdul Hadi, N., & Ismail, N. I. (2025). Greening the supply chain: Antecedents and ownership structure driving triple bottom line performance in Malaysian manufacturing firms. Logforum, 21(2), 11. https://doi.org/10.17270/J.LOG.2025.805

Ramli, E., Zainudin, D., & Islam, R. (2022). Explore the research trends of green supply chain in the manufacturing industry: A bibliometric analysis. Operations and Supply Chain Management: An International Journal, 15(3), 345–358. https://doi.org/10.31387/oscm0500355

Rao, P. & Holt, D. (2005). Do green supply chains lead to competitiveness and economic performance? International Journal of Operations and Production Management, 25 (9), 898–916. https://doi.org/ 10.1108/01443570510613904

Rasit, Z. A., Zakaria, M., Hashim, M., Ramli, A., & Mohamed, M. (2019). Green Supply Chain Management (GSCM) practices for sustainability performance: An empirical evidence of Malaysian SMEs. International Journal of Financial Research, 10(3), 371-379. https://doi.org/10.5430/ijfr.v10n3p371

Rizki, A. F., & Augustine, Y. [2022]. Green supply chain management practices: Direct effects on sustainability performance. Technium Social Sciences Journal, 28, 389. https://doi.org/10.47577/tssj.v28i1.6033

Saad, M. N., & Manshor, M. (2024). The Effects of Sustainable Development on the Sustainable Performance of Small and Medium Enterprises in Emerging Economies: From the Perspective of the VUCA Approach. Information Management and Business Review, 16(3), 295-308.

Saher, K., & Siddique, Q. (2023). The Impact of Corporate Social Responsibility (CSR) and Green Investments on Sustainable Performance: The Mediating Role of Firm Financial Performance. J. Glob. Econ. Rev, 3, 59-73. https://doi.org/10.4103/0019-5154.182410

Sarwar, A., Zafar, A., Hamza, M. A., & Qadir, A. (2021). The effect of green supply chain practices on firm sustainability performance: Evidence from Pakistan. *Uncertain Supply Chain Management*, 9 (1), 31â€-38.

Setia, M. S. (2016). Methodology series module 3: Cross-sectional studies. Indian Journal of Dermatology, 61(3), 261–264. | https://doi.org/10.4103/0019-5154.182410

Shafie, N. I., Abd Rahman, N. H., Harun, R., Ismail, S., & Shafie, N. A. (2024). Consumer Green Products through the Lens of Bibliometrics: Trends Analysis. Information Management and Business Review, 16(3), 514-524.

Shaharudin, M. S., Ganesan, Y., Fernando, Y., & Haron, H. (2022). Green Technology Adoption in Malaysia: Where Are We Now? What Is Lacking? & What Should We Do Next? Journal of Information Systems and Technology Management, 7(27), 109-121. https://doi.org/ 10.35631/JISTM.727009

Shahzad, M., Rehman, S. U., Zafar, A. U., & Masood, K. (2024). Sustainable sourcing for a sustainable future: the role of organizational motives and stakeholder pressure. Operations management research, 17(1), 75-90. https://doi.org/ 10.1007/s12063-023-00431-7

Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J. H., Ting, H., Vaithilingam, S., & Ringle, C. M. (2019). Predictive model assessment in PLS-SEM: guidelines for using PLSpredict. European journal of marketing, 53(11), 2322-2347. https://doi.org/ 10.1108/EJM-10-2018-0754

Silva, G. M., Gomes, P. J., Carvalho, H., & Geraldes, V. (2021). Sustainable development in small and medium enterprises: The role of entrepreneurial orientation in supply chain management. Business Strategy and the Environment, 30(8), 3804-3820. https://doi.org/ 10.1002/bse.2818

Singh, S., Singh, G., Singh, S., & Misra, S. C. (2023). Understanding green procurement dynamics: An assessment framework for public sector organizations. Journal of Environmental Management, 351, 119756. https://doi.org/10.1016/j.jenvman.2023.119756

Sun, H., Pofoura, A. K., Mensah, I. A., Li, L., & Mohsin, M. (2020). The role of environmental entrepreneurship for sustainable development: evidence from 35 countries in Sub-Saharan Africa. Science of the Total Environment, 741, 140132.

Vijayvargy, L., Thakkar, J. & Agarwal, G. (2017). Green supply chain management practices and performance: The role of firm-size for emerging economies. Journal of Manufacturing Technology Management, 28 (3), 299-323. https://doi.org/10.1108/JMTM-05-2016-0062

Wang, J., & Dai, J. (2018). Sustainable supply chain management practices and performance. Industrial Management & Data Systems, 118 (1), 2-21. https://doi.org/10.1108/IMDS-03-2017-0106

Wijaya, S. V., Tarigan, Z., & Siagian, H. (2023). The role of top management commitment, employee empowerment, and total quality management in production waste management and enhancing firm performance. Uncertain Supply Chain Management, 11(3), 1369-1382. https://doi.org/ 10.5267/j.uscm.2023.1.009

Yang, Y., Jiang, Y., Chen, H., & Xu, Z. (2023). Linking relation-specific investments and sustainability performance: the mediating role of supply chain learning. International Journal of Operations & Production Management, 43(8), 1329-1356.

Zhan, Y., Tan, K. H., Ji, G., & Tseng, M. L. (2018). Sustainable Chinese manufacturing competitiveness in the 21st century: green and lean practices, pressure, and performance. International Journal of Computer Integrated Manufacturing, 31(6), 523-536. https://doi.org/10.1080/0951192X.2018.1471372

Zhou, Y., Zhou, Y., Zhang, L., Zhao, X., & Chen, W. (2022). Effects of top management team characteristics on patent strategic change and firm performance. Frontiers in Psychology, 12, 6286. https://doi.org/ 10.3389/fpsyg.2021.737194

Zhu, Q., Sarkis, J. & Geng, Y. (2005). Green supply chain management in China: Pressures, practices, and performance. International Journal of Operations and Production Management, 25(5), 449 https://doi.org/0.1108/01443570510593149