

Institutional Pressures, Green Supply Chain Management Practices, and Sustainable Performance in Indonesian Manufacturing Companies

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Abstract

The empirical research studies institutional pressures that induce differentiated green supply chain management (GSCM) practices and their effect on performance outcomes in Indonesian manufacturing companies. Building on institutional theory and resource dependence theory, it explores coercive, normative, and mimetic institutional pressures and the different impacts from these pressures on internal (internal environmental management and eco-design) vs. external (green purchasing, customer cooperation, and investment recovery) GSCM practices. The Partial Least Squares Structural Equation Modeling method was employed to analyze data from 287 medium and large manufacturing companies across five major Indonesian industrial clusters. The findings indicate that coercive pressures drive both internal and external practices, that normative pressures have a significant impact only on internal practices, and that mimetic pressures predominantly drive external practices. The finding suggests that internal practices are imperative stepping stones to external collaboration and that environmental performance has significant consequences for economic performance. Through our results, we contribute to filling an important research gap in Indonesia's manufacturing economy and draw on empirical knowledge to provide strategic implications for managers who are pursuing GSCM transformation.

JEL classification numbers: Q56, M11, M14.

Keywords: Green supply chain management, Institutional pressures, Economic performance, Environmental performance, Manufacturing companies.

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1. Introduction

The manufacturing industry contributes approximately 20 percent to Indonesia's gross domestic product (GDP) and employs millions of workers in multiple sectors. But such growth also carries considerable environmental and social costs in carbon emissions, resource depletion, waste, and water pollution. Indonesia, as a developing economy located in a Southeast Asian manufacturing hub, is increasingly under pressure from several forces, including governments, international consumers, civil society, and non-governmental organizations (NGOs), to embrace responsible supply chain principles. It is important to apply green practices in organizational and external settings simultaneously to achieve their goals for environmental and economic results (Saeed et al., 2018).

In the last decades, Green Supply Chain Management (GSCM) emerged as an approach to organizational performance in environmental, economic, and social fields that has been adopted to improve its environment (Ahmed et al., 2026). However, how institutional pressures motivate the adoption of differentiated internal and external GSCM practices, as well as the respective contributions to performance outcomes, are insufficiently explained in the Indonesian manufacturing context. A recent bibliometric analysis shows that research into GSCM accelerated markedly, especially since 2019, with compound annual growth rates exceeding 19% (Nguyen et al., 2025). Indeed, cross-sector case studies have shown a range of environmental benefits from 15% to 85% carbon emissions reductions that can be achieved in various industries (Ashraf, 2026b). Many studies deal with GSCM practices in developing countries, notably those of Pakistan and China, but little research on GSCM practices has been carried out on Southeast Asia's largest manufacturing economy. Not surprisingly, the gaps in context are pronounced, given that Indonesia is an exception to the regulatory norm that prevails in most emerging economies with differing degrees of regulatory enforcement, engagement between stakeholders, and market conditions.

Based on institutional theory and resource dependence theory, this research investigates the impacts of coercive, normative, and mimetic institutional pressures on manufacturing companies in Indonesia to implement internal (internal environmental management and eco-design) and external (green purchasing, cooperation with customers, and investment recovery) GSCM practices, and their conversion into environmental and economic performance improvements. Institutional pressures—which include regulatory compliance, industry norms, and competitive benchmarking—play an important role in driving GSCM implementation throughout industries (Ngo, 2023; Wang & Zhang, 2023). However, the differential contribution of internal and external practices remains underexplored, particularly in emerging economy contexts (Vinothraja & Hariharan, 2025). The overall objective is to: (1) discover the differential effect of institutional pressures on internal versus external GSCM practices; (2) demonstrate the distinct contributions of internal and external GSCM practices to environmental and economic performance; (3) offer actionable and empirical recommendations for

managers and policymakers to accelerate the GSCM transformation in the Indonesian manufacturing sector.

This research adds to the GSCM literature in five different respects. First, it offers empirical evidence from an emerging economy setting that is typically ignored by GSCM researchers. Second, the study takes a dual-theory approach by using an institutional theory and resource dependence theory perspective, which explains both the antecedents and mechanisms by which performance benefits result from the GSCM practices. Third, it has taken internal and external GSCM practices as second-order constructs and provides the possibility to analyze them at higher abstraction levels, which is suggested by recent GSCM researchers. Fourth, it explores environmental and economic performance rather than treating them as independent variables. Finally, it fills the research gap of understanding GSCM in Southeast Asia, even more so in Indonesia, whose empirical work in peer-reviewed English-language journals is still lacking.

2. Literature Review and Hypotheses Development

2.1 Institutional Theory and External Pressures on GSCM Adoption

According to institutional theory, organizations operate within broader institutional environments, such as regulatory, cultural, and competitive dynamics that introduce isomorphic pressures. These pressures are of three forms: coercive, normative, and mimetic pressures, which provide different incentives for organizational change (Singh, 2024; Xu et al., 2022). For organizations to maintain legitimacy and access resources, they are required to conform to governmental regulations, industry standards, and contractual requirements that can act as coercive pressures (Chetanraj et al., 2024). According to studies published recently, coercive pressures heavily affect voluntary environmental information disclosure (Fan et al., 2024) and the adoption of environmental management accounting in manufacturing sectors (Yusoh et al., 2023).

Coercive pressures come in various forms in the Indonesian manufacturing environment. Indonesia's government has increasingly implemented stricter environmental regulations through instruments such as the PROPER (Program for Pollution Control, Evaluation and Rating) system, which gives public ratings of manufacturing companies' environmental compliance. These emissions standards, requirements for handling hazardous waste, and energy efficiency have been tightened by the Ministry of Environment and Forestry in recent years. Furthermore, Indonesia's involvement in regional ASEAN environmental agreements and global sustainability frameworks puts pressure on manufacturers in international supply chains from external coercive forces (Alonso-Almeida & Rodríguez-Antón, 2020). Professional standards, industry associations, consumer expectations, and stakeholder activism create normative pressures (Marculetiu et al., 2025). Normative pressures in Indonesia's manufacturing industry are also related to multinational customers requiring environmental certifications (ISO 14001, ISO 50001) and audits for social compliance. Increasing attention to environmental

protection NGOs, local business associations, and increased consumer awareness generate complementary normative pressures. Some evidence indicates a distinction in substantive sustainability strategies due to the role normative pressures have in the drive for meaningful strategies on sustainability, while coercive and mimetic pressures have some variability in influence (Marculetiu et al., 2025). Mimetic pressures appear when companies watch competitors embrace green practices and consider those practices as opportunities for competitive advantage or legitimacy (Xu et al., 2022). It has been shown that environmental policy stringency and belonging to environmentally sensitive sectors enhance circular economy disclosure by mimetic isomorphism (Pozzoli et al., 2023).

2.2 Resource Dependence Theory and GSCM Practice Implementation

The Resource Dependence Theory (RDT) adds to institutional theory by providing insight into the processes by which organizations manage their linkages with resource providers situated in the external environment, and how those relations can vary significantly over time (Singh, 2024). According to RDT, organizations rely on suppliers and customers for essential resources; thus, they must master relations with them effectively to secure critical resources and reduce reliance upon powerful stakeholders. Within the context of the GSCM, RDT tells us how firms implement the contrast of internal and external green practice: internal practices (internal environmental management and eco-design) can help firms to reduce their dependence on external environmental remediation and external practices (green purchasing, cooperation with customers, investment recovery) can help firms to align themselves with dominant supply chain partners and maintain access to markets and resources (Ahmed et al., 2026). Nguyen et al. (2025) showed that supply chain collaboration can mediate relationships between institutional pressures and sustainable performance outcomes.

The Indonesian manufacturing industry, especially manufacturers, needs to reconcile supply chain power-dependence with upstream suppliers and downstream customers. Large multinational customers increasingly exercise their bargaining power to require suppliers to meet environmental standards, thereby creating incentives for Indonesian manufacturers to adopt green practices. Suppliers of specialized raw materials or green technologies also wield greater bargaining power over manufacturers, potentially leading to dependencies that incentivize green practices. RDT suggests that the strength of these relationships determines the extent and nature of green practice adoption.

2.3 Internal Environmental Management and Eco-Design as Internal GSCM Practices

An internal GSCM approach consists of activities that have been planned and undertaken within the organization without immediate external partner collaboration. Internal Environmental Management (IEM) entails integrating environmental concerns into the organization's strategy through senior management

support, middle management engagement, and cross-functional team cooperation (Bett & Wachiuri, 2025). IEM defines the organizational baseline systems, measurement capacity, and culture of the company for implementing GSCM at a broader level. Eco-Design (ECO) is a form of proactive environmental degradation prevention that applies to the environmental considerations across the product conception, design, and manufacturing process (Labaran & Masood, 2023). Eco-design lowers the material demand and energy usage, lessens toxic emissions, and lowers costs in the short term, while simultaneously providing instant benefits to the environment. Studies conducted among beverage manufacturing companies in Kenya suggested that internal environmental management, eco-design practices, and environmentally oriented reverse logistics were positively and significantly related to firm performance (Bett & Wachiuri, 2025).

In Indonesian manufacturing, these internal practices serve multiple functions. They satisfy regulatory compliance requirements by establishing documented environmental management systems. Waste reduction and energy efficiency translate to lower overall production costs. They build organizational capabilities and employee awareness needed for the adoption of external green practices later. Studies established that firms that do not possess a good internal environmental foundation have a difficult time executing better external GSCM practices.

2.4 Green Purchasing, Customer Cooperation, and Investment Recovery as External GSCM Practices

External GSCM practices rely on cooperation and coordination with supply chain partners to achieve the environmental objectives (Labaran & Masood, 2023). Green Purchasing (GP) involves the choice of suppliers with the aim of improving environmental aspects and cooperating with the suppliers to produce products that are environmentally friendly (Al-Kharabsheh et al., 2025). The practice takes environmental concerns upstream, with manufacturers able to drive the sourcing of raw materials and the manner of supplier production. Cooperation with Customers (CC) is a downstream collaboration with customer firms on environmental impact projects extending to product design, manufacturing, packaging, and reverse logistics (Bett & Wachiuri, 2025). Investment Recovery (IR) converts waste and used materials into strategic rather than disposal liabilities, which lets companies make money on goods previously considered worthless and has a lesser adverse impact on the environment. New bibliometric analysis of published literature discovered green purchasing, eco-design, cooperation with customers, internal environmental management, reverse logistics, and investment recovery as the most commonly referenced GSCM practices (Labaran & Masood, 2023).

External practices have a fundamental distinction from internal practices: they involve establishing trust-based relationships with outsiders, communicating sensitive production processes and costs, as well as working together to mitigate environmental risks, operating across organizational boundaries. Given Indonesia's manufacturing environment has been, in the past, one of transactional, price-

oriented supplier relationships, making the shift to green partnership approaches will necessitate extensive relationship restructuring and cultural transition. Yet international customers' increasing demands for supply chain transparency and environmental compliance make such transitions increasingly unavoidable.

2.5 Environmental and Economic Performance Outcomes

The performance gains of GSCM approaches arise in different dimensions (Ashraf, 2026a). Environmental performance includes reductions in carbon emissions, water consumption, hazardous substance usage, waste generation, and pollution incidents (Liew & Cao, 2025). These benefits are produced by several mechanisms — cleaner production methods lead to pollution reduction at the source; waste reduction decreases disposal requirements; and improvement in resource efficiency lowers the total environmental impact (Ngo, 2023). Economic performance is concerned with manufacturing cost reductions or revenue gains (Real et al., 2025a). GSCM practices bring down the costs of purchased materials, energy consumption, waste treatment, waste discharge, and fines for environmental incidents. Meanwhile, corporate image and brand reputation go up. Improved environmental performance can attract environmentally conscious customers and help support market premium pricing strategies (Wang & Zhang, 2023). Several studies on the complementarity of GSCM practices have shown strong positive relationships of integrated GSCM competency with environmental impact (Al-Sheyadi et al., 2019).

Nevertheless, the relationship between GSCM practices and economic performance is disputed in the literature (Ayoubi & Radmehr, 2023). Some reports show positive direct effects, others negative short-term effects with positive long-term benefits; still others find indirect effects mediated through environmental performance improvements. Such variation is attributable to differences across study contexts, the maturity of practice implementation, and timescales when performance is measured. In particular, the current study attempts to clarify the ambiguity by evaluating how internal and external GSCM practices give rise to differences in their direct and indirect performance consequences, and possibly even non-linear effects in an Indonesian manufacturing context. According to recent research, internal GSCM practices may not directly affect economic performance but have positive impacts on environmental performance; on the contrary, external practices positively affect economic and social performance but not environmental performance (Real et al., 2025a).

2.6 Hypotheses Development

2.6.1 Institutional Pressures and Internal GSCM Practices

Internal GSCM practice adoption should be positively influenced by coercive, normative, and mimetic pressures (Xu et al., 2022; Zhu et al., 2023). Coercive pressures—including government environmental regulations, industry standards, and customer compliance requirements—create direct compliance incentives for firms to establish environmental management systems and adopt eco-design

methodologies (Chetanraj et al., 2024). Normative pressures from suppliers, customers, professional associations, and civil society organizations elevate environmental performance as a professional standard and business requirement (Marculetiu et al., 2025). Mimetic pressures enable firms to learn from competitors' environmental practice success and replicate proven approaches (Lee et al., 2022). Corporate environmental ethics has been demonstrated to moderate the relationship between coercive pressure and environmental management accounting adoption (Chetanraj et al., 2024).

H1a: Coercive pressures positively impact Indonesian manufacturing companies' adoption of internal GSCM practices.

H1b: Normative pressures positively impact Indonesian manufacturing companies' adoption of internal GSCM practices.

H1c: Mimetic pressures positively impact Indonesian manufacturing companies' adoption of internal GSCM practices.

2.6.2 Institutional Pressures and External GSCM Practices

Therefore, external GSCM practices require different pressure configurations compared to internal practices (Xu et al., 2022). Coercive pressures from regulatory bodies and multinational customers create requirements for suppliers to meet environmental standards, directly incentivizing external green purchasing and customer cooperation (Fan et al., 2024). Normative pressures from industry peers, professional standards bodies, and supply chain partners encourage external collaboration through green purchasing and customer partnerships (Ong et al., 2025). Mimetic pressures enable firms to learn successful external partnership models from competitors. Evidence from supply chain collaboration research indicates that firms actively respond to different types of institutional pressures by adopting appropriate external green practices (Nguyen et al., 2025).

H2a: Coercive pressures positively impact Indonesian manufacturing companies' adoption of external GSCM practices.

H2b: Normative pressures positively impact Indonesian manufacturing companies' adoption of external GSCM practices.

H2c: Mimetic pressures positively impact Indonesian manufacturing companies' adoption of external GSCM practices.

2.6.3 Internal to External GSCM Practice Sequencing

According to RDT, manufacturing firms should strengthen internal environmental capacity first before engaging in complex external alliances (Real et al., 2025a). However, firms with strong skills in internal environmental management and eco-design can work with suppliers and customers on environmental projects much better – because the business model is more equipped with technical tools, data networks, and organizational commitment to succeed (Real et al., 2025a). Recent empirical studies from emerging market settings have established that institutional pressures have an indirect positive influence on environmental performance through the implementation of environmental management strategies (Ngo, 2023).

H3: Internal GSCM practices have a significant positive effect on external GSCM practices in Indonesian manufacturing companies.

2.6.4 Internal GSCM Practices and Performance Outcomes

Internal practice is expected to have a more direct relationship to environmental performance than that of external practice when internal practices fall within the organization's direct controls and lead to immediate waste savings, energy efficiency, and pollution prevention gains (Al-Sheyadi et al., 2019). The association of internal practices and economic outcomes should be less strong, as such initiatives generally require more investment of capital, prior to a cost advantage emerging.

H4a: Internal GSCM practices have a significant positive effect on environmental performance in Indonesian manufacturing companies.

H4b: Internal GSCM practices have a significant positive effect on economic performance in Indonesian manufacturing companies.

2.6.5 External GSCM Practices and Performance Outcomes

The external practice focuses on customer cooperation and supply chain cooperation, which would result in better economic benefits from stronger customer relationships, market access, and revenue opportunities (Real et al., 2025a). Green purchasing and customer cooperation allow firms to penetrate environmentally conscious customers who are willing to pay a premium for green products, driving economic advantages (Wang & Zhang, 2023). Investment recovery leads to direct cost savings from the resale of wasted materials (Labaran & Masood, 2023). Improvements in economic performance via external practices must be more direct if external practices use secondary mechanisms, such as customer and supplier collaboration to implement solutions, instead of focusing on the direct reduction of pollution at the firm level. Recent research demonstrates that external practices contribute positively to the dimensions of sustainability (economic and social) but are not significantly related to environmental performance (Real et al., 2025a).

H5a: External GSCM practices have a significant positive effect on environmental performance in Indonesian manufacturing companies.

H5b: External GSCM practices have a significant positive effect on economic performance in Indonesian manufacturing companies.

2.6.6 Environmental Performance as a Path to Economic Performance

In terms of environmental performance improvements, they can lead to economic performance enhancement in several ways: reducing waste treatment costs, less water and energy consumption, lower fines associated with environmental incidents, and an improved corporate image that supports revenue growth (Lisnawati & Siahaan, 2025). Institutional pressure research suggests that environmental performance plays an important mediating role linking green supply chain and sustainability practices to economic outcomes (Anagnostopoulou, 2025).

H6: Environmental performance has a significant positive effect on economic performance in Indonesian manufacturing companies.

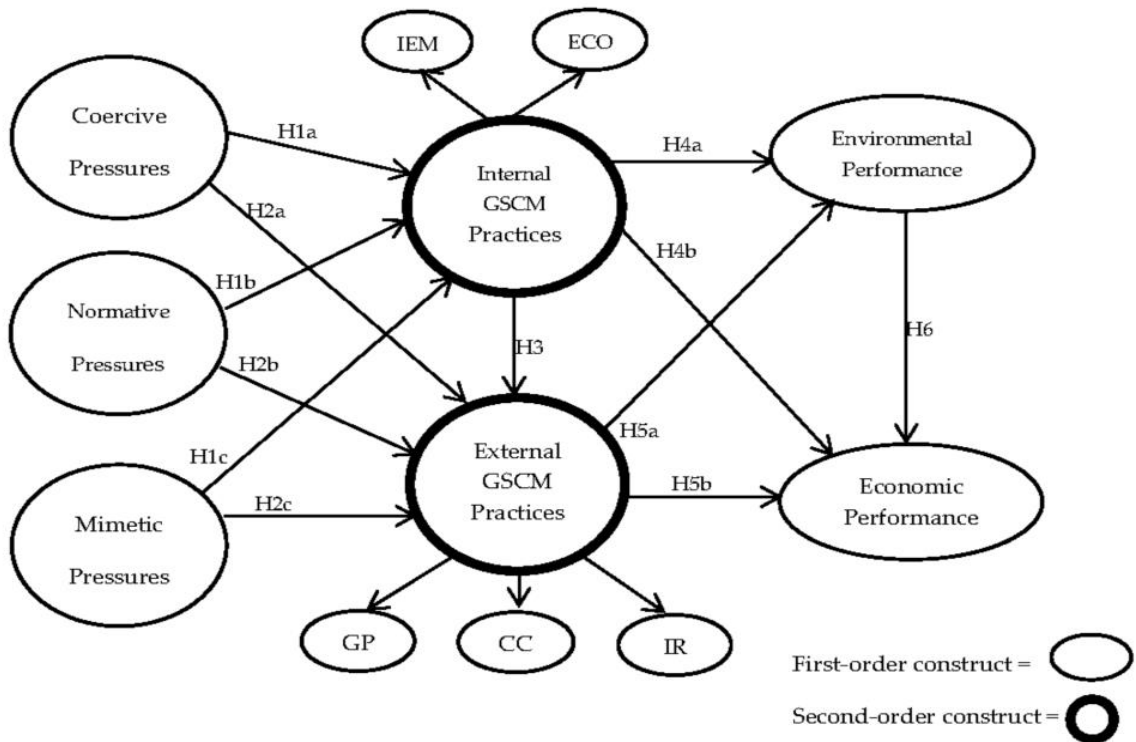


Figure 1: Proposed Theoretical Model

3. Research Methods

3.1 Research Design and Sample

The research in the present study adopted a quantitative cross-sectional design. Data were collected using structured questionnaires that were distributed to manufacturing companies based in Indonesia. The target population was composed of medium and large manufacturing companies (with more than 100 employees) in various sectors, including textiles, chemicals, pharmaceuticals, food and beverage processing, electronics, machinery, and paper products. These sectors were chosen in this research due to their significant environmental impacts and active GSCM adoption. Previously, cross-sectional survey research techniques have been quite widely used to explore institutional pressures and performance effects with GSCM research (Ahmed et al., 2026; Singh, 2024).

A sample of 385 manufacturing companies was targeted using stratified random sampling in five key Indonesian industrial clusters: Greater Jakarta (including Tangerang and Bekasi), Surabaya, Bandung, Medan, and Semarang. These areas comprise about 65% of Indonesia's manufacturing output, with the largest number of firms involved in GSCM initiatives located in these regions. Questionnaires were administered to senior supply chain managers, operations directors, environmental managers, and sustainability officers—individuals with direct responsibility for supply chain and environmental decisions. After multiple attempts via email, telephone, and in-person visits, 287 completed responses were obtained, yielding a response rate of 74.5%.

Data quality analysis involved assessing missing values (none exceeded 5% for any variable), performing variance assessment by Harman's single-factor test (the first principal component explained 42.3% of the variability, less than the 50% threshold to indicate no serious common method bias), and non-response bias test via cross-comparing the variable terms of the early and late respondents (using independent samples t-tests indicated no significant differences at $p < 0.05$).

3.2 Measurement Instruments

All constructs were measured using multi-item reflective scales based on validated tools in the GSCM literature. Institutional pressures were assessed with scales of coercive (4 items), normative (4 items), and mimetic (3 items) pressures, used in previous research as a 5-point Likert scale (1 = Not Important, 5 = Extremely Important). Instruments that assessed internal environmental management (9 items) and eco-design (3 items) were used to measure internal GSCM practices. External GSCM measures included green purchasing (9 items), cooperation with customers (5 items), and investment recovery (4 items). Environmental performance was assessed using 5 items on reductions in carbon emissions, water consumption, hazardous waste, packaging waste, and pollution incidents on a 5-point scale (1 = No Improvement, 5 = Significant Improvement). Economic performance was assessed considering 5 items measuring improvements in cost of purchased materials, energy costs, waste treatment costs, and operational profits on the same 5-point scale.

3.3 Data Analysis

For data analysis, Partial Least Squares Structural Equation Modeling (PLS-SEM) using WarpPLS 7.0 was utilized. We used this method because (1) the study uses second-order constructs (internal and external GSCM practices as composites of specific practices), which make PLS-SEM more suited; (2) the sample size of 287 is appropriate for PLS-SEM analysis; (3) there are no assumptions concerning multivariate normality required; and (4) the prediction and theory extension emphasis is compatible with PLS-SEM capabilities. PLS-SEM has been used as the main analytical approach in recent institutional theory-based GSCM studies published in peer-reviewed journals (Ahmed et al., 2026; Xu et al., 2022).

Analysis was conducted in two stages. Construct validity and reliability were established by first assessing the measurement model. The structural model was then tested to evaluate hypothesized relationships. Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) were calculated for all first-order constructs for the measurement model. Discriminant validity was assessed using both the Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio of correlations, with HTMT values below 0.90 showing sufficient discriminant validity (Sunani et al., 2024).

Second-order constructs were generated in two stages when first-order constructs had varying numbers of items. In the initial phase, first-order constructs were estimated, and their latent variable scores were preserved. These saved scores were employed in a second stage as indicators for second-order constructs. Internal GSCM practices were operationalized as a second-order construct with IEM and ECO considered to be the first-order reflective components. External GSCM practices were operationalized as a second-order construct comprising GP, CC, and IR as first-order reflective components.

For structural model evaluation, path coefficients (standardized beta values), statistical significance (assessed through bootstrapping with 5,000 subsamples), and confidence intervals (bias-corrected and accelerated, 95% confidence intervals) were discussed. Direct, indirect, and total influences were also estimated. The explanatory power of the model was assessed through R-squared values for endogenous constructs (values of 0.26, 0.13, and 0.02), which represented medium, small, and weak findings, respectively, with respect to explainability reliability of the model. Predictive relevance was measured by the Q-squared from blindfolding procedures; greater values than zero showed good predictive performance.

4. Results

4.1 Sample Characteristics

The respondent sample consisted of 287 manufacturing companies with a mean of 485 personnel (SD=612, range: 100-4,850). Respondents were distributed within 5 industrial cities in Indonesia: Greater Jakarta (39.0%), Surabaya (26.1%), Bandung (16.7%), Semarang (11.2%), and Medan (7.0%). This sample included firms in several manufacturing sectors: textiles (28.6%), food and beverage (19.2%), chemicals (15.0%), pharmaceuticals (12.5%), electronics (12.2%), machinery (7.3%), and paper products (5.2%). Most respondents were in senior roles in supply chain and environmental decision-making: operations directors (32.1%), environmental/sustainability managers (28.6%), supply chain managers (25.4%), and plant managers (13.9%).

4.2 Measurement Model Results

All first-order constructs had sufficient levels of internal consistency (Cronbach's alpha values ranging from 0.705 to 0.876, all above the 0.70 minimum threshold). Composite reliability numbers varied from 0.715 to 0.915, all above the 0.70 threshold. Average Variance Extracted (AVE) values varied from 0.522 to 0.718, all surpassing 0.50, proving convergent validity.

Table 1: The First-order Constructs' Reliability and Validity Test

Variable	Indicator	Loading Factor	AVE	CA	CR
Green Purchasing (GP)	GP1	0.871	0.599	0.873	0.915
	GP2	0.911			
	GP3	0.751			
	GP4	0.901			
	GP5	0.808			
	GP6	0.859			
	GP7	0.981			
	GP8	0.908			
	GP9	0.875			
Cooperation with Customers (CC)	CC1	0.856	0.718	0.866	0.911
	CC2	0.894			
	CC3	0.911			
	CC4	0.715			
Investment Recovery (IR)	IR1	0.891	0.522	0.705	0.776
	IR2	0.902			
	IR3	0.921			
	IR4	0.936			
	IR5	0.937			
Internal Environmental Management (IEM)	IEM1	0.912	0.581	0.754	0.762
	IEM2	0.893			
	IEM3	0.907			
	IEM4	0.745			
	IEM5	0.765			
	IEM6	0.871			
	IEM7	0.932			
	IEM8	0.923			
	IEM9	0.851			
Eco-Design (ECO)	ECO1	0.941	0.591	0.805	0.742
	ECO2	0.876			
	ECO3	0.923			
Environmental Performance (Evp)	Evp1	0.783	0.528	0.752	0.791
	Evp2	0.842			
	Evp3	0.833			
	Evp4	0.768			
	Evp5	0.769			
Economic Performance (Ecp)	Ecp1	0.872	0.553	0.716	0.715
	Ecp2	0.934			
	Ecp3	0.786			
	Ecp4	0.875			
	Ecp5	0.896			

Discriminant validity was confirmed by the Fornell-Larcker criterion (where each diagonal element corresponding to the square root of AVE values surpassed corresponding off-diagonal correlation values) and HTMT ratios (all HTMT values were below the 0.90 threshold). The model fit for the measurement model was satisfactory; all loadings exceeded the minimum threshold of 0.70. The second-order construct assessments further verified that IEM and ECO were sufficient measures of the Internal GSCM practices second-order construct (loadings: IEM=0.961, ECO=0.916) and GP, CC, and IR were sufficient measures of the External GSCM practices second-order construct (loadings: GP=0.967, CC=0.831, IR=0.969).

Table 2: The Second-order Constructs' Reliability and Validity Test

Variable	Indicator	Loading Factor	AVE	CA	CR
Internal GSCM Practice	lv IEM	0.961	0.924	0.918	0.961
	lv ECO	0.916			
External GSCM Practice	lv GP	0.967	0.627	0.835	0.785
	lv CC	0.831			
	lv IR	0.969			

4.3 Structural Model Results and Hypotheses Testing

The fit of the structural model was adequate. This indicates that coercive pressures predict internal GSCM practices ($\beta=0.161$, $p=0.047$), which provides evidence to the hypothesis of H1a. Normative pressures were also able to predict internal GSCM practices significantly ($\beta=0.466$, $p<0.001$), leading to support for H1b. Mimetic pressures are significantly predictive of internal GSCM practices ($\beta=0.319$, $p<0.001$), supporting H1c. For external GSCM practices, coercive pressures were positively associated ($\beta=0.237$, $p=0.007$), which confirms H2a and suggests that regulatory pressure alone is a substantial factor for the external adoption of green practice. Normative pressures were also not significant predictors of external GSCM practices ($\beta=0.013$, $p=0.45$), and their findings did not support H2b. Mimetic pressures substantially predicted the external GSCM practices ($\beta=0.377$, $p<0.001$), thus H2c was confirmed. Internal GSCM practices had a significant strength in predicting external GSCM practices ($\beta=0.322$, $p<0.001$), thus strongly supporting H3. Such results show how internal environmental management and eco-design capabilities form vital base functions for external green supply chain cooperation.

Internal GSCM practices did not significantly predict environmental performance ($\beta=-0.02$, $p=0.419$), failing to support H4a. Internal GSCM practices exhibited a direct and statistically significant negative impact on economic performance ($\beta=-0.331$, $p<0.001$), failing to support H4b. External GSCM practices showed a significant direct negative effect on environmental performance ($\beta = -0.334$, $p < 0.001$), failing to support H5a. External GSCM practices significantly negatively

predicted economic performance ($\beta=-0.152, p=0.059$), failing to support H5b. Environmental performance significantly predicted economic performance ($\beta=0.714, p<0.001$), supporting H6. This finding indicates that improving environmental performance leads to potential economic benefits, either through lower operating costs or increased corporate reputation.

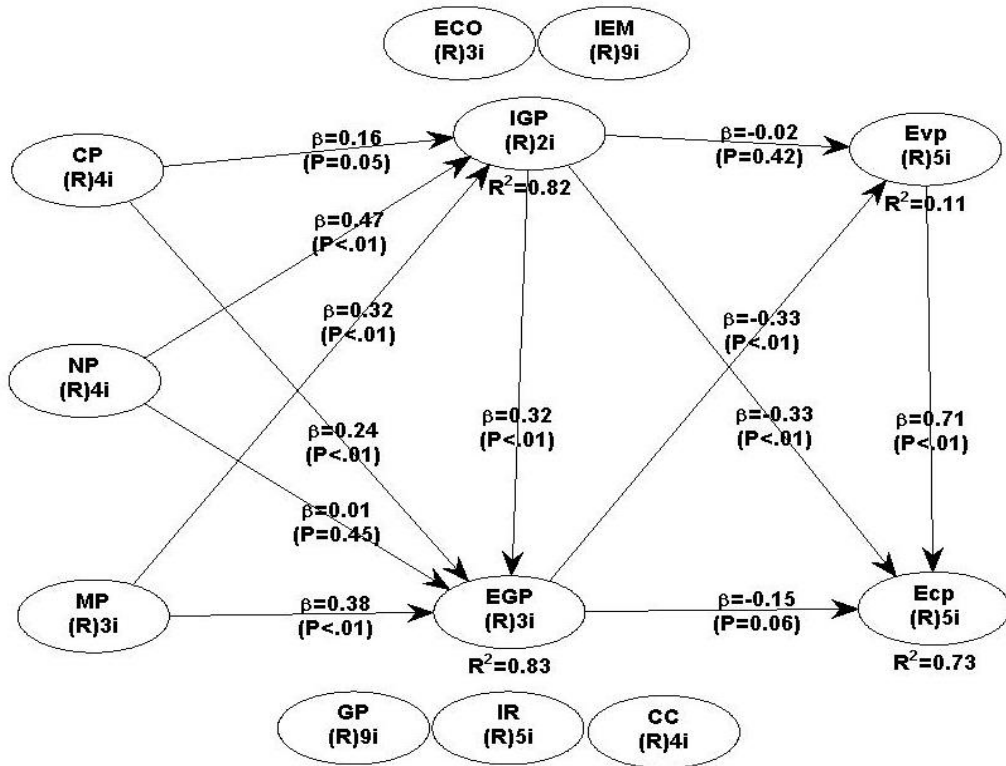


Figure 2: Structural Model Results

4.4 Model Fit and Additional Analyses

The structural model explained 82.2% of the variance in internal GSCM practices ($R^2=0.822$), 83.3% of variance in external GSCM practices ($R^2= 0.833$), 11.1% of variance in environmental performance ($R^2= 0.111$), and 73.2% of variance in economic performance ($R^2= 0.732$). The model demonstrated adequate predictive accuracy, with all Q^2 values exceeding zero, confirming that the model has predictive relevance for explaining endogenous constructs. Effect size analysis (f^2) indicated medium effects for most relationships, with institutional pressures on internal GSCM practices showing small, medium, and large effect sizes, respectively (coercive: $f^2= 0.138$, normative: $f^2= 0.412$, mimetic: $f^2= 0.273$), and internal GSCM practices on external practices showing a medium effect size ($f^2=0.284$).

Indirect effects testing revealed that internal GSCM practices did not indirectly influence economic performance through environmental performance (indirect $\beta=0.091$, $p=0.134$). This finding suggests that the costs associated with implementing internal green practices—such as investing in new technology, training staff, or changing materials—might be offsetting the economic gains typically expected from improved efficiency or reduced waste.

5. Discussion

5.1 Institutional Pressures and GSCM Practice Differentiation

The findings of the literature showed that different institutional pressures drive internal versus external GSCM practice adoption, which supports that the institutional pressures influence the green supply chain transformation process in a nuanced manner (Ngo, 2023; Singh, 2024). Coercive pressures across government environmental regulations, industry standards, and regulatory compliance are significant drivers of both internal GSCM practices and external practices (Chetanraj et al., 2024; Fan et al., 2024). The observation suggests that compliance at the firm level is largely a function of firm-level environmental management systems and production process improvements. Recent research has illustrated that the strength and consistency of regulatory enforcement significantly affect GSCM adoption practices among manufacturing businesses (Al-Kharabsheh et al., 2025). The positive association between coercive pressures and external GSCM practices ($\beta=0.24$, $p<0.001$) indicates that regulatory mandates and institutional requirements serve as a potent driver of firms' environmental activities beyond those within their organizational walls (Xu et al., 2022). Instead of focusing all their attention on internal compliance, organizations actively respond to these pressures by engaging in green collaboration with suppliers and customers to ensure end-to-end accountability. This is in accordance with institutional theory, positing that in emerging nations like Indonesia, strong regulatory frameworks (e.g., PROPER environmental rating system) strongly motivate firms to adopt external management practices, including green purchasing and eco-design cooperation (Lee et al., 2022). Legitimacy and the increasing importance of environmental ratings as a criterion drive firms to align their supply chain partnerships with sustainability initiatives, transforming regulatory "pressure" into a driver for broader supply chain integration. This agrees with results from construction industry studies, which demonstrate organizational learning partially mediates the effects of institutional pressures and environmental performance (Lee et al., 2022).

There are normative pressures to which the internal impact from GSCM, but not the external influence, is a major source, such that both professional and industry norms and practices have been successful in producing a green culture in the internal operations of the firm, but have been insufficient to overcome and resolve the complications involved in an industry-wide collaboration of the supply chain (Marculetiu et al., 2025). This suggests that although managers may focus on visible, modifiable, and controllable internal improvements (e.g., eco-design or

environmental management systems) to gain professional legitimacy among peers, they are reluctant to externalize these changes due to the costs of transaction, supplier resistance, and the absence of collective industry standards for cooperation (Ngo, 2023). As such, in such a scenario, the “green mandate” is still a self-contained organizational change rather than a boundary-spanning transformation, implying in this case that values alone cannot carry forward the more complex task of cross-firm environmental integration. The evidence on the adoption of ESG studies in Malaysian SMEs shows that normative pressures—particularly via educational initiatives and professional standards development efforts—contribute a significant amount of change into substantive sustainability practices (Ong et al., 2025).

Mimetic pressures shape external and internal practices, where successful competitors serve as the ultimate “roadmap” that provides a full blueprint for sustainability (Xu et al., 2022). In high uncertainty environments, however, companies not only mimic those external collaborations which are visible (e.g., joint green initiatives with suppliers) but also replicate the internal management systems and eco-design processes used by industry leaders (Lee et al., 2022). This implies that it’s all about using a more comprehensive imitation strategy, where instead of adhering to trial-and-error in a way that you’d rather not try at all, the firm mimics the whole of the “green winner” model. Given that external collaborations are more apparent and have superior symbolic value for benchmarking, and if the former becomes simultaneously driven by internal practices, firms consider internal and external GSCM to be an inseparable package that is required to compete at the standard of competition in their sector (Ngo, 2023). In research on the phenomenon of institutional isomorphism, specifically for environmentally sensitive sector firms, mimetic response to peer organizational behaviors is especially strong (Pozzoli et al., 2023).

5.2 Sequential Adoption: Internal Foundations for External Collaboration

The strong positive relationship between internal and external GSCM practices ($\beta=0.322$, $p<0.001$) reveals a clear sequential pattern, which suggests that internal environmental management and eco-design capabilities serve as necessary conditions for external collaboration (Real et al., 2025b). Firms lacking documented environmental management systems, established pollution prevention procedures, and product-level environmental expertise are poorly positioned to engage in credible external partnerships (Real et al., 2025a). Suppliers and customers demand transparency regarding partner environmental performance and capabilities; firms without internal systems cannot provide such transparency. This sequencing pattern aligns with resource-based view theory, which suggests firms must first develop internal competencies before leveraging external partnerships (Ahmed et al., 2026). This has significant implications for Indonesian manufacturing firms still at the beginning of their green transformation. Rather than attempting to pursue external green purchasing partnerships or customer cooperation initiatives without

established internal foundations, firms should strategically prioritize internal environmental management and product design improvements. After establishing these internal capabilities, firms are more prepared to pursue external partnerships that should deliver better market and competitive advantages. This strength of the relationship ($\beta=0.322$, $f^2=0.284$, medium effect) hints that internal and external practices are not detached; rather, they are one integrated system that is characterized by the internal competence to engage externally. This is especially critical in the Indonesian case since the supply chain relationships have been based on price and transaction. Green supply chain relationships depend on partner trust and confidence in each party's capabilities—trust is easier to build when internal environmental credentials are clearly established and documented.

5.3 Distinct Performance Mechanisms for Internal and External Practices

The findings demonstrate markedly different performance mechanisms for internal vs externally practiced GSCM. Internal GSCM practices were not a significant predictor of environmental performance ($\beta=-0.02$, $p=0.419$) and had a significantly negative direct effect on economic performance ($\beta=-0.331$, $p<0.001$). This indicates that internal green initiatives currently function as a short-term financial burden rather than a value driver. The large capital investment necessary for eco-design and environmental management systems results in a cost-heavy phase during which investments into green technology and staff training have not yet been offset by operational efficiencies.

External GSCM practices have a highly negative impact on ecological ($\beta=-0.334$) and economic performance ($\beta=-0.152$). This finding indicates an unusual degree of 'compliance complexity,' since the enormous administrative and logistical burden of managing supplier audits and customer requirements takes the firm away from its efforts to prevent internal pollution. Moreover, the negative economic trajectory underlines that the high transaction costs of outside cooperation—such as monitoring suppliers and paying premiums for green materials—currently outweigh the immediate market rewards.

The steep drop in environmental performance could suggest that the focal company has difficulty with "compliance complexity," a concept where managing the environmental audits of suppliers and environmentally-wise demands of customers actually detracts from or disrupts the internal pollution control mechanisms. Moreover, the negative economic trajectory shows that the costs associated with executing these external collaborations—including the higher price tags for green materials or the high transaction costs of monitoring suppliers—have not yet been mitigated via market premiums or reputation-based revenue. This indicates that, in this context, environmental enhancements of focal firms are heavily dependent on upstream supplier actions that remain largely beyond their direct control, leading to a "performance gap," meaning that more external effort is associated with less internal efficiency.

Environmental performance itself significantly improves economic performance ($\beta=0.714$, $p<0.001$), meaning that sustainability impacts lead to financial benefits in the end. The pathway is mediated: internal practices produce improvements in the environment, which then lead to a better end in the form of economic performance. At the same time, external practices directly produce economic improvements. Both of these paths work for firms that apply a coordinated, comprehensive GSCM approach: environmental benefits that have benefits on a long-term basis — lower running costs and improved branding — at the internal level, while external practices also provide immediate benefits on the market and relationship level, which will lead to gains in near-term economic performance.

5.4 Context-Specific Insights for Indonesian Manufacturing

The results of this study illustrate Indonesia's national institutional and market backdrop, where regulatory enforcement, while strengthening, remains inconsistent across regions. Some companies, however, counter coercive pressures with internal compliance strategies to address local mandates without having to make radical external change. On the other hand, international customers and industry peers (normative pressures), meanwhile, are a stronger driver, meaning more extensive green supply chain commitments are mandatory for global legitimacy. As Indonesia's manufacturing sector is in a phase of 'mid-transition', a clear sequential trend of adoption would be the pattern of entry. While multinational corporations have mature systems, most smaller domestic firms operate in resource-poor states, indicating a strategic position that emphasizes internal environmental management and eco-design ahead of a more difficult external cooperation.

The findings suggest that while external practices currently diminish direct operational performance, they are ultimately cost-efficient because they are largely market-directed. Indonesian manufacturers must therefore ensure that GSCM investments are complemented with explicit strategies for monetizing sustainability through customer communication, green market positioning, and premium pricing. Without these deliberate market-facing strategies, external GSCM investments may result in 'sunken costs' that reduce financial performance without providing the intended competitive offset.

5.5 Limitations and Boundary Conditions

There are several limitations that need to be noted. First, the study adopts a cross-sectional design, which prohibits causal inferences about the temporal sequence and dynamic relationships. Longitudinal studies would enhance knowledge on how GSCM adoption changes and gains in performance accrue over time. Second, the study focuses on medium and large manufacturing companies; results may not be relevant for small manufacturers or other sectors. Third, performance measurement data is perceptual and self-report based and may bring with it subjectivity; integration of objective secondary data (i.e., audited financial statements, official carbon disclosure reports) would enhance the validity of the results. Fourth, the

research is centered on manufacturing firms within major industrial clusters; there are no reports on the differences among regions about institutional pressures and GSCM uptake. Lastly, the study does not cover social performance dimensions; it only focuses on environmental and economic outcomes.

6. Conclusion

This study makes several theoretical contributions to the literature on GSCM. First, it finds that institutional pressures operate differentially on internal and external GSCM practices, with coercive pressures driving internal practices, normative pressures driving both, and mimetic pressures driving external practices. However, these results complicate the application of institutional theorizing to GSCM, as they indicate that not all institutional pressure yields consistent organizational responses. Secondly, it shows that internal and external GSCM practices are interconnected and not discrete systems, and internal capabilities constitute necessary platforms for external collaboration. The third implication, the study shows the complexities and trade-offs contained within performance mechanisms. Because theoretical models frequently make direct predictions, these findings emphasize a ‘performance lag’ in Indonesia’s manufacturing sector, with green supply chain initiatives imposing initially costly and complex requirements within both financial and environmental metrics.

For production company leaders, the results help shape the company’s strategy. Firms should adopt GSCM along a series of steps and first develop strong internal ESM facilities and eco-design capacity prior to cooperating with external SC providers. This order reflects both technical needs (partners need evidence of environmental capability prior to collaborating) and resource limitations (firms must restrict the number of resources they seek to deploy into areas over which they directly have control before they try to shape external partners).

Secondly, companies need to realize that either external or internal GSCM practices have different strategic meanings, even if the long-term benefits of these practices are not necessarily felt immediately. The study argues that companies confronted with rising environmental concerns through green investments should invest in customer collaboration initially to cover the costs of implementation. It is important to note that these internal practices are supposed to create environmental capabilities, so it will take longer for them to have a positive environmental impact. But because external practices include the supply chain across the broadening scope, they offer a more direct road to economic stability when managed through partnerships. Both are pursued in a comprehensive GSCM strategy, which encompasses changing a firm’s readiness from within to becoming more integrated into the external environment.

Third, firms must explicitly pursue market-facing approaches to monetize investments in external green practice. The economic benefits of external practices are transmitted through market mechanisms (customer relationships, reputation enhancement, premium pricing), rather than being brought about by operational cost

reductions. Without strategies intended to communicate green practices to customers and translate environmental improvements into market advantages, external practice investments entail costs without offsetting benefits.

Regulatory coercion (through environmental compliance) drives internal GSCM practice adoption, but it does not promote external supply chain collaboration, as policymakers should appreciate. If policymakers want to see a holistic green supply chain transformation without relying solely on internal regulations, they should support regulatory schemes by including initiatives to develop normative pressures (e.g., industry norms, professional roles, consumer demands). Indonesia's PROPER environmental rating system does a good job of setting up regulatory pressure to promote internal compliance; policymakers could widen some of the PROPER criteria to include supply chain collaboration and partner environmental performance as rating factors.

Industry associations should develop sector-specific GSCM standards and best practice frameworks that promote external supply chain collaboration. Professional associations can develop expectations of what is acceptable as practice for green supply chain cooperation and provide technical assistance to firms promoting external collaborative activities and peer learning around how to implement outside practice. Industry associations in Indonesia are an ideal environment for the fast growth of green supply chain transformation by norm-setting activities. Incentive programs that support GSCM adoption should focus explicitly on firms engaging in external cooperation. Emphasis should be given to financial support for establishing sustainable supply chain partnerships, technical assistance to facilitate industry practice adoption, and tax incentives for investing in green supply chains, all of which could help enable accelerating the transition from internal compliance to comprehensive green supply chain integration.

Future research should have several directions to extend this study. Longitudinal designs would elucidate the temporal mechanisms of GSCM adoption and the gain of performance benefits. Qualitative research could reveal difficulties and constraints in implementation, resource availability issues, and organizational change management challenges, none of which can be covered by the quantitative surveys. A cross-sector comparative analysis would uncover sector-specific differences in institutional pressures and patterns of GSCM adoption. It would broaden knowledge by examining small manufacturing companies beyond the medium and large companies that would seem the norm in such sample data. Finally, studies that examined social sustainability dimensions together with environmental and economic performance would give a fuller picture of the triple bottom line effects of GSCM.

References

- [1] Ahmed, Z., Akhtar, A., & Rabbani, A. A. (2026). Green Supply Chain Management and Sustainable Performance: The Mediating Role of Innovation and Institutional Pressures. *Inverge Journal of Social Sciences*. <https://doi.org/10.63544/ijss.v5i2.271>
- [2] Al-Kharabsheh, A., Assaf, N., Al-Shoura, L. B. S., Hashem, O., & Jarah, B. A. F. (2025). Enhancing Supply Chain Efficiency and Green Logistics: The Role of Environmental Regulations. *Journal of Cultural Analysis and Social Change*. <https://doi.org/https://doi.org/10.64753/jcasc.v10i4.2934>
- [3] Alonso-Almeida, M. D. M., & Rodríguez-Antón, J. M. (2020). The Role of Institutional Engagement at the Macro Level in Pushing the Circular Economy in Spain and Its Regions. <https://doi.org/10.3390/ijerph17062086>
- [4] Al-Sheyadi, A., Muyldermans, L., & Kauppi, K. (2019). The complementarity of green supply chain management practices and the impact on environmental performance. *Journal of Environmental Management*. <https://doi.org/10.1016/j.jenvman.2019.04.078>
- [5] Anagnostopoulou, E. (2025). The Mediating Role of Climate Targets in Corporate Emission Reductions. *Business Strategy and the Environment*. <https://doi.org/10.1002/bse.70364>
- [6] Ashraf, S. (2026a). Challenging role of green supply chain management in sustainable growth. *Frontiers in Sustainability*. <https://doi.org/10.3389/frsus.2026.1735187>
- [7] Ashraf, S. (2026b). Green supply chain management and environmental performance: Evidence from cross-sector case analysis. *Journal of Sustainable Development of Transport and Logistics*. <https://doi.org/10.14254/jsdtl.2026.11-1.1>
- [8] Ayoubi, M. S. E., & Radmehr, M. (2023). Green food supply chain management as a solution for the mitigation of food supply chain management risk for improving the environmental health level. *Heliyon*. <https://doi.org/10.1016/j.heliyon.2023.e13264>
- [9] Bett, M. J., & Wachiuri, E. (2025). Green Supply Chain Management Practices and Performance of Beverage Manufacturing Industry in Kenya. *International Journal of Social Science and Humanity Research*. <https://doi.org/10.61108/ijsshr.v3i2.187>
- [10] Chetanraj, D. B., Kumar, J. P. S., Sai, V. S., & Ramegowda, K. V. (2024). The role of corporate environmental ethics in shaping environmental management accounting adoption under the institutional theory. *Environmental Economics*. [https://doi.org/10.21511/ee.15\(1\).2024.03](https://doi.org/10.21511/ee.15(1).2024.03)
- [11] Fan, J., Muhamad, H., Said, R. M., & Daud, Z. M. (2024). Do Institutional Pressures Impact Voluntary Environmental Information Disclosure? *Bangladesh Journal of Multidisciplinary Scientific Research*, 9(5), 29–38. <https://doi.org/10.46281/bjmsr.v9i5.2254>

- [12] Labaran, M. J., & Masood, T. (2023). Industry 4.0 Driven Green Supply Chain Management in Renewable Energy Sector: A Critical Systematic Literature Review. *Energies*. <https://doi.org/10.3390/en16196977>
- [13] Lee, D., Fu, Y., Zhou, D., Nie, T., & Song, Z. (2022). Is There a Missing Link? Exploring the Effects of Institutional Pressures on Environmental Performance in the Chinese Construction Industry. *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph191811787>
- [14] Liew, M., & Cao, J. (2025). Accounting for Carbon Emissions Through Green Supply Chain Management: A Systematic Literature Review. *Business Strategy and the Environment*. <https://doi.org/https://doi.org/10.1002/bse.70021>
- [15] Lisnawati, L., & Siahaan, M. (2025). Can green and blue thematic financing enhance sustainability value? Evidence from Southeast Asia. *International Journal of Ethics and Systems*. <https://doi.org/10.1108/ijoes-11-2024-0374>
- [16] Marculetiu, A., Ataseven, C., & Chen, I. J. (2025). Norms Over Threats and Trends: A Managerial Perspective on the Role of Normative Pressures in Motivating Sustainable Strategies and Positive Outcomes. *Business Ethics, the Environment & Responsibility*. <https://doi.org/10.1111/beer.12827>
- [17] Ngo, Q. (2023). Do environmental management practices mediate institutional pressures-environmental performance relationship? Evidence from Vietnamese SMEs. *Heliyon*. <https://doi.org/10.1016/j.heliyon.2023.e17635>
- [18] Nguyen, D. N., Mac, T. T., & Hoang, H. H. (2025). Supply chain collaboration and green supply chain management: A bibliometric review, 2000–2023. *Journal of Transport and Supply Chain Management*. <https://doi.org/https://doi.org/10.4102/jtscm.v19i0.1170>
- [19] Ong, J. H., Khatibi, A., Mohd, Z., & George, T. R. (2025). Ethical leadership in environmental, social and governance (ESG) adoption for Malaysian micro, small and medium enterprises (MSMEs). *International Journal of Ethics and Systems*. <https://doi.org/10.1108/ijoes-08-2024-0266>
- [20] Pozzoli, M., Nastari, R., Pisano, S., & Venuti, M. (2023). How Circular Economy Disclosure Responds to Institutional Determinants Empirical Evidences in Non-Financial European Firms. *Sustainability*. <https://doi.org/10.3390/su152216069>
- [21] Real, J. C., Cepeda-Carrión, I., & Pérez-Bou, S. (2025a). Driving sustainability: Green drivers and practices in the textile-fashion industry. *Cuadernos de Gestión*. <https://doi.org/10.5295/cdg.252326jc>
- [22] Real, J. C., Cepeda-Carrión, I., & Pérez-Bou, S. (2025b). Road to sustainability with green practices: a look at SMEs in the textile-fashion industry in Spain. *European Business Review*. <https://doi.org/10.1108/eb-03-2025-0074>
- [23] Saeed, A., Jun, Y., Nubuor, S. A., RasikaPriyankara, H. P., & Jayasuriya, M. P. F. (2018). Institutional pressures, green supply chain management practices on environmental and economic performance: A two theory view. *Sustainability (Switzerland)*, 10(5). <https://doi.org/10.3390/su10051517>

- [24] Singh, R. (2024). Wheeling towards sustainability: the nexus of external pressures, green innovation and circular supply chain excellence. *Business Process Management Journal*. <https://doi.org/10.1108/bpmj-10-2023-0772>
- [25] Sunani, A., Widodo, U. P. W., Wijaya, R. M. S. A. A., & Kirana, N. W. I. (2024). Environmental disclosure analysis of manufacturing companies to realize sustainable green economy. *Intangible Capital*, 20(2), 321–342. <https://doi.org/10.3926/ic.2505>
- [26] Vinothraja, P., & Hariharan, C. (2025). Sustainability Challenges and Innovations in the Coastal Hospitality Sector of Tamil Nadu. *Lex Localis - Journal of Local Self-Government*. <https://doi.org/10.52152/fb9nzw28>
- [27] Wang, M., & Zhang, G. (2023). What motivates firms to adopt a green supply chain and how much does it matter? *Frontiers in Environmental Science*. <https://doi.org/10.3389/fenvs.2023.1227008>
- [28] Xu, Y., Chin, W., Liu, H., & He, K. (2022). Do institutional pressures promote green innovation? The effects of cross-functional coopetition in green supply chain management. *International Journal of Physical Distribution & Logistics Management*. <https://doi.org/10.1108/ijpdlm-03-2022-0104>
- [29] Yusoh, N. N. A. M., Mat, T. Z. T., & Abdullah, A. (2023). Institutional Pressures and Environmental Management Accounting System Adoption: Evidence from Malaysian Public Listed Companies. *Asian Journal of Accounting and Governance*, 19. <https://doi.org/10.17576/ajag-2023-19-03>
- [30] Zhu, D., Zhu, H., & Arkorful, V. E. (2023). Institutional Pressure and Eco-innovation: The Moderating Role of Environmental Uncertainty. *Science Technology & Society*. <https://doi.org/10.1177/09717218231201945>.