

# GREEN SUPPLY CHAIN PRACTICES THAT LEADS TO SUSTAINABILITY

## *An Integrated Triple Bottom Line, Natural Resource-Based View and Theory of Planned Behaviour Perspective*

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### **Abstract**

*Green Supply Chain Management (GSCM) has become an important strategic instrument for organisations pursuing long-term sustainability amid growing environmental pressures, regulatory demands, and stakeholder expectations. This study examines how four GSCM practices Green Packaging, Green Logistics, Internal Environmental Management, and Collaboration & Innovation influence organisational Sustainability Performance, viewed through the environmental, economic, and social dimensions of the Triple Bottom Line (TBL). The study is grounded in the TBL, the Natural Resource-Based View (NRBV), and the Theory of Planned Behavior (TPB), and adopts a quantitative, descriptive research design. Primary data were collected from 200 managers, executives, and supervisors of Indian logistics, e-commerce, manufacturing, and third-party logistics organisations using a structured questionnaire distributed via Google Forms, and were analysed using descriptive statistics, reliability testing, correlation analysis, and multiple linear regression in SPSS. The results show that Green Logistics, Internal Environmental Management, and Collaboration & Innovation each have a strong, statistically significant, positive effect on Sustainability Performance, jointly explaining 59.7% of its variance, whereas Green Packaging, although positively correlated, does not exert a statistically significant independent effect once the other predictors are controlled for. These findings suggest that sustainability performance is driven less by symbolic or isolated green initiatives and more by operational efficiency, internal environmental governance, and collaborative innovation. The study extends empirical understanding of GSCM within the Indian context and offers practical guidance to managers and policymakers seeking to embed sustainability into core supply chain operations rather than treat it as a peripheral or compliance-driven activity.*

**Keywords** *Green Supply Chain Management; Green Packaging; Green Logistics; Internal Environmental Management; Collaboration and Innovation; Sustainability Performance; Triple Bottom Line; Natural Resource-Based View*

## **I. INTRODUCTION**

### **A. Introduction**

The definition of business success in the twenty-first century has broadened beyond profit maximisation to encompass social and environmental responsibility. Growing awareness of climate change, pollution, and resource scarcity has pushed organisations toward more sustainable business models, giving rise to Green Supply Chain Management (GSCM) a strategic approach that embeds environmental consideration into every stage of the supply chain, from raw-material procurement and manufacturing to distribution and disposal. GSCM promotes efficient resource use, waste minimisation, and cleaner operations, aligning corporate goals with eco-friendly development. Global innovators such as Unilever, Toyota, and IKEA illustrate that green initiatives can enhance both environmental performance and brand equity. Yet a persistent gap remains between the sustainability that companies claim and the sustainability they practise, raising the question of whether green supply chain investments translate into genuine, long-term outcomes or remain largely symbolic. This study investigates the extent to which specific green supply chain practices contribute to sustainability across its environmental, economic, and social dimensions.

### **B. Background of the Study**

The Industrial Revolution and subsequent globalisation drove rapid economic and technological growth, but at a significant environmental cost. Overexploitation of finite resources such as energy, water, and raw materials has caused severe ecological degradation, prompting international bodies such as the United Nations to place sustainable production and consumption at the centre of the Sustainable Development Goals. This shift in corporate philosophy gave rise to GSCM, which, as described by Zhu and Sarkis [20], extends sustainability across the entire supply network connecting suppliers, manufacturers, distributors, and customers rather than confining it to cost reduction within a single firm.

GSCM rests on the Triple Bottom Line (TBL) framework introduced by Elkington [5], which evaluates organisational performance across three interdependent pillars People, Planet, and Profit. Empirical evidence links green innovation to reduced waste, energy consumption, and emissions, alongside tangible business benefits such as lower operating costs and improved efficiency [7]. GSCM is especially relevant in developing economies such as India, which ranks among the world's leading greenhouse-gas emitters, with industrial activity much of it from Micro, Small and Medium Enterprises (MSMEs) accounting for a large share of national pollution [8]. In response, the Indian government has introduced measures

including the National Green Manufacturing Policy, the Companies Act (2013) CSR mandate, the Plastic Waste Management Rules (2016) with Extended Producer Responsibility (EPR), and the National Action Plan on Climate Change. Despite this policy architecture, structural barriers high start-up costs, weak logistical infrastructure, and a shortage of trained managers continue to constrain widespread GSCM adoption.

### **C. Research Problem**

GSCM has become one of the most widely discussed strategic approaches in contemporary management, underpinned by frameworks such as the TBL and the Natural Resource-Based View (NRBV) that link environmental responsibility to competitive advantage. Yet considerable doubt remains over its real-world efficacy, producing two related gaps. The first is an industrial or practical gap between what organisations claim to do such as adopting renewable energy or eco-friendly packaging and what they actually achieve, a phenomenon often labelled greenwashing. The second is a theoretical gap: existing literature tends to examine single GSCM practices or isolated performance outcomes (typically environmental or cost-related) rather than the joint contribution of multiple practices to the full Triple Bottom Line. Accordingly, the research problem addressed in this study is whether specific green supply chain practices Green Packaging, Green Logistics, Internal Environmental Management, and Collaboration & Innovation produce measurable, meaningful improvements in sustainability performance across its environmental, economic, and social dimensions, or whether they function largely as symbolic gestures with limited long-term effect.

### **D. Research Questions and Objectives**

Based on the research problem identified above, the study addresses the following research questions:

- 1) Does green packaging significantly influence sustainability performance in organisations?
- 2) Does green logistics significantly influence sustainability performance in organisations?
- 3) Does internal environmental management significantly influence sustainability performance in organisations?
- 4) Does collaboration and innovation significantly influence sustainability performance in organisations?

In line with these questions, the study aims to investigate the significant relationship between each of the four GSCM practices green packaging, green logistics, internal environmental management, and collaboration and innovation and sustainability performance in organisations.

### **E. Significance of the Study**

Organisations in emerging economies such as India face mounting pressure to implement GSCM practices, yet a tangible gap remains in the literature regarding how specific practices translate into long-term sustainability outcomes. This study addresses that gap by examining how green packaging, green logistics, internal environmental management, and

collaboration and innovation jointly shape sustainability performance, offering managers and supply chain leaders data-driven guidance for designing operations that are cost-effective, environmentally responsible, and socially inclusive. Academically, the study deepens understanding of GSCM by integrating three complementary frameworks: the TBL [5], which evaluates sustainability across People, Planet, and Profit; the NRBV [10], which explains how environmental capability can become a source of competitive advantage; and the Theory of Planned Behavior (TPB) [1], which explains how organisational attitudes, stakeholder pressure, and perceived control shape the adoption of green practices. Together these frameworks provide both a conceptual foundation for this study and a template for future research into the evolving relationship between green innovation, sustainability, and stakeholder engagement.

## **II. LITERATURE REVIEW**

### **A. Overview**

Indian industries generate large volumes of industrial waste, contribute significantly to national carbon emissions, and face mounting challenges such as water scarcity, declining air quality, and land degradation, compelling firms to integrate 'green thinking' across procurement, production, logistics, packaging, and collaborative partnerships. This chapter reviews the literature on GSCM with specific attention to the four independent variables of this study Green Packaging, Green Logistics, Internal Environmental Management, and Collaboration & Innovation and their influence on Sustainability Performance, the dependent variable, spanning environmental, economic, and social outcomes. The review is strengthened with India-specific evidence and regulatory context, including the Plastic Waste Management Rules (2016) and EPR guidelines, the National Logistics Policy (2022), the National Action Plan on Climate Change, and the National Clean Air Programme (2019). Theoretically, the chapter draws on the TBL, which defines sustainability; the NRBV, which explains competitive advantage rooted in environmental capability; and the TPB, which explains the behavioural drivers of and barriers to GSCM adoption.

### **B. Green Supply Chain Management (GSCM)**

GSCM refers to the integration of environmental considerations into every stage of the supply chain procurement, product design, production, distribution, and reverse logistics with the aim of reducing the ecological footprint of industrial activity while enhancing enterprise performance [19]. International research links GSCM to reductions in waste, energy consumption, and carbon emissions [20], [7], alongside competitive gains from lower operating costs, better resource utilisation, and stronger brand image. In India, regulatory instruments such as the Solid Waste Management Rules (2016), E-Waste Management Rules (2016), EPR regulations, and the Energy Conservation Act have pushed companies toward more sustainable supply chains, reinforced by national programmes such as the Green Hydrogen Mission and the Swachh Bharat Mission. Indian conglomerates including Tata, Mahindra, Marico, ITC, and Godrej have

implemented green packaging, renewable energy, and zero-waste-to-landfill initiatives, although structural barriers inadequate green infrastructure, limited technological capacity, cost sensitivity, and inconsistent supplier readiness continue to constrain the pace of adoption.

### ***C. Triple Bottom Line (TBL)***

The TBL, proposed by Elkington [5], holds that genuine organisational sustainability requires simultaneous performance across People, Planet, and Profit. This framework maps directly onto the dependent variable of this study: Green Logistics and Green Packaging primarily support the Planet dimension by reducing pollution, waste, and emissions [7]; Internal Environmental Management supports the Profit dimension through cost savings from cleaner processes and improved compliance; and Collaboration & Innovation supports both the People and Profit dimensions by strengthening stakeholder trust and generating environmentally and socially beneficial solutions. Applying the TBL allows this study to move beyond superficial sustainability claims and evaluate whether the selected GSCM practices produce genuine gains across all three dimensions.

### ***D. Natural Resource-Based View (NRBV)***

The NRBV, developed by Hart [10], argues that a firm's management of natural resources and environmental impact not merely its financial and technological assets can be a source of sustained competitive advantage. Each GSCM practice examined in this study maps onto one of NRBV's core capabilities: Green Logistics and Green Packaging relate to pollution prevention through reduced waste and emissions; Internal Environmental Management parallels product stewardship through cleaner production systems and standards such as ISO 14001; and Collaboration & Innovation reflects the capacity for sustainable development through supplier cooperation and green technology adoption. In the Indian context, firms that invest in eco-design, recycling systems, and stewardship of chemical inputs report improved market access, brand image, and operational efficiency, reinforcing the view that GSCM practices function as strategic instruments rather than mere environmental obligations.

### ***E. Theory of Planned Behavior (TPB)***

Whereas the TBL and NRBV explain sustainability outcomes and competitive advantage, the TPB [1] explains the behavioural and organisational drivers of GSCM adoption attitudes, subjective norms, and perceived behavioural control. A firm favourably disposed toward, say, green logistics because it expects fuel savings and reputational benefit exhibits a positive attitude; pressure from regulators, customers, or competitors reflects subjective norms; and the availability of finance, technology, and managerial capability reflects perceived behavioural control. Prior research confirms that green practices are adopted when perceived benefits outweigh costs and external pressure is high, while limited resources and infrastructure constrain perceived behavioural control in the Indian context, producing inconsistent GSCM implementation despite favourable attitudes toward sustainability. Incorporating the TPB alongside the TBL and NRBV therefore

adds a behavioural dimension that helps explain why some organisations translate sustainability intent into practice more effectively than others.

### ***F. Green Packaging***

Green packaging recyclable, biodegradable, reusable, or reduced-material packaging has consistently been shown to shape consumer attitudes and brand perception. Consumers report greater trust and a stronger sense of making a responsible choice when packaging appears environmentally safe [14]; biodegradable or minimalist packaging reduces the environmental guilt associated with purchasing, while lightweight and recyclable materials lower packaging costs and enhance brand image [16]. Evidence from Asian markets shows that customers are willing to pay a premium for recyclable or compostable packaging, particularly among younger consumers who associate green packaging with honesty and modernity [17]. Collectively, these findings position green packaging as more than a technical or cosmetic change it is a mechanism for building customer trust and brand reputation that is expected to contribute to long-term sustainability.

### ***G. Green Logistics***

Green logistics involves making transportation, warehousing, distribution, and inventory management more environmentally responsible, typically through electric or hybrid fleets, route optimisation, greener warehousing, and reverse logistics [4]. Studies show that fuel-efficient vehicles and optimised routing yield significant reductions in transportation emissions and operating costs, while reverse logistics recycling, remanufacturing, and product take-back enables organisations to recover material value and improve regulatory compliance [13]. In India, where logistics accounts for a substantial share of national carbon emissions owing to an ageing vehicle fleet and fragmented transport networks, green logistics initiatives such as electric delivery fleets and optimised route planning have produced measurable reductions in fuel cost, delivery time, and emissions, as demonstrated by large-scale investments from firms such as Amazon India and Flipkart.

### ***H. Internal Environmental Management***

Internal Environmental Management (IEM) encompasses organisational policies, management commitment, employee training, environmental audits, and formal systems such as ISO 14001 that embed sustainability into daily operations [11]. Firms that train employees on environmental concerns and integrate sustainability into work processes report less waste and smarter resource use, while ISO 14001 certification is associated with heightened employee awareness and more rigorous performance tracking. Indian evidence shows that organisations with well-developed environmental committees, audits, and management-led green programmes achieve visible reductions in emissions, water use, and industrial waste, underscoring IEM as the internal foundation on which broader green supply chain initiatives depend.

### ***I. Collaboration and Innovation***

Collaboration and innovation cooperation with suppliers, customers, research institutions, and other stakeholders to develop environmentally friendly products, processes, and technologies consistently outperform isolated organisational efforts. Joint environmental initiatives between manufacturers and suppliers accelerate information exchange and access to green technologies, producing greater reductions in emissions and stronger regulatory compliance. Green product innovation similarly delivers competitive advantage through customer retention and brand differentiation [2], and enhances market performance as customers increasingly favour sustainable alternatives. In emerging markets such as India, partnerships with green suppliers help organisations overcome resource constraints and achieve superior environmental outcomes, while joint R&D on biodegradable materials and water-treatment technologies has helped Indian exporters remain competitive in international markets.

### ***J. Sustainability Performance (Dependent Variable)***

Sustainability performance reflects how well an organisation balances environmental responsibility, financial objectives, and social contribution; a firm cannot be considered sustainable if it excels on one dimension while neglecting the others. Firms that embed sustainability into core processes report stronger stakeholder relationships and lower long-term risk, and attract socially conscious consumers who reinforce market position and reputation. Environmentally proactive firms also experience fewer supply chain disruptions and superior long-term financial performance through reduced waste, fewer regulatory penalties, and stronger competitive advantage. In the Indian context, organisations that adopt renewable energy, waste reduction, and ethical labour practices report improved operational efficiency, stronger regulatory compliance, and greater customer and community trust, positioning sustainability performance as a necessary condition for long-term competitiveness rather than a discretionary undertaking.

### ***K. Relationship between GSCM Practices and Sustainability Performance***

Green packaging is associated with reduced waste and carbon emissions relative to conventional plastic-based packaging, alongside lower material and transport costs and stronger consumer loyalty rooted in perceived ethical practice [14], [16]. Green logistics contributes to sustainability through direct fuel and emissions reductions, lower transportation costs, and improved community well-being through cleaner air and reduced congestion. Internal Environmental Management shapes organisational culture and routine, with training, policy, and certification producing measurable reductions in waste and energy use as well as improved employee well-being and community trust. Collaboration and Innovation enable organisations to pool resources, share knowledge, and jointly develop green solutions, generating environmental, economic, and social benefits that would be difficult to achieve individually. Together, these four practices are expected to make organisations less environmentally harmful, more operationally efficient, and more trusted by stakeholders, forming an integrated system that supports long-term sustainability performance.

### ***L. Hypothesis Development***

Based on the literature review and theoretical grounding, four hypotheses are proposed to examine the effect of GSCM practices on sustainability performance.

H1: Green packaging has a significant positive effect on sustainability performance.

H2: Green logistics has a significant positive effect on sustainability performance.

H3: Internal environmental management has a significant positive effect on sustainability performance.

H4: Collaboration and innovation has a significant positive effect on sustainability performance.

### ***M. Research Framework***

The conceptual framework treats Green Packaging, Green Logistics, Internal Environmental Management, and Collaboration & Innovation as independent variables and Sustainability Performance as the dependent variable, positing a direct path from each GSCM practice to sustainability outcomes (Fig. 1). The framework is grounded in the TBL, supported by the NRBV's explanation of environmentally rooted competitive advantage, and further informed by the TPB's account of the behavioural drivers of adoption.

|                                      |                                       |
|--------------------------------------|---------------------------------------|
| Green Packaging                      | <b>Sustainability<br/>Performance</b> |
| Green Logistics                      |                                       |
| Internal Environmental<br>Management |                                       |
| Collaboration & Innovation           |                                       |

*Fig. 1. Research Framework (Independent Variables → Dependent Variable)*

### ***N. Research Gap***

Despite extensive GSCM literature, several gaps justify the present study. First, most prior work examines single practices in isolation typically green procurement or green logistics whereas the Indian industrial ecosystem calls for a synergistic view spanning green packaging, green logistics, internal environmental management, and collaboration and innovation. Second, much research emphasises environmental and economic sustainability while leaving the social dimension comparatively unexplored, particularly in labour-intensive Indian sectors such as textiles, construction, FMCG, and automotive manufacturing. Third, international GSCM models are rarely contextualised to India's distinctive regulatory environment the Swachh Bharat Mission, Plastic Waste Management Rules, EPR, National Logistics Policy, and NAPCC which creates adoption drivers and barriers not captured in Western or East Asian studies. Fourth, although the TBL and NRBV are frequently applied, the behavioural dimension captured by the TPB is rarely used to explain why Indian firms struggle with green adoption despite favourable attitudes. Finally, few empirical studies examine the combined effect of all four GSCM variables on the tri-dimensional sustainability framework within the Indian industrial setting a gap this study addresses directly.



### III. RESEARCH METHODOLOGY

#### A. Introduction

This section describes how the theoretical arguments developed in the literature review were operationalised and empirically tested. A properly developed methodology ensures that the study's findings carry empirical credibility and scientific validity [3]. The following subsections describe the operational definitions of the research variables, the research framework and hypotheses, the sources of data, the sampling design, sample size determination, the research instrument and data collection procedure, and the statistical techniques applied.

#### B. Operational Definitions of Research Variables

**Green Packaging (GP):** the extent to which an organisation uses recyclable, biodegradable, reusable, or reduced-material packaging designed to minimise environmental impact while preserving product safety and functionality [14].

**Green Logistics (GL):** the extent to which an organisation employs fuel-efficient transportation, route optimisation, and reverse logistics to reduce fuel use, emissions, and operational waste [4].

**Internal Environmental Management (IEM):** the extent to which an organisation embeds environmental responsibility into its operations through management commitment, employee training, clear environmental policy, and regular performance monitoring [11].

**Collaboration & Innovation (C&I):** the extent to which an organisation works with suppliers, customers, and other stakeholders to develop eco-friendly products, processes, and technologies, and invests in green innovation [2].

**Sustainability Performance (SP):** the extent to which an organisation reduces waste and energy consumption, lowers operational costs, sustains long-term profitability, and improves employee and stakeholder satisfaction through its green initiatives [5].

#### C. Research Framework and Hypotheses

Consistent with the framework in Fig. 1, the study tests four hypotheses (H1–H4, Section II-L) positing a direct, positive relationship between each GSCM practice and Sustainability Performance. The corresponding null hypotheses (H0) state that no significant relationship exists.

#### D. Sources of Research Data

Primary data were collected through a structured questionnaire administered to managers, executives, and supervisors of Indian organisations engaged in logistics, e-commerce/retail, manufacturing/distribution, and third-party logistics (3PL) that have implemented or are implementing GSCM practices. Respondents in these roles are directly involved in planning, executing, and evaluating green initiatives, giving them first-hand operational and strategic knowledge of sustainability practice. Secondary data were drawn from peer-reviewed journal articles, academic books, industry reports, and government publications, which informed the design of the research instrument, refined the measurement

constructs, and helped situate the empirical findings within the broader GSCM literature.

#### E. Sampling Design

The study used purposive sampling, selecting respondents most likely to provide accurate, contextually relevant data on GSCM practice [3]. Because GSCM involves strategic decision-making and cross-functional coordination, not every organisational member is well positioned to answer questions on sustainability performance; targeting managers, executives, and supervisors in supply chain and sustainability-related functions ensures that responses reflect practical operational experience rather than general perception. This approach is consistent with prior technology-adoption and sustainability research and strengthens the internal validity of the study's findings.

#### F. Sample Size Determination

Sample size was determined a priori using G\*Power 3.1, based on an F-test for multiple linear regression (fixed model,  $R^2$  deviation from zero). Assuming a medium effect size ( $f^2 = 0.15$ ), a significance level ( $\alpha$ ) of 0.05, a statistical power of 0.80, and four predictors, the analysis indicated a minimum required sample of 85 respondents (critical  $F = 2.486$ , noncentrality parameter  $\lambda = 12.75$ , actual power = 0.803). To offset non-response, incomplete questionnaires, and potential outliers, and to strengthen the stability of the regression estimates, the study deliberately targeted a substantially larger sample, yielding 200 valid responses for final analysis.

#### G. Research Instrument and Data Collection

A structured questionnaire, administered online via Google Forms, served as the primary data collection instrument. The instrument comprised an introductory section capturing demographic and organisational information (gender, job role, years of experience, and type of organisation) followed by five sections measuring Green Packaging, Green Logistics, Internal Environmental Management, Collaboration & Innovation, and Sustainability Performance, with five items per construct. All items were rated on a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5) [Likert, 1932], and were adapted from previously validated GSCM and sustainability scales with minor contextual adjustments for the Indian setting to strengthen content validity. Table I presents representative items.

TABLE I. SAMPLE QUESTIONNAIRE ITEMS

| Variable                   | Representative Item                                                          |
|----------------------------|------------------------------------------------------------------------------|
| Green Packaging            | Our organisation uses recyclable or biodegradable packaging materials.       |
| Green Logistics            | Fuel-efficient transportation methods are used to reduce emissions.          |
| Internal Env. Mgmt.        | Top management is committed to environmental sustainability initiatives.     |
| Collaboration & Innovation | We collaborate with suppliers to develop eco-friendly products or processes. |
| Sustainability Performance | Our organisation has reduced waste generation over time.                     |

Respondents were informed of the academic purpose of the study, and confidentiality and anonymity were assured to encourage honest, unbiased responses. Sufficient time was allowed for completion so that respondents could reflect on organisational practice rather than answer hastily.

## H. Data Analysis

Data were analysed using IBM SPSS Statistics. Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to profile respondents and summarise the study variables. Reliability was assessed using Cronbach's alpha, with a threshold of 0.60 treated as minimally acceptable and 0.70 as good internal consistency [Nunnally & Bernstein, 1994]. Pearson correlation analysis examined the strength and direction of relationships among variables and screened for multicollinearity, while multiple linear regression tested the hypothesised relationships, estimated the relative contribution of each independent variable, and determined statistical significance at the conventional  $\alpha = 0.05$  threshold.

## IV. DATA ANALYSIS AND RESULTS

This section presents the analysis and interpretation of results obtained from 200 valid respondents, proceeding through the respondent profile, descriptive statistics, reliability analysis, correlation analysis, and multiple regression analysis used to test the four hypotheses developed in Section II-L.

### A. Profile of the Respondents

Table II presents the gender distribution of respondents.

TABLE II. GENDER OF RESPONDENTS

| Gender | Frequency | Percent |
|--------|-----------|---------|
| Male   | 142       | 71.0    |
| Female | 58        | 29.0    |
| Total  | 200       | 100.0   |

Male respondents accounted for 71.0% of the sample and female respondents 29.0%, broadly reflecting the current gender composition of logistics and supply chain roles in India, while still providing a meaningful diversity of perspective.

TABLE III. JOB ROLE OF RESPONDENTS

| Job Role           | Frequency | Percent |
|--------------------|-----------|---------|
| Supervisor         | 68        | 34.0    |
| Executive          | 48        | 24.0    |
| Fleet Manager      | 30        | 15.0    |
| Logistics Manager  | 27        | 13.5    |
| Operations Manager | 27        | 13.5    |
| Total              | 200       | 100.0   |

Supervisors formed the largest respondent group (34.0%), followed by executives (24.0%), ensuring that responses combine policy-level perspective with ground-level implementation experience of green supply chain practices.

TABLE IV. YEARS OF EXPERIENCE

| Experience       | Frequency | Percent |
|------------------|-----------|---------|
| Less than 1 year | 122       | 61.0    |
| 1–3 years        | 43        | 21.5    |
| 4–6 years        | 21        | 10.5    |
| 7–10 years       | 10        | 5.0     |

|                    |     |       |
|--------------------|-----|-------|
| More than 10 years | 4   | 2.0   |
| Total              | 200 | 100.0 |

A majority of respondents (61.0%) had less than one year of experience, reflecting strong participation from early-career professionals, while the inclusion of more experienced respondents ensures the sample also captures views grounded in longer-term organisational exposure.

TABLE V. TYPE OF ORGANISATION

| Organisation Type            | Frequency | Percent |
|------------------------------|-----------|---------|
| Logistics / Courier Services | 79        | 39.5    |
| Third-Party Logistics (3PL)  | 56        | 28.0    |
| E-commerce / Retail          | 37        | 18.5    |
| Manufacturing / Distribution | 28        | 14.0    |
| Total                        | 200       | 100.0   |

Most respondents were drawn from logistics and courier service companies (39.5%) and third-party logistics providers (28.0%), confirming that the sample reflects organisations central to supply chain operations, while the inclusion of manufacturing and retail firms extends the generalisability of the findings.

### B. Reliability Analysis

TABLE VI. RELIABILITY STATISTICS

| Construct                  | Items | Cronbach's $\alpha$ |
|----------------------------|-------|---------------------|
| Green Packaging            | 5     | 0.678               |
| Green Logistics            | 5     | 0.795               |
| Internal Env. Management   | 5     | 0.786               |
| Collaboration & Innovation | 5     | 0.665               |
| Sustainability Performance | 5     | 0.725               |

All five constructs exceeded the minimum acceptable reliability threshold of 0.60. Green Logistics ( $\alpha = 0.795$ ) and Internal Environmental Management ( $\alpha = 0.786$ ) showed the strongest internal consistency, followed by Sustainability Performance ( $\alpha = 0.725$ ). Green Packaging ( $\alpha = 0.678$ ) and Collaboration & Innovation ( $\alpha = 0.665$ ) were moderate but acceptable, consistent with constructs spanning varied operational practices across different organisations. Overall, the results confirm that the research instrument is statistically reliable and fit for the subsequent correlation and regression analyses.

### C. Descriptive Statistics

TABLE VII. DESCRIPTIVE STATISTICS (N = 200)

| Variable                   | Mean  | Std. Dev. |
|----------------------------|-------|-----------|
| Green Packaging            | 4.154 | 0.629     |
| Green Logistics            | 4.057 | 0.741     |
| Internal Env. Management   | 3.943 | 0.837     |
| Collaboration & Innovation | 4.019 | 0.677     |
| Sustainability Performance | 4.090 | 0.699     |

All variables recorded mean scores above 3.9, indicating a generally high level of agreement among respondents regarding the adoption and importance of GSCM practices. Green Packaging (M = 4.154) recorded the highest mean, suggesting it is a relatively well-established and visible sustainability strategy, while Sustainability Performance (M = 4.090) and

Green Logistics ( $M = 4.057$ ) also scored highly. Standard deviations below 1.0 across all variables indicate low dispersion and a broadly consistent perception of sustainability practice across the sampled organisations.

#### D. Correlation Analysis

**TABLE VIII. CORRELATION WITH SUSTAINABILITY PERFORMANCE**

| Independent Variable       | Pearson r |
|----------------------------|-----------|
| Green Packaging            | 0.635**   |
| Green Logistics            | 0.725**   |
| Internal Env. Management   | 0.698**   |
| Collaboration & Innovation | 0.667**   |

\*\*  $p < 0.01$  (two-tailed).

All four independent variables show a positive, statistically significant correlation with Sustainability Performance at the 1% level. Green Logistics shows the strongest association ( $r = 0.725$ ), followed by Internal Environmental Management ( $r = 0.698$ ), Collaboration & Innovation ( $r = 0.667$ ), and Green Packaging ( $r = 0.635$ ). These results offer preliminary empirical support for the proposed research framework and justify proceeding to multiple regression analysis to determine the relative predictive strength of each variable.

#### E. Multiple Regression Analysis

**TABLE IX. REGRESSION MODEL SUMMARY**

| R     | R <sup>2</sup> | Adjusted R <sup>2</sup> | Std. Error |
|-------|----------------|-------------------------|------------|
| 0.772 | 0.597          | 0.588                   | 0.448      |

The model shows a strong multiple correlation ( $R = 0.772$ ) between the four GSCM practices and Sustainability Performance. The  $R^2$  value of 0.597 indicates that the model jointly explains 59.7% of the variance in sustainability performance, with a minimal shrinkage to an adjusted  $R^2$  of 0.588, indicating a stable, well-specified model.

**TABLE X. ANOVA RESULTS**

| Model      | F      | Sig.  |
|------------|--------|-------|
| Regression | 72.094 | 0.000 |

The regression model is statistically significant,  $F = 72.094$ ,  $p < 0.001$ , confirming that the combined set of GSCM practices significantly predicts sustainability performance and that the model provides a good fit for the data.

**TABLE XI. REGRESSION COEFFICIENTS**

| Variable                   | $\beta$ | t     | Sig.  |
|----------------------------|---------|-------|-------|
| Green Packaging            | 0.087   | 1.190 | 0.235 |
| Green Logistics            | 0.336   | 4.069 | 0.000 |
| Internal Env. Management   | 0.248   | 3.203 | 0.002 |
| Collaboration & Innovation | 0.187   | 2.577 | 0.011 |

Dependent variable: Sustainability Performance.

Green Logistics emerged as the strongest and most significant predictor ( $\beta = 0.336$ ,  $p < 0.001$ ), followed by Internal Environmental Management ( $\beta = 0.248$ ,  $p = 0.002$ ) and Collaboration & Innovation ( $\beta = 0.187$ ,  $p = 0.011$ ). Green

Packaging, while positively related to sustainability performance, was not statistically significant ( $\beta = 0.087$ ,  $p = 0.235$ ), suggesting its contribution may be indirect or mediated by other operational practices such as logistics efficiency or internal environmental management.

#### F. Hypothesis Testing

**TABLE XII. SUMMARY OF HYPOTHESIS TESTING**

| Hypothesis | Path                                        | Decision      |
|------------|---------------------------------------------|---------------|
| H1         | Green Packaging $\rightarrow$ SP            | Not Supported |
| H2         | Green Logistics $\rightarrow$ SP            | Supported     |
| H3         | Internal Env. Mgmt. $\rightarrow$ SP        | Supported     |
| H4         | Collaboration & Innovation $\rightarrow$ SP | Supported     |

Three of the four hypothesised relationships (H2, H3, H4) were supported, while H1 was not supported, indicating that Green Packaging's effect on sustainability performance may require more time, regulatory support, or complementary practice to become measurable. Overall, the pattern of results strongly supports the proposed research framework and underscores the importance of a holistic, integrated approach to GSCM.

### V. DISCUSSION, CONCLUSION AND RECOMMENDATIONS

#### A. Findings of the Study

Overall, sustainability performance in the sampled Indian organisations is driven more strongly by operational efficiency, managerial commitment, and collaborative capability than by isolated or symbolic environmental initiatives. Green Logistics emerged as the leading driver, confirming that transportation efficiency, fuel optimisation, route planning, and emissions monitoring deliver immediate, visible sustainability gains a result consistent with the TBL, since improved logistics simultaneously protects the environment, lowers cost, and supports long-term competitiveness. Internal Environmental Management was similarly significant, indicating that sustainability outcomes are strongest where internal systems are robust, leadership is committed, and employees are actively engaged a finding that lends strong empirical support to the NRBV's emphasis on internal organisational capability as a source of competitive advantage. Collaboration & Innovation also showed a significant positive effect, confirming that organisations with active supplier, customer, and stakeholder relationships achieve better sustainability outcomes by sharing resources, exchanging knowledge, and jointly overcoming technological and financial barriers to green transformation.

By contrast, Green Packaging, despite scoring highest on the descriptive mean, did not show a statistically significant direct effect on sustainability performance once the other three practices were controlled for. This suggests that packaging-related initiatives, although popular and positively regarded, may function as a baseline or largely standardised practice with limited variation across organisations, or that their sustainability benefit depends on integration with complementary practices such as efficient logistics and strong internal environmental governance rather than operating as a standalone driver. Taken together, the findings indicate that

sustainability performance is best achieved through a holistic and integrated GSCM approach in which operational excellence, sound internal governance, and collaborative innovation are the most influential levers, and green packaging plays a complementary rather than a primary role.

### ***B. Theoretical and Managerial Implications***

Theoretically, the study extends the TBL by demonstrating empirically that GSCM practices which succeed in improving sustainability performance do so across environmental, economic, and social dimensions simultaneously rather than in isolation. It strengthens the NRBV by showing that internally developed organisational capabilities environmental training, leadership commitment, and formal management systems translate directly into measurable sustainability gains, positioning such capabilities as a genuine source of competitive advantage. It also extends the TPB by showing how collaboration and innovation operationalise the influence of subjective norms and stakeholder pressure on organisational sustainability behaviour, and by highlighting that the comparatively weak, non-significant effect of green packaging may reflect compliance-driven rather than strategically integrated adoption.

Managerially, the findings direct practitioner attention toward green logistics as the highest-impact area for investment fuel-efficient or alternative-fuel vehicles, route optimisation technology, shipment consolidation, and reverse logistics systems given its capacity to deliver simultaneous environmental and cost benefits. Managers are further encouraged to strengthen internal environmental management through visible leadership commitment, recurring environmental training, and the integration of sustainability metrics into performance evaluation, and to actively pursue supplier and stakeholder collaboration and green innovation as mechanisms for overcoming resource constraints and accelerating sustainable transformation. Finally, green initiatives including packaging should be embedded within, rather than treated as separate from, core operational and procurement decisions.

### ***C. Study Recommendations***

Based on the findings, the following interventions are recommended for organisations seeking to strengthen sustainability performance through GSCM:

- 1) Prioritise green logistics investment route optimisation, fuel-efficient or alternative-fuel fleets, and reverse logistics as the highest-impact lever for measurable environmental and cost gains.
- 2) Strengthen internal environmental management through sustained leadership commitment, regular employee training, and integration of environmental metrics into performance evaluation systems.
- 3) Actively pursue collaborative partnerships with suppliers, customers, and other stakeholders, and invest in green innovation to share knowledge, distribute cost, and accelerate green technology adoption.

4) Integrate green packaging initiatives with logistics and internal environmental strategies considering sourcing, transport impact, recyclability, and end-of-life disposal rather than treating packaging as a stand-alone sustainability measure.

5) Adopt a holistic, integrated GSCM strategy that aligns all green initiatives with core business objectives, ensuring that sustainability is pursued through structural and strategic integration rather than symbolic or compliance-based gestures.

### ***D. Limitations of the Study***

The study relied on self-reported survey data, which may be subject to social desirability bias and common method variance [Podsakoff et al., 2003]. Its cross-sectional design captures perceptions at a single point in time and cannot reveal how GSCM adoption and its effects evolve as organisations gain experience with green practices. The empirical scope was confined to logistics, e-commerce, manufacturing, and third-party logistics organisations operating within India, which may limit generalisability to other sectors or geographic contexts. The study also examined a defined set of four GSCM practices; other organisational factors such as green procurement, technological readiness, financial constraints, regulatory intensity, and organisational culture were not included and may further explain sustainability outcomes. Finally, the sample was drawn primarily from managers and supervisors, which, while offering informed perspectives, may not fully capture the views of frontline employees or external stakeholders.

### ***E. Scope for Future Research***

Future research could employ longitudinal designs to examine how the effects of green logistics, internal environmental management, and collaboration and innovation evolve as organisations mature in their sustainability practice. Extending the model to incorporate additional variables regulatory pressure, technological readiness, financial constraints, and organisational culture would deepen understanding of the drivers and barriers to GSCM adoption. The integration of emerging technologies such as big-data analytics, artificial intelligence, blockchain, and the Internet of Things into green supply chain management also represents a promising avenue, as does comparative research across industries and geographic markets, and mixed-method designs combining surveys with qualitative interviews to surface practical barriers not fully captured by survey-based methods.

### ***F. Conclusion***

This study examined the effect of four Green Supply Chain Management practices Green Packaging, Green Logistics, Internal Environmental Management, and Collaboration & Innovation on Sustainability Performance among Indian organisations, using an integrated Triple Bottom Line, Natural Resource-Based View, and Theory of Planned Behavior perspective. The empirical results show that Green Logistics, Internal Environmental Management, and Collaboration & Innovation are positively and significantly associated with sustainability performance, together explaining 59.7% of its



variance, while Green Packaging, though positively correlated, was not a statistically significant independent predictor.

The findings confirm that meaningful sustainability outcomes depend less on isolated or symbolic green measures and more on the extent to which environmental responsibility is embedded within core logistics operations, internal governance systems, and collaborative innovation. Organisations seeking to derive genuine sustainability benefit from GSCM should therefore pursue an integrated approach that combines operationally efficient logistics, robust internal environmental governance, and active stakeholder collaboration, rather than relying on singular or superficial green initiatives. As environmental expectations continue to intensify across the Indian economy, understanding and managing these determinants of sustainability performance will remain critical to organisations' long-term resilience and competitiveness.

## REFERENCES

- [1] I. Ajzen, "The theory of planned behavior," *Organizational Behavior and Human Decision Processes*, vol. 50, no. 2, pp. 179–211, 1991.
- [2] Y. S. Chen, S. B. Lai, and C. T. Wen, "The influence of green innovation performance on corporate advantage in Taiwan," *Journal of Business Ethics*, vol. 67, no. 4, pp. 331–339, 2006.
- [3] J. W. Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 4th ed. Thousand Oaks, CA: Sage, 2014.
- [4] R. Dekker, J. Bloemhof, and I. Mallidis, "Operations research for green logistics," *European Journal of Operational Research*, vol. 219, no. 3, pp. 671–679, 2012.
- [5] J. Elkington, *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*. Oxford: Capstone Publishing, 1997.
- [6] P. Evangelista, L. Santoro, and A. Thomas, "Environmental sustainability in third-party logistics service providers," *International Journal of Production Economics*, vol. 188, pp. 276–286, 2017.
- [7] C. Gimenez and V. Sierra, "Sustainable supply chains: Governance mechanisms to improve performance," *Journal of Cleaner Production*, vol. 56, pp. 1–10, 2013.
- [8] K. Govindan and R. Bhan, "Analysis of barriers to implement green supply chain management in Indian industries," *Journal of Cleaner Production*, vol. 27, pp. 75–84, 2012.
- [9] J. F. Hair, W. C. Black, B. J. Babin, and R. E. Anderson, *Multivariate Data Analysis*, 8th ed. Boston, MA: Cengage Learning, 2019.
- [10] S. L. Hart, "A natural-resource-based view of the firm," *Academy of Management Review*, vol. 20, no. 4, pp. 986–1014, 1995.
- [11] C. J. C. Jabbour, "Environmental training and environmental management maturity of companies," *Journal of Cleaner Production*, vol. 96, pp. 331–338, 2015.
- [12] R. D. Klassen and D. C. Whybark, "Environmental management in operations," *Journal of Operations Management*, vol. 17, no. 6, pp. 599–615, 1999.
- [13] Y. Liu, Q. Zhu, and S. Seuring, "Linking supply chain management practices with sustainability performance," *International Journal of Production Economics*, vol. 225, art. 107561, 2020.
- [14] L. Magnier and J. Schoormans, "Consumer reactions to sustainable packaging," *Journal of Cleaner Production*, vol. 103, pp. 1–10, 2015.
- [15] A. McKinnon, *Decarbonizing Logistics: Distributing Goods in a Low Carbon World*. London: Kogan Page, 2018.
- [16] N. Nordin and S. Selke, "Social aspects of sustainable packaging," *Packaging Technology and Science*, vol. 23, no. 6, pp. 317–326, 2010.
- [17] G. Prakash and P. Pathak, "Intention to buy eco-friendly packaged products," *Journal of Cleaner Production*, vol. 137, pp. 785–793, 2017.
- [18] J. Sarkis, Q. Zhu, and K. H. Lai, "An organizational theoretic review of green supply chain management," *International Journal of Production Economics*, vol. 130, no. 1, pp. 1–15, 2011.
- [19] S. K. Srivastava, "Green supply-chain management: A state-of-the-art literature review," *International Journal of Management Reviews*, vol. 9, no. 1, pp. 53–80, 2007.
- [20] Q. Zhu and J. Sarkis, "Relationships between operational practices and performance among early adopters of green supply chain management," *Journal of Operations Management*, vol. 22, no. 3, pp. 265–289, 2004.