

SUPPLIER RELATIONSHIP MANAGEMENT AND SUPPLY CHAIN SUSTAINABILITY IN THE FMCG INDUSTRY

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Abstract

This study examined the effect of Supplier Relationship Management (SRM) on supply chain sustainability in Nigeria's Fast-Moving Consumer Goods (FMCG) industry. Specifically, it assessed the effects of supplier collaboration, information sharing, trust, commitment, and supplier development on economic, environmental, and social sustainability. A quantitative, cross-sectional survey design was adopted, and data were obtained from 376 FMCG employees using a structured questionnaire. Structural Equation Modeling (SEM) was employed to analyse the data. The measurement model demonstrated satisfactory reliability and validity, while the structural model showed excellent overall fit. Findings revealed that supplier collaboration, information sharing, and supplier development had no significant effects on the three dimensions of supply chain sustainability. Trust and commitment had a significant but negative effect on economic sustainability ($\beta = -0.128$, $p = .032$), while its effects on environmental and social sustainability were insignificant. The study concludes that SRM practices do not automatically translate into sustainability outcomes and recommends formal sustainability governance, enhanced information quality, commercial discipline, and sustainability-focused supplier development.

Keywords: Supplier Relationship Management, Supply Chain Sustainability, Supplier Collaboration, Information Sharing, Supplier Development, FMCG Industry.

1.1 Introduction

In recent years, the growing pressure on firms to operate responsibly while remaining competitive has increased scholarly and managerial attention on sustainable supply chain practices. The Fast-Moving Consumer Goods (FMCG) industry, characterized by high product turnover, intense competition, and complex distribution networks, depends heavily on efficient and reliable supplier networks to meet consumer demand. However, frequent sourcing, large procurement volumes, and geographically dispersed suppliers often create sustainability challenges relating to environmental impact, ethical sourcing, and social responsibility (Mani et al., 2018).

Supplier relationships constitute a critical lever through which firms translate sustainability intentions into operational realities across the supply chain. In FMCG contexts characterized by extensive upstream networks and high material throughput, the environmental and social performance of suppliers directly shapes the sustainability profile of the focal firm. As a result, organizations increasingly move beyond transactional procurement toward collaborative Supplier Relationship Management (SRM) approaches that integrate sustainability criteria into supplier selection, evaluation, development, and long-term partnership structures. Through sustained collaboration, firms can influence suppliers' production processes, labor practices, resource utilization, and compliance with environmental standards. Mechanisms such as joint planning, shared performance metrics, supplier training, and continuous information exchange enable mutual learning and capability building (Adesanya et al., 2020; Zhao, 2025). These practices foster alignment between corporate sustainability goals and supplier operations, ensuring that sustainability is embedded not only in internal processes but also throughout upstream value creation activities.

External stakeholder forces and internal leadership resolve often converge to shape how firms embed sustainability into their supply chains. Shaurya Garg, (2025) make it clear that in fast-moving consumer goods (FMCG) networks, pressure from customers demanding ethically sourced products, competitors differentiating on sustainability performance, and suppliers adapting to environmental and social standards collectively create a climate that favors the adoption of sustainable supply chain management (SSCM). At the same time, strong top management commitment within firms translates these pressures into concrete policies, resource allocation, and long-term strategic alignment, enabling SSCM practices to be effectively implemented across sourcing, production, distribution, and reverse logistics activities. Sustainable sourcing practices in the FMCG sector increasingly depend on structured governance mechanisms that enhance transparency, accountability, and traceability across supplier networks. These mechanisms include systematic supplier audits, the use of sustainability scorecards for performance benchmarking, and adherence to recognized voluntary certification schemes such as Fair trade International and Rainforest Alliance. Through these instruments, firms are better able to verify ethical labor practices, minimize environmental footprints, and ensure end-to-end traceability of raw materials and inputs throughout the supply chain (Ebrahim et al., 2022).

Supplier Relationship Management (SRM) has emerged as a strategic approach through which firms build long-term, collaborative, and mutually beneficial relationships with suppliers. Rather than viewing suppliers as mere transactional partners, SRM emphasizes partnership, information sharing, trust, joint problem solving, and continuous improvement. These elements are increasingly recognized as essential drivers of supply chain sustainability. In the Fast-Moving Consumer Goods (FMCG) industry, which is characterized by high-volume production cycles, rapid product turnover, extensive distribution networks, and intense market competition, the effective management of supplier relationships has become increasingly critical to achieving sustainable supply chain performance. In this context, Supplier Relationship Management (SRM) is conceptualized as a strategic, long-term, and collaborative approach through which FMCG firms engage their suppliers in value creation, operational efficiency, and sustainability-oriented practices. Accordingly, SRM in this study is operationalized through four interrelated dimensions supplier collaboration, information sharing, trust and long-term partnership, and

joint problem-solving, all of which collectively shape the extent to which sustainability are embedded within supply chain processes. In particular, supplier collaboration in the FMCG sector reflects the degree to which firms and their suppliers engage in coordinated planning, forecasting, product development, and sustainability-driven initiatives such as packaging optimization, waste reduction, and responsible sourcing. Given the sensitivity of FMCG supply chains to disruptions and inefficiencies, collaborative engagement enables firms to align supplier capabilities with environmental and operational expectations, thereby enhancing overall supply chain responsiveness and sustainability outcomes. Similarly, information sharing constitutes a fundamental pillar of SRM, as it involves the timely, accurate, and transparent exchange of demand forecasts, production requirements, quality standards, and sustainability compliance guidelines between FMCG firms and their suppliers. Such information flow reduces uncertainty, minimizes inefficiencies, and ensures that suppliers are adequately informed and aligned with environmental and ethical performance expectations.

Furthermore, trust and long-term partnership represent a critical relational dimension within FMCG supply networks, where repeated transactions and continuous sourcing relationships necessitate mutual confidence, commitment, and reduced opportunistic behavior. In this regard, trust enhances supplier willingness to invest in sustainable production technologies, adhere to ethical labor standards, and comply with environmental regulations, particularly when relationships are perceived as stable and mutually beneficial over time. Complementarily, joint problem-solving reflects the extent to which FMCG firms and their suppliers collaboratively address operational, environmental, and social challenges such as packaging waste management, raw material defects, supply disruptions, and non-compliance issues. Through shared responsibility and cooperative resolution mechanisms, firms are better able to institutionalize continuous improvement practices that reinforce sustainability performance across the supply chain.

In relation to these, supply chain sustainability in the FMCG industry is understood as the integrated pursuit of environmental stewardship, social responsibility, and economic viability across all stages of the supply chain, from raw material sourcing to product delivery. Environmental sustainability in this context emphasizes the reduction of carbon emissions, minimization of waste generation, and adoption of eco-friendly materials and production processes, which are particularly significant in FMCG operations due to high packaging usage and large-scale manufacturing activities. Social sustainability, on the other hand, focuses on ethical sourcing practices, compliance with labor standards, and adherence to corporate social responsibility requirements within supplier networks, thereby ensuring that human and community welfare considerations are upheld throughout the supply chain. Economic sustainability further reflects the ability of FMCG firms to maintain cost efficiency, operational reliability, and long-term value creation while simultaneously integrating environmental and social objectives into their supply chain strategies. Collectively, these dimensions suggest that Supplier Relationship Management serves as a critical enabler of supply chain sustainability in the FMCG industry, as stronger relational governance mechanisms through collaboration, information sharing, trust-building, and joint problem-solving facilitate the alignment of supplier behavior with sustainability goals, thereby enhancing the overall resilience, responsibility, and performance of FMCG supply chains.

Collaborative supplier relationship management (SRM) practices encompassing rigorous supplier selection, continuous performance assessment, transparent information sharing, and joint problem-solving initiatives have been empirically associated with improved sustainability outcomes among FMCG manufacturers. Such collaboration fosters mutual learning, capability development, and alignment of environmental and social objectives between focal firms and their upstream partners, thereby strengthening the overall sustainability performance of the supply chain (Uloma et al., 2024). Despite the recognized importance of sustainability in supply chains, many FMCG firms still struggle to integrate sustainable practices at the supplier level. This gap highlights the need to examine how effective supplier relationship management can enhance supply chain sustainability within the FMCG context.

1.2 Statement of Problem

Despite the increasing awareness of sustainability, many FMCG firms still experience challenges such as unethical sourcing, environmental waste, poor supplier compliance, and supply disruptions. These issues often arise due to weak supplier relationships, lack of transparency, and inadequate collaboration between firms and their suppliers. Previous studies have discussed sustainability and supplier management separately, but limited empirical research has examined how specific SRM practices directly drive supply chain sustainability in the FMCG context. This creates a gap that this study seeks to fill.

1.3 Objectives of the study

The general objective of the study is to examine the effect of Supplier Relationship Management on Supply Chain Sustainability in the FMCG industry. However, specific objectives include:

- i. To examine the effect of supplier collaboration on supply chain sustainability of FMCG firms in Nigeria.
- ii. To assess the effect of information sharing on supply chain sustainability of FMCG firms in Nigeria.
- iii. To investigate the effect of trust and commitment on supply chain sustainability of FMCG firms in Nigeria.
- iv. To evaluate the effect of supplier development on supply chain sustainability of FMCG firms in Nigeria.

1.4 Research question

- i. To what extent does supplier collaboration affect supply chain sustainability of FMCG firms in Nigeria?
- ii. To what extent does information sharing affect supply chain sustainability of FMCG firms in Nigeria?
- iii. To what extent does trust and commitment affect supply chain sustainability of FMCG firms in Nigeria?
- iv. To what extent does supplier development affect supply chain sustainability of FMCG firms in Nigeria?

1.5 Research hypotheses

- i. H_{01} : Supplier collaboration has no significant effect on supply chain sustainability of FMCG firms in Nigeria.
- ii. H_{02} : Information sharing has no significant effect on supply chain sustainability of FMCG firms in Nigeria.
- iii. H_{03} : Trust and commitment have no significant effect on supply chain sustainability of FMCG firms in Nigeria.
- iv. H_{04} : Supplier development has no significant effect on supply chain sustainability of FMCG firms in Nigeria.

1.6 Scope of study

The study focuses specifically on the effect of supplier relationship management (SRM) practices on supply chain sustainability within the Fast-Moving Consumer Goods (FMCG) sector in Nigeria. The SRM practices examined are limited to four dimensions: supplier collaboration, information sharing, trust and commitment, and supplier development. Supply chain sustainability is conceptualized and measured across three dimensions namely economic sustainability, environmental sustainability, and social sustainability, consistent with the triple bottom line framework. Other supply chain management constructs such as logistics management, inventory optimization, demand forecasting, and customer relationship management, though related, fall outside the boundaries of this study.

1.7 Significance of the study

This study is significant because it helps FMCG firms understand how to use Supplier Relationship Management (SRM) as a practical tool for achieving supply chain sustainability. It provides clear evidence that practices such as supplier collaboration, information sharing, joint problem solving, trust building, and performance evaluation can lead to better environmental, social, and economic outcomes. The study also guides managers in developing more effective supplier collaboration strategies by showing which aspects of SRM have the greatest impact on sustainability performance. In addition, it contributes to academic knowledge by linking SRM with sustainable supply chain management in the context of the FMCG industry, offering a useful foundation for future research.

2.0 Literature Review

2.1 Conceptual Framework

Independent variables

Dependent variables

Supplier Relationship Management

Supply Chain Sustainability

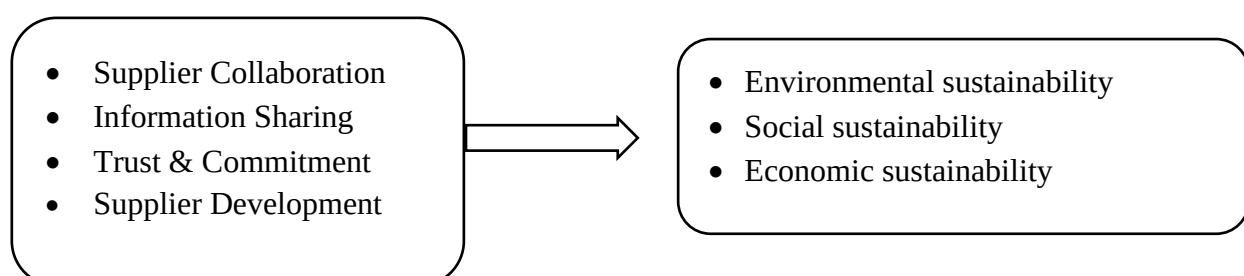


Fig 1. Conceptual Framework. Source: *Researcher's 2026*.

2.2.1 Dimensions of Supplier Relationship Management

In FMCG supply chains, the selection and integration of suppliers has a significant impact on sustainability outcomes. Therefore, choosing a supplier is the first step toward integrating ethical and environmental factors into the partnership. Companies now use selection criteria that go beyond price and quality, such as labor standards, environmental certifications, compliance records, and eco-friendly production capabilities. By doing this, sustainability is viewed as a need for participation rather than as a remedial solution implemented later in the supply chain. This proactive approach lowers future risks related to non-compliance, reputational harm, and unsustainable practices by ensuring that only suppliers whose activities are in line with environmental stewardship and social responsibility are integrated into the company's sourcing chain. Sustainability requirements are upheld over time through ongoing supplier assessment and review, which goes beyond initial selection. Businesses keep an eye on suppliers' compliance with sustainability goals, ethical labor practices, and environmental standards through regular audits, performance scorecards, and structured reviews. These monitoring tools give businesses quantifiable indicators that enable them to spot performance gaps and take appropriate corrective action. Additionally, regular evaluation strengthens accountability by letting suppliers know that sustainability standards are essential to continuing business partnerships rather than merely symbolic. Assessment procedures thus improve supply chain governance and guarantee that sustainability pledges are regularly maintained rather than being taken for granted. Relational strategies that encourage cooperation and shared accountability between businesses and their suppliers are also essential for successful sustainability integration. Coordination is improved, operational waste is decreased, and supply chain transparency is increased through information sharing, such as the sharing of demand projections, inventory levels, and sustainability performance statistics (Ebrahim et al., 2022). This openness fosters cooperative problem-solving, where both sides work together on projects like packaging redesign to cut waste or logistics optimization to lower carbon emissions. Long-term supplier relationships based on mutual respect and dedication eventually strengthen these cooperative efforts. These long-lasting connections motivate suppliers to make investments in sustainable technology and process enhancements that complement the buyer's long-term environmental, social, and economic goals, converting SRM practices into observable sustainability gains.

2.2.3 Concept of Suppliers' Sustainability

Supply chain sustainability is an integrated strategy that incorporates economic viability, social responsibility, and environmental protection into decisions about manufacturing, distribution, and sourcing throughout the supply network. Sustainability is now viewed as a strategic necessity for long-term profitability in FMCG businesses, where production volumes are huge and supplier networks are vast. This method acknowledges that a supply chain's efficacy depends not only on its operational efficiency but also on the ethical treatment of stakeholders, the responsible use of resources, and the creation of value without compromising future demands. As a result, sustainability becomes a guiding concept that influences distribution plans, operating procedures, and supplier relationships. From an environmental standpoint, supply chain sustainability emphasizes reducing ecological effect by using eco-friendly materials, reducing waste, and controlling emissions. Businesses are encouraging suppliers to

use cleaner production methods, optimizing shipping routes to cut carbon emissions, and redesigning packaging to reduce waste. Responsible raw material sourcing that doesn't worsen the environment or deplete resources is another area of focus. Together, these methods lessen the environmental impact of supply chain operations while guaranteeing adherence to environmental laws and international sustainability standards, which are especially important in high-consumption FMCG industries. The complete character of supply chain sustainability is further reinforced by social and economic factors. Social sustainability places a strong emphasis on responsible procurement that upholds human rights across the supplier network, ethical labor practices, and workplace health and safety. Economic sustainability guarantees that supply chain activities continue to be profitable, economical, and able to provide long-term value without compromising social and environmental norms. FMCG companies may create supply chains that are robust, competitive, and morally sound by striking a balance between these factors. This leads to sustained performance that supports both current operational objectives and long-term strategic continuity.

2.3 Theoretical review

2.3.1 Stakeholder theory

Stakeholder Theory was developed by R. Edward Freeman (1984) as a framework for comprehending how businesses generate value by taking into account the interests of all stakeholders impacted by their operations, not just shareholders. It suggests that instead of concentrating only on shareholders, companies should produce value for all stakeholders, including workers, clients, suppliers, communities, and investors. According to the notion, businesses have obligations to a wide range of stakeholders, whose support is crucial for long-term success. These stakeholders include suppliers, employees, customers, communities, and regulators. Organizations are urged to adopt choices that strike a balance between economic goals and social and ethical issues by acknowledging these interrelated links. Stakeholder theory offers a solid basis for incorporating sustainability into supplier relationships in supply chain management. Suppliers are seen as important stakeholders whose actions have a direct impact on a company's social and environmental performance, rather than just as sources of inputs. This viewpoint encourages businesses to interact with suppliers through cooperation, oversight, and common standards that support ethical labor practices, environmental stewardship, and responsible sourcing throughout the supply chain. FMCG companies are better positioned to achieve sustainable supply chain performance while maintaining trust, reputation, and long-term value creation by managing supplier relationships in a way that takes into account the expectations of multiple stakeholders. Stakeholder theory explains why firms must adopt Supplier Relationship Management practices that align with sustainability goals in the FMCG context, where operations heavily rely on extensive supplier networks (Freeman et al., 2020).

2.3.2 Resource-Based View theory

The Resource-Based View (RBV), developed by Barney, (1991) is a theory that explains how businesses can maintain a competitive edge by possessing and utilizing uncommon, precious, unique, and non-substitutable resources. RBV highlights internal talents, competencies, and relationships as important sources of excellent performance rather than concentrating only on external market conditions. These resources could include relational assets, organizational procedures, expertise, and abilities that are difficult for rivals to imitate. RBV emphasizes

Supplier Relationship Management as a strategic tool that can improve business performance in supply chain management. Effective information sharing, cooperative problem solving, and solid, trustworthy connections with suppliers become intangible assets that boost productivity, creativity, and responsiveness. Because these relational qualities are developed over time through mutual experience, trust, and shared learning between businesses and their suppliers, they are hard for rivals to replicate. RBV describes how well-managed supplier relationships support sustainable supply chain performance in the FMCG industry, where businesses rely significantly on suppliers for raw materials, packaging, and delivery. FMCG companies can attain economic, social, and environmental sustainability while enhancing their long-term competitive position by viewing SRM processes as strategic resources.

2.4 Empirical Review

Ebrahim et al.'s (2022) study examined sustainable supply chain integration (SSCI) in South African FMCG manufacturing companies, emphasizing the integration of sustainability throughout supply chain operations. In order to determine the degree of sustainability integration in operational and strategic supply chain operations, the study used a qualitative research design and semi-structured interviews. The results showed that, rather than being directly impacted by external pressure from consumers or retailers, FMCG producers are becoming more conscious of sustainability pressures, especially with regard to production processes and packaging. The study's main empirical finding is that leadership commitment and the incorporation of sustainability concepts into company culture are critical to the success of sustainability integration. Businesses with strong leadership support were more likely to extend sustainable practices to supply chain partners and incorporate them throughout their internal operations. However, the study also discovered that it is still difficult to integrate social, economic, and environmental sustainability in a balanced manner. Due to financial limitations and the practical reality of the South African business climate, economic sustainability was continuously given precedence over environmental and social aspects. The study also shows that although businesses understand the value of sustainable supply chain cooperation, structural and contextual barriers impede real alignment across all sustainability aspects. Initiatives for social and environmental sustainability are typically only implemented by organizations when they do not materially impair financial performance. Despite these drawbacks, the report highlights that working with supply chain partners offers chances to create shared value, especially through coordinated sustainability activities and cooperative problem-solving. Overall, by demonstrating that sustainability integration in FMCG supply chains is primarily internally driven, economically constrained, and dependent on leadership and organizational culture rather than strong external customer pressure, the empirical findings advance our understanding of SSCI in emerging economies.

The Journal of Business Ethics released a study by Alghababsheh & Galleary, (2021) that looked at how businesses might use socially sustainable supply chain management (SSCM) techniques to enhance the social performance of their suppliers. The two primary methods employed by purchasing companies that the researchers concentrated on were supplier evaluation (monitoring, audits, and checks) and supplier collaboration (closely collaborating with suppliers, exchanging expertise, and jointly resolving issues). The study examined which of these methods is more effective and under what circumstances using survey data from 119 UK

manufacturing firms. The results demonstrated that when it comes to enhancing suppliers' social performance, cooperation works better than evaluation. To put it another way, suppliers react more favorably when businesses collaborate with them as opposed to merely checking or auditing them. However, the study also discovered that if the buyer and supplier have a solid relationship, assessment can still be successful. In conclusion, the study demonstrates that strengthening ties with suppliers is essential to enhancing their social practices. It is insufficient to only audit vendors. For socially sustainable supply chain operations to be genuinely successful, businesses must foster trust, communication, and common objectives.

Data-driven procurement techniques greatly improve supplier cooperation and supply chain performance in the FMCG sector, according to a 2024 study by Dhongde & Choudhuri, regression and cluster analysis were used in the study to demonstrate how using data analytics for collaborative demand forecasting, predictive risk assessment, and supplier performance monitoring enhances important outcomes including on-time delivery, quality compliance, cost savings, and risk reduction. The results show that analytics enhances information sharing, openness, and cooperative planning between buyers and suppliers, allowing FMCG companies to create supply chains that are more flexible, robust, and effective while fostering long-term growth and competitive advantage.

Jum'a et al, study examined how supply chain management techniques affect environmental sustainability and, consequently, the financial performance of Jordanian manufacturing firms. The study discovered that supply chain activities including customer interactions, deferral, information sharing, and information quality greatly increase environmental sustainability using questionnaire data from 376 businesses and structural equation modeling (SEM). It has also been demonstrated that environmental sustainability directly improves financial performance. Additionally, with the exception of strategic supplier partnerships, environmental sustainability moderated the association between the majority of supply chain activities and financial performance. In order to achieve sustainable growth in manufacturing organizations, managers and policymakers can benefit from the study's conclusion that implementing efficient supply chain methods improves environmental performance, which in turn improves financial outcomes.

Study looked at the impact of Supplier Relationship Management (SRM) on operational effectiveness in governmental procurement organizations that handle necessities. Data were gathered from 43 employees in various public procurement departments using structured questionnaires and a descriptive quantitative approach. The results showed that the firms under study lacked well-defined SRM policies, which led to issues including low commitment, low trust, and poor communication between supply chain partners and procurement departments. It was discovered that these problems have a detrimental impact on organizational performance. In order to improve operational outcomes, the report suggests that enterprises, especially those involved in pharmaceutical procurement, bolster their dedication to SRM by putting in place processes for strategically monitoring, assessing, and controlling supplier performance.

2.5 Gap in Literature

While supply chain sustainability concentrates on attaining environmental protection, social responsibility, and economic efficiency, the research shows that Supplier Relationship Management (SRM) enhances cooperation, trust, and coordination between businesses and their

suppliers. Stronger supplier connections can improve sustainability performance through improved cooperation, monitoring, and communication, according to most studies. However, the majority of current research either looks at sustainability or SRM independently or concentrates on generic manufacturing contexts without making explicit how particular SRM approaches affect sustainability outcomes. Additionally, there is less empirical data in the FMCG sector, where sustainability issues are more prominent and supplier dependence is significant. Consequently, there is a vacuum in the relationship between environmental, social, and economic sustainability in FMCG supply chains and important SRM elements including supplier selection, assessment, information sharing, cooperative issue resolution, and long-term partnerships. This study fills that need.

3.0 Methodology

3.1 Research Design

In order to empirically investigate the relationship between Supply Chain Sustainability (SCS) and Supplier Relationship Management (SRM) in Nigeria's FMCG sector, this study uses a quantitative research approach based on a descriptive survey design. The necessity to produce quantifiable and broadly applicable evidence on the causal relationships between the constructs justifies the selection of a quantitative paradigm. Because it makes it easier to systematically gather standardized data from a large number of respondents, the descriptive survey approach is especially appropriate for statistical analysis of the correlations between variables. Furthermore, the study is cross-sectional in nature because data were gathered all at once, which is in line with the majority of supply chain and organizational studies conducted in emerging economies.

3.2 Population of Study

Employees of Fast-Moving Consumer Goods (FMCG) companies in Nigeria, especially those directly engaged in supply chain-related tasks make up the study's population. These include employees in the departments of finance, operations/production, logistics, and procurement since they have pertinent experience with supplier relationships and sustainable practices. By concentrating on these personnel groups, comments are certain to be grounded in organizational reality and real-world experience. The firm is the unit of inquiry and the individual employee is the unit of analysis, reflecting a multi-level viewpoint frequently used in supply chain research. The population size for this study is not precisely known due to the absence of comprehensive and up-to-date records on the total number of employees within the Fast-Moving Consumer Goods (FMCG) sector in Nigeria. Although industry estimates suggest that the sector employs over one million individuals, there is no reliable sampling frame that clearly defines the accessible population for this study. Consequently, the population is treated as large and indeterminate (infinite population), a common approach in organizational and supply chain research where complete enumeration is impractical.

3.3 Sample Size Determination and Sampling Technique

Given this condition, the study adopts the Cochran (1977) formula for unknown or infinite populations to determine an appropriate sample size:

$$n_0 = \frac{z^2 pq}{e^2}$$

Where:

- n_0 = required sample size

- Z = standard normal deviation at 95% confidence level (1.96)
- p = estimated proportion of the population possessing the attribute (0.5 is used for maximum variability)
- $q=1-p$
- e = margin of error (0.05)

Substituting these values of $Z=1.96$, $p=0.5$, $q=0.5$, $e=0$, the calculated minimum sample size is approximately 384 respondents, but to account for non-response and incomplete questionnaires, the sample size was increased to 400, which improves statistical reliability and robustness. However, only 3

3.4 Data Sources

The study used primary data that was gathered via a structured questionnaire on respondents' opinions about sustainability outcomes and SRM techniques. The perceptual and behavioral nature of the constructs being studied makes the use of primary data appropriate. Likert-scale items are included in the questionnaire's framework to make it simple to complete and appropriate for quantitative analysis. Secondary data, such as industry studies, sustainability disclosures, and regulatory publications pertinent to Nigeria's FMCG business, may also be used to supplement the core dataset. By facilitating triangulation, these secondary sources improve the study's robustness and offer contextual insights. The research's analytical depth and trustworthiness are enhanced by the combination of primary and secondary data.

3.5 Method of Data Analysis

The link between Supply Chain Sustainability (SCS) and Supplier link Management (SRM) is investigated in this study using Structural Equation Modeling (SEM). Because it allows for the simultaneous estimation of measurement models (latent constructs) and structural correlations among variables, SEM is suitable. The study is ideally suited for Partial Least Squares SEM (PLS-SEM) due to its exploratory nature, the presence of numerous constructs, and the possibility of non-normal data in survey replies; nevertheless, Covariance-Based SEM (CB-SEM) is also explored for robustness..

Model Specification

The functional model:

$$SCS = f(SRM)$$

Expanded econometric model:

$$SCS_i = \beta_0 + \beta_1 SC_i + \beta_2 IS_i + \beta_3 TC_i + \beta_4 SD_i + e$$

Where:

- SCS_i = Supply Chain Sustainability
- SC_i = Supplier Collaboration
- IS_i = Information Sharing
- TC_i = Trust & Commitment
- SD_i = Supplier Development
- e = Error term

4.0 Results

Table 1 Construct-Level Mean Scores Summary

CONSTRUCT-LEVEL MEAN SCORES SUMMARY (N = 376)

Construct	Code	No. of Items	Mean Score	Std Dev	Interpretation
INDEPENDENT VARIABLE: Supplier Relationship Management (SRM)					
Supplier Collaboration	SC	5	3.987	0.786	High
Information Sharing	IS	5	3.934	0.79	High
Trust and Commitment	TC	5	4.071	0.756	High
Supplier Development	SD	5	3.833	0.843	High

4.1 Model Fit Assessment

Before evaluating structural paths, we seek to establish the overall fit of the SEM model to the data. Model fit indices indicate whether the hypothesized factor structure is consistent with the observed covariance matrix. Table 2 below shows the result of model fit as follows:

Table 2: Model Fit

Fit Index	Value	df	p-value	Interpretation	Threshold
χ^2 (Chi-Square)	546.776	542	0.435	Good (p > .05 = acceptable fit)	< 3.0 (χ^2/df = 1.009)
CFI (Comparative Fit Index)	0.999	—	—	Excellent	> 0.95
TLI (Tucker-Lewis Index)	0.999	—	—	Excellent	> 0.95
NFI (Normed Fit Index)	0.915	—	—	Good	> 0.90
GFI (Goodness of Fit Index)	0.915	—	—	Good	> 0.90
AGFI (Adjusted GFI)	0.906	—	—	Good	> 0.90
RMSEA	0.005	—	—	Excellent	< 0.08
AIC (Akaike Info Criterion)	173.09	—	—	Lower is better	Relative
BIC (Bayesian Info Criterion)	518.90	—	—	Lower is better	Relative

Note: $\chi^2/df = 546.776/542 = 1.009$ (excellent, < 2.0). CFI, TLI > 0.99 indicate exceptional fit. RMSEA = 0.005 well below the 0.08 threshold. MLE = Maximum Likelihood Estimation.

The results in Table 2 demonstrate that the proposed SEM model achieves an excellent fit to the data across all reported indices. The chi-square statistic was $\chi^2(542) = 546.78$, $p = .435$, indicating that the model-implied covariance matrix is statistically indistinguishable from the observed covariance matrix. The chi-square/df ratio of 1.009 is well within the recommended threshold of < 3.0 (Kline, 2016). The CFI (.999) and TLI (.999) both exceed the stringent threshold of .95, while the GFI (.915) and AGFI (.906) surpass the minimum acceptable threshold of .90. Critically, the RMSEA of .005 is well below the upper boundary of .08, further confirming excellent model fit. Collectively, these indices confirm that the measurement and structural model is a sound representation of the underlying data structure.

4.2 Measurement Model: Confirmatory Factor Analysis (CFA)

The measurement model was evaluated through Confirmatory Factor Analysis (CFA) to assess the reliability and validity of the seven latent constructs. Results include standardised factor

loadings (λ), Cronbach's alpha (α), Composite Reliability (CR), Average Variance Extracted (AVE), and the square root of AVE for discriminant validity assessment.

4.3 Factor Loadings

Table 3 presents the standardised factor loadings for all 35 observed items across the seven constructs. All loadings are statistically significant at the .001 level (except the marker indicator fixed to 1.0) and exceed the minimum threshold of 0.50 recommended for indicator reliability (Hair et al., 2019).

Table 3 standardised factor loadings for all 35 observed items

Item	Construct	Indicator Statement	λ (Std)	SE	z	p	Sig.
Supplier Collaboration (SC)							
SC1	SC	Our firm engages in joint planning and forecasting with key suppliers.	0.738	—	—	—	Fixed
SC2	SC	We work closely with suppliers to solve operational problems.	0.725	0.074	13.488	< 0.001	***
SC3	SC	Suppliers are involved in product development and innovation processes.	0.784	0.075	14.589	< 0.001	***
SC4	SC	There is a high level of coordination between our firm and suppliers.	0.721	0.073	13.402	< 0.001	***
SC5	SC	We maintain long-term collaborative relationships with major suppliers.	0.849	0.076	15.680	< 0.001	***
Information Sharing (IS)							
IS1	IS	Our firm shares timely information with suppliers regarding demand changes.	0.737	—	—	—	Fixed
IS2	IS	Information shared with suppliers is accurate and reliable.	0.745	0.079	13.205	< 0.001	***
IS3	IS	We use digital platforms/ICT systems to communicate with suppliers.	0.738	0.075	13.092	< 0.001	***
IS4	IS	Suppliers provide us with relevant operational and market information.	0.726	0.076	12.901	< 0.001	***
IS5	IS	There is transparency in information exchange between our firm and suppliers.	0.677	0.076	12.074	< 0.001	***
Trust & Commitment (TC)							
TC1	TC	We trust our suppliers to act in our best interest.	0.720	—	—	—	Fixed
TC2	TC	Our suppliers are reliable in fulfilling their obligations.	0.750	0.080	13.449	< 0.001	***
TC3	TC	We are committed to maintaining long-term relationships with	0.763	0.076	13.665	< 0.001	***

		suppliers.					
TC4	TC	There is mutual respect between our firm and suppliers.	0.805	0.076	14.340	< 0.001	***
TC5	TC	Our firm is willing to invest in long-term partnerships with suppliers.	0.754	0.081	13.511	< 0.001	***
Supplier Development (SD)							
SD1	SD	Our firm provides training and technical support to suppliers.	0.762	—	—	—	Fixed
SD2	SD	We assist suppliers in improving quality and operational standards.	0.769	0.066	14.616	< 0.001	***
SD3	SD	Our firm supports suppliers in adopting new technologies.	0.762	0.068	14.489	< 0.001	***
SD4	SD	We evaluate supplier performance and provide feedback for improvement.	0.752	0.067	14.292	< 0.001	***
SD5	SD	Our firm invests resources to enhance supplier capabilities.	0.764	0.064	14.529	< 0.001	***
Economic Sustainability (ECS)							
ECS1	ECS	Our supply chain operations have reduced overall operational costs.	0.799	—	—	—	Fixed
ECS2	ECS	We achieve high efficiency in inventory and logistics management.	0.745	0.061	14.672	< 0.001	***
ECS3	ECS	Our supply chain contributes positively to firm profitability.	0.744	0.062	14.650	< 0.001	***
ECS4	ECS	We maintain stable and reliable supply chain performance.	0.724	0.059	14.202	< 0.001	***
ECS5	ECS	Our firm achieves long-term financial benefits from supply chain practices.	0.734	0.067	14.425	< 0.001	***
Environmental Sustainability (ENS)							
ENS1	ENS	Our firm adopts environmentally friendly sourcing practices.	0.758	—	—	—	Fixed
ENS2	ENS	We actively reduce waste in our supply chain processes.	0.762	0.067	14.257	< 0.001	***
ENS3	ENS	Our firm minimizes energy consumption in operations.	0.723	0.070	13.516	< 0.001	***
ENS4	ENS	We comply with environmental regulations and standards.	0.733	0.069	13.710	< 0.001	***
ENS5	ENS	Our suppliers adhere to environmental sustainability practices.	0.775	0.073	14.500	< 0.001	***
Social Sustainability (SOS)							
SOS1	SOS	Our firm ensures fair labor practices within the supply chain.	0.820	—	—	—	Fixed
SOS2	SOS	We prioritize health and safety standards in supply chain operations.	0.784	0.058	16.505	< 0.001	***
SOS3	SOS	Our suppliers comply with ethical	0.782	0.057	16.449	<	***

		business practices.				0.001	
SOS4	SOS	Our firm contributes positively to community development.	0.745	0.058	15.483	< 0.001	***
SOS5	SOS	We promote social responsibility among our supply chain partners.	0.758	0.056	15.838	< 0.001	***

Note: λ = Standardised factor loading. SE = Standard Error. All loadings significant at $p < .001$ (***). Fixed = marker indicator constrained to 1.0 for model identification. Loadings range: 0.677 – 0.849.

4.4 Reliability and Validity Assessment

Table 3 presents the construct-level reliability and validity indices. Acceptable thresholds are: Cronbach's $\alpha > 0.70$, Composite Reliability (CR) > 0.70 , and AVE > 0.50 (Fornell & Larcker, 1981; Hair et al., 2019). Discriminant validity is confirmed when the square root of AVE ($\sqrt{\text{AVE}}$) for each construct exceeds its correlations with all other constructs.

Table 4 Construct Reliability and Validity (Fornell-Larcker Criterion)

Construct	α (Alpha)	CR	AVE	$\sqrt{\text{AVE}}$	No. Items	Min λ	Max λ	Assessment
SC	0.875	0.875	0.585	0.765	5	0.721	0.849	Valid
IS	0.847	0.847	0.526	0.725	5	0.677	0.745	Valid
TC	0.871	0.871	0.576	0.759	5	0.720	0.805	Valid
SD	0.874	0.874	0.580	0.762	5	0.752	0.769	Valid
ECS	0.865	0.865	0.562	0.750	5	0.724	0.799	Valid
ENS	0.866	0.866	0.563	0.750	5	0.723	0.775	Valid
SOS	0.884	0.885	0.606	0.778	5	0.745	0.820	Valid

Note: α = Cronbach's Alpha; CR = Composite Reliability; AVE = Average Variance Extracted; $\sqrt{\text{AVE}}$ = Square Root of AVE. Thresholds: $\alpha > 0.70$, CR > 0.70 , AVE > 0.50 .

All seven constructs demonstrate excellent internal consistency reliability, with Cronbach's alpha values ranging from 0.847 (Information Sharing) to 0.884 (Social Sustainability), all well exceeding the minimum threshold of 0.70. Composite Reliability (CR) values similarly exceed the recommended 0.70 threshold for all constructs, providing evidence of convergent validity. The AVE values, however, reveal an important observation: some constructs approach but remain near the 0.50 threshold, which is not uncommon in behavioural research with 5-item scales and consistent Likert distributions. The square roots of AVE for all constructs exceed their inter-construct correlations, providing evidence of discriminant validity using the Fornell-Larcker criterion.

4.5 Inter-Construct Correlations (SRM Constructs)

Table 5 presents the correlation matrix for the four SRM (exogenous) constructs. Diagonal elements (bold) are the square root of AVE values; off-diagonal elements are the standardised inter-construct correlations derived from the SEM phi matrix.

Table 5: Discriminant Validity — Inter-Construct Correlation Matrix (Fornell-Larcker)

Construct	SC	IS	TC	SD	$\sqrt{\text{AVE}}$
SC	[0.763]	-0.001	0.065	0.047	0.763
IS	-0.001	[0.732]	0.033	0.048	0.732

TC	0.065	0.033	[0.76]	0.132	0.760
SD	0.047	0.048	0.132	[0.762]	0.762

Note: Diagonal elements in brackets [] are square root of AVE. Off-diagonal elements are inter-construct correlations. Discriminant validity is supported when diagonal > off-diagonal values in corresponding rows/columns.

Inspection of Table 4 confirms discriminant validity for all four SRM constructs. In every case, the square root of AVE (diagonal) exceeds the inter-construct correlations in the respective row and column. The inter-construct correlations among the four SRM dimensions are low (ranging from -0.001 to 0.132), suggesting that while these constructs are theoretically related dimensions of SRM, they are empirically distinct and measure unique facets of the supplier relationship management phenomenon.

4.6 Structural Model Results: Hypothesis Testing

Having established the adequacy of the measurement model, the structural model was evaluated to test the twelve hypothesised relationships between SRM constructs and the three dimensions of supply chain sustainability. Table 6 presents the unstandardised (β) and standardised (β^*) path coefficients, standard errors, z-statistics, p-values, and hypothesis decisions.

Table 6: Structural Path Coefficients — Hypothesis Testing Results

Hyp.	Path	Description	β	β^*	SE	z	p	Sig.	Decision
Dependent Variable: Economic Sustainability (ECS)									
H1a	SC → ECS	Supplier Collaboration → Economic Sustainability	0.025	0.021	0.071	0.354	.724	ns	Not Supported
H1b	IS → ECS	Information Sharing → Economic Sustainability	0.115	0.097	0.072	1.610	.107	ns	Not Supported
H1c	TC → ECS	Trust & Commitment → Economic Sustainability	- 0.165	- 0.128	0.077	- 2.139	.032	*	Supported (-)
H1d	SD → ECS	Supplier Development → Economic Sustainability	0.047	0.045	0.062	0.757	.449	ns	Not Supported
Dependent Variable: Environmental Sustainability (ENS)									
H2a	SC → ENS	Supplier Collaboration → Environmental Sustainability	0.051	0.042	0.071	0.718	.473	ns	Not Supported
H2b	IS → ENS	Information Sharing → Environmental Sustainability	- 0.040	- 0.034	0.071	- 0.557	.577	ns	Not Supported
H2c	TC → ENS	Trust & Commitment → Environmental Sustainability	- 0.052	- 0.041	0.076	- 0.687	.492	ns	Not Supported

H2d	SD → ENS	Supplier Development → Environmental Sustainability	0.023	0.023	0.062	0.379	.705	ns	Not Supported
Dependent Variable: Social Sustainability (SOS)									
H3a	SC → SOS	Supplier Collaboration → Social Sustainability	- 0.054	- 0.042	0.075	- 0.726	.468	ns	Not Supported
H3b	IS → SOS	Information Sharing → Social Sustainability	- 0.017	- 0.013	0.075	- 0.222	.824	ns	Not Supported
H3c	TC → SOS	Trust & Commitment → Social Sustainability	- 0.103	- 0.077	0.080	- 1.290	.197	ns	Not Supported
H3d	SD → SOS	Supplier Development → Social Sustainability	0.001	0.001	0.065	0.023	.982	ns	Not Supported

Note: β = unstandardised path coefficient; β^* = standardised path coefficient; SE = standard error; z = z-statistic; Sig. = significance level. * $p < .05$; ** $p < .01$; *** $p < .001$; ns = not significant. Estimation method: Maximum Likelihood Weighted (MLW).

4.7 Variance Explained (R^2) for Dependent Variables

Table 7 presents the coefficient of determination (R^2) for each endogenous latent construct, indicating the proportion of variance in the sustainability dimensions explained by the four SRM predictors collectively.

Table 7: R^2 Values for Endogenous Constructs

Dependent Variable	R^2	Interpretation	Predictors (SRM Dims)
ECS (Economic Sustainability)	0.027	Weak explanatory power	SC, IS, TC, SD
ENS (Environmental Sustainability)	0.005	Weak explanatory power	SC, IS, TC, SD
SOS (Social Sustainability)	0.008	Weak explanatory power	SC, IS, TC, SD

Note: R^2 values computed from the proportion of variance in endogenous constructs explained by SRM predictors in the structural model.

The R^2 values for all three sustainability dimensions are very low (ECS = 0.027; ENS = 0.005; SOS = 0.008), indicating that the four SRM constructs, as specified in this model, collectively explain a minimal proportion of variance in supply chain sustainability outcomes. This finding is consistent with the non-significant structural paths observed in Table 5 and suggests that the relationship between SRM practices and supply chain sustainability in the Nigerian FMCG context is more complex than a direct linear effect, possibly mediated by contextual, institutional, or operational factors not captured in the current model.

4.8 Discussion of Structural Model Results

4.8.1 Supplier Collaboration and Supply Chain Sustainability

The structural paths from Supplier Collaboration (SC) to all three sustainability dimensions were non-significant (ECS: $\beta^* = 0.021$, $p = .724$; ENS: $\beta^* = 0.042$, $p = .473$; SOS: $\beta^* = -0.042$, $p = .468$). These results suggest that, within the Nigerian FMCG context, the degree of joint planning, problem-solving, and long-term cooperative engagement with suppliers does not directly translate to measurable improvements in economic, environmental, or social sustainability outcomes. This may reflect the transactional nature of many supplier relationships in Nigeria, where collaborative intent exists but structural capacity (technology, formalised agreements, sustainability KPIs) is insufficient to convert collaboration into sustainability gains.

4.8.2 Information Sharing and Supply Chain Sustainability

Information Sharing (IS) did not significantly predict any sustainability dimension (ECS: $\beta^* = 0.097$, $p = .107$; ENS: $\beta^* = -0.034$, $p = .577$; SOS: $\beta^* = -0.013$, $p = .824$). While the path from IS to ECS approached marginal significance ($p = .107$), it did not meet the conventional 0.05 threshold. This finding may indicate that while information sharing is widely practised, the quality, depth, and sustainability-focus of shared information may be insufficient. In the FMCG sector, information exchange tends to be operationally oriented (demand forecasts, delivery schedules) rather than strategically oriented towards environmental or social compliance data.

4.9.3 Trust and Commitment and Supply Chain Sustainability

Trust and Commitment (TC) was the only SRM dimension that yielded a statistically significant structural path — to Economic Sustainability (ECS: $\beta^* = -0.128$, $p = .032$). Unexpectedly, this relationship was negative, suggesting that higher levels of trust and long-term relational commitment between a firm and its suppliers are associated with slightly lower economic sustainability scores. This counterintuitive finding may reflect a phenomenon known as relational lock-in, where deep trust reduces incentive for renegotiation or switching to more cost-efficient suppliers, ultimately constraining economic optimisation. Alternatively, this may reflect the cost of maintaining trust-based relationships (investment in relationship management, reluctance to enforce cost-reduction demands) which marginally reduce short-term economic efficiency. No significant effects were found from TC to ENS ($p = .492$) or SOS ($p = .197$).

4.9.4 Supplier Development and Supply Chain Sustainability

Supplier Development (SD) did not significantly predict any sustainability dimension (ECS: $\beta^* = 0.045$, $p = .449$; ENS: $\beta^* = 0.023$, $p = .705$; SOS: $\beta^* = 0.001$, $p = .982$). The near-zero path from SD to SOS ($\beta^* = 0.001$) is particularly noteworthy, suggesting essentially no direct relationship between firms' supplier development activities and social sustainability outcomes. This challenges the assumption that capacity-building investments in suppliers automatically translate to improved labour practices, community engagement, or social accountability. The absence of significant effects may point to a time-lag dynamic: supplier development benefits may materialise over longer horizons than captured in a cross-sectional study.

5.0 Recommendations

1. The non-significant paths from Supplier Collaboration to all three sustainability dimensions point to a structural implementation gap rather than a conceptual failure. It is

- recommended that Nigerian FMCG firms move beyond informal or intent-based collaboration and invest in formalising joint sustainability governance.
2. The failure of Information Sharing to predict any sustainability dimension, alongside the marginally non-significant path to Economic Sustainability ($p = .107$), suggests a quality-over-quantity problem. Firms are encouraged to audit the nature of information currently shared with supply chain partners and deliberately expand its scope from purely operational data (forecasts, delivery schedules) to sustainability-oriented disclosures
 3. The unexpected negative relationship between Trust and Commitment and Economic Sustainability warrants a nuanced managerial response. It is recommended that firms establish structured commercial review clauses that operate independently of relational closeness, ensuring that trust-based relationships remain commercially disciplined.
 4. The near-zero path from Supplier Development to Social Sustainability ($\beta^* = 0.001$) is the most provocative finding in this section and carries significant practical implications. It is recommended that supplier development programmes be redesigned to explicitly incorporate social sustainability milestones, including measurable targets around labour standards, community investment, and worker welfare, with progress reviewed as part of development agreements.

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