

Assessing the Environmental Sustainability of Fast-Moving Consumer Goods Supply Chains in Zambia

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Abstract

Fast-moving consumer goods (FMCG) supply chains contribute to economic activity and consumer welfare, but procurement, production and distribution can create environmental pressures through resource consumption, waste generation, energy use and transport emissions. This study assessed the environmental sustainability of FMCG supply chains in Zambia, focusing on green procurement, production and waste management, transportation, and environmental awareness. A mixed-methods design was employed among ten FMCG firms in Lusaka. Quantitative data were collected from 60 respondents drawn equally from procurement, production and logistics departments. Firms were purposively identified, grouped into food and beverages and hygiene products, and selected using simple random sampling. Data were collected through semi-structured questionnaires and a key-informant interview schedule and analysed using descriptive statistics and chi-square procedures in SPSS and Microsoft Excel. The findings indicate that 70% of procurement respondents reported a green procurement policy, but only 60% reported considering environmentally responsible firms in contract awards and only 40% reported environmental clauses binding contractors. Among respondents reporting green contracting, 58.3% indicated that only 1–5 contracts had been awarded on green grounds during the previous five years. In production, 80% reported the national grid as the preferred energy source, while fuel-powered generators were the most common alternative. Solid waste was the dominant reported waste stream, 85% relied on local-authority collection, and 80% reported no alternative use for production waste. Logistics were dominated by road transport, reported by all logistics respondents, while 95% reported diesel as the principal fuel. Environmental advocacy was reported by 86.7%, while 71.7% reported an environmental-protection policy; 28.3% reported no specific intervention to reduce environmental impact. The study concludes that environmental awareness and policy adoption have advanced faster than operational implementation. It contributes Zambia-specific evidence showing that FMCG environmental sustainability requires integrated procurement controls, cleaner energy, circular waste practices, greener logistics, measurable targets and stronger monitoring.

1. Introduction

Fast-moving consumer goods include frequently purchased products such as food, beverages, personal-care products and household goods. Their high volumes and frequent replenishment make supply-chain efficiency important, but the scale of sourcing, processing, packaging and distribution also creates environmental pressures. Sustainable supply-chain management consequently requires firms to integrate environmental considerations beyond the factory, including supplier selection, procurement, production, logistics and end-of-life activities.

Recent evidence shows that green supply-chain management (GSCM) can improve environmental performance when supported by organisational capabilities and institutional pressure. Nazir et al. (2024) report positive relationships between GSCM practices and environmental performance in manufacturing and identify institutional pressure as an important contextual factor. Huang et al. (2024) similarly link GSCM practices with sustainable performance in an emerging economy. Liu, Yousaf and Rosak-Szyrocka (2024) connect GSCM with green innovation and zero-waste management.

Procurement is a critical environmental intervention point because supplier selection determines many of the materials, packaging, services and technologies entering an organisation. Green supplier-selection studies emphasise environmental management systems, pollution control, green technology and related criteria in supplier evaluation (Kang, Xu and Yang, 2022; Al Mohamed and Al Mohamed, 2023). Production creates environmental impacts through energy consumption, emissions, material losses and waste, while logistics affects environmental performance through transport mode, fuel use, vehicle efficiency and routing (Panagiotopoulou, Stavropoulos and Chrysosouris, 2022; Liew and Cao, 2024).

The Zambian context remains under-researched from an integrated FMCG supply-chain perspective. The underlying dissertation identified gaps in evidence concerning procurement, production energy, waste disposal and detailed logistics and fuel use. The present article addresses these gaps using evidence from ten FMCG firms in Lusaka.

1.1 Problem Statement

The existence of environmental policies does not necessarily mean that environmentally responsible practices are implemented consistently. The underlying study found that environmental policies and awareness were more developed than implementation in procurement contracting, waste recovery, cleaner energy and logistics. The research problem is therefore the gap between formal environmental intentions and operational supply-chain practices among FMCG firms in Lusaka.

1.2 Research Objectives

- To assess how environmentally friendly the procurement process is in the supply chain of FMCGs.
- To determine whether the production processes of FMCGs harm the environment.
- To determine whether the transportation stage of FMCGs contributes to environmental damage.
- To assess whether players in FMCG supply chains are environmentally aware.

2 Literature Review

2.1 Sustainable and Green Supply Chains

GSCM incorporates environmental thinking into supply-chain planning and execution. Its purpose is not simply to reduce pollution at a production site but to influence sourcing, manufacturing, distribution and recovery decisions. Evidence from manufacturing firms indicates that green procurement, planning and execution are associated with better environmental outcomes, while institutional pressure can influence implementation (Nazir et al., 2024). Emerging-economy research further suggests that GSCM can contribute to sustainable performance, although organisational and contextual constraints matter (Huang et al., 2024).

2.2 Green Procurement

Green procurement involves incorporating environmental criteria into purchasing decisions and supplier relationships. It can include environmental screening, supplier evaluation, green specifications, environmental management systems, contract clauses and monitoring. Kang, Xu and Yang (2022) demonstrate that environmental criteria can be systematically incorporated into supplier evaluation, while Al Mohamed and Al Mohamed (2023) show how environmental-management criteria can be incorporated into supplier selection.

The literature distinguishes policy adoption from implementation. A green procurement policy has limited environmental value if it is not translated into tender criteria, contractual obligations and supplier monitoring. This is particularly relevant in emerging economies, where firms may face limited supplier capability, infrastructure and environmental-management expertise.

2.3 Production, Energy and Waste

Manufacturing sustainability is shaped by energy efficiency, cleaner production, material efficiency and waste management. Panagiotopoulou, Stavropoulos and Chrysosouris (2022) argue for holistic assessment of manufacturing environmental impacts. Waste management is increasingly connected to circular-economy principles that prioritise source reduction, reuse, recycling and recovery. Liu, Yousaf and Rosak-Szyrocka (2024) highlight the relationship between GSCM, green innovation and zero-waste management, while Soleimani et al. (2022) emphasise energy-efficient closed-loop supply-chain design.

2.4 Green Logistics

Transportation affects environmental performance through fuel consumption, emissions, congestion and vehicle use. Road freight is particularly significant in landlocked economies. Firms can reduce environmental intensity through route optimisation, load consolidation, preventive maintenance, fuel monitoring, fleet utilisation and progressive transition to lower-emission vehicles. Liew and Cao (2024) show that stronger GSCM quality can support supply-chain carbon accountability and lower carbon footprints.

2.5 Environmental Awareness and Implementation

Environmental awareness is necessary but not sufficient for environmental performance. Organisational systems are required to translate awareness into targets, budgets, responsibilities, monitoring and corrective action. Recent research shows that management support and complementary organisational capabilities can strengthen the relationship between GSCM and environmental performance.

2.6 Theoretical Framework: Anomie Theory

The study is anchored in Durkheim's Anomie Theory. Anomie refers to situations in which norms and controls become weakened or insufficiently effective. The dissertation applies this perspective to environmental management, arguing that environmental laws and policies may exist while enforcement and implementation mechanisms remain weak.

This theory is useful for interpreting the study's recurring policy–practice gap. Environmental policies and advocacy represent formal norms, while green contract clauses, supplier monitoring, waste recovery, cleaner energy and logistics controls represent mechanisms for operationalising those norms. The coexistence of relatively strong environmental awareness with weaker implementation can therefore be understood as a form of organisational norm–practice disconnection.

3 Methodology

Research Design

A mixed-methods design was used to combine quantifiable evidence with contextual information. Semi-structured questionnaires generated quantitative and qualitative responses, while a key-informant interview schedule was used with a Ministry of Commerce respondent.

Study Area, Population and Sample

The study covered ten FMCG firms in Lusaka, Zambia, operating in food, beverages and hygiene products. The firms identified in the dissertation were Seba Foods, Heinrich's Beverages Limited, Zambeef, Parmalat Zambia, Zayaan Investments, Chat Milling, Trade Kings, YoYo Foods, Kingdom Hall and Aru Industries. The target population comprised employees in procurement, production and logistics. Two employees from each department were selected from each firm, giving 60 respondents.

Sampling and Data Analysis

Twenty firms were initially identified from Ministry of Commerce information. They were grouped into food and beverages and hygiene products, after which five firms from each group were selected through simple random sampling. Quantitative data were analysed using SPSS 21.0 and Microsoft Excel. Frequencies, percentages and descriptive statistics were generated, while chi-square procedures were specified for categorical associations.

Ethics

Ethical clearance was sought through ESAMI. Participation was voluntary, informed consent was obtained, and respondents were assured of confidentiality and anonymity.

4 Results and Discussion

4.1 Respondent Characteristics

Table 1. Characteristics of respondents

Characteristic	Category	n	%
Gender	Male	49	81.7
	Female	11	18.3
Age	20–29	17	28.3
	30–39	32	53.3
	40–49	4	6.7
	50–59	6	10.0
	60+	1	1.7
Education	Secondary certificate	1	1.7
	Certificate	17	28.3
	Diploma	30	50.0
	Degree	12	20.0
Experience	0–5 years	38	63.3
	6–10 years	10	16.7
	11–15 years	4	6.7
	15–20 years	6	10.0
	Over 20 years	2	3.3
Department	Procurement	20	33.3
	Production	20	33.3
	Logistics	20	33.3

Table 1 indicates that respondents were predominantly male and aged 30–39 years. The equal representation of procurement, production and logistics personnel is particularly useful because the study examines environmental sustainability across three supply-chain functions. The sample nevertheless represents a relatively small number of firms, so the results should be interpreted as firm-level evidence from Lusaka rather than as a statistically representative estimate for all Zambian FMCGs. The underlying dissertation reports the same 60-person sample and departmental balance.

4.2 Green Procurement

Table 2. Procurement of environmentally harmful products

Response	n	%
Yes	4	20.0
No	16	80.0
Total	20	100.0

Table 2 shows that 80% of procurement respondents did not perceive the products they procured as environmentally harmful. This is a positive perception but does not by itself establish objective environmental performance. The policy and contracting indicators provide stronger evidence of whether environmental considerations were embedded in procurement.

Table 3. Existence of a green procurement policy

Response	n	%
Yes	14	70.0
No	6	30.0
Total	20	100.0

Table 3 shows that 70% reported a green procurement policy, demonstrating substantial formal recognition of environmental considerations. However, 30% reported no policy. The finding supports the argument that green procurement was emerging but not yet universal. The gap between policy and practice becomes clearer in the contract-related results.

Table 4. Duration of green procurement policy

Duration	n	% of policy respondents
0–5 years	8	57.1
6–10 years	3	21.4
16–20 years	2	14.3
Do not know	1	7.1
Total	14	100.0

Table 4 shows that 57.1% of respondents with a green procurement policy reported that it had existed for 0–5 years. This suggests relatively recent institutionalisation of green procurement in many sampled firms and may partly explain why implementation mechanisms remained incomplete.

Table 5. Environmental criteria and contractual clauses

Indicator	Yes (%)	No (%)
Environmental criteria considered in contract awards	60.0	40.0
Environmental clauses binding contractors	40.0	60.0

Table 5 demonstrates a clear implementation gap. While 60% considered environmentally responsible firms in contract awards, only 40% had environmental clauses binding contractors. Environmental preference was therefore more common than enforceable supplier accountability. This is important because green procurement requires environmental criteria to move from policy statements into supplier-selection, contractual and monitoring systems (Kang, Xu and Yang, 2022).

Table 6. Contracts awarded on green grounds in the previous five years

Number of contracts	n	%
1–5	7	58.3
Over 20	2	16.7
None	3	25.0
Total	12	100.0

Table 6 reinforces the implementation gap. Among respondents reporting green contracting, 58.3% reported only 1–5 green contracts over five years, while 25% reported none. The result suggests that green supplier selection was not yet a routine procurement practice, consistent with research identifying organisational and capability barriers to green procurement.

4.3 Production, Energy and Waste

Table 7. Production energy and waste-management indicators

Indicator	Category	n	%
Principal energy	Coal	3	15.0
	National grid (hydro-electricity)	16	80.0
	Diesel	1	5.0
Alternative energy available	Yes	12	60.0
	No	8	40.0
Alternative source*	Fuel-powered generator	5	41.7
	Coal	3	25.0
	National grid	3	25.0
	Wood	1	8.3
Main waste	Gas	2	10.0
	Effluent	4	20.0
	Raw material	2	10.0
	Solid waste	12	60.0
Waste disposal	Local authority	17	85.0
	Drainage system	1	5.0

	Sold	2	10.0
Disposal site	Garbage site	18	90.0
	Forest	1	5.0
	Drainage system	1	5.0
Alternative use for waste	Yes	4	20.0
	No	16	80.0

Table 7 shows a mixed production sustainability profile. The national grid was the principal reported energy source for 80% of respondents, but fuel-powered generators were the most common alternative among respondents with alternative sources. This indicates that energy continuity was still partly dependent on fossil-fuel generation. Solid waste was the dominant waste stream, while most waste was transferred to local-authority collection and 80% reported no alternative use. The pattern suggests a predominantly disposal-oriented system rather than a circular recovery model. Contemporary research supports stronger integration of waste reduction, recovery, green innovation and zero-waste practices (Liu, Yousaf and Rosak-Szyrocka, 2024).

4.4 Transportation and Logistics

Table 8. Transport mode, fuel choice and weekly fuel consumption

Indicator	Category	n	%
Transport mode	Road	20	100.0
Fuel	Diesel	19	95.0
	Petrol	1	5.0
Weekly fuel	1,000–5,000 litres	14	70.0
	5,000–10,000 litres	3	15.0
	Over 15,000 litres	3	15.0

Table 8 identifies logistics as a major environmental pressure point. All logistics respondents reported road transport and 95% reported diesel. Seventy percent reported weekly consumption of 1,000–5,000 litres. Zambia's landlocked geography helps explain road dependence, but the scale of reported fuel use indicates opportunities for route optimisation, vehicle utilisation, preventive maintenance, fuel monitoring and progressive adoption of lower-emission technologies. The finding is consistent with research linking GSCM quality to supply-chain carbon accountability (Liew and Cao, 2024).

4.5 Environmental Awareness

Table 9. Environmental awareness, policy and interventions

Indicator	Category	n	%
Advocacy for environmental protection	Yes	52	86.7
	No	8	13.3
Environmental protection policy	Yes	43	71.7
	No	17	28.3
Main intervention	Waste management	30	50.0
	Servicing automobiles	10	16.7
	Using non-pollutants	3	5.0
	Nothing	17	28.3

Table 9 provides the strongest evidence of an awareness–implementation gap. Advocacy was reported by 86.7%, but only 71.7% reported an environmental protection policy and 28.3% reported no specific intervention. Waste management was the most common intervention, while only 5% reported using non-polluting inputs. The evidence indicates that environmental consciousness had developed faster than comprehensive operational action.

The finding is theoretically significant. From an Anomie perspective, environmental advocacy and policy represent formal norms, while procurement controls, cleaner energy, waste recovery and logistics measures represent institutional mechanisms that operationalise those norms. The gap between the two suggests that environmental expectations were not consistently supported by strong implementation controls.

4.6 Integrated Discussion

Across the four study objectives, the dominant pattern is a policy–practice gap. Procurement policies existed in most sampled firms, but environmental contracting was weaker. Production relied on conventional backup energy and disposal-oriented waste systems. Logistics depended overwhelmingly on road transport and diesel. Environmental awareness was relatively high, but a substantial minority reported no concrete intervention.

The procurement finding is consistent with contemporary green supplier-selection literature, which stresses that environmental criteria need to be integrated into supplier evaluation and contractual management (Kang, Xu and Yang, 2022). The production findings reinforce research emphasising holistic environmental assessment across energy, material and waste flows (Panagiotopoulou, Stavropoulos and Chrysosolouris, 2022). The logistics findings reinforce the importance of transport and carbon accountability within supply chains (Liew and Cao, 2024).

The study therefore suggests that the next stage of environmental sustainability in Zambian FMCG supply chains should be implementation-oriented. Firms need to move from general environmental commitments to measurable targets, supplier requirements, cleaner technologies, waste recovery systems and logistics indicators. Policymakers can support this transition through incentives, standards, monitoring and enforcement.

5 Conclusion and Recommendations

5.1 Conclusion

This study assessed environmental sustainability in FMCG supply chains in Zambia through procurement, production, transportation and environmental awareness. The overall evidence indicates that sampled firms have moved toward environmental awareness and formal policy adoption, but implementation remains uneven.

Procurement showed the clearest institutionalisation gap: 70% reported green procurement policies, but only 40% reported environmental clauses binding contractors. Green procurement therefore exists more strongly as a policy intention than as an enforceable supplier-management practice.

Production showed dependence on the national grid under normal conditions but reliance on fuel-powered generators as the most common alternative. Waste management was dominated by conventional disposal, with 85% relying on local-authority collection and 80% reporting no alternative use for production waste. These findings identify cleaner backup energy and circular resource recovery as priority areas.

Logistics represented another major environmental pressure point. All logistics respondents reported road transport and 95% used diesel. Although Zambia's geography constrains modal choice, firms can still reduce environmental intensity through better routing, vehicle utilisation, maintenance, fuel monitoring and progressive fleet renewal.

Finally, environmental awareness exceeded implementation. While 86.7% reported organisational advocacy for environmental protection, 28.3% reported no specific intervention. The study's central conclusion is therefore that environmental sustainability requires a transition from awareness and policy adoption to measurable operational systems.

The study contributes Zambia-specific firm-level evidence by integrating procurement, production, logistics and environmental awareness in a single FMCG supply-chain assessment. It also demonstrates the usefulness of Anomie Theory as an interpretive lens for understanding situations in which environmental norms and policies coexist with weak implementation mechanisms. For managers, the priority is to embed environmental criteria in procurement, production and logistics decisions. For policymakers and environmental authorities, the findings support stronger monitoring, incentives for cleaner technologies and enforceable environmental requirements.

5.2 Recommendations

Embed measurable environmental criteria in supplier prequalification, tender evaluation and contract management.

Use enforceable environmental clauses in supplier and contractor agreements and monitor supplier compliance.

Develop waste-segregation, recycling, reuse and resource-recovery programmes and build partnerships with recycling firms and other manufacturers.

Assess cleaner backup-energy options, including solar and energy-storage technologies, where technically and financially feasible.

Introduce logistics sustainability indicators covering fuel consumption, routing, vehicle utilisation, maintenance and avoidable empty kilometres.

Strengthen incentives for cleaner commercial vehicles and energy technologies while improving environmental monitoring and enforcement.

Translate environmental policies into annual targets with assigned responsibilities, budgets and performance indicators.

Provide regular training for procurement, production and logistics staff on green supply-chain management.

5.3 Limitations and Future Research

The study is cross-sectional and covers ten FMCG firms in Lusaka, limiting generalisation. The evidence is also substantially self-reported and does not directly measure emissions, waste quantities, fuel intensity or environmental quality. Future research should use larger samples and objective indicators such as greenhouse-gas inventories, energy intensity, fuel intensity, waste recovery rates and supplier environmental-performance measures. Longitudinal research would also help determine whether environmental policies translate into sustained operational change.

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