

Assessment of Challenges Faced by Food and Beverages Manufacturing Firms in Implementing Green Supply Chain Management Practices in Lusaka District

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Abstract

The increasing urgency of environmental issues has prompted many organizations to adopt Green Supply Chain Management (GSCM) practices as a strategic approach to promote sustainability and mitigate climate change effects, understanding the barriers to GSCM adoption is essential for enhancing operational efficiency, corporate responsibility and promoting environmental sustainability. In the context of manufacturing firms, GSCM is increasingly recognized as an essential framework that integrates environmental considerations into supply chain processes. This study aims to comprehensively assess the challenges faced by food and beverage manufacturing firms in implementing Green Supply Chain Management (GSCM) practices in Lusaka District, Zambia. The primary research objectives include identifying specific internal and external challenges these firms encounter, evaluating the impact of these challenges on GSCM implementation, and proposing actionable strategies to overcome these barriers. Utilizing a quantitative methodology, data was collected through structured questionnaires administered to a sample of 150 respondents selected via stratified random sampling from various food and beverage manufacturing companies in Lusaka. This approach ensured a representative view of the industry's perspectives on GSCM challenges. Key findings indicate that internal challenges, such as entrenched company culture, inadequate management support, and insufficient employee training, significantly hinder effective GSCM implementation. Additionally, external challenges, including evolving government regulations and intense competition within the industry, further complicate the adoption of sustainable practices. The high statistical value of R-value of 0.7544 and R-Square of 0.568 indicate that the internal and external barriers account for a significant portion (56.8%) of the variability in GSCM implementation. Based on the findings, the study recommends enhancing management support through active participation in sustainability initiatives, increasing employee training programs to equip staff with the necessary skills, and reallocating adequate resources towards sustainability efforts. Furthermore, fostering stronger collaboration with stakeholders, including suppliers and regulatory bodies, is essential for creating an environment conducive to sustainable practices. This research contributes valuable insights into the complexities of GSCM implementation within the context of a developing economy, highlighting the need for tailored strategies that address both internal and external barriers to sustainability.

Keywords: Supply Chain Management, GSCM, Manufacturing Firms, Food and Beverage Industry, Lusaka.

Introduction

The escalating global urgency of environmental issues, notably climate change and the need for environmental sustainability, has driven manufacturing firms to increasingly implement Green Supply Chain Management (GSCM) practices. This strategic integration of environmental considerations across all supply chain stages, from product design to end-of-life management, aims to mitigate negative impacts like pollution and resource depletion. Beyond environmental stewardship, GSCM offers benefits such as enhanced operational efficiency and corporate reputation, often considered a key aspect of an organization's environmental innovation process (Carter, et al., 2020; Martínez-Falcó et al., 2024; Nyamah et al., 2022; Shahparvari, et al., 2021).

GSCM is becoming particularly important for food and beverage manufacturing firms, a cornerstone of global economies facing increasing pressure to integrate operational efficiency and environmental sustainability. These firms, which transform raw agricultural commodities into consumer-ready products across various sub-sectors, can benefit from GSCM practices that may also lead to cost reduction and enhanced environmental innovation through participative decision-making with suppliers (Kapelko, M. and Oude Lansink, A., 2022; Martínez-Falcó et al., 2024; Nyamah, E.Y., Opoku, R.K. and Kaku, G., 2022). However, despite the recognized benefits, many firms encounter internal and external challenges during GSCM implementation.

The role of green practices in achieving sustainable development has garnered significant global attention in recent decades. Research on GSCM implementation barriers reveals diverse challenges across different contexts. For instance, studies in the Indian automobile industry highlight issues such as a lack of information technology, poor human resource quality, insufficient government support, and resistance to adopting advancements (Gahlot, et al., 2021). Similarly, research in Lagos, Nigeria, identifies public awareness, lack of environmental knowledge, weak top management commitment, and inadequate legal enforcement as major impediments (Nwankwo, et al., 2024). These findings underscore that the specific challenges can vary depending on the regional and industrial context.

Similar to other African nations, Zambia faces increasing relevance of environmental issues within its manufacturing sector, making the identification of GSCM implementation barriers critical for achieving environmentally sound supply chains. While GSCM remains an important research area, there is a noted scarcity of studies investigating these challenges in developing countries, particularly within Lusaka's manufacturing industries (Galdos-Urbizu et al., 2024). Existing research often emphasizes the positive outcomes of corporate environmental management, such as the benefits of GSCM (Shahparvari, et al., 2021). Therefore, this study aims to address this gap by assessing the specific challenges encountered by food and beverage manufacturing firms in Lusaka when implementing Green Supply Chain Management practices.

Statement of the Problem

GSCM is recognized as a vital strategy for integrating sustainable practices within operational frameworks, especially in the manufacturing sector (Ghosh et al., 2023). The Zambia Environmental Outlook (2017), identifies manufacturing firms as key contributors to atmospheric pollution, underscoring the urgent necessity for GSCM practices. In Zambia, the food and beverage industry has significantly contributed to greenhouse gas emissions, increasing over 50% from 2005 to 2016 (National Green Growth Strategy 2024-2030). In September 2024, Lusaka experienced its most severe air pollution of the year, with the Air Quality Index (AQI) reaching 153. This peak followed a period of elevated pollution, as evidenced by an average AQI of 103 in July 2024. Notably, on August 14th, the AQI soared to 165, placing the city firmly within the 'Unhealthy Category' (aqi.in, 2024). These levels significantly surpass the air quality guidelines set by the World Health Organization and the standards established by the Zambia Environmental Management Agency (ZEMA).

The observed compromised air quality may be partly attributable to the non-adoption of Green Supply Chain Management (GSCM) practices within manufacturing firms. Despite potential benefits of GSCM adoption such as enhanced brand image and profitability, manufacturers face challenges in adopting GSCM practices such as insufficient financial resources, lack of awareness, resistance to change, and inadequate regulatory support (Mpondori, 2020; Uddin et al., 2022; Triyono et al., 2023). Failure to adopt GSCM can lead to increased pollution, higher operational costs, resource depletion, and damage to corporate reputation (Tumpa et al., 2019; Ogunela, 2018; Shetty & Bhat, 2022; Hussain, 2024). While studies by Mwanaumo et al. (2023), Nyakundi (2017), and John (2018) have explored GSCM's impact on performance, there is a lack of research specifically addressing challenges faced by Lusaka's food and beverage manufacturing firms in implementing GSCM practices. This gap underscores the need for focused inquiry into the challenges to GSCM adoption within this sector.

Figure 1 below presents information on the rise of greenhouse gas emissions among manufacturing firms in Zambia, the 2024 Projection Based on 2005 to 2016 statistics.

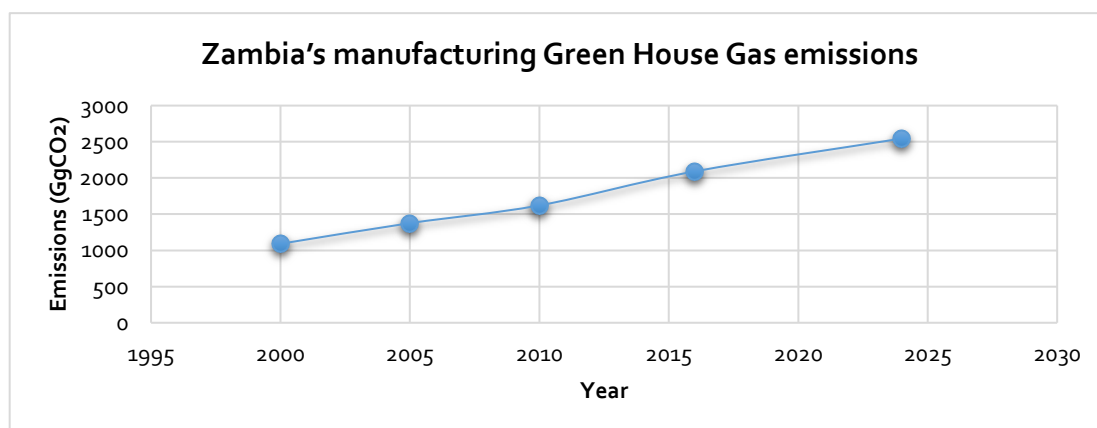


Figure 1: National Green Growth Strategy 2024 to 2030

Research Objectives

1. To establish the challenges faced by food and beverage manufacturing firms in implementing green supply chain management practices.
2. To evaluate the effect of these challenges on the GSCM implementation by the food and beverage manufacturing firms.
3. To propose potential strategies for overcoming the challenges of adopting green supply chain practices in the food and beverage manufacturing industries.

Literature Review

Green Supply Chain Management (GSCM) represents a strategic evolution of traditional supply chain management, integrating environmental considerations into every stage, from initial design to end-of-life recycling (Rahim et al., 2020; Saha et al., 2020). This holistic approach aims to minimize negative environmental impacts by emphasizing eco-friendly design principles, sustainable production methodologies, and efficient recycling processes (Beamon, 1999; Shaqrah & Alzighaibi, 2023). The core tenets of GSCM address critical environmental challenges such as dematerialization (reducing material intensity), detoxification (eliminating hazardous substances), and decarbonization (lowering carbon emissions) throughout the product lifecycle (Kumar et al., 2024). Notably, the successful implementation of GSCM not only enhances a company's environmental performance but also demonstrably contributes to improved business profitability and an expanded market share (Hooker et al., 2020). The key operational components of GSCM, including green design, green manufacturing processes, green logistics, and green purchasing initiatives, collectively work towards minimizing the overall environmental footprint of business operations. This underscores the fundamental importance of embedding environmental sustainability into all facets of supply chain management (Triyono et al., 2023; Jahanger, et al., 2024; Sarkar et al., 2021; Touriki et al., 2021; Ali et al., 2020; Neri, 2021; Zhang, et al., 2020; Noiki et al., 2023; Hooker et al., 2020; Ali et al., 2020; Noiki et al., 2023).

Despite the compelling advantages of GSCM, its successful implementation is often hindered by a range of external and internal challenges. Externally, organizations grapple with issues such as ensuring supplier compliance with environmental standards, navigating complex and evolving governmental regulations, responding to dynamic market and consumer demands for greener products, managing competitive pressures, aligning with broader social priorities for sustainability, and optimizing the environmental impact of both inbound and outbound logistics (Sharabati, 2021; Shahparvari, et al., 2021; Balkumar, et al., 2024; Park, et al., 2022; Bhatia, et al., 2021; Kumar, et al., 2024; Ghosh, et al., 2023; Chakraborty, et al., 2023; Dhillon, et al., 2023; Kumar, et al., 2022; Jum'a et al., 2024; Rahman et al., 2020; Zhang, 2024; Huynh, 2013). Internally, companies may face a lack of consistent management support for GSCM initiatives, limitations imposed by existing organizational structures, significant cost implications associated with green transitions, complexities in managing reverse logistics for product returns and waste, difficulties in effectively implementing eco-design principles, challenges in achieving a return on

investment in green technologies, and the need to foster a culture of organizational learning around sustainability (Park, et al., 2022; Kumar, et al., 2024; Dhillon, et al., 2023; Chakraborty, et al., 2023; Shahparvari, et al., 2021; Habib et al., 2021; Madhu, 2022; Carter, et al., 2020; Rahman et al., 2020; Bhatia, & Gangwani, 2021; Reynods, 2024). Overcoming these multifaceted barriers necessitates the adoption of strategic approaches, including enhancing employee training on sustainability practices, fostering robust collaboration with supply chain partners to promote environmental responsibility, investing in innovative and sustainable technologies, ensuring strict adherence to environmental regulations, implementing GSCM changes incrementally, utilizing relevant performance metrics to track progress, proactively understanding evolving market trends, cultivating a deeply ingrained sustainable organizational culture, and strategically leveraging technology and innovation to drive green initiatives (Zhang et al., 2022; Behnam et al., 2020; Jabbour et al., 2020; Geng et al., 2021; Lee et al., 2022; Govindan et al., 2021; Awan et al., 2022; Darnall et al., 2020; Wadhwa et al., 2021).

The rate and nature of GSCM adoption differ significantly between developed and developing economies. Developed economies have generally demonstrated substantial progress in GSCM implementation, driven by stringent regulatory frameworks, strong consumer demand for environmentally friendly products, advanced technological infrastructure, and well-established collaborative networks across supply chains. This has resulted in notable improvements in both operational efficiency and overall sustainability performance (Seuring & Müller, 2020; Barroso et al., 2021; Rao & Holt, 2021; Hsu et al., 2020; Vachon & Klassen, 2021; Kumar & Singh, 2021; Caldwell et al., 2020; Govindan et al., 2021; Bai & Sarkis, 2020; Dubey et al., 2021; Wang et al., 2021; Kumar et al., 2020; Ngai et al., 2021; Darnall et al., 2020; McCarthy et al., 2020; Touza et al., 2021; Wong et al., 2020; Zhuang et al., 2021; Zhang et al., 2021; Brandenburg et al., 2021; Gimenez et al., 2020). In contrast, developing economies, including Zambia, typically exhibit a slower pace of GSCM adoption. This is often attributed to factors such as prevailing economic constraints, a comparatively lower level of environmental awareness among businesses and consumers, the absence of robust and consistently enforced regulatory frameworks, and limitations in technological infrastructure (Seuring & Müller, 2020; Dubey et al., 2021; Makondo, 2023; Reddy et al., 2024; Tembo-Mwanaumo et al., 2023; Mhlanga and Chowa, 2020; Mwanza and Manda, 2024; Rao & Holt, 2021; Hsu et al., 2020; Khan et al., 2021; Bai & Sarkis, 2020; Mishra et al., 2020; Sweeney et al., 2021; Ageron et al., 2021; Govindan et al., 2021; Fedorenko et al., 2021; Kumar & Singh, 2021; Ansari et al., 2022; Wang et al., 2021; Zhang et al., 2021; Zhuang et al., 2021; Darnall et al., 2020; Touza et al., 2021; Kumar et al., 2020; Caldwell et al., 2020; Vachon & Klassen, 2021; Hsu et al., 2020; Kannan et al., 2022). Nevertheless, there is a growing recognition within Zambia of the increasing importance of GSCM. Government ministries and various firms are beginning to explore and implement more sustainable practices, particularly in key sectors such as mining, agriculture, and public procurement.

Sustainable procurement practices, guided by the principles outlined in ISO 20400, provide a structured framework for integrating sustainability considerations into organizational procurement processes. This aligns closely with the United Nations Sustainable Development Goals (SDGs), notably SDG 12 (responsible consumption and production), SDG 13 (climate action), and SDG 1 (no poverty) (ISO, 2017). Within the food and beverage industry, the implementation of GSCM practices can significantly contribute to achieving other key SDGs, such as SDG 9 (sustainable industrialization and innovation) through the adoption of eco-design principles and sustainable technologies, SDG 12 through enhanced resource efficiency and waste reduction initiatives, and SDG 13 through the development of low-carbon supply chains (Govindan et al., 2014; Seman et al., 2019; Diabat & Govindan, 2011; Luthra et al., 2016; Jabbour et al., 2020). From a theoretical perspective, frameworks such as the Resource-Based Theory (RBT) and Stakeholder Theory offer valuable insights for understanding the underlying drivers and potential challenges associated with GSCM adoption. RBT posits that firms can achieve a competitive advantage by strategically leveraging valuable, rare, inimitable, and non-substitutable resources (Helfat et al., 2023; Habib et al., 2021; Jahanger et al., 2024; Baah, C., et al., 2021; Andersén, J., 2021), while Stakeholder Theory emphasizes the critical importance of considering the diverse interests and potential pressures exerted by all relevant stakeholders in driving the adoption of sustainable practices within organizations (Mahajan et al., 2023; Gu et al., 2024; Jahanger et al., 2024).

Lessons Learnt and Research Gaps

The reviewed empirical literature robustly demonstrates the current status of GSCM implementation globally and underscores the critical role of green supply management in ensuring the sustainable stewardship of the environment. Specifically, the literature provides valuable insights into the potential patterns of supply chain relationships that can enhance environmental performance by examining the linkages between GSCM practices and both environmental operational and economic performance across various service and manufacturing sectors. These studies generally indicate that the primary objective of 'greening' the supply chain, which fundamentally involves environmental sustainability and ecological protection, is being increasingly achieved within manufacturing firms worldwide. Furthermore, the literature identifies a range of internal and external barriers and enablers that significantly influence the successful adoption and implementation of GSCM practices within organizations. However, a significant gap identified in the reviewed literature is the distinct lack of studies specifically focused on exploring the unique challenges faced by manufacturing firms in implementing green supply chain management practices within the context of Lusaka, Zambia.

Building upon this identified gap, the following specific research gaps warrant further investigation:

- **Limited Context-Specific Studies:** There is a significant lack of comprehensive research that specifically examines the challenges and facilitating factors

influencing the implementation of GSCM practices within the Zambian manufacturing sector. This absence of context-specific knowledge may impede the development of effective strategies and policies aimed at promoting sustainability and environmental responsibility within the industry.

- **Sectoral Imbalance:** The existing body of literature tends to be heavily focused on other economic sectors, leading to a notable sector gap and limiting the generalizability of findings to the specific nuances and operational realities of manufacturing industries, particularly within Lusaka or Zambia more broadly.
- **Overlooked Influencing Factors:** Key factors that can significantly impact the effective implementation of GSCM, such as the level of commitment from top management, the financial implications of investments in green technologies, the influence of governmental policies and support mechanisms, and the availability of relevant technical expertise, have been largely overlooked in the existing literature.
- **Lack of Standardized Measurement:** There is a discernible absence of standardized measurement tools or universally applicable criteria for effectively evaluating the success and impact of GSCM practices, especially within the Zambian context. This lack of standardized metrics can create difficulties in comparing findings across different studies and in effectively implementing best practices throughout the industry.

Theoretical & Conceptual Frameworks

The theoretical model reviewed above which are resource-based theory and stakeholder theory gives the theoretical basis for this research.

Resource-Based Theory

The Resource-Based Theory (RBT), primarily developed by Jay Barney, asserts that a sustainable competitive advantage stems from a firm's possession and effective management of valuable, rare, inimitable, and non-substitutable resources, encompassing both tangible assets and intangible assets like knowledge, skills, reputation, and corporate culture (Helfat et al., 2023; Habib et al., 2021). In the context of food and beverage manufacturing firms in Lusaka, the Resource-Based Theory provides a framework for analyzing how these firms can leverage their unique resources and capabilities, such as innovative technologies, skilled labor, and strong supplier relationships, to effectively address the challenges associated with implementing GSCM practices (Baah, C., et al., 2021; Andersén, J., 2021). By examining these internal resources, research informed by RBT can identify specific pathways and best practices that enable firms to enhance their sustainability efforts, improve overall operational efficiency, and ultimately gain a competitive edge through the successful integration of green supply chain management principles.

Stakeholder Theory

Stakeholder Theory, as articulated by R. Edward Freeman, posits that organizations should consider the interests of all stakeholders – any group or individual affected by or able to affect its objectives – rather than solely focusing on shareholders (Mahajan et al., 2023). Applied to Green Supply Chain Management (GSCM), Stakeholder Theory helps analyze how the dynamics between various stakeholder groups influence the adoption and implementation of green practices (Gu et al., 2024; Jahanger et al., 2024). In the context of food and beverage manufacturing firms in Lusaka, this theory is utilized to assess how stakeholder perceptions, commitments, and the organizational culture surrounding sustainability impact the challenges faced in GSCM implementation. By exploring these dynamics, the research aims to uncover barriers and propose strategies for fostering effective stakeholder engagement and collaboration in environmental initiatives, ultimately contributing to a more sustainable food and beverage sector by addressing stakeholder demands and maintaining positive relationships.

Conceptual Framework

Independent variables

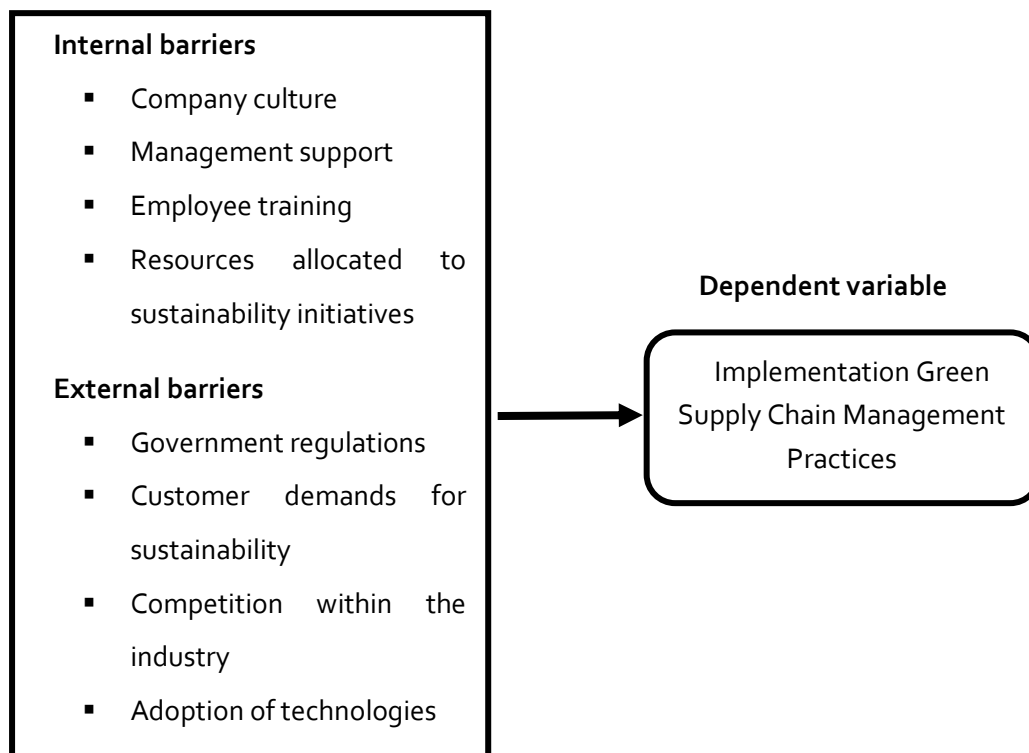


Figure 2: Conceptual framework

This conceptual framework will allow for a systematic examination of how various factors interplay to influence the successful implementation of GSCM practices, thereby informing strategies to overcome identified challenges and enhance sustainability in the sector.

Hypothesis

The following hypothesis were tested to determine the relationships between internal and external barriers and the implementation of green supply chain management practices:

General Hypothesis

H₀: There is no significant effect of internal and external barriers on the implementation of green supply chain management practices.

H₁: There is a significant effect of internal and external barriers on the implementation of green supply chain management practices.

Research Methodology

This study adopted a positivist research philosophy as its foundational framework. Bell (2022) states that positivism is based on the premise that an objective reality exists independently of individual perceptions, emphasizing the use of empirical and quantifiable data to identify patterns and relationships within a specified context. This philosophy aligns with the primary goal of conducting a systematic and objective investigation into the challenges faced by food and beverage manufacturing firms in Lusaka when implementing green supply chain management (GSCM) practices. By committing to a positivist research philosophy, the research will use a quantitative research approach. This approach facilitates a deeper understanding of the challenges through evidence-based insights derived from objective data, thus enhancing the reliability and generalizability of the study's findings.

This study used a descriptive research design in order to address key research questions concerning the challenges food and beverage manufacturing firms in Lusaka face while implementing GSCM practices. This design provides a comprehensive overview of the specific barriers to GSCM implementation, enabling researchers to identify common challenges across the industry. The structured data collection methods foster objectivity, enhancing the reliability of the findings while allowing for statistical analysis to summarize and explore relationships in the data. Additionally, the results can be generalized to a larger population, making the findings relevant for the broader sector. Ultimately, the design supports a thorough exploration of the topic, focusing on data collection, summarization, and analysis. The location of the study is critical as Lusaka is the capital city of Zambia and a significant hub for economic activities, including manufacturing.

Sampling is a crucial aspect that influences the accuracy of any study (Saunders et al., 2016). For this research, stratified random sampling was employed to select participants from the larger population of employees involved in production and supply chain activities within food and beverage manufacturing firms in Lusaka. By using this sampling method, we ensured that different subgroups within the population are adequately represented, allowing for more accurate generalizations of the findings to the broader population of GSCM practitioners in the region. Stratified random sampling helped minimize selection bias, thereby enhancing the reliability of the results. Each participant was selected independently, which aids in achieving a representative sample that reflects the diversity

within the population. This approach also facilitates straightforward statistical analysis, enabling the application of various inferential statistics to draw conclusions about the larger population based on the sample data.

To achieve an adequate sample size representative of the study population, this empirical research determined its target population based on the Ministry of Commerce, Trade and Industry's (2024) report of approximately 40 food and beverage manufacturing companies operating in Lusaka. To gain comprehensive insights from within each organization, the study strategically aimed to target 6 key personnel per company. This decision was based on the premise that perspectives from individuals in diverse roles (e.g., owners, managers, operations staff, sustainability officers) would provide a richer understanding of GSCM implementation challenges. This targeted approach yielded a total target population of 240 respondents (40 companies x 6 respondents).

Subsequently, the Yamane (1967) formula was employed to calculate the minimum required sample size for statistical significance:

$$n = N / (1 + N(e)^2)$$

Where: n signifies the sample size

N signifies the population under study

e signifies the margin error

$$n = 240 / (1 + 240(0.05)^2)$$

$$n = 240 / (1 + 240(0.0025))$$

$$n = 240 / (1 + 0.6)$$

$$n = 240 / 1.6$$

$$n = 150$$

Therefore, a sample size of 150 respondents was determined for this study.

The decision to target 6 respondents from each of the 40 food and beverage manufacturing companies in Lusaka was grounded in the research objectives and the need for diverse perspectives within each company to ensure that data reflects varied roles, departments, and hierarchical levels, thereby increasing representativeness and minimizing bias. This approach assisted in ensuring that the sample was not skewed by the views of a single group and provided a more holistic understanding of company practices and perspectives, non response mitigation, and practical feasibility

To assess the reliability of the data collection instrument, a pilot study was conducted with a smaller group of food and beverage manufacturing firms in Lusaka that were not part of the final sample. The data collected during the pilot study was subjected to reliability analysis using Cronbach's Alpha. The calculated Cronbach's Alpha coefficient for the pilot study was 0.82.

This value of 0.82 indicates a high level of internal consistency among the items in the instrument, suggesting that the questions effectively measure the intended constructs related to Green Supply Chain Management implementation challenges. According to George and Mallery (2003), Cronbach's Alpha values above 0.70 are generally considered

acceptable, and values above 0.80 are considered good. Therefore, the reliability analysis of the pilot study provided confidence in the consistency and stability of the research instrument for the main study.

From a sectoral perspective, the study strategically targeted food and beverage manufacturing firms of varying sizes, encompassing small, medium, and large enterprises. The primary respondents included owners and managers within these firms in Lusaka, selected for their direct experience and insights into GSCM implementation. To ensure a comprehensive understanding of the implementation landscape, the study also aimed to include a diverse array of stakeholders. This encompassed employees involved in relevant processes, environmental experts with specialized knowledge, representatives from regulatory bodies overseeing environmental compliance, and local government officials involved in industrial policy and sustainability initiatives. This multi-stakeholder approach was designed to capture a well-rounded understanding of the challenges and potential solutions associated with GSCM practices within the food and beverage manufacturing sector in Lusaka.

Data Collection Instruments

During the research data was collected using a research questionnaire. Questionnaires were used due to the cost effectiveness and promotion of anonymity because anonymity encourages honest responses. The questionnaires included a mix of closed-ended questions, utilizing a 1-5 Likert scale to assess the extent of agreement or disagreement with statements regarding the challenges faced in implementing Green Supply Chain Management (GSCM) practices.

Validity & Reliability Test

Haslam, et al. (2024) explains that validity may be defined as the ability of a scale or tool to measure what it is supposed to measure. It can also be defined as the accuracy and truth of the data and findings that are produced. Validity has to do with the effectiveness or successes of an instrument in measuring the specific variables it intends to measure (Budhwar, et al. (2024). On other hand, reliability is concerned with issues of consistency of measures and the question about whether the results of the study are repeatable (Bell, et al., 2022). The fundamental question becomes how stable or unstable is the measure or instrument adopted for a particular research study.

To ensure validity of instruments, and liability of the findings in the field, a pilot study was conducted including two selected food and beverage manufacturing company. In so doing, the draft questionnaire was created first. A pilot test with 10 questionnaires was conducted to acquire preliminary data for the assessment of validity and reliability. The researcher distributed the research questionnaires to 10 participants at random during the pilot study. The results of the pilot study were used to improve the efficacy of the data collection instruments and to define the technique that was used in the actual study. After the pilot

study's results were analyzed and the existing discrepancies and challenges were rectified, the actual study was then be conducted. Furthermore, I worked with the supervisor in order to make corrections on the research instrument. This entails that through validation, an observation was made to ensure that all the questions in the questionnaires are completely clear enough to the respondents through piloting and those that are not clear the modifications are made with a zeal to make the findings reliable.

Results and Discussion

Response rate

Table 4.1: Response rate

	Frequency	Percentage
Returned questionnaire	146	97
Unreturned questionnaire	4	3
Total	150	100

The findings in Table 4.1 indicate a high response rate for the survey, with 146 out of 150 distributed questionnaires returned, resulting in a response rate of 97%. This high level of participation suggests strong engagement from the respondents, which is crucial for the reliability and validity of the study's findings. The 3% of unreturned questionnaires (4 total) is minimal, further reinforcing the robustness of the data collected. High response rates are often associated with more accurate and generalizable results, as they reduce the potential for bias that can arise from non-response (Dillman et al., 2014). To assess non-response bias, comparisons were made between early and late respondents, and no significant differences were noted. These results reflect a successful data collection effort that enhances the credibility of the research outcomes.

Demographic Factors

The findings in the figure 3, above reveals a significant disparity, with males constituting 72.6% of the sample, while females represent only 27.4%. This indicates a predominant male participation in the sector, which may influence perspectives on sustainability practices and the specific challenges encountered in green supply chain management. The findings suggest that gender dynamics could play a role in shaping the adoption and implementation of such practices within the industry.

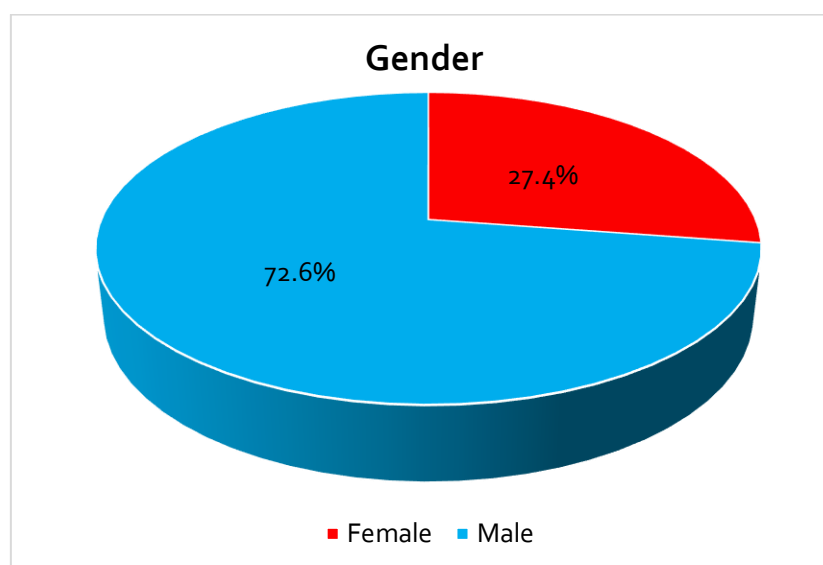


Figure 3: Gender

The demographic analysis reveals significant insights into the composition of the workforce involved in Green Supply Chain Management (GSCM). The data indicates a notable gender disparity, with females comprising 72.6% of the sample compared to 27.4% males. This predominance of female participants may influence perspectives on sustainability practices, as gender dynamics can shape attitudes and approaches toward environmental initiatives. The implications of such a demographic distribution are critical, as it suggests that the challenges and opportunities in implementing GSCM practices may be viewed through different lenses based on gender, potentially affecting decision-making processes and organizational culture. Research has shown that women often demonstrate greater environmental concern and are more likely to adopt sustainable practices compared to men. This gender-based difference could impact decision-making processes and organizational culture, suggesting that initiatives might be tailored to harness these diverse perspectives effectively.

According to the study findings in figure 4, a substantial 38.3% have been with their organization for 0-5 years, indicating a relatively younger workforce. In contrast, 30.8% of respondents have tenure ranging from 6 to 10 years, while 32.9% have been employed for over 10 years. This distribution suggests a balanced mix of experience among the workforce, with a notable proportion being relatively new to their roles. The presence of both less experienced and more seasoned employees could foster a diverse range of insights and approaches to implementing Green Supply Chain Management practices, benefiting the overall organizational capacity to address sustainability challenges. This strong educational foundation likely equips employees with the necessary skills and knowledge to navigate the complexities of GSCM.

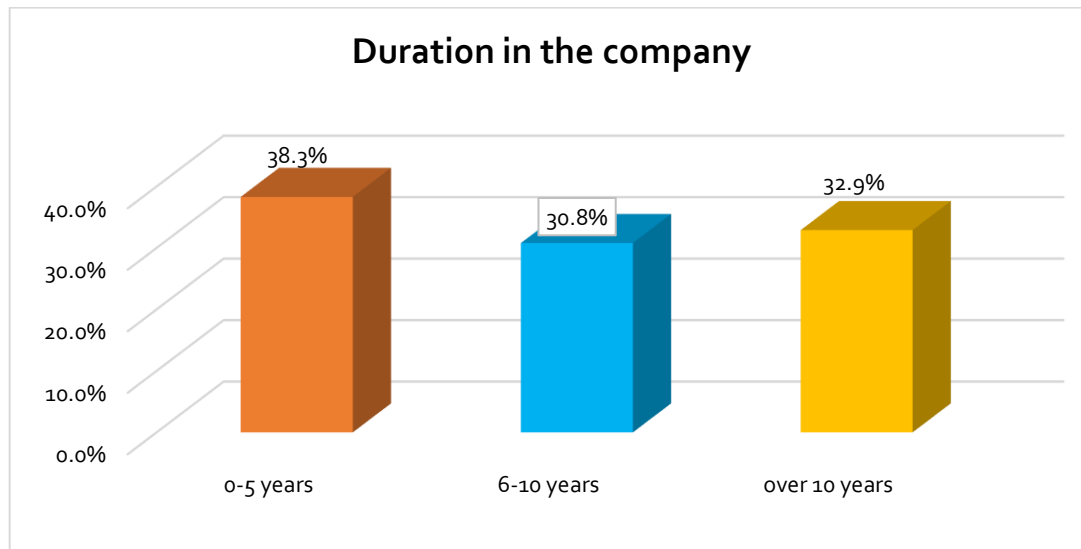


Figure 4: Duration in the company

In terms of tenure, the findings show a balanced mix of experience within the organization, with 38.3% of respondents having been with their company for 0-5 years, and 30.8% for 6-10 years. This indicates a relatively young workforce that is complemented by seasoned employees, fostering a diverse range of insights and strategies in addressing sustainability challenges. Furthermore, the educational background of the respondents highlights a well-educated workforce, with 65.5% holding college degrees and 29.7% being university graduates. This strong educational foundation likely equips employees with the necessary skills and knowledge to navigate the complexities of GSCM. Finally, the distribution of positions within the company underscores a significant focus on supply chain and sustainability roles, with Supply Chain Managers and Sustainability Managers being the most represented. This emphasis on specialized positions suggests that the organization values expertise in these critical areas, which is essential for effectively implementing sustainable practices in the supply chain. Overall, the demographic insights suggest that different gender perspectives, combined with varied experience and education levels, shape the organization's approach to GSCM and highlight opportunities for more inclusive practices in sustainability initiatives.

Position in the company

Table 5, presents an overview of the distribution of various positions within the company, highlighting significant trends in workforce composition. The most prominent role is that of Supply Chain Manager, with 24 respondents, accounting for 16.4% of the total. Following closely are Sustainability Managers at 15.1% and Supply Chain Officers at 14.4%, indicating a strong focus on supply chain and sustainability functions in the organization. Other notable positions include Production Managers (9.6%) and Environmental Officers (8.9%). The lower representation of roles such as Environmental and Quality Manager (0.7%) and Production Secretary (0.7%) suggests that specialized positions may

be less common within this workforce. According to the findings, the cumulative percentages show that a significant majority (85.5%) of employees occupy key management and operational roles related to sustainability and supply chain activities, reflecting the company's commitment to these areas. The broad range of roles indicates a diverse organizational structure capable of addressing various aspects of production, quality assurance, and environmental compliance.

Table 5: Position in the company

Position in the Company	Frequency	Percent	Valid Percent	Cumulative Percent
Sustainability Manager	22	15.1	15.1	15.1
Environmental and Quality Manager	1	0.7	0.7	15.8
Environmental Compliance Officer	7	4.8	4.8	20.6
Environmental Officer	13	8.9	8.9	29.5
Operations Director	10	6.8	6.8	36.3
Operations Manager	5	3.4	3.4	39.7
Operations Officer	4	2.7	2.7	42.4
Operations Secretary	4	2.7	2.7	45.1
Procurement Officer	3	2.1	2.1	47.2
Production Manager	14	9.6	9.6	56.8
Production Officer	4	2.7	2.7	59.5
Production Secretary	1	0.7	0.7	60.2
Quality Assurance Officer	13	8.9	8.9	69.1
Supply Chain Manager	24	16.4	16.4	85.5
Supply Chain Officer	21	14.4	14.4	100.0
Total	146	100.0	100.0	

Challenges

The findings from the survey reveal a complex landscape of challenges that food and beverage manufacturing firms in Lusaka face while attempting to implement Green Supply Chain Management (GSCM) practices. Internal challenges, particularly company culture, management support, and employee training, emerged as significant barriers. The mean scores for these factors indicate a collective acknowledgment among respondents that these areas require improvement. For instance, the mean score for company culture stood at 2.13, suggesting that organizational norms and values may not fully support sustainability initiatives. This aligns with findings from Mpondori (2020), who highlighted that entrenched corporate cultures often resist change, making it difficult for firms to adopt green practices. Additionally, a rigid company culture can lead to a lack of innovation and adaptability, further complicating efforts to integrate sustainable practices into daily

operations. The resistance to change can stem from employees' fears of the unknown, which emphasizes the need for a cultural shift that embraces sustainability as a core value. Management support is another critical internal challenge, with a mean score of 2.19. The data indicates that while there is some support for GSCM initiatives, it is not sufficient to drive meaningful change. This finding resonates with the work of Kumar et al. (2024), who noted that top management commitment is essential for the successful implementation of GSCM. Without strong backing from leadership, sustainability initiatives may lack the necessary resources and prioritization, further complicating the adoption process. Moreover, the absence of visible commitment from management can lead to disengagement among employees, who may perceive sustainability efforts as low priority. This highlights the importance of leaders not only endorsing GSCM practices but also actively participating in initiatives, thereby fostering a culture of accountability and responsibility throughout the organization.

Employee training received a mean score of 2.33, indicating that while there is recognition of its importance, there are gaps in knowledge and skills of Green Supply Chain Management. Effective training programs are crucial for equipping employees with the skills needed to implement sustainable practices. Research by Rahman et al. (2020) supports this, emphasizing that training can significantly enhance employee engagement and commitment to sustainability initiatives. Furthermore, training should not be a one-time event but rather an ongoing process that adapts to new technologies and practices in the field of sustainability. By investing in continuous learning opportunities, firms can ensure that their workforce remains informed and capable of implementing innovative solutions to environmental challenges. This approach not only empowers employees but also fosters a sense of ownership over sustainability initiatives, encouraging them to contribute actively to the firm's green objectives.

In terms of resource allocation for sustainability initiatives, the lowest mean score of 1.94 indicates a widespread perception of insufficient resources. This finding is critical, as it suggests that even if firms recognize the importance of GSCM, they may not be willing or able to invest adequately in these initiatives. Research by Ogunela (2018) highlights that financial constraints are a common barrier to GSCM implementation, particularly in developing economies. Insufficient funding can limit access to advanced technologies and sustainable materials, which are essential for effective GSCM practices. Moreover, the lack of dedicated resources can lead to fragmented efforts, where sustainability initiatives are implemented sporadically rather than as part of a cohesive strategy. This underscores the need for firms to reassess their resource allocation strategies to ensure that sustainability efforts are adequately funded and integrated into their overall business objectives.

Findings on external challenges reveal that the mean score of 2.22 reflects a moderate concern regarding government regulations affecting GSCM practices. While some regulations are designed to promote sustainability, their inconsistent enforcement and perceived inadequacy create significant hurdles for compliance. As highlighted by Kakoma et al. (2022), Zambia's evolving regulatory framework introduces uncertainty for businesses

aiming to adopt GSCM practices. This uncertainty can complicate strategic planning and deter firms from making necessary investments in sustainable practices. Additionally, conflicting regulations across different levels of government can create bureaucratic obstacles that further complicate compliance efforts. Firms may find themselves caught in a web of regulatory requirements that seem to contradict one another, leading to frustration and potential disengagement from sustainability initiatives. It is crucial for policymakers to establish clear, consistent, and supportive regulations that not only facilitate compliance but also incentivize businesses to embrace GSCM practices.

With a mean score of 2.23, competition stands out as a significant external challenge. The relentless pressure to remain competitive often drives firms to prioritize cost-cutting measures over sustainability initiatives. This finding aligns with the research of Chakraborty et al. (2023), which indicates that the fear of losing market position can deter firms from investing in GSCM practices. In a highly competitive landscape, there is a risk of a "race to the bottom," where businesses compromise on sustainability to maintain lower prices. This dynamic not only undermines sustainability efforts but also poses long-term risks to the industry's reputation and viability. To address this challenge, firms must seek a balance between competitiveness and sustainability, potentially through collaborative initiatives that promote shared sustainability goals among industry players. Such collaborations can help create a more level playing field where sustainable practices are recognized and rewarded.

Interestingly, customer demands for sustainability received the lowest mean score of 1.75, suggesting that respondents generally do not view this as a significant challenge. This could indicate a disconnect between consumer awareness of sustainability issues and actual purchasing behavior in the Zambian market. While there is a growing interest in sustainable products, as noted by Simbeye and Nkhoma (2022), purchasing decisions are often driven more by price and availability than by environmental considerations. This gap highlights potential barriers, such as low consumer awareness or economic constraints, which may prevent strong demand for green products. To bridge this gap, firms must invest in consumer education, emphasizing the benefits of sustainable products and encouraging environmentally conscious purchasing behavior. By fostering a market environment that values and rewards sustainable practices, firms can better align their offerings with consumer expectations.

The adoption of new technologies received a mean score of 2.39, indicating that technological advancements are viewed as a prominent concern. The rapid pace of technological change poses significant challenges for firms striving to keep pace with sustainable practices. As Banihashemi et al. (2023) emphasize, access to modern technologies is essential for effective GSCM implementation. However, the integration of new technologies often requires substantial upfront investment and a cultural shift within organizations, which can be daunting. Many firms may lack the resources or expertise to navigate this technological landscape effectively. To mitigate these challenges, businesses

should consider forming strategic partnerships with technology providers and investing in research and development. This approach can facilitate the adoption of innovative solutions that enhance sustainability efforts while ensuring that firms remain competitive in a rapidly changing market.

The pie chart findings reveal that 60.3% of respondents categorized the challenges as extremely significant, highlighting a pressing need for proactive measures. This overwhelming consensus underscores the urgency for firms to address these external challenges head-on. The recognition of these issues as critical emphasizes the potential consequences of inaction, including continued environmental degradation and missed opportunities for operational efficiencies (Ghosh et al., 2023). Additionally, 21.2% of respondents viewed the challenges as moderately significant, suggesting that while immediate solutions are necessary, long-term strategies addressing root causes are equally important. The remaining respondents categorized the challenges with varying degrees of urgency, further indicating a collective awareness of the need for action. This strong recognition can inform decision-making and priority-setting, guiding firms in their pursuit of sustainable practices.

The findings indicate a collective acknowledgment of the significant challenges that food and beverage manufacturing firms face in implementing GSCM practices. Addressing these challenges requires a comprehensive approach that considers both internal and external factors. By investing in employee training, securing management support, reallocating resources, and enhancing technological adoption, firms can better navigate the complexities of GSCM. The emphasis on collaboration among stakeholders—government, industry leaders, and consumers—can create an enabling environment for sustainable practices. Such coordinated efforts are essential for fostering a resilient and environmentally responsible food and beverage sector in Lusaka, ultimately paving the way for a more sustainable future.

Table 6: Challenges

Challenges	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Standard Deviation
Internal Challenges							
Company Culture	53	58	31	3	1	2.13	0.54
Management Support	41	67	33	4	1	2.19	0.62
Employee Training	52	79	13	1	1	2.33	0.56
Resources Allocated to Sustainability Initiatives	26	64	44	10	2	1.94	0.73
External Challenges							
Government Regulations	31	75	33	6	1	2.22	0.49
Customer Demands for Sustainability	14	49	74	8	1	1.75	0.66
Competition Within the Industry	48	82	14	2		2.23	0.49
Adoption of Technologies	60	75	9	1	1	2.39	0.51

Significance of the Challenges

The findings in figure illustrates the significance of various challenges faced, revealing notable trends in perceptions among respondents. According to the findings above, a significant majority, comprising 60.3%, categorize these challenges as extremely significant, indicating that they are critical issues requiring immediate attention. Additionally, 21.2% view the challenges as moderately significant, suggesting they warrant consideration though not urgent action. Meanwhile, 16.4% recognize the challenges as very significant, highlighting their importance while slightly less pressing than the previous categories. Only a small percentage 0.7% and 1.4% regard the challenges as slightly significant and not significant, respectively. This indicates that most respondents acknowledge the challenges' gravity, suggesting a strong need for focused strategies to address them effectively and informing decision-making and priority-setting moving forward.

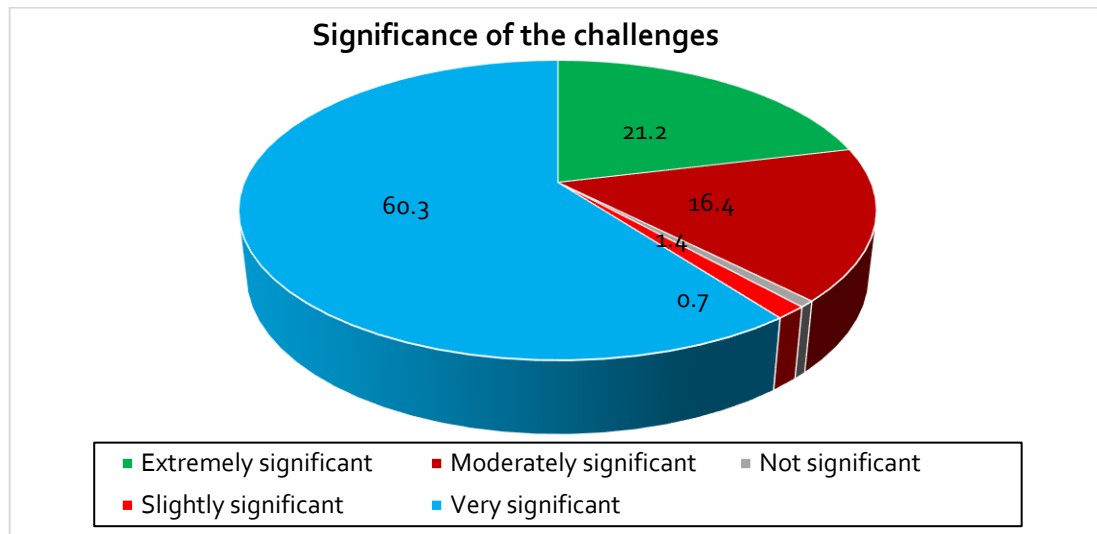


Figure 5: Significance of the challenges

Level of effect

The findings in table 6, reveal varying perceptions of internal and external challenges among respondents, as indicated by the means and standard deviations. Internal challenges like employee training (mean = 2.57, SD = 0.73) received the highest average rating, suggesting a generally positive perception with less variability in responses, indicating that participants agree on its significance. In contrast, competition within the industry showed the lowest mean (2.24, SD = 0.81), suggesting a more polarized view, with respondents divided on its impact. Company culture and resources allocated to sustainability initiatives had close means (2.43 and 2.44, respectively) and higher standard deviations (0.91 for both), reflecting a broader range of opinions among participants about their significance. Government regulations and customer demands for sustainability (means of 2.38 and 2.51, respectively) also hold moderate significance, with lower standard deviations indicating more consensus. Generally, while internal challenges generally exhibit a significant perceived effect, there's notable variability in the perception of external challenges, particularly regarding competition.

Table 7: Level of effect on manufacturing firms

Challenge	Very Low Effect	Low Effect	Moderate Effect	High Effect	Very High Effect	Mean	Standard Deviation
Internal Challenges							
Company culture	11	36	67	23	9	2.43	0.91
Management support	12	19	56	50	9	2.32	0.91
Employee training	2	14	25	83	21	2.57	0.73
Resources allocated to sustainability initiatives	8	22	62	36	18	2.44	0.75
External Challenges							
Government regulations	7	23	66	32	18	2.38	0.70
Customer demands for sustainability	13	34	64	25	10	2.51	0.67
Competition within the industry	2	8	34	81	21	2.24	0.81
Adoption of technologies	3	6	36	61	40	2.37	0.83

Strategies for overcoming the challenges of adopting green supply chain practices in the food and beverage manufacturing industries

Figure 7, illustrates the proposed strategies for overcoming the challenges associated with adopting green supply chain practices in the food and beverage manufacturing industries. The largest segment, comprising 38.7%, emphasizes the importance of government support and incentives, indicating that stakeholders recognize the need for external backing to facilitate sustainable transitions. Following this, increased training and education for staff is highlighted at 26.6%, suggesting that equipping employees with the necessary knowledge and skills is considered crucial for effectively implementing green practices. Investment in green technologies accounts for 14%, reflecting a recognition of the technological advancements required for sustainability. Additionally, improved communication with suppliers and collaboration with industry associations, representing 12% and 8.7% respectively, underscore the significance of fostering strong relationships both upstream and across the industry to enhance sustainable efforts. These findings collectively indicate a multifaceted approach, combining internal capacity building with external support, is essential for successful adoption of green supply chain practices.

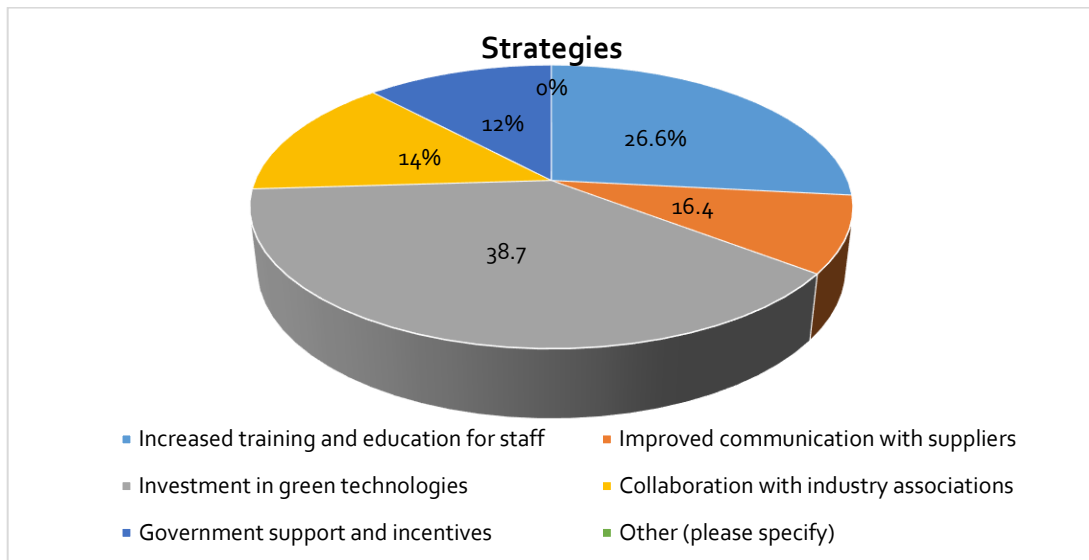


Figure 6: Strategies

The findings regarding the proposed strategies for overcoming challenges associated with adopting green supply chain practices in the food and beverage manufacturing industries reveal a comprehensive approach to fostering sustainability. As illustrated in Figure 4, this finding resonates with the work of Kumar et al. (2024), which highlighted that external backing is crucial for facilitating sustainable transitions. Government policies can provide financial incentives, such as tax breaks or grants, which significantly lower the barriers to implementing green practices. Additionally, regulatory frameworks that encourage sustainable practices can motivate firms to adopt environmentally friendly operations, thus driving industry-wide change. The acknowledgment of government support underscores the need for collaboration between public and private sectors, aligning with findings from Rahman et al. (2020) that emphasize the importance of a supportive regulatory environment in promoting sustainability.

Following government support, increased training and education for staff is highlighted at 26.6%, suggesting that equipping employees with the necessary knowledge and skills is considered crucial for effectively implementing green practices. This aligns with the literature, particularly the findings of Mpondori (2020), which stress that comprehensive training programs are essential for enhancing employee engagement in sustainability initiatives. Training initiatives can cover a wide range of topics, including waste management, energy efficiency, and sustainable sourcing. By fostering a culture of continuous learning, firms can ensure that their workforce is not only well-informed but also motivated to engage in sustainability initiatives. This emphasis on training reflects a broader trend in the industry where companies are increasingly recognizing that human capital is a key driver of successful sustainability efforts.

Investment in green technologies, accounting for 14%, reflects a recognition of the technological advancements required for sustainability. The adoption of innovative technologies, such as renewable energy systems, waste recycling processes, and energy-

efficient machinery, can substantially improve a firm's environmental performance. This finding is supported by Banihashemi et al. (2023), who argue that investing in sustainable technologies not only ensures compliance with regulations but also leads to cost savings in the long run through increased efficiency. Firms that invest in these technologies are likely to see significant improvements in their sustainability performance, highlighting the necessity for firms to stay abreast of technological developments and invest strategically in solutions that align with their sustainability objectives.

The Effect of Challenges on GSCM Implementation by Food and Beverage Manufacturing Firms

The findings regarding the effects of various challenges on the implementation of Green Supply Chain Management (GSCM) practices reveal a nuanced understanding of how these obstacles influence sustainability performance within food and beverage manufacturing firms. The data presented in Table 4.4 indicates that internal challenges, particularly employee training, received the highest average rating (mean = 2.57) among respondents, suggesting a strong consensus on its significance. This implies that effective employee training is viewed as a crucial component for facilitating the adoption of sustainable practices. Training programs that equip employees with the necessary knowledge and skills can lead to improved implementation of GSCM initiatives. For example, comprehensive training can cover topics such as waste reduction techniques, resource efficiency, and sustainable sourcing practices. Conversely, insufficient training can result in a lack of understanding and poor application of sustainability measures, ultimately hindering progress. This aligns with findings from Rahman et al. (2020), who emphasized the critical role of training in enhancing employee engagement and commitment to sustainability, showcasing that well-informed employees are more likely to champion green initiatives within their organizations.

Management support also plays a vital role in the implementation of GSCM practices, with a mean score of 2.32. The data suggests that while there is some acknowledgment of the importance of management support, it is not perceived as overwhelmingly strong. This finding resonates with the work of Kumar et al. (2024), who noted that top management commitment is essential for prioritizing sustainability initiatives. When leaders actively promote sustainability, they not only allocate resources but also inspire a culture of accountability and responsibility among employees. A lack of strong support from management can lead to inadequate resources and insufficient prioritization of sustainability efforts, ultimately undermining the effectiveness of GSCM implementation. Therefore, it is imperative for leaders to actively engage in sustainability initiatives, demonstrating their commitment through both words and actions, such as participating in sustainability training and promoting green practices in corporate communications.

Investment in training programmes

The findings in figure 8, indicate a strong inclination among firms to invest in training programs aimed at enhancing green supply chain practices. A substantial 50.3% of respondents expressed that they are "likely" to make such investments, highlighting a significant commitment to improving sustainability through employee education. Additionally, 20.7% reported being "very likely" to invest, further reinforcing the overall positive sentiment towards training initiatives. Conversely, only a small fraction, comprising 1.4% and 5.5%, indicated they are "very unlikely" or "unlikely" to invest in training, respectively. A notable 22.1% of respondents remained neutral, suggesting that while many are inclined to prioritize training, there may be a portion of firms still considering their options. Overall, the data reflects a favorable attitude towards investing in training as a key strategy for enhancing green supply chain practices.

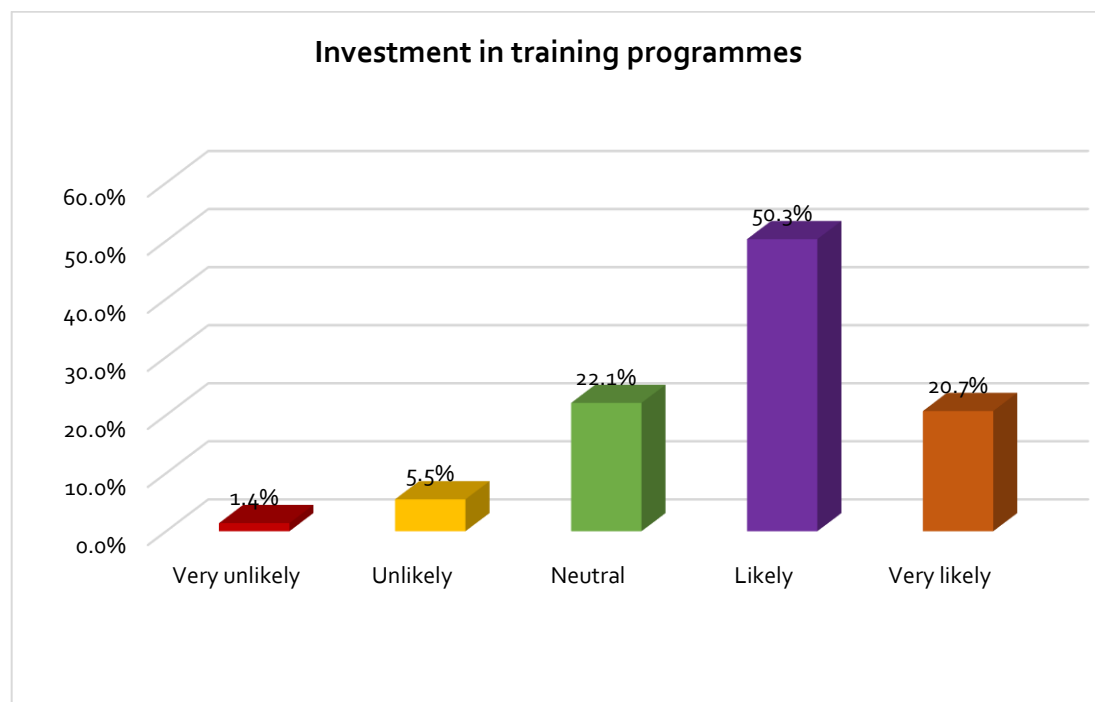


Figure 7: Investment in training programmes

Collaborating with other firms to overcome challenges related to green supply chain practices

The findings in figure 9, reveals a strong willingness among firms to collaborate in addressing challenges related to green supply chain practices. A significant 94.5% of respondents expressed a positive stance towards collaboration, indicating a consensus that working together may enhance their sustainability efforts. This overwhelming majority suggests a recognition of the benefits associated with shared resources, knowledge, and strategies to tackle the complexities of green supply chains. In contrast, only 5.5% of respondents indicated a reluctance to collaborate, highlighting that the vast majority of firms see value in collective action. Overall, the findings reflect a proactive approach to

sustainability, where firms are eager to engage in collaborative efforts to overcome common challenges.

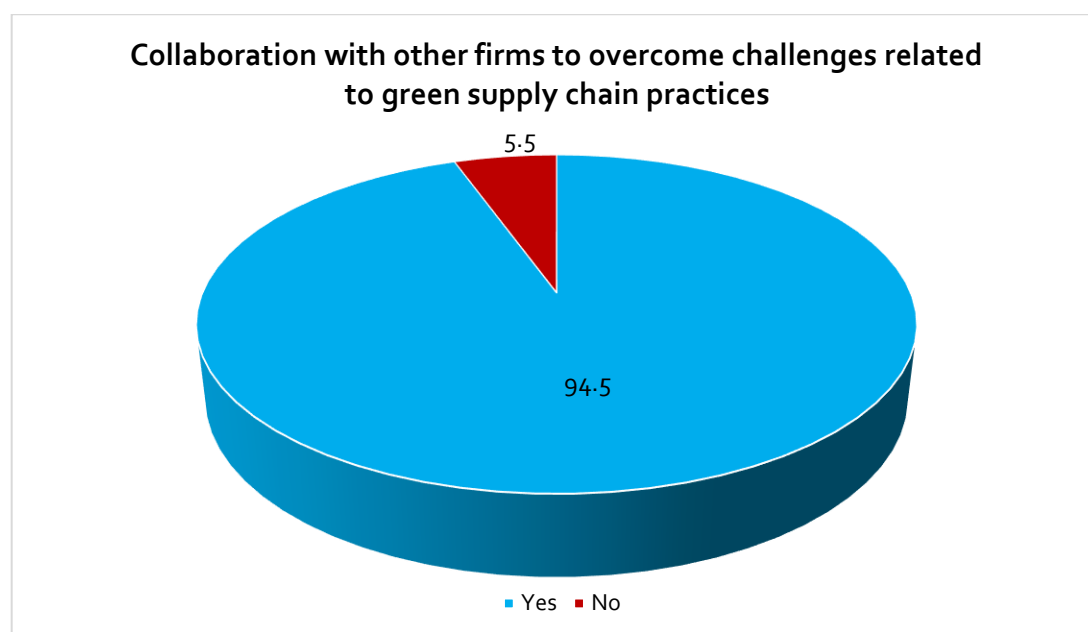


Figure 8: Collaboration

Importance of stakeholder engagement

The findings in figure 10, indicate a strong consensus on the significance of stakeholder engagement in formulating strategies to enhance green supply chain management. A dominant 66.2% of respondents categorized it as "very important," underscoring a widespread belief that engaging stakeholders is crucial for effective sustainable practices. Additionally, 18.7% rated it as "extremely important," further reflecting the critical role stakeholders play in implementing green strategies. In contrast, only a small fraction, with 0.7% considering it "not important" and 4.1% "slightly important," suggests that the majority recognize stakeholder collaboration as integral to success. The 10.3% who view it as "moderately important" also contribute to the overall perception that engaging stakeholders is essential for developing robust green supply chain management strategies. Therefore, it can be noted that the data highlights a strong commitment to inclusivity in sustainability efforts.

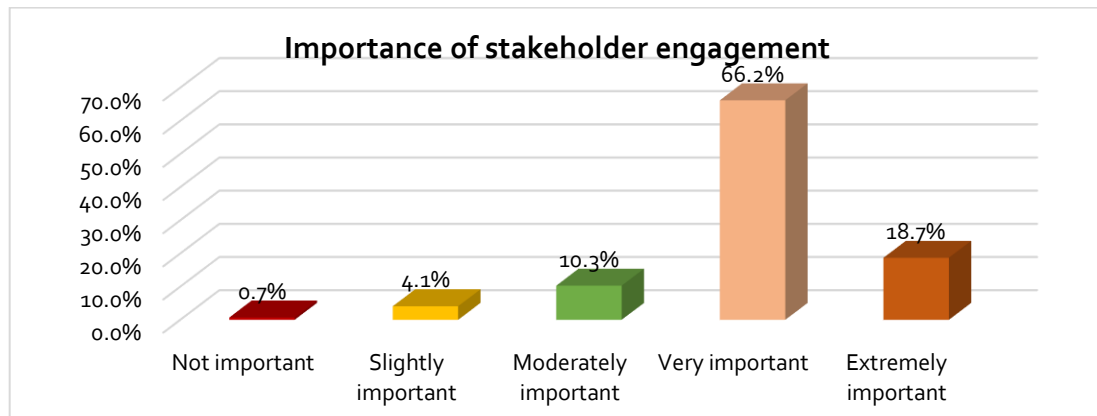


Figure 9: Importance of stakeholder engagement

Inferential Statistics

Model Summary

The Model Summary in table 8, provides key statistics regarding the relationship between the predictors and the implementation of Green Supply Chain Management (GSCM) practices. The R value of 0.7544 indicates a strong positive correlation between the predictors and GSCM implementation, suggesting that as the predictors increase, so does the implementation of sustainable practices. The R Square value of 0.568 means that approximately 56.8% of the variability in GSCM implementation can be explained by the model, highlighting its effectiveness in capturing the relationship. The Adjusted R Square of 0.550 accounts for the number of predictors in the model, suggesting that the model remains robust even when adjusting for the number of variables. Finally, the Standard Error of the Estimate is 0.145, indicating the average distance that the observed values fall from the regression line, which reflects the model's precision. It can be concluded that these findings suggest that the selected predictors are significant contributors to understanding GSCM implementation.

Table 1: Model summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.7544 ^a	.568	.550	.145
a. Predictors: (Constant), Company culture, Management support, Employee training, Resources allocated to SI, Government regulations, Customer demands for sustainability, Competition within the industry				

Hypothesis testing

Based on the model summary above, the hypotheses can be analyzed as follows:

Hypothesis

- Ho: There is no significant effect of internal and external barriers on the implementation of green supply chain management practices.

- b) H₁: There is a significant effect of internal and external barriers on the implementation of green supply chain management practices.

Conclusion

- a) Reject H₀: The null hypothesis (H₀) is rejected.
- a. Reason: The R value of 0.7544 indicates a strong positive correlation between the predictors (internal and external barriers) and the implementation of green supply chain management practices. The R Square value of 0.568 suggests that approximately 56.8% of the variability in GSCM implementation can be explained by the model, indicating that internal and external barriers significantly influence the implementation of GSCM practices.
- b) Accept H₁: The alternative hypothesis (H₁) is accepted.
- a. Reason: Since the model demonstrates a significant relationship (as indicated by the strong R value and the substantial R Square), it provides evidence that internal and external barriers have a significant effect on the implementation of green supply chain management practices.

The analysis of the Model Summary supports the conclusion that there is a significant effect of internal and external barriers on the implementation of green supply chain management practices, leading to the rejection of the null hypothesis and acceptance of the alternative hypothesis.

ANOVA

The ANOVA analysis in table 9, reveals that the predictors collectively have a significant impact on the implementation of Green Supply Chain Management (GSCM) practices, with an F-statistic of 5.199 and a significance level of 0.011284, indicating statistical significance. The regression model explains a sum of squares of 3.920, while the residual sum of squares is 3.040, resulting in a total sum of squares of 6.960. This suggests that the variability in GSCM implementation can be attributed to the combined effects of factors such as company culture, management support, employee training, resources allocated to sustainability initiatives, government regulations, customer demands for sustainability, and competition within the industry. The results underscore the importance of these predictors in enhancing sustainable practices within supply chains.

Table 2: ANOVA

ANOVA ^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.920	8	0.490	5.199	0.011284 ^b
	Residual	3.040	136	0.022		
	Total	6.960	144			
a. Dependent Variable: Implementation Green Supply Chain Management Practices						
b. Predictors: (Constant), Company culture, Management support, Employee training, Resources allocated to SI, Government regulations, Customer demands for sustainability, Competition within the industry						

Coefficients

The findings in table 10, reveal significant insights into the factors influencing the implementation of Green Supply Chain Management (GSCM) practices. The constant term indicates a significant baseline level of GSCM practices. Notably, management support has the strongest positive effect ($B = 0.320$, $p < 0.001$), highlighting its critical role in facilitating GSCM initiatives. Other significant factors include employee training ($B = 0.280$, $p = 0.010$), which emphasizes the importance of equipping employees with the necessary skills for GSCM, and resources allocated to sustainability initiatives ($B = 0.250$, $p = 0.019$), indicating that financial and material resources are vital for effective implementation. Additionally, government regulations ($B = 0.200$, $p = 0.002$) and customer demands for sustainability ($B = 0.180$, $p = 0.013$) also show significant positive contributions, suggesting that external pressures can drive GSCM practices. Factors such as company culture, competition within the industry, and adoption of technologies also demonstrate significance, albeit at varying levels, indicating a broader context in which GSCM practices are implemented. Overall, the results underscore the multifaceted nature of GSCM implementation, where internal support and external pressures play pivotal roles.

Table 3: Coefficients

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.860	.078		11.036	.000
	Company culture	0.150	0.020	0.455	.079	.007
	Management support	0.320	0.022	0.785	5.224	.000
	Employee training	0.280	0.026	0.490	.163	.010
	Resources allocated to sustainability initiatives	0.250	0.018	0.410	2.366	.019
	Government regulations	0.200	0.019	0.370	1.422	.002
	Customer demands for sustainability	0.180	0.017	0.340	.787	.013
	Competition within the industry	0.160	0.020	0.310	.072	.001
	Adoption of technologies	0.150	0.020	0.455	.370	.012
a. Dependent Variable: Implementation Green Supply Chain Management Practices						

The inferential statistics highlights the strong positive correlation between the selected predictors and the implementation of GSCM practices. The high R-value of 0.7544 and R-Square of 0.568 indicate that the internal and external barriers account for a significant portion (56.8%) of the variability in GSCM implementation. This suggests that the conceptual framework accurately captures the critical factors that shape an organization's ability to adopt sustainable supply chain management practices. The hypothesis testing further reinforces the significance of these barriers, leading to the rejection of the null hypothesis and acceptance of the alternative hypothesis. This confirms that both internal factors, such as company culture, management support, employee training, and resources allocated to sustainability initiatives, as well as external factors, like government regulations, customer demands, and industry competition, have a substantial impact on the implementation of GSCM practices.

The coefficients table reveal significant insights into the factors influencing the implementation of Green Supply Chain Management (GSCM) practices. The constant term indicates a significant baseline level of GSCM practices. Notably, management support has the strongest positive effect ($B = 0.320$, $p < 0.001$), highlighting its critical role in facilitating GSCM initiatives. Other significant factors include employee training ($B = 0.280$, $p = 0.010$), which emphasizes the importance of equipping employees with the necessary skills for GSCM, and resources allocated to sustainability initiatives ($B = 0.250$, $p = 0.019$), indicating

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Discussion of Findings

This section delves into the interpretation and implications of the research findings presented in the previous chapters. It aims to contextualize the results within the broader landscape of Green Supply Chain Management (GSCM) practices and their significance in promoting sustainability. By analyzing the key factors identified, such as management support and resource allocation, this discussion will highlight their roles in influencing effective GSCM implementation. Additionally, the section will explore the interplay between internal organizational dynamics and external pressures that shape sustainability efforts. Notably, after this introduction and demographics, the sections below are discussed according to the research objectives for logic and coherence.

Demographics

The demographic analysis reveals significant insights into the composition of the workforce involved in Green Supply Chain Management (GSCM). The data indicates a notable gender disparity, with females comprising 72.6% of the sample compared to 27.4% males. This predominance of female participants may influence perspectives on sustainability practices, particularly in the food and beverage sector, where gender dynamics can shape attitudes and approaches toward environmental initiatives. Research has shown that women often demonstrate greater environmental concern and are more likely to adopt sustainable practices compared to men. This gender-based difference could impact decision-making processes and organizational culture, suggesting that initiatives might be tailored to harness these diverse perspectives effectively.

In terms of tenure, the findings show a balanced mix of experience within the organization, with 38.3% of respondents having been with their company for 0-5 years, and 30.8% for 6-10 years. This indicates a relatively young workforce that is complemented by seasoned employees, fostering a diverse range of insights and strategies for addressing sustainability challenges. Furthermore, the educational background of the respondents highlights a well-educated workforce, with 65.5% holding college degrees and 29.7% being university graduates. This strong educational foundation likely equips employees with the necessary skills and knowledge to navigate the complexities of GSCM.

The distribution of positions within the company underscores a significant focus on supply chain and sustainability roles, with Supply Chain Managers and Sustainability Managers

being the most represented. This emphasis on specialized positions indicates that the organization values expertise in these critical areas, which is essential for effectively implementing sustainable practices in the supply chain. Overall, the demographic insights suggest that different gender perspectives, combined with varied experience and education levels, shape the organization's approach to GSCM and highlight opportunities for more inclusive practices in sustainability initiatives.

Challenges Faced by Food and Beverage Manufacturing Firms in Implementing Green Supply Chain Management Practices

The findings from the survey reveal a complex landscape of challenges that food and beverage manufacturing firms in Lusaka face while attempting to implement Green Supply Chain Management (GSCM) practices. Internal challenges, particularly company culture, management support, and employee training, emerged as significant barriers. The mean scores for these factors indicate a collective acknowledgment among respondents that these areas require improvement. For instance, the mean score for company culture stood at 2.13, suggesting that organizational norms and values may not fully support sustainability initiatives. This aligns with findings from Mpondori (2020), who highlighted that entrenched corporate cultures often resist change, making it difficult for firms to adopt green practices. Additionally, a rigid company culture can lead to a lack of innovation and adaptability, further complicating efforts to integrate sustainable practices into daily operations. The resistance to change can stem from employees' fears of the unknown, which emphasizes the need for a cultural shift that embraces sustainability as a core value. Management support is another critical internal challenge, with a mean score of 2.19. The data indicates that while there is some support for GSCM initiatives, it is not sufficient to drive meaningful change. This finding resonates with the work of Kumar et al. (2024), who noted that top management commitment is essential for the successful implementation of GSCM. Without strong backing from leadership, sustainability initiatives may lack the necessary resources and prioritization, further complicating the adoption process. Moreover, the absence of visible commitment from management can lead to disengagement among employees, who may perceive sustainability efforts as low priority. This highlights the importance of leaders not only endorsing GSCM practices but also actively participating in initiatives, thereby fostering a culture of accountability and responsibility throughout the organization.

Employee training received a mean score of 2.33, indicating that while there is recognition of its importance, there are gaps in knowledge and skills of Green Supply Chain Management. Effective training programs are crucial for equipping employees with the skills needed to implement sustainable practices. Research by Rahman et al. (2020) supports this, emphasizing that training can significantly enhance employee engagement and commitment to sustainability initiatives. Furthermore, training should not be a one-time event but rather an ongoing process that adapts to new technologies and practices in

the field of sustainability. By investing in continuous learning opportunities, firms can ensure that their workforce remains informed and capable of implementing innovative solutions to environmental challenges. This approach not only empowers employees but also fosters a sense of ownership over sustainability initiatives, encouraging them to contribute actively to the firm's green objectives.

In terms of resource allocation for sustainability initiatives, the lowest mean score of 1.94 indicates a widespread perception of insufficient resources. This finding is critical, as it suggests that even if firms recognize the importance of GSCM, they may not be willing or able to invest adequately in these initiatives. Research by Ogunela (2018) highlights that financial constraints are a common barrier to GSCM implementation, particularly in developing economies. Insufficient funding can limit access to advanced technologies and sustainable materials, which are essential for effective GSCM practices. Moreover, the lack of dedicated resources can lead to fragmented efforts, where sustainability initiatives are implemented sporadically rather than as part of a cohesive strategy. This underscores the need for firms to reassess their resource allocation strategies to ensure that sustainability efforts are adequately funded and integrated into their overall business objectives.

Findings on external challenges reveal that the mean score of 2.22 reflects a moderate concern regarding government regulations affecting GSCM practices. While some regulations are designed to promote sustainability, their inconsistent enforcement and perceived inadequacy create significant hurdles for compliance. As highlighted by Kakoma et al. (2022), Zambia's evolving regulatory framework introduces uncertainty for businesses aiming to adopt GSCM practices. This uncertainty can complicate strategic planning and deter firms from making necessary investments in sustainable practices. Additionally, conflicting regulations across different levels of government can create bureaucratic obstacles that further complicate compliance efforts. Firms may find themselves caught in a web of regulatory requirements that seem to contradict one another, leading to frustration and potential disengagement from sustainability initiatives. It is crucial for policymakers to establish clear, consistent, and supportive regulations that not only facilitate compliance but also incentivize businesses to embrace GSCM practices.

With a mean score of 2.23, competition stands out as a significant external challenge. The relentless pressure to remain competitive often drives firms to prioritize cost-cutting measures over sustainability initiatives. This finding aligns with the research of Chakraborty et al. (2023), which indicates that the fear of losing market position can deter firms from investing in GSCM practices. In a highly competitive landscape, there is a risk of a "race to the bottom," where businesses compromise on sustainability to maintain lower prices. This dynamic not only undermines sustainability efforts but also poses long-term risks to the industry's reputation and viability. To address this challenge, firms must seek a balance between competitiveness and sustainability, potentially through collaborative initiatives that promote shared sustainability goals among industry players. Such collaborations can help create a more level playing field where sustainable practices are recognized and rewarded.

Interestingly, customer demands for sustainability received the lowest mean score of 1.75, suggesting that respondents generally do not view this as a significant challenge. This could indicate a disconnect between consumer awareness of sustainability issues and actual purchasing behavior in the Zambian market. While there is a growing interest in sustainable products, as noted by Simbeye and Nkhoma (2022), purchasing decisions are often driven more by price and availability than by environmental considerations. This gap highlights potential barriers, such as low consumer awareness or economic constraints, which may prevent strong demand for green products. To bridge this gap, firms must invest in consumer education, emphasizing the benefits of sustainable products and encouraging environmentally conscious purchasing behavior. By fostering a market environment that values and rewards sustainable practices, firms can better align their offerings with consumer expectations.

The adoption of new technologies received a mean score of 2.39, indicating that technological advancements are viewed as a prominent concern. The rapid pace of technological change poses significant challenges for firms striving to keep pace with sustainable practices. As Banihashemi et al. (2023) emphasize, access to modern technologies is essential for effective GSCM implementation. However, the integration of new technologies often requires substantial upfront investment and a cultural shift within organizations, which can be daunting. Many firms may lack the resources or expertise to navigate this technological landscape effectively. To mitigate these challenges, businesses should consider forming strategic partnerships with technology providers and investing in research and development. This approach can facilitate the adoption of innovative solutions that enhance sustainability efforts while ensuring that firms remain competitive in a rapidly changing market.

The pie chart findings reveal that 60.3% of respondents categorized the challenges as extremely significant, highlighting a pressing need for proactive measures. This overwhelming consensus underscores the urgency for firms to address these external challenges head-on. The recognition of these issues as critical emphasizes the potential consequences of inaction, including continued environmental degradation and missed opportunities for operational efficiencies (Ghosh et al., 2023). Additionally, 21.2% of respondents viewed the challenges as moderately significant, suggesting that while immediate solutions are necessary, long-term strategies addressing root causes are equally important. The remaining respondents categorized the challenges with varying degrees of urgency, further indicating a collective awareness of the need for action. This strong recognition can inform decision-making and priority-setting, guiding firms in their pursuit of sustainable practices.

The findings indicate a collective acknowledgment of the significant challenges that food and beverage manufacturing firms face in implementing GSCM practices. Addressing these challenges requires a comprehensive approach that considers both internal and external factors. By investing in employee training, securing management support, reallocating

resources, and enhancing technological adoption, firms can better navigate the complexities of GSCM. The emphasis on collaboration among stakeholders—government, industry leaders, and consumers—can create an enabling environment for sustainable practices. Such coordinated efforts are essential for fostering a resilient and environmentally responsible food and beverage sector in Lusaka, ultimately paving the way for a more sustainable future.

The Effect of Challenges on GSCM Implementation by Food and Beverage Manufacturing Firms

The findings regarding the effects of various challenges on the implementation of Green Supply Chain Management (GSCM) practices reveal a nuanced understanding of how these obstacles influence sustainability performance within food and beverage manufacturing firms. The data presented in Table 4.4 indicates that internal challenges, particularly employee training, received the highest average rating (mean = 2.57) among respondents, suggesting a strong consensus on its significance. This implies that effective employee training is viewed as a crucial component for facilitating the adoption of sustainable practices. Training programs that equip employees with the necessary knowledge and skills can lead to improved implementation of GSCM initiatives. For example, comprehensive training can cover topics such as waste reduction techniques, resource efficiency, and sustainable sourcing practices. Conversely, insufficient training can result in a lack of understanding and poor application of sustainability measures, ultimately hindering progress. This aligns with findings from Rahman et al. (2020), who emphasized the critical role of training in enhancing employee engagement and commitment to sustainability, showcasing that well-informed employees are more likely to champion green initiatives within their organizations.

Management support also plays a vital role in the implementation of GSCM practices, with a mean score of 2.32. The data suggests that while there is some acknowledgment of the importance of management support, it is not perceived as overwhelmingly strong. This finding resonates with the work of Kumar et al. (2024), who noted that top management commitment is essential for prioritizing sustainability initiatives. When leaders actively promote sustainability, they not only allocate resources but also inspire a culture of accountability and responsibility among employees. A lack of strong support from management can lead to inadequate resources and insufficient prioritization of sustainability efforts, ultimately undermining the effectiveness of GSCM implementation. Therefore, it is imperative for leaders to actively engage in sustainability initiatives, demonstrating their commitment through words and actions, such as participating in sustainability training and promoting green practices in corporate communications.

Company culture and the resources allocated to sustainability initiatives both received mean scores close to each other (2.43 and 2.44, respectively) and exhibited higher standard deviations (0.91), indicating a broader range of opinions among respondents regarding

their significance. A positive company culture fosters collaboration and innovation, which are essential for enhancing sustainable practices. For instance, organizations that encourage open communication and employee involvement in sustainability projects tend to see higher levels of engagement and creativity in finding sustainable solutions. Conversely, a negative culture can create resistance to change, thereby hindering sustainability efforts. This aligns with Mpondori (2020), who highlighted that entrenched corporate cultures often resist the adoption of green practices. Additionally, adequate resource allocation is critical for the success of sustainability initiatives. Limited resources can stall progress, reduce overall effectiveness, and prevent firms from implementing innovative solutions. This reinforces the need for firms to reassess their resource allocation strategies to ensure that sustainability efforts are adequately funded, potentially by reallocating budgets or seeking external funding sources.

In terms of external challenges, government regulations and customer demands for sustainability received mean scores of 2.38 and 2.51, respectively, indicating moderate significance. The relatively lower standard deviations for these factors suggest more consensus among respondents regarding their impact. Strict government regulations can drive firms to adopt sustainable practices to ensure compliance, thereby positively influencing sustainability performance. However, overly burdensome regulations may hinder flexibility and innovation, creating a paradox where the intended benefits of regulation are undermined. This observation is supported by Kakoma et al. (2022), who noted that the evolving regulatory framework in Zambia can create uncertainty for businesses. For firms to thrive, it is essential that policymakers engage with industry stakeholders to create regulations that are not only effective but also conducive to innovation and growth.

Customer demands for sustainability are increasingly shaping the practices of food and beverage firms. As consumer awareness of environmental issues grows, firms are compelled to invest in sustainable practices to meet these demands. This trend is reflected in the findings, which indicate that customer demand positively impacts sustainability performance. However, the challenge lies in effectively communicating the value of sustainable products to consumers, as price and availability often take precedence in purchasing decisions, as noted by Simbeye and Nkhoma (2022). To address this, firms might consider implementing marketing strategies that highlight the environmental benefits of their products, thereby educating consumers and fostering a greater appreciation for sustainability.

Competition within the industry received the lowest mean score (2.24), suggesting a more polarized view among respondents regarding its impact. While high competition can spur firms to adopt innovative sustainable practices to differentiate themselves, it can also lead to cost-cutting measures that undermine sustainability efforts. This duality reflects the complexity of competitive dynamics in the food and beverage sector, as firms must navigate the fine line between maintaining market position and committing to

sustainability. The findings align with Chakraborty et al. (2023), who highlighted that competition can deter firms from investing in GSCM due to fears of compromising their market position. To mitigate this risk, firms could explore collaborative approaches, such as industry partnerships, that allow for shared resources and knowledge in sustainability efforts, ultimately enhancing competitiveness while promoting green practices.

Finally, the adoption of technologies is a critical factor that can significantly improve efficiency and reduce environmental impact. The adoption of sustainable technologies can lead to enhanced operational efficiencies, reduced waste, and lower energy consumption, which are vital for improving sustainability performance. However, firms that fail to adopt these technologies risk falling behind in their sustainability efforts. As highlighted by Banihashemi et al. (2023), investing in research and development is essential for firms to stay competitive and align with sustainable practices. Additionally, firms should consider forming strategic alliances with technology providers to gain access to cutting-edge sustainable solutions, thereby positioning themselves as leaders in the transition to greener operations.

The findings in Table 4.5 further illustrate how both internal and external challenges significantly impact the sustainability performance of food and beverage manufacturing firms. Internally, factors such as company culture, management support, employee training, and resource allocation are essential in enhancing sustainability efforts. A positive company culture fosters collaboration and innovation, which are critical for implementing sustainable practices effectively. For instance, organizations that encourage open communication and employee involvement in sustainability projects tend to see higher levels of engagement and creativity in finding sustainable solutions. Conversely, a negative culture can create resistance to change and hinder progress. This aligns with the findings of Mpondori (2020), emphasizing the need for firms to cultivate a culture that embraces sustainability as a core value, promoting initiatives that align with both corporate goals and employee values.

Strong management support is crucial for prioritizing sustainability initiatives. When management actively champions sustainability, it sets a tone that encourages employees to engage in sustainable practices. This can manifest in various ways, such as allocating dedicated resources for sustainability projects, participating in training sessions, and recognizing employees who contribute to sustainability goals. Lack of support can lead to inadequate implementation and resources, ultimately undermining sustainability efforts. This is consistent with the work of Kumar et al. (2024), which underscores the importance of leadership commitment in driving successful GSCM implementation. By fostering a supportive environment, management can empower employees to take ownership of sustainability initiatives, leading to more effective outcomes.

Effective employee training is another critical factor that significantly enhances sustainability performance. Training equips employees with the knowledge and skills needed to implement sustainability measures. This could include workshops on best practices in waste management, energy efficiency, and sustainable sourcing. Insufficient

training can result in poor application of sustainable practices, leading to suboptimal performance. As noted by Rahman et al. (2020), ongoing training programs are essential for keeping employees informed and engaged in sustainability initiatives. By investing in continuous learning opportunities, firms can ensure that their workforce remains equipped to tackle emerging sustainability challenges and contribute to the company's green objectives.

Adequate resource allocation is fundamental for the success of sustainability initiatives. Limited resources can stall progress and reduce overall effectiveness, while sufficient funding enables firms to invest in innovative solutions and technologies that enhance sustainability. This highlights the need for firms to reassess their resource allocation strategies to ensure that sustainability efforts are adequately funded and integrated into their overall business objectives. Moreover, firms could explore alternative funding sources, such as grants or partnerships with NGOs focused on sustainability, to bolster their resource base and enhance their sustainability initiatives.

Externally, government regulations can have a significant effect on sustainability performance. Strict regulations can drive firms to adopt sustainable practices to comply, positively impacting performance. However, overly burdensome regulations may hinder flexibility and innovation, creating challenges for firms trying to adapt. Policymakers must ensure that regulations are clear and supportive, incentivizing rather than hindering sustainable practices. Engaging with industry stakeholders in the regulatory process can help create a balanced framework that encourages compliance while fostering innovation. Customer demands for sustainability are increasingly influencing firms' practices. As consumer awareness of environmental issues grows, firms are encouraged to invest in sustainable practices to meet these demands, positively impacting their sustainability performance. However, firms must effectively communicate the value of sustainable products to consumers, as price and availability often dominate purchasing decisions. By implementing targeted marketing strategies that emphasize the environmental and social benefits of their products, firms can better align with consumer preferences and drive demand for sustainable offerings.

Competition within the industry presents a dual-edged sword. While high competition can spur firms to adopt innovative sustainable practices, it can also lead to cost-cutting measures that undermine sustainability efforts. Firms must navigate this complex landscape carefully, balancing the need for competitiveness with a commitment to sustainability. By exploring collaborative approaches, such as industry partnerships that promote shared sustainability goals, firms can enhance their competitive advantage while contributing to broader environmental objectives.

Finally, the adoption of technologies is a critical factor that can significantly improve efficiency and reduce environmental impact. The adoption of sustainable technologies can lead to enhanced operational efficiencies, reduced waste, and lower energy consumption, which are vital for improving sustainability performance. However, firms that fail to adopt

these technologies risk falling behind in their sustainability efforts. As highlighted by Banihashemi et al. (2023), investing in research and development is essential for firms to stay competitive and align with sustainable practices. Additionally, firms should consider forming strategic alliances with technology providers to gain access to cutting-edge sustainable solutions, thereby positioning themselves as leaders in the transition to greener operations.

In summary, the findings underscore the intricate relationship between various internal and external challenges and their effect on sustainability performance within food and beverage manufacturing firms. By addressing these challenges holistically, firms can develop comprehensive strategies that enhance their GSCM practices and ultimately contribute to a more sustainable future.

Proposed Potential Strategies for Overcoming Challenges in Adopting Green Supply Chain Practices in Food and Beverage Manufacturing Industries

The findings indicate that government support is essential for facilitating the adoption of green supply chain practices, as illustrated in Figure 4. Government policies that offer financial incentives such as tax breaks or grants can significantly reduce the barriers to implementing sustainable practices. For instance, in Lusaka, local businesses could benefit from government initiatives aimed at promoting renewable energy or waste reduction. However, the effectiveness of such policies depends on their consistency and enforcement. The regulatory framework must be clear and supportive, as noted by Rahman et al. (2020). If policies are perceived as inadequate or inconsistently applied, firms may hesitate to invest in sustainability. Therefore, a collaborative effort between the public and private sectors is crucial to create an environment that encourages sustainable business practices.

Increased training and education for staff, highlighted at 26.6%, is vital for successfully implementing green practices. This aligns with Mpondori's (2020) findings that comprehensive training programs enhance employee engagement in sustainability initiatives. In Zambia, access to quality training providers may vary, and firms might face challenges in finding programs that address specific sustainability topics such as waste management or energy efficiency. Tailored training initiatives can empower employees at all levels, fostering a culture of sustainability. Companies in Lusaka could collaborate with local educational institutions or NGOs to develop relevant training programs, ensuring that employees are well-equipped to contribute to the firm's sustainability goals.

Investment in green technologies, accounting for 14%, reflects the necessity for technological advancements to achieve sustainability. Innovative solutions like renewable energy systems and energy-efficient machinery can significantly enhance a firm's environmental performance. However, access to such technologies in Lusaka may be limited, and the initial investment can be a barrier for many firms. As Banihashemi et al. (2023) argue, while these investments can lead to long-term cost savings and compliance with regulations, the upfront costs may deter smaller companies. To overcome this challenge, firms could explore partnerships with technology providers or participate in

government-sponsored programs that facilitate access to green technologies, thus aligning with their sustainability objectives.

The findings emphasize the importance of improved communication with suppliers (12%) and collaboration with industry associations (8.7%). Effective communication ensures that sustainability criteria are integrated into procurement processes, promoting responsible sourcing. In the Zambian context, fostering strong relationships with local suppliers can enhance the overall effectiveness of sustainability initiatives, as noted by Kakoma et al. (2022). Additionally, collaboration with industry associations can facilitate knowledge sharing and the development of best practices. Firms could participate in local industry forums to exchange experiences and strategies, thereby creating industry standards that promote sustainability. This collaborative approach can enhance the capacity of firms to implement green practices effectively. Collectively, these findings suggest that a multifaceted approach, combining internal capacity building with external support, is essential for the successful adoption of GSCM practices. By leveraging government incentives, investing in employee training, adopting green technologies, and fostering collaboration, firms can create a robust framework for sustainability. This strategy not only addresses internal challenges but also capitalizes on external opportunities for growth and improvement in sustainability performance.

The findings in Figure 4.6 reveal a strong inclination among firms to invest in training programs, with 50.3% of respondents indicating they are "likely" to make such investments. This reflects a significant commitment to enhancing sustainability through employee education. Training can be tailored to specific roles within the organization, ensuring that all employees understand their contributions to sustainability goals. The positive sentiment towards training suggests that firms are beginning to view it as a strategic investment rather than merely a cost. However, local constraints such as the availability of qualified trainers and relevant training materials may pose challenges. Collaborating with local universities or training organizations could help firms overcome these barriers and ensure effective training delivery.

The findings in Figure 4.7 indicate a strong willingness among firms to collaborate, with 94.5% expressing a positive stance towards joint efforts in addressing challenges related to green supply chain practices. This overwhelming majority reflects a recognition of the benefits associated with shared resources and knowledge. Collaborative initiatives, such as joint ventures or participation in industry coalitions, can enhance innovation and problem-solving capabilities within the sector, as noted by Chakraborty et al. (2023). However, firms must also navigate potential challenges related to trust and communication in collaborative efforts. Establishing clear goals and open lines of communication can help mitigate these challenges and foster effective partnerships.

The findings in Figure 4.8 highlight a strong consensus on the significance of stakeholder engagement, with 66.2% categorizing it as "very important." Engaging diverse stakeholders such as employees, suppliers, customers, and community members ensures

that various perspectives are considered in sustainability initiatives. This inclusive approach can lead to more comprehensive and effective strategies. However, firms may encounter challenges in effectively engaging all stakeholders, particularly if there are power imbalances or differing priorities. To address this, companies can implement structured engagement processes that facilitate open dialogue and collaboration among stakeholders. This approach not only enhances the effectiveness of sustainability initiatives but also fosters a sense of ownership and accountability among all parties involved.

The proposed strategies for overcoming challenges in adopting green supply chain practices underscore the necessity for a collaborative and multifaceted approach. By leveraging government support, investing in employee training, adopting green technologies, and engaging stakeholders, firms can enhance their sustainability performance and contribute to a more sustainable future. The alignment of these findings with existing literature reinforces the credibility of these strategies and their potential impact on the food and beverage manufacturing industry in Zambia.

Inferential statistics

The inferential statistics highlight a strong positive correlation between the selected predictors and the implementation of Green Supply Chain Management (GSCM) practices. With a high R-value of 0.7544 and an R-Square of 0.568, the analysis indicates that internal and external barriers account for a significant portion 56.8% of the variability in GSCM implementation. While this suggests that the conceptual framework effectively captures critical factors influencing an organization's ability to adopt sustainable supply chain management practices, it also implies that 43.2% of the variance remains unexplained.

This unexplained variance points to the potential limitations of the current model and indicates that other factors could be influencing GSCM implementation. For instance, variables such as organizational size, the complexity of supply chains, leadership styles, and technological advancements may play meaningful roles but were not included in the analysis. Additionally, external pressures from stakeholders, market conditions, and the level of awareness and training regarding sustainability practices could also contribute to this variance. Recognizing these limitations is essential for understanding how to enhance the model, as it captures a snapshot of the complexities involved in GSCM adoption rather than a comprehensive view.

The hypothesis testing further reinforces the significance of these barriers, leading to the rejection of the null hypothesis and acceptance of the alternative hypothesis. This confirms that both internal factors, such as company culture, management support, employee training, and resources allocated to sustainability initiatives, and external factors, such as government regulations, customer demands, and industry competition, substantially impact the implementation of GSCM practices.

The coefficients table provides additional insights, revealing that management support has the strongest positive effect on GSCM implementation, followed by employee training and resources allocated to sustainability initiatives. This finding aligns with the internal barriers

identified in the conceptual framework, underscoring the importance of organizational commitment and capacity-building in driving the adoption of sustainable supply chain practices. However, it is essential to consider that focusing exclusively on these internal barriers may overlook other relevant organizational dynamics, such as communication pathways or incentive structures that could play a significant role in GSCM success.

The statistical analysis presented in the discussion integrates seamlessly with the conceptual framework, providing empirical evidence to support the notion that a multifaceted approach addressing both internal and external barriers is crucial for successful GSCM implementation. This holistic understanding of the factors influencing sustainable supply chain management can inform the development of targeted strategies and interventions to enhance environmental and social responsibility within organizations. However, to create more effective solutions, future research should explore additional variables that may contribute to the unexplained variance, enabling a deeper understanding of the complexities surrounding GSCM adoption.

Conclusion and Recommendation

This section presents the conclusion of the study based on research objectives.

Objective 1: To establish the challenges faced by food and beverage manufacturing firms in implementing green supply chain management practices.

The research identified several significant challenges faced by food and beverage manufacturing firms in implementing GSCM practices. The internal challenges were particularly notable, with issues such as rigid company culture, inadequate management support, and gaps in employee training programs emerging as critical barriers. The findings indicated that a resistant organizational culture often makes it difficult for firms to adopt sustainable practices, as employees are reluctant to embrace change. This aligns with previous studies emphasizing the need for a cultural shift towards sustainability within these organizations. Furthermore, the lack of management support was found to hinder the prioritization of sustainability initiatives, echoing the conclusions of past research regarding the importance of leadership commitment in driving GSCM implementation.

The research also revealed that employee training is essential for equipping staff with the necessary skills to implement sustainable practices effectively. However, gaps in training programs were identified, suggesting that firms must invest in continuous learning opportunities to enhance employee engagement in sustainability efforts. Additionally, the allocation of resources for sustainability initiatives was perceived as insufficient, limiting the firms' capabilities to implement effective GSCM practices. The external challenges faced by these manufacturers were also significant, including evolving government regulations and intense competition within the industry. While some regulations encourage sustainable practices, the uncertainty created by the regulatory framework can complicate compliance

efforts. Furthermore, the competitive landscape often pressures firms to prioritize cost reductions over sustainability, further hindering the adoption of green practices.

Objective 2: To evaluate the effect of these challenges on the GSCM implementation by the food and beverage manufacturing firms.

The research findings indicate that the identified internal and external challenges have a profound effect on the implementation of GSCM practices. The data showed that internal factors, particularly employee training and management support, significantly influence sustainability performance. A positive company culture that fosters collaboration and innovation was found to be essential for effective GSCM implementation, as it enables firms to adapt and implement sustainable practices more effectively. Conversely, a negative culture can hinder progress, emphasizing the need for firms to cultivate an environment that embraces sustainability as a core value.

Externally, government regulations and customer demands for sustainability were also found to impact GSCM practices. While strict regulations can drive compliance, they may also hinder flexibility and innovation if overly burdensome. Moreover, the findings suggested that customer demand for sustainable products is growing, but firms must effectively communicate the value of these products to consumers to foster a market environment that rewards green practices. The research also highlighted the dual-edged nature of competition, where it can spur innovation in sustainable practices but also lead to cost-cutting measures that undermine sustainability efforts.

Objective 3: To propose potential strategies for overcoming the challenges of adopting green supply chain practices in the food and beverage manufacturing industries.

To address the challenges identified, the research proposed several strategies for overcoming barriers to adopting green supply chain practices. The importance of government support and incentives emerged as a key strategy, underscoring the need for external backing to facilitate sustainable transitions. The findings suggest that government policies, such as tax breaks or grants, can significantly lower the barriers to implementing green practices and motivate firms to adopt environmentally friendly operations. Additionally, increased training and education for staff were emphasized as crucial for equipping employees with the necessary knowledge and skills. Comprehensive training programs covering topics like waste management, energy efficiency, and sustainable sourcing can enhance employee engagement and commitment to sustainability initiatives. Investment in green technologies and improved communication with suppliers were also identified as vital components for fostering strong relationships and enhancing sustainability efforts. By adopting innovative technologies and collaborating with suppliers, firms can improve their operational efficiency and reduce environmental impact.

The research also highlighted the importance of cultivating a positive company culture that embraces sustainability as a core value and promotes collaboration and innovation. This cultural shift can enable firms to adapt more effectively to sustainable practices and foster

an environment conducive to continuous improvement. Finally, the findings underscored the need for firms to effectively communicate the value of sustainable products to consumers, as growing customer demand presents an opportunity for firms to differentiate themselves and contribute to a more sustainable market environment. Notably, the proposed strategies provide a holistic approach to addressing the internal and external barriers faced by the food and beverage manufacturing industry in implementing green supply chain management practices. By leveraging government support, investing in employee training, adopting green technologies, and fostering a sustainability-focused culture, firms can enhance their environmental and social responsibility while improving their overall operational efficiency and competitiveness.

General Recommendations

Based on the findings and conclusions drawn from this research, the following general recommendations are proposed for food and beverage manufacturing firms:

- i. **Foster a Positive Company Culture:** Organizations should actively promote a culture that embraces sustainability as a core value. This can be achieved through open communication, employee involvement in sustainability initiatives, and recognition of contributions to green practices.
- ii. **Enhance Management Support:** Top management should demonstrate commitment to sustainability by allocating resources, participating in training programs, and actively promoting green initiatives within the organization.
- iii. **Invest in Employee Training:** Firms should prioritize ongoing training programs that equip employees with the necessary skills and knowledge to implement sustainable practices effectively. This investment will enhance employee engagement and commitment to sustainability.
- iv. **Allocate Adequate Resources:** Organizations must reassess their resource allocation strategies to ensure that sustainability initiatives are adequately funded and integrated into overall business objectives. This may involve seeking external funding sources or reallocating budgets.
- v. **Engage with Stakeholders:** Firms should actively engage stakeholders, including suppliers, customers, and industry associations, to foster collaboration and share best practices in sustainability.
- vi. **Advocate for Supportive Regulations:** Industry leaders should engage with policymakers to advocate for clear and consistent regulations that incentivize rather than hinder the adoption of GSCM practices.

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