Assessment of the Drivers and Barriers to Adoption of Green Supply Chain Management Practices: A case of the Beverage Manufacturing Industry

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DOI: https://dx.doi.org/10.47772/IJRISS.2024.814MG0034

Received: 07 November 2024; Revised: 26 November 2024; Accepted: 29 November 2024; Published: 28 December 2024

ABSTRACT

Growing environmental concerns have prompted the global manufacturing sector to adopt sustainable practices, with Green Supply Chain Management (GSCM) emerging as a vital strategy. This study focuses on the Zambian beverage manufacturing industry, which faces unique challenges and opportunities in implementing GSCM practices due to its reliance on natural resources and environmental footprint. The research employed a qualitative exploratory design, targeting nine beverage manufacturing firms in Zambia. Data was collected through semi-structured interviews with supply chain managers and analyzed thematically using NVivo 12 software. The analysis identified internal and external drivers and barriers influencing the adoption of GSCM practices. The findings of the study revealed a multideimentional array of drivers and barriers influencing the adoption of GSCM practices in Zambia's beverage manufacturing sector. These drivers and barriers were either internal or external. Key internal drivers included financial availability, leadership, organizational policies, and employee passion for the environment. External drivers encompassed global calls to reduce greenhouse gas emissions and environmental pollution. Internal barriers included insufficient financial capacity, waste management challenges, and lack of employee involvement and external barriers included supplier integration issues and commodity price fluctuations. Based on the findings of the study, it was concluded that there is a complex interplay of motivations and obstacles impacting GSCM adoption in the Zambian beverage manufacturing industry. Enhencing the drivers and addressing these barriers through strategic interventions can enhance the industry's shift toward sustainable supply chain practices, offering insights for policymakers and stakeholders in developing nations to promote environmental sustainability.

Keywords: Beverage manufacturing industry, Barriers, Drivers, GSCM practices, Sustainability

INTRODUCTION

Background

Due to growing concerns about how industrial activities are affecting the environment, sustainability has become an important matter in the world of manufacturing (Rajala et al., 2016). As a result, many sectors are realizing that their supply chains need to incorporate ecologically responsible processes. Among these techniques, GSCM has come to be recognized as a key strategy for minimizing environmental impact and attaining sustainable development objectives (Sharma et al., 2017). GSCM entails the incorporating of environmental considerations into the supply chain, and covers product design, sourcing and selection of sustainable raw materials, using sustainable manufacturing procedures, eco-distribution of the finished product to customers, and management of a product's end-of-life after its useful life (Payán-Sánchez et al., 2021).

Like other manufacturing industries, due to their large environmental impact and reliance on natural resources, beverage manufacturers face particular problems and opportunities when adopting GSCM (Onyinkwa & Ochiri, 2016). The beverage industry includes such beverages as carbonated beverages, juices, bottled water, and alcoholic drinks, all of which have an impact on the environment by contributing to waste production, greenhouse gas emissions, and water depletion (Rodriguez-Sanchez & Sellers-Rubio, 2021). Stakeholders from the beverage sector, legislators, and researchers can work together to provide customized solutions, remove obstacles, and advance the shift to more sustainable beverage production by identifying the elements that support or hinder the implementation of GSCM (Jianguo & Solangi, 2023).

Despite the growing importance and demand of GSCM practices, adopting these practices has been a challenge especially among developing countries (Chatzoudes & Chatzoglou, 2022). Being a developing country in sub Saharan Africa, the Zambian beverage manufacturing industry may also face challenges which may lead to reduced adoption of GSCM practices (Mtonga, 2019). In this regard, the objective of this study was to thoroughly analyse the factors, particularly, the drivers and the barriers that influence the adoption of GSCM in the beverage manufacturing sectors in Zambia. This study will also provide useful guidance for other firms looking to adopt GSCM practices in the manufacturing sector, besides providing valuable insights to decision-makers for policy development, and strategic planning.

Significance of the study

This study is crucial as it focuses on the urgent need for sustainable practices within Zambia's beverage manufacturing sector, which faces significant environmental challenges due to its dependence on natural resources and considerable ecological impact. By examining the factors that drive or hinder the adoption of Green Supply Chain Management (GSCM) practices, the research provides valuable insights for manufacturers, policymakers, and researchers to encourage sustainable practices. The findings will help identify practical strategies to address barriers and capitalize on opportunities, promoting a shift toward environmentally conscious supply chain operations. Additionally, the study contributes to the global conversation on sustainability in developing nations by shedding light on the specific challenges and prospects within this context. It serves as a guide for similar industries aiming to adopt GSCM practices, while also aiding in policy development, fostering stakeholder collaboration, and advancing sustainable development objectives.

Structure of the paper

Following the background, the literature review examined existing studies on Green Supply Chain Management (GSCM), identifying the relevant studies related to the adoption of sustainable practices. The methodology section outlines the research design, population and sampling methods, data collection techniques, and data analysis approach used to explore GSCM adoption in the Zambian beverage manufacturing sector. The results section presents the findings of the study, supported by thematic analysis and participant insights. The discussion interprets these findings in relation to existing literature, identifies practical implications, and provides recommendations for overcoming barriers and enhancing GSCM adoption. Finally, the conclusion summarizes the key findings, discusses their significance, and outlines directions for future research and policy development.

LITERATURE REVIEW

Through review of literature, we dug into an examination of the key factors influencing the adoption of GSCM practices based on other studies. By synthesizing existing literature, this study gained insights into the multifaceted factors that propel and impede the integration of GSCM practices in this specific context, ultimately contributing to the broader discourse on sustainable supply chain management.

In a study conducted in South Egypt, on the most important drivers and barriers that affect the implementation of GSCM practices in the field of solar energy production, it was concluded that normative

drivers such as stakeholder pressure are the most powerful drivers of GSCM practice, while external barriers such as a lack of government regulations and support, poor supplier commitment, and customer unawareness are the most dominant barriers to GSCM practice implementation. According to the report, normative factors are the most important drivers of GSCM practice, followed by a lack of government regulation and assistance (Yassin et al., 2021).

Similar research was done in South Africa to identify the major drivers of and hurdles to the implementation of GSCM in the cement industry. High capital expenditures, poor supplier commitment, high certification costs, poor marketing positioning, and a lack of knowledge were identified as impediments to the integration of green supply chain management in the cement industry. As a result, the study revealed that the drivers and obstacles to GSCM differ by sector and nation, with financial performance and market competitive advantages being the most important in South Africa (Nteta & Mushonga, 2021).

This study that highlights barriers to GSCM adoption, revealing a predominant use of reactive supply chain design in surveyed businesses across Russia, Kazakhstan, and Azerbaijan. This reactive approach impedes resilient supply chain development. The findings underscore the need for transformative practices to shift from reactive to cooperative supply chain management models, enabling resilience amid uncertainty. Barriers include the inertia of reactive design and the absence of resilient practices (Xu et al., 2022)

A study done in India identified "lack of managerial vision" and "cultural disparities among supply chain partners" as the primary impediments to GSCM technology adoption. Whereas 'collaboration issues' and 'hesitation and workforce obsolescence' were observed as the most influential barriers (Bag et al., 2020). Another study that was conducted to identify the drivers of GSCM identified consumer awareness, government legislation and society demand for green building materials as drivers to the implementation of GSCM. Other drivers were, supplier and distributor pressure with CEOs' environmental knowledge acting as a moderator (J. Zhu & Xu, 2019)

In the article of Masoumik and Abdul-Rashid structural equation modeling was used to define and evaluate relationships and the mediating influence using survey data from 139 certified Malaysian enterprises. The research analyzed the adoption of green practices in supply chains in the context of the industry, considering the moderating influence of institutional pressure and supply chain flexibility. It was found that internal strategic objectives and external forces promote the adoption of green supply chain management strategies. Companies' green initiatives moderate the interaction between internal and external elements, as do green supply chain management methods (Masoumik & Abdul-Rashid, 2021).

A study done in Poland identified drivers and barriers to adopting Green Supply Chain Management (GSCM) practices among small and medium-sized enterprises (SMEs) in Poland. Findings reveal that SMEs in the Transport Forwarding Logistics (TFL) sector naturally gravitate towards 'green logistics' due to their industry focus. Moreover, a direct relationship with supply chain leaders facilitates the implementation of environmental goals (Zowada, 2021)

Another study conducted in India on the impact of environmental drivers on green supply chain practices in manufacturing companies was analyzed through structural equation modeling technique to identify the significant environmental drivers and the direct and indirect effects of the environmental drivers. The study found that regulatory pressure, customer pressure, socio-cultural pressure, and competitor pressure were the key drivers that encourage environmental practices in manufacturing plants (Narayanan & Thirunavukkarasu, 2020).

Pham et al, stated that the global supply chain's growth brings economic benefits but raises environmental concerns due to emissions. Solutions like blockchain integration, renewable energy, and closed-loop supply chains promise greener logistics, yet comprehensive studies are lacking. Key drivers for Green Supply Chain Management (GSCM) adoption include environmental awareness, technological advances, regulatory support, and potential cost savings. However, barriers such as policy challenges, inadequate awareness, and

perceived risks impede progress. Policy inconsistencies, insufficient incentives, and regulatory gaps create uncertainties, while limited understanding among stakeholders poses challenges. Addressing these barriers requires policy alignment, increased awareness, and risk mitigation strategies. By leveraging drivers such as environmental consciousness, technology, and regulations, organizations can advance towards sustainable supply chain operations, aligning with decarbonization strategies and net-zero goals (Pham et al., 2023).

METHODOLOGY

Study design

This study used an exploratory study design to meet the objective(s) of the study. The approach used was qualitative in nature which allowed the researcher(s) to explore the drivers and barriers to GSCM adoption in-depth.

Targeted population

The study's target population consisted of beverage manufacturing businesses registered with the Zambia Association of Manufacturers (ZAM). These companies were spread out in 2 provinces of Zambia, Copperbelt and Lusaka province.

Sampling methods and sample size

Purposive sampling was used to select participants who were experts or managers within the firms in the beverage manufacturing industry. The sampling frame given by ZAM consisted of 37 beverage manufacturing businesses, from which a sample of nine (9) firms were purposively chosen accounting for about 25% of the total number of firms registered with ZAM. Based on literature for sampling from small populations, this sampling method was appropriate for this study (Mwanza, 2018). Therefore, each firm was represented by a supply chain manager as respondent for each firm.

Data collection

To meet the objective(s) of this study, data was collected using one to one guided interview with nine supply chain managers and experts in the industry from the targeted companies. The interviews were guided and structured, and they lasted an average of 32 minutes. The topics that were looked at included sociodemographic characteristics, understanding of GSCM, drivers and barriers to the adoption of the GSCM practices. This was done to provide useful insights into the drivers and barriers associated with adoption of green supply chain management. Their thoughts and experiences helped to comprehend the research issue and improve the study's practical relevance and applicability.

Data analysis

Thematic analysis was used to get insights into the drivers and barriers to green supply chain management adoption in beverage manufacturing firms. Data familiarization was established through listening and transcribing of the recorded conversations. The transcribed data was read and re-read to ensure verbatim. Secondly, initial codes were generated, and emerging themes were searched and defined from the transcribed data. To do this, the following thematic areas were considered; demographic characteristics managers and specialists who were representing the specific beverage production companies, the drivers, and barriers of the adoption of GSCM practices which were classified as internal and external factors. Furthermore, the identified themes were organized and analyzed using NVivo 12 software which is a qualitative data analysis software that allowed the researchers to facilitate thematic analysis.

Reliability and validity

To ensure the reliability and validity of the study, rigorous measures were undertaken throughout the research process. Reliability was achieved by maintaining consistency in the data collection process, where a

structured interview guide was employed across all participants to standardize the questions and ensure uniformity. The interviews were conducted by the same researcher(s) to minimize variation in how questions were asked and responses recorded. Additionally, the data was transcribed verbatim, reviewed multiple times for accuracy, and cross-checked to ensure completeness and consistency.

For validity, the study employed strategies to ensure both content and construct validity. The interview guide was designed based on a thorough review of existing literature on Green Supply Chain Management (GSCM) to ensure it covered all relevant themes and concepts. Expert feedback was sought from professionals in the field to refine the guide and verify its relevance to the study objectives. Triangulation was used by comparing interview findings with insights from the literature to confirm the alignment of results with established knowledge. Furthermore, the use of NVivo 12 software for thematic analysis ensured a systematic and transparent approach to identifying themes, reducing researcher bias and increasing the credibility of the findings.

Ethical Considerations

Ethical principles were meticulously adhered to throughout the study to ensure the integrity and fairness of the research process. Prior to data collection, informed consent was obtained from all participants. They were provided with detailed information about the purpose of the study, the nature of their participation, and their right to withdraw at any time without penalty. Confidentiality and anonymity of the participants and their organizations were strictly maintained to protect their identity and sensitive information. Data collected during the study was securely stored and accessible only to authorized members of the research team to prevent unauthorized access or breaches of confidentiality. Additionally, ethical approval was obtained from the appropriate institutional review board (IRB) or ethics committee, ensuring the study met all ethical guidelines and regulatory requirements. Care was taken to avoid any form of coercion or undue influence on participants, and they were encouraged to share their views freely without fear of judgment or reprisal.

RESULTS

Characteristics of the respondents

Table 1 shows the characteristics of the respondents. A total of 9 respondents were engaged and all were male. Most of the respondents were in the age group 50 to 55 (55.56%) followed by those in the age group 45 to 50 (33.33%) then those in the age group 55 years and above (11.11%). With regards to experience, most of the respondents worked for 5 years and more (77.78%) in the beverage manufacturing industry while the minority had worked for less than 5 years (22.22%). Finally, the distribution of company sizes among the surveyed firms is as follows: one company had less than 100 employees (11.11%); two companies had between 100 and 200 employees each (22.22%); one company had between 200 and 300 employees, while another had between 300 and 400 employees. Additionally, two companies had between 400 and 500 employees, and two others had more than 500 employees. Majority of the participants were based in Lusaka province (66.67%) while the minority were from Copperbelt (33.33%)

Table 1: Characteristics of the respondents

Sex	**Count (n)**	**Percentage (%)**
Male	9	100.00%
Female	0	0.00%
Age group		
Less than 45 years	0	0.00%
45 - 50	3	33.33%
50 - 55	5	55.56%
55 years and above	1	11.11%

Experience		
Less than 5 years	2	22.22%
5 years and above	7	77.78%
Organization size		
Less than 100	1	11.11%
100 to 200	2	22.22%
200 to 300	1	11.11%
300 to 400	1	11.11%
400 to 500	2	22.22%
More than 500	2	22.22%
Province		
Copperbelt province	3	33.33%
Lusaka province	6	66.67%

This was primary data (2023)

Understanding GSCM

Based on the insights gathered from participants, a qualitative examination of their responses unveiled recurring themes related to the understanding of GSCM practices. Participants overwhelmingly highlighted the overarching objective of GSCM to diminish emissions, reduce waste, and mitigate pollution across various resources integral to the production and supply chain processes.

Sustainability emerged as a prominent theme in participants' perspectives, emphasizing the imperative to recycle resources and curtail environmental repercussions stemming from production processes and value chains. Within the realm of the production environment, respondents consistently emphasized the significance of cleanliness, hygiene, and adherence to environmental standards.

Notably, participants identified key GSCM techniques aimed at minimizing environmental impact, with a particular focus on recycling and reusing packaging materials. One respondent succinctly expressed this sentiment, affirming the pivotal role of such practices in GSCM by stating:

“Green supply chain management for me is basically ensuring that everyone involved in the production and supply process has measures in place that help with reducing emissions, reducing waste, and reducing pollution whether it’s land, water, or whatever resources we may be talking about” - Respondent 1 (General Manager, Lusaka)

These findings collectively underscore the multifaceted nature of GSCM understanding among the participants, emphasizing a commitment to environmental responsibility, sustainability, and the adoption of specific techniques to foster eco-friendly production and supply chain practices.

Drivers to the adoption of GSCM

The investigation into the adoption of GSCM practices unveiled a nuanced landscape shaped by a multitude of influences propelling organizations toward eco-friendly supply chain operations. The outcomes of the thematic qualitative analysis, shaded light on the diverse drivers behind the embrace of GSCM practices.

Through an exploration of participant responses, the drivers to the adoption of GSCM practices were classified into two distinctive categories: internal and external. In this regard, the ensuing discussion offers a comprehensive understanding of the intrinsic motivations within organizations and the external pressures shaping the adoption of GSCM.

Internal drivers

The results from the responses generated three main themes under internal drivers which include financial availability, leadership and organizational polices. Other themes included passion for the environment among employees.

Financial availability

This study found that one of the major drivers for GSCM procedures to be implemented successfully involves significant financial expenditure, which includes buying new equipment and using more expensive raw materials. This finding consistent with past studies which stipulated that implementing GSCM procedures often requires a significant financial expenditure because of the need to purchasing new equipment and using more expensive raw materials. In a study conducted in developing countries to examine the drivers for the adoption of GSCM practices emphasized the importance of collaboration and financial support in facilitating the adoption of GSCM practices (Asif et al., 2020). Another study that was conducted in Italy which extensively explored the driver, practices and performance of GSCM alluded to the role of financing in the adoption of the GSCM practices (Micheli et al., 2020).

Leadership

We also found another key driver in the adoption of the GSCM practices among the beverage manufacturing companies which was leadership. Contextually, high-level leadership had significant influence that would motivate the implementation of GSCM techniques. This finding was in line with various studies. One participant stated that:

“Yeah, decisions that affect all the countries that our parent companies are embarking on so they're doing this not only here in Zambia they're doing it in South Africa, Tanzania, Nigeria, essentially the whole region. Yeah, so this is coming from…It's part of the environmental policy that was set aside by the CEO in New York. So, part of that environmental policy includes coming up with these sustainability measures to ensure that we are doing our part and contributing to the environment in that regard”- Respondent 4 (Logistics Supervisor, Lusaka)

A study from Asia pacific, which explored the integration of leadership and human resource management in numerous contexts, suggested that leadership and human resource management may interact with each other to mediate the influence that each has on a particular outcome (Zhao et al., 2020). In another study that was conducted in India to explore the relationship between leadership, operational practices, institutional pressures and environmental performances found and suggested that leadership played a crucial part in achieving environmentally friendly practices within the supply chain (Dubey et al., 2015).

Organizational policies

The GSCM strategies are adopted in large part due to organizational policy. These regulations operate as a framework that guides and encourages companies to use environmentally friendly supply chain activities when they are in line with sustainability goals. Establishing a foundation for GSCM integration, clear and strong organizational rules may set clear expectations for resource efficiency, waste reduction, and emissions management. Additionally, by incorporating sustainability factors into decision-making processes, these policies can promote the use of environmentally friendly technology, supplier participation in green

initiatives, and adherence to strict environmental regulations. Organizational policies are essentially the primary driver behind the effective integration of GSCM techniques since they shape the business culture and goals. This finding is consistent with findings from other studies (Bai et al., 2023; Rizvi & Aziz, 2023).

Passion for the environment

The passion for the environment and preservation was highlighted as part of the internal drivers: emphasis was made on the love of the outdoors and desire to protect the environment by directors in the firms. An investigation that was undertaken in Italy supports the findings of this study. That survey noted how consumers and customers were becoming more environmentally conscious, which encouraged them to buy green products. Additionally, it discussed how the community, Non-Governmental Organizations (NGOs), and media could support or oppose a company's environmental policy. The study highlighted the fact that GSCM is seen as a crucial corporate approach to increase eco-sustainability and address environmental drivers. (Micheli et al., 2020).

External Drivers

In the category of external drivers, the primary theme that were identified was the global call which included two nodes, (1) to reduce the greenhouse gas emission and (2) to reduce environmental pollution. The other theme identified included care for the environment. These themes are elaborated as follows:

Global environmental sustainability

We also found that the use of natural water supplies and the response to greenhouse gas emissions were identified as external drivers to GSCM practice adoption. Organizations may implement GSCM strategies in response to environmental concerns and the desire to lessen the effects of climate change. One of the respondents expressed the following sentiment towards the need to reduce the greenhouse gas emissions.

First, is reaction to the greenhouse gas emissions and the like, also the adequate use of natural sources of water – Respondent 6 (Assistant Manager Production, Copperbelt)

This finding was in line with a study conducted in Pakistan that examined how green supply chain management, sustainable performance, and lean manufacturing strategies are related. It was emphasized that adopting lean manufacturing techniques, which aim to cut expenses and waste in manufacturing companies, might improve sustainability. It highlights how crucial it is for industrial firms to maintain a balance between their social, economic, and environmental performance (Awan et al., 2022). Another study that had similar findings was conducted among the developing countries which investigated how GSCM methods affect economic growth and environmental sustainability in a developing nation. The study concluded that GSCM methods affect costs, waste management, resource consumption, and greenhouse gas emissions in a statistically meaningful way (Rupa & Mohammad Saif, 2021). Furthermore, a study that was done in China highlighted the significance of GSCM techniques in boosting profitability and lowering dangers to the environment and human health. The study emphasized how environmental and sustainability issues are motivating firms to embrace GSCM strategies. Sustainable production, green innovation, environmental sustainability, and enhanced connections between suppliers and consumers are all related to the adoption of GSCM techniques (Maqsood et al., 2022).

Galvanizing global action

This study found that there was a global call for pollution reduction which influenced the adoption of the GSCM practices. The need to reduce pollution globally, highlighting societal pressure and outside pressure to take part in environmental measures and the need to adapt and meet changing global standards because of shifting market dynamics, technological improvements, and customer expectations played a major role in externally influencing manufacturing companies to adopt GSCM and maintain competitive advantage. Similar findings were highlighted in a study in Jordan which observed that the adoption and implementation of green supply chain management was encouraged by the global sustainability movement (Jum'a et al.,

2022). Another study conducted in China found that for businesses engaged in international commerce, GSCM has emerged as a crucial competitive strategy as a result of economic globalization, increasing resource scarcity, and environmental deterioration (Q. Zhu et al., 2008).

Respect for the environment

Sincere respect for the environment as well as how cost reduction through GSCM procedures coincides with guaranteeing food safety, implying a combination of internal motives and external obligations. This finding was similar to the findings in the study that involved multiple countries and regions which highlighted how important environmental and food safety issues are for human health, as well as how toxins can move from the environment to food and then to people (Jiang et al., 2021). To add more emphasis, a study on GSCM, environmental collaboration and sustainability performance stated that for businesses engaged in international commerce, GSCM has emerged as a crucial competitive strategy as a result of economic globalization, increasing resource scarcity, and environmental deterioration (Chin et al., 2015).

Barriers to the adoption of GSCM

This section examines the challenges associated with implementing GSCM methods and examines the obstacles that prevent their broad implementation in businesses. To fully address sustainability goals, it is important to comprehend the obstacles that eco-friendly supply chain methods face. This section tries to clarify the many obstacles faced in the pursuit of GSCM adoption by a thorough analysis of participant views and industry viewpoints. The conversation that follows aims to clarify the complex network of challenges that companies face when they travel the route toward sustainable supply chain management, from internal organizational limitations to external elements within the larger business environment.

Internal Barriers

Internal barriers constitute a critical dimension in understanding the challenges associated with the adoption of Green Supply Chain Management (GSCM) practices within organizations (Nusa et al., 2023). These hurdles often stem from within the organizational structure. In this regard, this study identified insufficient financial capacity, waste management, and involvement of employees as the themes of the internal barriers.

Insufficient financial capacity

Finance was the most pronounced GSCM barrier to the implementation of GSCM practices as, according to the respondents, it involves buying new equipment and using more expensive raw materials. Among financially challenged organizations, it may have an adverse effect on the firm's immediate profitability. A key informant responded that,

“Yes, it costs a lot of money. It costs a lot of money to invest. 2014-15 the company went out of its way to borrow some money from a commercial bank to reinvest in the factory that's when we bought the new machinery to do the polycarbonate regrinding and reusing.” – Respondent 1 (General Manager, Lusaka)

Similarly, studies have shown that green supply chain management strategies may have a major financial impact on firms, as it necessitates a significant financial investment (Younis et al., 2020). Another study stated similar findings that implementing GSCM might have a negative impact on the firm's immediate profitability which impede the adoption of GSCM procedures (Ahmed et al., 2019).

Poor Waste management

Wastage Management was among the internal constraints highlighted. It was submitted that it is difficult to control created waste and to locate consumers ready to pay recovered materials at market prices. Internal obstacles that must be overcome include maximizing recycling activities' return on investment and efficient

waste management. Studies have shown that internal waste management limits and optimizing return on investment in recycling efforts are significant difficulties that must be addressed (Ayilara et al., 2020). Efficient waste management is essential for waste control and locating clients ready to pay market rates for recovered goods (Zhang et al., 2019). Another inquiry showed that efficient implementation of waste management requires infrastructure, regulatory compliance, increased costs and supply collaboration which may affect the return on investment (Ferronato & Torretta, 2019). While GSCM are known for reducing costs in the long run, implementing waste management as a strategy for GSCM may have a negative impact on return on investment in the short run (Wyawahare & Udawatta, 2017).

Lack of employee Involvement

Lack of involvement among employees showed vague or constrained answers on the adoption and implementation of GSCM, which may indicate a lack of understanding or interest in the obstacles to GSCM implementation from their respective positions or viewpoints. Implementing GSCM processes may be hampered by the organization's lack of clarity or involvement. In line with the study findings, Kumar et al., (2018) stated that lack of involvement in companies can hinder the implementation of GSCM practices. In addition, internal waste management limits and optimizing return on investment in recycling efforts are significant difficulties that must be addressed. Efficient waste management is essential for waste control and locating clients ready to pay market rates for recovered goods (Dhillon & Bentley, 2020).

External Barriers

One important component of the adoption landscape for Green Supply Chain Management (GSCM) is external barriers, which include obstacles arising from reasons that are external to the firm (Balkumar et al., 2023). This section examines these external obstacles with the goal of elucidating the external factors that businesses encounter while attempting to adopt and execute GSCM programs. In this regard, this study found two major themes that formed the external barriers. These themes include integration of supplies and price fluctuations of commodities.

Lack of Buyer-Supplier Synergy

Not all suppliers have fully adopted GSCM practices. It will take more time for them to adapt their operations to sustainability principles. Supplier integration emphasizes the necessity of collaboration and coordination throughout the supply chain for the effective adoption of GSCM. Similar to the study findings, another study found that in GSCM techniques, supplier integration is seen as a major challenge and the incorporation of suppliers is critical in the adoption and execution of GSCM(Fayezi et al., 2019). Similarly, the influence of institutional forces on GSCM processes also requires an understanding of buyer reliance. While institutional factors stimulate the use of GSCM practices, an increase in buyer reliance can limit the good performance outcomes of green sourcing (Balaji et al., 2014).

Price fluctuations of commodities

One external barrier to the implementation of GSCM is market price fluctuations. Price volatility can make businesses uneasy and has an impact on adoption of sustainable practices. One of the respondents stated that,

“Changes in prices. High. It's not stable, there are so many changes every now and then.” – Respondent 1 (General Manager, Lusaka)

Therefore, in a study that was conducted in Bangladesh, it was observed that pricing fluctuations may have an impact on GSCM adoption, since firms may prioritize short-term financial advantages above long-term environmental benefits (Tumpa et al., 2019). According to another study, the cost impact of applying GSCM techniques varies since GSCM procedures have a statistically significant influence on cost (Rupa & Mohammad Saif, 2021).

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume VIII Issue XIV December 2024 | Special Issue on Management

The model shown in figure 1 depicts the drivers and barriers to the adoption of GSCM practices among firms in the beverage manufacturing industry identified based on the objective(s) of this study.

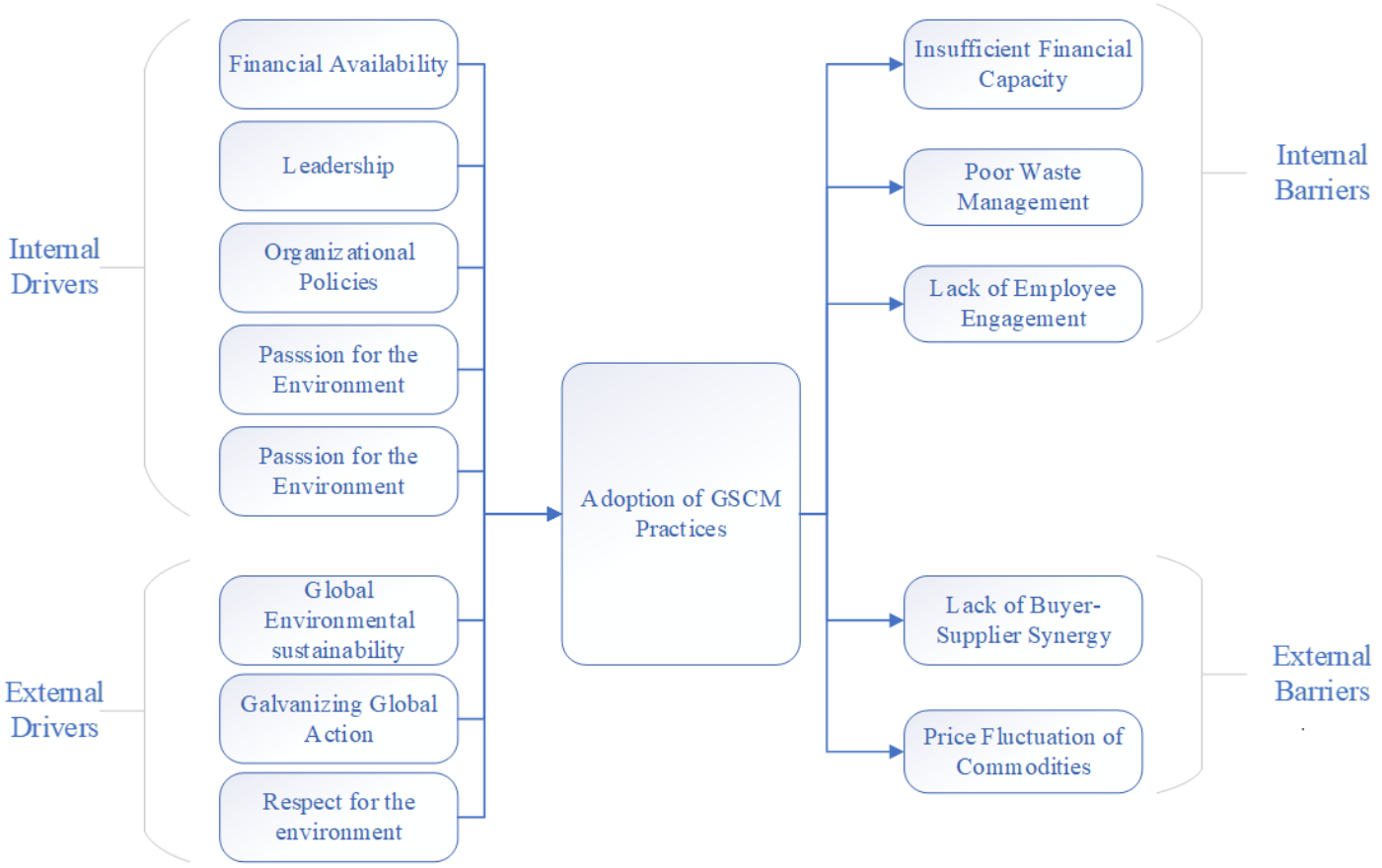

Figure 1: Model of the drivers and barriers to the adoption of GSCM practices in the beverage manufacturing industry (Adapted from (Saeed et al., 2018))

DISCUSSION

The objective of this study is to thoroughly analyse the factors, particularly, the drivers and the barriers that influence the adoption of GSCM in the beverage manufacturing sectors in Zambia. Each firm was represented by a supply chain expert who responded on behalf of the firm. The characteristics of the respondents were considered to provide an overview of the demographic information of the participants and the firm and to appreciate the diversity of the respondents which suggests a broad range of perspectives among respondents.

To ensure appropriate responses, the participants were asked about what they knew about GSCM practices, and they consistently emphasized GSCM's overarching objective to reduce emissions, waste, and pollution in various stages of the production and supply chain. Sustainability emerged as a prominent theme, with a focus on recycling resources and minimizing environmental harm. Cleanliness, hygiene, and adherence to environmental standards in the production environment were also highlighted. Additionally, participants stated crucial GSCM techniques, such as recycling and reusing packaging materials. The findings collectively underscore a multifaceted understanding of GSCM, emphasizing a commitment to environmental responsibility and the adoption of specific techniques for eco-friendly practices.

With regards to the drivers to the Adoption of GSCM, this study it found the various factors influencing organizations to embrace eco-friendly supply chain operations. The thematic qualitative analysis classified these drivers into internal and external categories. Internal drivers encompass financial availability, leadership, and organizational policies, with respondents emphasizing the need for substantial financial

investment and the influential role of high-level leadership in GSCM adoption. Organizational policies were identified as a primary driver, acting as a framework guiding companies toward environmentally friendly supply chain activities. External drivers include the global call to reduce greenhouse gas emissions and pollution, emphasizing the importance of environmental concerns and societal pressure in motivating organizations to adopt GSCM practices. The study also highlighted the care for the environment and food safety as a key driver. The findings collectively provide a nuanced understanding of the diverse motivations compelling organizations to integrate GSCM practices. By understanding these drivers, organizations can tailor their GSCM strategies to address specific motivations and maximize the positive impacts on the environment and their bottom line.

The study further delves into the barriers to the adoption of GSCM. These were also classified into internal and external categories. Internal barriers include insufficient financial capacity, waste management, and employee involvement. Financial limitations were identified as a pronounced barrier, impacting immediate profitability, and hindering GSCM implementation. Waste management presented challenges in controlling waste and finding consumers willing to pay for recovered materials. Lack of employee involvement indicated potential gaps in understanding or interest. External barriers encompass the integration of suppliers and commodity price fluctuations. Supplier integration challenges arise from varying levels of GSCM adoption among suppliers. Price fluctuations in commodities can make businesses uneasy and impact the adoption of sustainable practices. The study provides a comprehensive analysis of both internal and external barriers, shedding light on the obstacles organizations face in their pursuit of GSCM adoption. In this regard, to ensure the effective implementation of GSCM procedures, it is important to overcome both internal and external barriers. External obstacles include supplier connections, market expertise, and adaptation to changing external conditions, whereas internal barriers necessitate organizational dedication, budgeted preparation, and clear communication. By removing these impediments, it will be easier to deploy GSCM approaches successfully and promote sustainability.

This study was not void of limitations. That is, the reliance on self-reported data through qualitative responses could introduce subjectivity and recall bias, potentially affecting the accuracy and depth of the information obtained. Lastly, while the study highlighted both internal and external barriers to GSCM adoption, the specific context of beverage manufacturing may limit the applicability of these findings to other industries or sectors. Considering this, future research in GSCM is recommended to adopt a mixed-methods approach by supplementing self-reported qualitative responses with quantitative data. Researchers should extend their investigations beyond beverage manufacturing to various industries and sectors to ensure broader applicability and a more comprehensive understanding of industry-specific challenges and opportunities related to GSCM adoption. Additionally, longitudinal studies tracking the evolution of GSCM practices over time are encouraged to capture dynamic changes and provide nuanced insights into how organizations navigate and overcome sustainability challenges. By incorporating these methodological refinements, future studies can contribute to a more robust, widely applicable, and temporally informed understanding of the factors influencing the adoption of sustainable supply chain practices.

Limitations of the study and future research

This study has several limitations that should be acknowledged. First, the reliance on qualitative data collected through interviews introduces the possibility of subjectivity and recall bias, as participants' responses are based on their perceptions and experiences. This may affect the generalizability of the findings across different contexts or industries. Additionally, the sample size was limited to nine beverage manufacturing firms in Zambia, which, while appropriate for qualitative research, may not capture the full spectrum of challenges and drivers present in larger or more diverse industries. The study is also geographically constrained, focusing solely on the Zambian beverage manufacturing sector, which may limit the applicability of the findings to other countries or regions with different regulatory, economic, or cultural contexts. Furthermore, the analysis does not include quantitative data, which could have provided more robust and statistically validated insights into the drivers and barriers to GSCM adoption. Lastly, the cross-

sectional nature of the study captures the state of GSCM adoption at a single point in time, making it difficult to assess how these practices and challenges evolve over time. Future research could address these limitations by employing mixed methods approaches, expanding the sample size and geographical scope, and incorporating longitudinal studies to better understand the dynamics of GSCM adoption.

CONCLUSION

Based on the findings in this study, it can be concluded that there is a a diverse array of motivations propelling GSCM adoption, ranging from internal factors like financial considerations, leadership, and organizational policies to external forces such as global pollution reduction initiatives and concerns over greenhouse gas emissions. Conversely, barriers to GSCM adoption encompass both internal challenges like financial constraints and employee engagement issues, as well as external hurdles like supplier integration and market price volatility.

To this effect, the study findings provide a pathway for managers to be encouraged to prioritize leadership involvement in driving sustainability initiatives, as high-level commitment significantly influences the successful implementation of GSCM strategies. Developing clear organizational policies that align with environmental goals can provide a structured framework to guide decision-making and operations toward sustainability. The findings also inform managers to focus on securing adequate financial resources to support investments in green technologies and infrastructure, ensuring the long-term feasibility of GSCM initiatives. Additionally, fostering a culture of environmental responsibility through employee training and engagement programs can address internal barriers, such as lack of involvement or awareness, and build a committed workforce aligned with sustainability objectives.

Externally, managers should strengthen supplier relationships and collaboration to ensure alignment with GSCM practices across the supply chain. Proactive strategies to navigate market challenges, such as commodity price fluctuations, and adapting to evolving regulatory standards are also essential. By addressing these managerial aspects, organizations can not only enhance their environmental performance but also achieve competitive advantages, improve stakeholder relations, and align with global sustainability trends.

RECOMMENDATION

To surmount these obstacles and fully capitalize on the benefits of GSCM adoption, organizations must adopt a holistic approach. This entails strategic financial planning, effective waste management, and robust employee engagement internally, while externally necessitating strengthened collaboration with suppliers and adaptive strategies to manage market fluctuations. By comprehensively addressing these factors, businesses can align with environmental imperatives, meet evolving global standards, and achieve sustainable economic and ecological outcomes, thereby paving the path for a greener and more responsible supply chain and contributing to a sustainable future.

Data availability statement

The data that support the findings of this study are not publicly available due to confidentiality agreements with participants and the proprietary nature of the information provided by the organizations involved. However, de-identified and aggregated data may be available from the corresponding author upon reasonable request, subject to approval and compliance with ethical and legal requirements. Any requests for data sharing will be reviewed to ensure participant confidentiality and adherence to the study's ethical guidelines.

Authors declaration

All the authors declare no conflict of interest

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