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Exploring sustainable food supply chain management practices to enhance food security

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Background: The food industry faces longstanding challenges in meeting sustainability practices within its supply chain, often prioritising commercial obligations and profit motives. However, there is a growing recognition of the critical role that sustainable food supply chain management (SFSCM) practices play in enhancing food security.

Objectives: This study aims to establish the significance of SFSCM practices in enhancing food security. Furthermore, the study explores approaches to reduce challenges against implementation of SFSCM practices.

Method: The study employed a qualitative approach and used stratified and purposive sampling techniques to interview 22 participants from a population of 9 gatekeeper institutions within the Zimbabwean food industry.

Results: The findings highlighted several essential SFSCM practices covering waste management, logistics optimisation, water and energy conservation, employing qualified individuals, carbon emission reduction, corporate social responsibility, cost reduction, pricing efficiency, fair food distribution and continuous consumer taste surveys. Approaches to reduce SFSCM implementation challenges were also identified, and these include stakeholder communication plans, capacity building programmes, integrating sustainability into mission statements, budget allocation, lobbying for government support, and fostering collaborative engagements. Open information sharing was also emphasised.

Conclusion: It is concluded that the adoption of identified SFSCM practices by food producers, intermediaries, suppliers, consumers and other stakeholders can significantly enhance food security and minimise hunger in nations.

Contribution: This article contributes to the understanding of addressing SFSCM implementation challenges and provides valuable insights into the importance of sustainable practices in improving food security within the Zimbabwean food industry and the world at large.

Keywords: food supply chain management practices; sustainability; food security; sustainable development; Zimbabwe; food supply chain stakeholders.

Introduction

The global food industry faces a dual challenge of meeting the increasing demand for food while ensuring sustainability in the face of environmental and social pressures. Factors such as climate change, water scarcity and food loss in the supply chain impact the ability of the food sector to meet growing demands (Yu et al. 2022a). Food supply chains are complex systems involving multiple stakeholders, each contributing to the production, processing and distribution of food products. This complexity is further heightened by the diverse range of food types and consumer preferences, which necessitate intricate supply chain networks (Lawrence et al. 2022a).

In developing nations, the complexity of food supply chains is exacerbated by the involvement of smallholder farmers with limited access to markets and resources. This often leads to intermediary activities that increase costs, reduce quality, and contribute to food losses and waste, ultimately affecting food security (Gatto & Chepeliev 2024a). To address these challenges, businesses are increasingly turning to sustainable food supply chain management (SFSCM) practices.

Investing in SFSCM not only helps to ensure a steady food supply but also presents opportunities for businesses to enhance their brands and cater to changing consumer preferences (Lawrence

et al. 2022b). Successful cases such as Alara Wholefoods, Barnana and NOW Foods demonstrate the potential of SFSCM practices to improve supply chain efficiency and enhance food security (Lu et al. 2022). Alara Wholefoods, for example, has pioneered sustainable practices such as organic certification, zero waste manufacturing and renewable energy use, setting a benchmark for other food companies (Adamu et al. 2023). Similarly, Barnana focuses on repurposing imperfect produce to reduce food waste and supports smallholder farmers through fair pricing and regenerative agriculture practices (Lu et al. 2022). NOW Foods, on the other hand, emphasises sustainable sourcing and environmental conservation, receiving international recognition for its efforts in SFSCM (Ajayi et al. 2024). These cases highlight the importance of collaboration between businesses, farmers and communities to achieve sustainability goals in the food supply chain.

Borrowing from these successful examples, there is an opportunity for the Zimbabwean food industry to adopt SFSCM practices tailored to its unique context. By understanding the specific challenges and opportunities within the Zimbabwean landscape, policymakers and industry stakeholders can develop targeted interventions to improve food security and sustainability (Yu et al. 2022b). This study aims to provide theoretical and practical insights into SFSCM practices, thereby identifying key challenges and proposing solutions to enhance food security and sustainability in the country. To achieve this, the study explores SFSCM practices that are currently being adopted by organisations within the food industry. The study also establishes the extent to which SFSCM practices are being implemented by food industry organisations. Furthermore, the study explores the challenges that organisations face as they implement SFSCM practices within the food industry. Lastly, the study recommends approaches that can be employed to overcome the challenges against the implementation of SFSCM practices in the food sector.

Statement of the problem

Despite growing recognition of the importance of sustainability, many organisations within the food industry continue to prioritise commercial obligations and profit motives over sustainable practices. This misalignment exacerbates food insecurity, particularly in developing nations such as Zimbabwe, where supply chains are often fragile and vulnerable to disruptions (Ajayi et al. 2024). The persistent prioritisation of short-term gains over long-term sustainability has led to inefficient resource use, increased waste and a lack of resilience in the food supply chain. These issues not only threaten the environmental and economic stability of food systems but also undermine social equity, leaving smallholder farmers and vulnerable populations at greater risk of food insecurity.

Evidence suggests that the adoption of SFSCM practices, such as waste management, carbon emission reduction, logistics optimisation, water and energy conservation, and fair food distribution, can play a pivotal role in enhancing food security (Yu et al. 2022b). However, the extent to which these practices are implemented varies widely, with many organisations encountering significant barriers. These challenges include financial constraints, a lack of technical expertise, resistance to change and insufficient stakeholder engagement (Gatto & Chepeliev 2024a). For instance, smallholder farmers, who form the backbone of the food supply in many developing countries, often struggle with limited access to markets and resources, leading to inefficiencies and food losses (Lawrence et al. 2022b). To address the problem, the study aims to explore the SFSCM practices that are currently adopted by organisations within the food industry and to determine the extent of their implementation. Furthermore, the study seeks to identify the challenges associated with implementing SFSCM practices and the approaches to overcome such challenges.

Theoretical framework

Sustainability theory is an interdisciplinary framework that evolved over decades, influenced by environmental science, economics and social sciences. A key milestone was the 1987 Brundtland Report, commissioned by the United Nations, which defined sustainable development as meeting present needs without compromising future generations (World Commission on Environment and Development 1987). In 1994, John Elkington introduced the triple bottom line (TBL) framework, emphasising environmental, social and economic performance, which became a cornerstone of corporate sustainability (Elkington 1994). The theory emerged in response to global awareness of environmental degradation, social inequality and economic instability, with environmental movements in the 1960s and 1970s and intensified dialogue in the 1980s and 1990s (Meadows et al. 1972). Sustainability theory thus advocates for a balanced approach integrating environmental, social and economic considerations for long-term sustainability.

This framework guides the exploration of SFSCM practices, their implementation, the challenges faced and the strategies to overcome these challenges to enhance food security.

In the context of SFSCM, environmental sustainability includes practices such as reducing carbon emissions, minimising waste and using renewable energy (Yu et al. 2022b). Social sustainability involves ensuring fair treatment of workers, equitable distribution of resources, and fostering community well-being, as seen in practices such as fair pricing, supporting smallholder farmers and ensuring food safety (Lawrence et al. 2022b). Economic sustainability requires businesses to remain profitable while adopting environmentally and socially responsible practices, creating efficient supply chains that reduce costs and improve productivity (Adamu et al. 2023). Evaluating the economic benefits of SFSCM practices helps to assess

their contribution to the overall sustainability of food industry organisations.

Systems thinking, another key concept within sustainability theory, views the food supply chain as an interconnected and interdependent system, crucial for understanding its complexity and dynamic nature. This perspective helps analyse the extent to which SFSCM practices are implemented and the interconnected challenges organisations face. For example, smallholder farmers in developing nations often encounter barriers like limited access to markets and resources, leading to higher costs and food losses (Gatto & Chepeliev 2024b). Understanding these interdependencies is essential for developing effective solutions.

Stakeholder engagement is essential for achieving sustainability, involving all stakeholders, including suppliers, consumers, communities and governments, in decision-making to address their needs and concerns (Lu et al. 2022). This principle helps explore collaborative approaches to overcoming the challenges in implementing SFSCM practices. Effective stakeholder engagement can lead to innovative solutions and shared benefits, as demonstrated by Barnana's collaboration with smallholder farmers through fair pricing and regenerative agriculture practices (Lu et al. 2022).

Critics argue that implementing sustainability practices can be challenging because of high initial costs, a lack of technical expertise and organisational resistance. Overcoming these challenges requires comprehensive support from policymakers, including subsidies for green technologies, training programmes to build expertise, and regulations encouraging sustainable practices (Lu et al. 2022).

Literature review

Sustainable food supply chain management has a critical role in addressing the multifaceted challenges within the global food industry. The SFSCM aims to ensure the delivery of safe, nutritious food while minimising environmental impact and promoting social welfare. This approach involves coordinated supply chain operations to enhance environmental performance and ensure equitable treatment of stakeholders throughout the food supply chain (Zhang & Chen 2023).

Key components of SFSCM include waste management, energy efficiency, water conservation, greenhouse gas emissions reduction and ethical sourcing. These practices collectively contribute to environmental sustainability by reducing resource consumption, minimising waste and lowering the carbon footprint (Ray, Muddu and Sharma 2022). Researchers consistently agree on the importance of these practices and their benefits, such as cost reduction and increased resilience to climate change (Gatto & Chepeliev 2024b; Munuhwa 2022; Palazzo & Vollero 2022). While there is consensus on the necessity of these components for achieving sustainability, the extent to which different regions or organisations can implement these practices varies significantly, reflecting divergence based on local contexts and resource availability (Palazzo & Vollero 2022).

The successful implementation of SFSCM relies heavily on collaboration among various stakeholders, including government entities, suppliers, consumers and retailers. Effective stakeholder engagement fosters transparency, accountability and trust, thereby enhancing decision-making and social impact (Gurzawska 2020). While there is broad agreement on the need for stakeholder collaboration, there is divergence on the methods and effectiveness of such collaborations, particularly in different cultural and economic contexts.

Risk management is crucial for maintaining the integrity and resilience of the food supply chain. Identifying and addressing potential risks, such as supply chain disruptions and regulatory changes, is essential for sustaining food production and distribution (Burger-Helmchen, David & Hendrik 2020). There is consensus on the importance of risk management, but divergence exists in specific strategies and their success rates across different regions and industries.

The adoption of SFSCM practices in developed countries is more widespread compared to regions such as Africa, where financial constraints, a lack of technology and corruption pose significant barriers (Munuhwa 2022). In Zimbabwe, specific challenges include insufficient funding, a lack of top-level management commitment, technological limitations and unclear government policies (Muñoz-Torres et al. 2021; Caiado et al. 2022). Recurring themes across the body of research include financial constraints and technological limitations, with a trend indicating a growing recognition of these barriers and an increasing call for targeted interventions to overcome them (Burger-Helmchen et al. 2020; Zhang & Chen 2023).

To mitigate these challenges, various approaches are suggested, including risk management practices, robust stakeholder communication plans, and technological integration such as blockchain and Internet on Things (IoT) (Hassoun et al. 2023). Emphasising training and capacity building, along with participation in industry collaborations, is also recommended (Humphries et al. 2021). There is convergence on the need for comprehensive approaches that combine risk management, stakeholder engagement and technology. However, differences were observed on the effectiveness of specific strategies in different contexts, reflecting the unique challenges faced by various regions.

Several gaps have been identified from few researchers on SFSCM. There is a significant focus on developed countries, with limited research on SFSCM practices in developing regions such as Africa. Furthermore, there is a lack of consensus on standardised frameworks for measuring the effectiveness of SFSCM practices (Tetteh, Agyenim-Boateng & Simpson 2024). The need for more longitudinal studies to assess the long-term impacts of SFSCM practices and the sustainability of implemented solutions is also

apparent. In addition, the role of government policies and their effectiveness in different regions remains underexplored (Tetteh et al. 2024; Munuhwa 2023). The next section focuses on the research questions.

Research questions

This study sought to answer the following four research questions:

- **RQ1:** What SFSCM practices are currently being adopted by organisations within the food industry?
- **RQ2:** To what extent are SFSCM practices being implemented by food industry organisations?
- **RQ3:** What challenges do organisations face in implementing SFSCM practices within the food industry?
- **RQ4:** What approaches can be employed to overcome the challenges associated with implementing SFSCM practices in the food industry?

Methodology

The research is based on an exploratory design, which is appropriate as it delves into a topic that has not been extensively studied and lacks a substantial body of prior research (Hay, Smith & Jones 2020). In this study, the emphasis is on SFSCM practices within the food industry, which have not been extensively studied.

The study population comprises nine gatekeeper institutions in Zimbabwe: the Consumer Council of Zimbabwe; the Grain Marketing Board; the Grain Millers Association of Zimbabwe; the Ministry of Lands, Agriculture, Food and Nutrition; the Water and Rural Resettlement Ministry; the Food and Agriculture Organisation of Zimbabwe; the Chartered Institute of Purchasing and Supply; the Zimbabwe National Chamber of Commerce and the Confederation of Zimbabwe Retailers. The populations from these institutions were stratified into five distinct stakeholder categories: (1) food producers and processors, (2) suppliers and distributors, (3) wholesalers and retailers, (4) Zimbabwe's Consumer Council and consumers and (5) the government representatives (Ministry of Agriculture) and non-governmental organisations. Stratified sampling technique was employed to ensure that all relevant subgroups (SFSCM stakeholders) within the population are equally represented (Mweshi & Sakyi 2020). After the development of stakeholder groups, the selection of participants was then conducted using purposive sampling. Purposive sampling helps in selecting a sample that is particularly knowledgeable or experienced in the area of interest (Nyimbili & Nyimbili 2024), in this particular case managerial employees with 10 years of experience in the supply chain field. It makes the research effort more efficient in terms of time and resources, as it directs efforts towards individuals who are most likely to provide valuable information. To ensure enough representation, five participants from each stakeholder group were initially selected to make a sample size of 25 interviewees. Out of the total sample, only 22 participants were successfully interviewed.

Ethical considerations

The field of ethics focuses on developing moral guidelines for assessing instances in which a community or individual may suffer injury, embarrassment or discomfort because of the methods used for gathering data (Massie & Gillam 2015). As a result, the study followed all stated protocols and accepted standards for academic research etiquette (Creswell & Poth 2018). Nelson Mandela University granted ethics approval for the study (H21-BES-LOG-132). The study's interview subjects voluntarily participated. They were also made aware of the goals of the study and that the information was being collected solely for scholarly purposes. In addition, the researcher advised the interview subjects that they could withdraw from the study at any point without incurring any fees or explanations, and that their participation was entirely voluntary. Furthermore, anonymity was guaranteed and the respondents' information was kept strictly confidential (Massie & Gillam 2015). Prior to the interviews, the study participants and responders were asked to provide their written, informed consent for participation in the study as well as permission to record the interviews.

Profile of participants

Table 1 shows the summary of participants interviewed.

All of the requirements for participant enrolment were met, as indicated in Table 1. Every participant has a minimum of 5 years of experience in management or supervision. Every participant, who ranged in age from 30 to 60 years, had at least 10 years of job experience in the food supply chain industry.

Findings

Sustainable food supply chain management practices adopted by organisations within the food industry

The study investigated the SFSCM practices used by businesses in Zimbabwe's food sector. Different technical and industry-related responses from the interviewees indicated that they had been in the SFSCM business for a while. The implementation of SFSCM practices was reported by all 22 participants, and a fair distribution of SFSCM practices that align with the TBL framework was supplied. The SFSCM practices that the participants identified were categorised into social, economic and environmental categories, as shown in Table 2.

Participants in the interview responded as follows to the first question on SFSCM practices used by companies in the food business in Zimbabwe:

TABLE 1: A summary of interviewed participants.

Pseudonym	Gender	Age range (years)	Work experience (Years)	Working experience at managerial level	Occupation
Pat1	Male	41–50	15	6	Logistics manager
Pat2	Male	41–50	18	14	Supply chain coordinator
Pat3	Female	41–50	16	9	Contracts manager
Pat4	Male	41–50	21	13	General manager
Pat5	Female	41–50	19	16	Procurement and logistics manager
Pat6	Male	41–50	11	7	Stores manager
Pat7	Male	31–40	11	5	Warehouse and distribution manager
Pat8	Female	41–50	17	7	Buyer
Pat9	Male	51–60	20	16	Purchasing and logistics director
Pat10	Female	41–50	14	8	Supply chain analyst
Pat11	Male	31–40	11	8	Inventory controller
Pat12	Male	31–40	15	12	Dispatch manager
Pat13	Male	41–50	12	9	Inbound logistics manager
Pat14	Male	31–40	10	6	Driver controller
Pat15	Female	31–40	14	10	Logistics manager
Pat16	Female	41–50	17	15	Procurement manager
Pat17	Male	41–50	23	14	Procurement manager
Pat18	Male	51–60	16	6	Logistics coordinator
Pat19	Male	51–60	25	21	Supply chain manager
Pat20	Female	51–60	26	19	Assistant procurement and logistics manager
Pat21	Male	41–50	11	5	Distribution manager
Pat22	Male	41–50	13	7	Transport manager

TABLE 2: Sustainable food supply chain management practices.

Social sustainability practices	Environmental sustainability practices	Economic sustainability practices
• Human development and healthful food consumption	• Green purchasing, for example, sourcing only from ISO-certified vendors	• Paying employees enough to cover all of their eating needs
• Corporate social responsibility	• Waste management practices	• Cost-cutting and pricing efficiency in food manufacturing, distribution and retail
• Continuously undertaking market surveys to understand consumer tastes prior to food production	• Carbon emission reduction through efficient vehicle management	• Employing competent and skilled workers in the food supply chain
• Fair distribution of food	• Utilising renewable energy sources, such as solar energy, in logistics and food production	• Cultivation of various profitable crops
• Food donations	• Conserving energy and water	–
	• Reusing food waste materials	
	• Optimisation of transportation	
	• Optimising warehouse operations	

SFSCM, sustainable food supply chain management.

'Energy conservation, water conservation, food waste reduction, fair distribution of food and a number of small ad hoc things to reduce poverty in Zimbabwe.' (Participant 12: male, 12 years of managerial experience, dispatch manager)

'It's actually a lot, we encourage our farmers to use environmentally friendly farming methods. We also ensure the growing of crop varieties that are commercially profitable so that farmers become self-sufficient with their agricultural proceeds. More we encourage the use of fuel-efficient vehicles that doesn't pollute much. On the same note, we constantly carry out surveys to identify which crop varieties do our customers prefer most and we make sure seed organisations provide as per customer preference. Further as you can see, we sale maize to households and individuals at very affordable rates to ensure that even the poorest families can afford.' (Participant 4: male, 13 years of management experience, general manager)

'Yes, our role is to ensure that all consumers of different levels are satisfied with the food which they consume in terms of a number of variables including pricing, availability and accessibility of grain, ingredients and food packaging weights. And also lobbying and advocacy, consumer education, complaint processing, and consumer representation are some of the services available to food consumers which are practices we always do to protect our consumers.' (Participant 19: male, 21 years of managerial experience, supply chain manager)

'We use energy server lights in warehouses, and our production system runs when there is need for us to serve on electricity. Ooh yes, we have a warehouse optimisation system that help us when picking orders and also when a certain stock item is moving fast, we quickly see that without having to constantly count, so we haven't been experiencing stock-outs since we got the system in late 2018. So … the same system helps to effectively monitor shelf life of our food products.' (Participant 6: male, 7 years of managerial experience, stores manager)

The economic sustainability practices identified include reducing the cost of food production and distribution, encouraging farmers to cultivate a variety of profitable crops for self-sufficiency, employing skilled workers to boost productivity within the food industry, and providing salaries that are sufficient to meet employees' complete food needs. These practices are detailed in Table 2 and supported by the aforementioned direct quotes. For instance, when companies in the food supply chain offer fair wages and benefits to their employees, it enhances their purchasing power and grants them

access to affordable, safe and high-quality food products, thereby supporting the sustainability of food security. However, the implementation of these practices depends on the organisation's size, objectives and policies that drive SFSCM.

Participants emphasised the significance of social and environmental sustainability in Zimbabwe's food industry, focusing on human development, corporate social responsibility and understanding customer preferences. Social sustainability practices included nutrient-dense foods, while environmental efforts involved waste management, renewable energy, reducing carbon emissions, and water and energy conservation. Transport professionals highlighted optimising distribution through fuel-efficient vehicles and effective scheduling. Procurement and warehousing participants discussed green procurement and automation for efficiency. Despite economic challenges, these practices align with global standards and enhance organisational efficiency, partnerships and reputational protection, supporting findings by Costa et al. (2023) and Mubarik et al. (2023).

The extent of sustainable food supply chain management practices implementation

The SFSCM procedures are implemented to varying extents according to all 22 interviewees. Eleven participants reported consistently and comprehensively applying SFSCM techniques in their businesses, attributing their consistent use to memberships in numerous food professional organisations overseeing food safety, quality and environmental standards. These organisations include the Food Safety Management Systems (FSMS), ISO 14000, ISO 9000, ISO 22000, Hazard Analysis Critical Control Point (HACCP), the Standards Association of Zimbabwe and the Environmental Management Agency (EMA). However, the other 11 participants noted inconsistencies in their application of SFSCM methods because of constantly changing food regulations, which complicate senior management's planning and strategy execution. Most interviewees identified the high costs, particularly during the coronavirus disease 2019 (COVID-19) period, as the main barrier to consistently applying SFSCM techniques. Seventeen participants acknowledged that both current and future practices require significant funding. All participants, regardless of their implementation level, recognised that successful SFSCM requires agreement on performance metrics among all parties involved. Baig et al. (2020) supported this view, observing that SFSCM methods are effective when all stakeholders are committed to and collaborate on sustainability.

Challenges faced by stakeholders in implementing sustainable food supply chain management practices in the food industry

The study also sought to identify the challenges organisations face when implementing SFSCM techniques. To achieve this, participants were asked to enumerate the difficulties their organisations experience with SFSCM practices. This objective was addressed during the third interview. Understanding these challenges is vital as it enables stakeholders to proactively address common implementation issues. As shown in Table 3, food industry organisations in Zimbabwe encounter both organisational and macroenvironmental obstacles in executing SFSCM techniques.

TABLE 3: Challenges faced by stakeholders when implementing sustainable food supply chain management.

Category	Challenges
Organisational challenges	• Absence of resources (money, expertise) • Absence of commitment from high management • Ineffective information exchange • Absence of technological advances • Insufficient mutual trust • Not enough money allocated to each area • Organisations lack a supply chain sustainability culture • Absence of measuring performance • Employees lacking motivation • Absence of commitment and support from stakeholders
Macroenvironmental challenges	• Absence of government assistance • Constantly evolving food laws • Constrained economies • Insufficient consumer demand for nutritious and sustainable food • Non-supportive customers • Corruption and bad governance in food distribution • Inefficiencies caused by intermediaries, such as price inflation

Participants in the interview responded as follows when asked about the obstacles stakeholders face in implementing SFSCM practices in Zimbabwe's food industry:

> 'The challenge is that when we produce environmentally friendly and healthy foods like the fibre mealie meal, it takes more than forever on the shelves without selling. Now we end up producing the more refined, which is not equally healthy but is preferred by our customers and helps us to boost sales. Also, these healthy and environmentally friendly products are not becoming popular with consumers because they are distributed by intermediaries who tend to increase prices and sometimes charge double our producer price.' (Participant 10: female, 8 years of managerial experience, food supply chain analyst)

> 'Eish, I think we have a number of challenges including lack of technology, inadequate funding and budgets, poor information sharing amongst stakeholders in the food and beverage supply chain. Also, corruption is everywhere, when we think maize has been allocated to a certain population, the next day you go there and they still ask for more citing that they didn't get enough, the same applies to inputs like fertilisers donated by our partners, the distribution is just not done right.' (Participant 11: male, 8 years of supervisory experience, inventory controller)

> 'Our customer base has gone down drastically that we may soon be unable to meet our overhead costs, I think the business environment is generally so tough for now and employees are not motivated because they are not getting salaries in time, plus the salaries are not inflation adjusted, there is nothing the organisation can do for now since we are on the verge of closing down. We made an application to the government to assist us, but it wasn't successful. Apart from that I really feel stakeholders within our industry are not willing to help in anyways as well. The situation is currently tough for the organization.' (Participant 22: male, 7 years of managerial experience, transport manager)

All 22 participants expressed concern about the increasing challenges facing the food industry in Zimbabwe, highlighting various multifaceted difficulties. The participants found the following organisational issues: insufficient funding and budgets, a lack of technology, inadequate commitment from top management, poor performance measurement, poor information sharing among stakeholders, low mutual trust among food stakeholders, and a lack of resources. Additionally, the participants identified macro environmental challenges such as lack of commitment and support from stakeholders, a lack of government support, unsupportive customers, low customer demand for healthy and sustainable foods, corruption and poor governance of food distribution, economic hardships, constantly changing food regulations, and intermediaries causing inefficiencies such as price inflation. For a food supply chain to benefit the entire network, it must have transparency, mutual trust, information exchange between stakeholders, and effective governance of food distribution. Mahroof, Omar and Kucukaltan (2022) argue that countries source a significant portion of their food supplies from international suppliers within a larger coordinated supply chain network, complicating the process of obtaining food information and potentially jeopardising the stability of food support functions. The food industry in Zimbabwe is not exempt from these difficulties, as the country is currently among the most corrupt globally, with a corruption rating of 23 (Mahuni 2018). High levels of corruption and poor governance of food distribution in Zimbabwe lead to chronic hunger and food insecurity for many individuals. Mohseni, Baghizadeh and Pahl (2022) report a negative correlation between food waste and sustainability, noting that mismanaged food supply chain stages – such as production, processing, distribution and consumption – greatly increase food waste. The following subsection covers the methods used to address the aforementioned SFSCM challenges.

Approaches to address sustainable food supply chain management implementation challenges and their effectiveness

Through interview question 4, participants were asked about the strategies used to tackle the challenges of implementing SFSCM practices. The results indicate that significant progress has been made, yet more effort is required to achieve full sustainability within Zimbabwe's food industry and mitigate the obstacles to SFSCM implementation. Interviewees highlighted several notable initiatives, including ongoing training for internal stakeholders on SFSCM, developing communication plans to bridge information gaps, and integrating SFSCM into their mission and vision statements to show top management's commitment. Additionally, participants emphasised the importance of fostering transparent information exchange between internal and external stakeholders in Zimbabwe's food industry and advocating for government support. Three interviewees noticed that their organisations are now promoting more discussions on SFSCM issues than ever before. One participant mentioned, for example:

> 'The issue of lacking transparency needs effective information sharing starting from within the organisation then going out to all our external stakeholders. On the other hand, employee knowledge gaps may be closed by employing appropriate training, such as explaining the importance of sustainable food production. I also feel that consumer awareness campaigns should constantly be carried out by food supply chain stakeholders to parade the importance of consuming healthy and nutritious foods.' (Participant 3: female, 9 years of managerial experience, contracts manager)

Other interviewees mentioned that:

> 'The human resources department must develop programs aimed at training all employees on current trends in consumer food tastes so that we may develop own products that are mostly healthier, eco-friendly and that meet consumer needs. And also … technology is ever improving these days, it is necessary that our organisation acquires modern grain harvesting and drying machines to improve on overall process efficiency.' (Participant 10: female, 8 years of managerial experience, food supply chain analyst)

> 'The idea of SFSCM challenges needs to be presented to the parliament so that the government puts it as one of its priorities. The ministry of Industry and Trade specifically should spearhead assisting organisations to articulate challenges revolving around sustainable food supply chain. Zimbabwe as a nation is constantly not meeting food requirements for its entire population. Also, the government should introduce another program, more or less like the command agriculture and then employ audit teams that expedite the flow of inputs and post-harvest grain output to ensure that there is no corrupt distribution to the needy communities.' (Participant 14: female, 6 years of supervisory experience, driver controller)

Additionally, the participants were asked to evaluate how effectively these techniques enhanced the application of SFSCM practices within their companies and across their entire food supply chains, as well as how well they addressed the identified challenges. Most participants (17) reported that they had not yet implemented the strategies for managing SFSCM challenges, while three participants indicated they were still in the process of resolving the issues. Only two participants mentioned that their organisations had seen positive results from involving stakeholders to overcome SFSCM implementation issues. Furthermore, three participants found that applying some of the techniques had partially alleviated the implementation problems their organisations were experiencing with SFSCM.

This suggests that Zimbabwean food industry companies still have significant progress to make in addressing SFSCM implementation challenges. Baig et al. (2020) highlight that managing and monitoring external sustainable supply chain issues with multiple stakeholders can be difficult, which aligns with these findings. They also emphasise that commitment from both internal and external stakeholders, effective information sharing, alignment of responsibilities and regular process reviews are crucial for overcoming complex SFSCM issues.

To enhance employee involvement, interviewees recommended integrating staff into SFSCM practices. One participant suggested that Zimbabwean food industry organisations seek government support to address the challenges of SFSCM implementation, given that a major obstacle is insufficient funding. Another recommendation was for companies to conduct regular environmental scans and audits to ensure they are addressing the most critical SFSCM implementation issues. This approach is reasonable, as ongoing scanning and auditing would help organisations prioritise and tackle pressing SFSCM challenges, ultimately benefiting both the organisation and the entire supply chain (Ajayi et al. 2024).

Discussion

This study explored the challenges and strategies associated with the implementation of SFSCM practices in Zimbabwe's food industry. Findings revealed both organisational and macroenvironmental hurdles, including insufficient funding, lack of technology, inadequate commitment from top management, poor performance measurement and corruption. These obstacles complicate the efforts of businesses striving for sustainability.

To address these challenges, various strategies have been employed by organisations. These include continuous training for internal stakeholders, developing robust communication plans to address information gaps, and incorporating SFSCM principles into organisational mission and vision statements. Furthermore, fostering transparent information exchange among stakeholders and seeking government support have been crucial steps.

Despite these efforts, the study highlights that more work is needed to create a comprehensive roadmap towards sustainability. The ongoing economic hardships and constantly changing food regulations in Zimbabwe pose additional difficulties. Nevertheless, the proactive initiatives and increased dialogue around SFSCM issues indicate a positive shift towards sustainable practices.

Limitations of the study and recommendations for further research

The study's major limitation was its focus on addressing SFSCM practices and challenges in one specific region (Zimbabwe), which does not fully represent the entire food industry's diversity, impacting the generalisability of the findings. The methodological approach in this particular research was only qualitative, resulting in the use of a non-probability sampling technique, making the findings less generalisable across all situations. Further research can be conducted in countries within other continents and also with a more robust methodology approach, such as the mixed method. This can enhance the comprehensiveness of the study.

Recommendations and propositions

Based on the findings, several recommendations and propositions are made to enhance the adoption of SFSCM practices. Developing a robust plan for stakeholder communications is crucial to foster positive relationships and consistently communicate the expectations and benefits of sustainable supply chain practices. Implementing targeted capacity-building and training initiatives aimed at enhancing sustainability knowledge and promoting behavioural shifts across the supply chain is also recommended. It is important to embed aspects of SFSCM into the organisation's mission and vision statements to align strategic goals with sustainability objectives.

Persistently advocating for government support by emphasising the benefits of a sustainable food supply chain to relevant ministries can help secure policy backing and resources. Allocating dedicated funds to programmes promoting sustainability in the food supply chain ensures that financial resources support the transition to sustainable practices. Fostering cooperative and ongoing interactions with intermediary stakeholders to share objectives and interests related to supply chain sustainability is essential. Ensuring transparent communication about advancements and sustainability policies with both internal and external stakeholders can foster a culture of openness and trust.

To further support the adoption of SFSCM practices, it is proposed to develop standardised metrics for measuring and benchmarking sustainability within food supply chains, facilitating continuous improvement and accountability. Launching consumer awareness campaigns to educate the public on the impact of their choices on the food supply chain can encourage sustainable consumption patterns. Investing in the research and development of technologies that enhance sustainability, such as renewable energy sources, advanced logistics systems and precision agriculture tools, is also recommended.

Conclusion

The study underscores the critical importance of adopting SFSCM practices to address the pressing challenges of food security, environmental sustainability and social equity. Despite the acknowledged benefits, the food industry's adoption of SFSCM practices remains hindered by multifaceted organisational and macroenvironmental challenges, including inadequate funding, a lack of advanced technology, insufficient stakeholder commitment, and external factors such as poor government support and consumer demand. To overcome these barriers, the study recommends several strategic actions, including developing effective stakeholder communication plans, implementing capacity-building and training initiatives, integrating sustainability into organisational vision and mission statements, and advocating for government support. Additionally, fostering collaborative relationships with intermediaries and maintaining transparent communication with all stakeholders are crucial for the successful implementation of SFSCM practices. Future research should address the identified limitations by conducting longitudinal

studies, expanding the geographical scope, involving a broader range of stakeholders, and employing mixed-methods approaches. By focusing on these areas, researchers can gain deeper insights into and contribute to the advancement of sustainable practices in the food industry.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

S.M. participated in developing the structure and approach, and collected data through interviews. He further conducted the analysis and wrote the original manuscript. P.H-S. conceptualised the study, reviewed and edited the written content.

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Data availability

The data that support the findings of this study are available in a transcribed format, on request from the corresponding author, S.M.

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