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Ghana's Sustainable Supply Chain Challenge: Forging the Path to a Responsible Future: A Case Study of JC Farms

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Abstract

This research investigates the integration of sustainability practices within JC Farms' supply chain in the Western Region of Ghana, aiming to explore the balance between environmental protection, economic viability and social equity. Utilising qualitative methods, including semi-structured interviews and observational research, the study examines JC Farms' sustainability efforts, challenges, and stakeholder engagement. Findings indicate an all-embracing commitment to sustainability, demonstrated through waste management, energy efficiency, and renewable energy initiatives. Financial constraints are noted as significant barriers, yet strategic solutions, such as government grants and Return On Investments (ROI) analysis, are used to overcome these obstacles. The study highlights the crucial role of organisational culture and stakeholder collaboration in embedding sustainability. Comparative analysis with existing literature also emphasises JC Farms' innovative approaches to sustainability in agriculture. Recommendations for agricultural entities and policymakers are provided to enhance sustainability practices across the supply chain sector. This study contributes to the discussions on sustainable supply chain management, offering insights for adopting sustainability in agricultural operations in Ghana and similar contexts.

KEY PHRASES

Sustainability; supply chain; sustainability challenges; technical skills; social responsibility; sustainable strategies; technology; community impact; environmental impact, agriculture

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1. INTRODUCTION

1. Background of the study

In recent years, the need for sustainability intersecting with supply chain management has become highly pertinent. Owing to the continuously mounting concern for social responsibility and environmental protection, industries and businesses alike have been compelled to incorporate eco-friendly initiatives into all facets of their supply chain framework. Consequently, a bevy of stakeholders - ranging from customers, regulators and investors to general society - are prompting transparency, moral procurement, and operations that are neighbourly to our planet (Khan *et al.*, 2021).

The need to confront business activities' environmental impact, such as resource depletion and waste generation, has led to the rise of sustainability within supply chain management which forms the actuality of the study. Apart from this, recognizing social issues including community development, fair trade, and labour rights has bolstered sustainability's significance in managing the supply chain (Putri and Hisjam, 2019).

The unwavering topicality of sustainable practices in the realm of supply chain management is completely and unmistakably obvious as businesses endeavour to enhance their brand image, bolster their competitive advantage, and comply with mandated regulations. Organizations and corporations that neglect to include sustainable segments within their respective supply chains risk enduring unfavourable publicity, dissipation of customer confidence, and probable lawful repercussions (Koberg and Longoni, 2019).

Furthermore, sustainable administration of a supply chain is intricately linked to performance proficiency, cost-cutting, and continual profitability, deeming it an indispensable element of contemporary corporate stratagem amid an environmentally conscious marketplace.

By acknowledging the importance and relevance of sustainability within supply chain operations, companies and industries can proactively adjust to changing expectations and promote a more sustainable and responsible approach.

1.1 Objectives of the Study

The main objectives of researching sustainability issues in the supply chain within JC Farms are as follows:

1. Recognizing and appraising the present sustainability behaviours and efforts within the supply chain in the company.
2. Examining the struggles and hindrances experienced by the company when executing sustainable measures across their supply chain.
3. How sustainability is viewed and where its incorporation from a cultural perspective stands within the firm and throughout the value chain. It entails grasping the organization's culture in terms of sustainability, attitudes of employees, and incorporation relating to an organization's principle and mission.
4. Discuss the nature and effectiveness of collaboration and involvement of stakeholders vis-à-vis sustainability initiatives within the supply chain. It involves establishing how to involve different categories of stakeholders (e.g., suppliers, clients, local communities) in practices on sustainability and understanding relationship dynamics as a result of impact on sustainable results.

1.2 Possible Research Questions

1. Inquire about the current eco-friendly policies and measures currently being implemented through the supply chain of the company in question.
2. What primary impediments and troubles does the company/sector encounter when putting into practice ecologically aware behaviour across its supply chain?
3. What impacts does the incorporation of sustainability principles into the supply chain have on a company's financial output such as cost reduction, income production, and market competition?
4. What outcomes for the environment might arise from supply chain activities of the company, and what methods can be employed to reduce their adverse effects with sustainable practices?
5. How does implementing sustainable supply chain management impact the company’s relationships with various stakeholders such as customers, suppliers, employees, and local communities?
6. What strategies can be implemented by the organization to surmount the outlined difficulties and enrich its sustainability effectiveness within the logistics network?

7. How can the company measure and communicate the social impact of its supply chain sustainability initiatives, such as improvements in labour conditions, human rights, and community development?

These research questions can serve as a starting point for investigating the sustainability issues within a JC Farms supply chain and provide insights into the current state, challenges, and potential strategies for improving sustainability performance.

1.3 Potential Data

1. Company internal data: This includes the sustainability metrics of supply chain operations, procurement practices, transportation, and logistics, energy consumption, waste management, among others.
2. Supplier data: This refers to information on supplier sustainability practices, certifications, adherence to environmental, and social standards, among others.
3. Stakeholder interviews: Key stakeholders in the company include company executives, supply chain managers, suppliers, customers, and employees who give the research qualitative information based on their practical experiences on sustainability practices and challenges.
4. External sources: This can be a basic set of your industry reports, regulatory guidelines, scholar literature on the subject of supply chain sustainability, or other sources mentioned in your agenda

The study aims to evaluate the sustainability performance of the whole supply chain in JC Farms. The main objective will be to review strengths, weaknesses, and areas for improvement in terms of environmental responsibility, social impact in the case of pollution of their products and process outcomes on economic viability as well. Looking at best practices as well as reviewing critical challenges related to sustainability within the supply chain, the research would provide recommendations and strategies to enhance sustainability along with drive positive change within the company.

The significance of the study lies in the important increase in global focus on sustainability and the importance of businesses and industries to adopt sustainable practices. In this context, understanding and improving the sustainability performance of the supply chain is important

for a country like Ghana with its unique environmental and social challenges. The results and recommendations of this study can assist JC Farms in Ghana to address sustainability issues, reduce negative environmental impacts, promote social responsibility, as well as help improve economic viability for the company. Moreover, the research provides insights and strategies that are applicable to other companies in quite structured contexts where they can contribute to the broader field of sustainable supply chain management.

2. LITERATURE REVIEW

2.1 Introduction to the Literature Review

In today's rapidly changing world, the significance of integrating sustainability into business practices, especially in supply chain management, is increasingly recognized (Inaba, 2016). As consumers increasingly expect companies to prioritize not only profits but also broader social and environmental responsibilities, sustainability in supply chain management has become a critical area of interest.

The purpose of this literature review on sustainable supply chain management is to explore how sustainability principles are integrated into supply chain management and to trace the evolution and development of the concept of sustainable supply chain management. This review aims to examine the strategic, transparent integration and achievement of an organization's social, environmental, and economic goals through systemic coordination of key inter-organizational business processes for enhancing long-term economic performance (Busse and Mollenkopf, 2017).

The structure of the literature review involves examining various definitions and perspectives on sustainable supply chain management from different scholars and researchers, including seminal works by Zikmund and Stanton, Peattie, and Sheth and Parvatiyar. Contributions by Min and Galle, Reinhardt and Lippman, and insights from Welford, Crane, Hoffman, Young and Kielkiewicz-Young, Zsidisin and Siferd, Dyllick and Hockerts, De Boer, Svensson, and Seuring and Müller are also pivotal (Dos Santos, Svensson and Padin, 2014).

Overall, the literature review on sustainable supply chain management aims to provide a comprehensive overview of the diverse concepts and constructs related to sustainable business practices. It seeks to understand the various perspectives, definitions, and concepts related to sustainability in supply chain management, and how effectively integrating these principles can positively impact an organization's social, environmental, and economic performance (Abbasi, 2017).

2.1 Theoretical Foundations of Sustainable Supply Chain Management (SSCM)

2.1.1 Introduction

Sustainable Supply Chain Management (SSCM) integrates concepts from environmental management, social responsibility, and economic efficiency. Recent advancements in theory provide a contemporary understanding of its multidimensional nature.

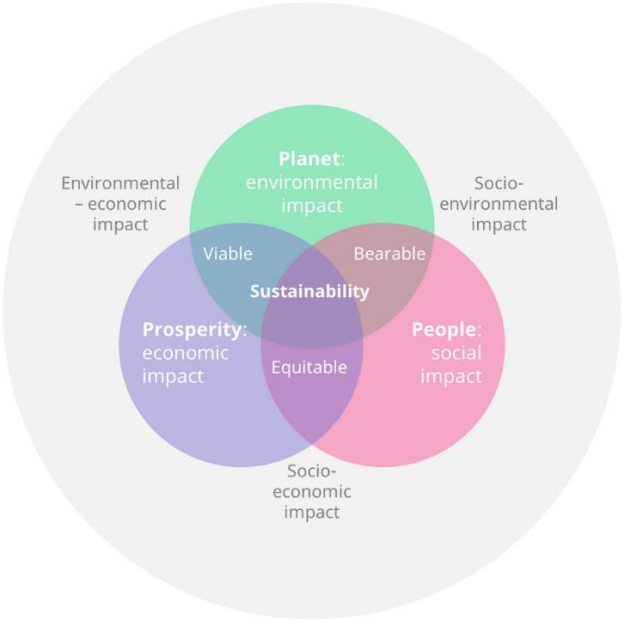
2.1.2 Contemporary Triple Bottom Line Framework in Sustainable Supply Chain Management

The discipline of sustainable supply chain management (SCM) has witnessed a notable transformation, evolving from discrete investigations in social and environmental domains to an integrated approach within corporate social responsibility (Murray and Boron, 2019). Presently, this field is advancing towards a synthesis of diverse viewpoints, culminating in the adoption of the triple bottom line (TBL) as a foundational theoretical construct.

The modern TBL framework within sustainable SCM is critical for ensuring that enterprises not only adhere to environmental standards but also fulfil societal obligations while achieving economic prosperity (Alghababsheh and Gallear, 2022). Effective implementation of this paradigm necessitates that organizations develop capabilities in alignment with the principles and objectives of sustainable SCM.

This comprehensive strategy mandates a balanced focus on the three pillars of sustainability - economic, environmental, and social - and necessitates a coordinated effort among supply chain partners to collectively pursue sustainability targets. Thus, the contemporary TBL framework in sustainable SCM underlines the need for simultaneous achievement of environmental, social, and economic objectives, aiming to meet stakeholder expectations and foster enduring, sustainable growth and performance across the supply chain.

Figure 1.: Pillars of Sustainability
Source: (The Triple Bottom Line Framework, 2020)



This framework acknowledges the imperative of integrating economic, social, and environmental considerations to ensure the long-term viability and sustainability of supply chains. By embracing the contemporary TBL framework, organizations enhance not only their efficiency and competitive edge but also make significant contributions to societal and environmental welfare, establishing a mutually beneficial scenario for all stakeholders involved (Malsinghe *et al.*, 2022).

In essence, the modern TBL framework in sustainable SCM accentuates the concurrent pursuit of economic, environmental, and social objectives, aiming to fulfil stakeholder expectations and create sustainable growth and performance throughout the company and its supply chain (Nichols, Stolze and Kirchoff, 2019).

2.1.3 Application of the Contemporary TBL Framework in Sustainable SCM

Incorporating the contemporary TBL framework in sustainable SCM is pivotal for organizations striving for enduring sustainability. This integration allows for a comprehensive consideration of economic, environmental, and social factors within supply chain operations (Malsinghe *et al.*, 2022). The approach encompasses economic considerations like cost efficiency and revenue enhancement, alongside environmental concerns such as emission

reduction and waste minimization. The social aspect of the TBL framework concentrates on promoting equitable labour practices and safeguarding the welfare of communities impacted by supply chain processes.

Overall, the application of the contemporary TBL framework empowers organizations to harmonize their supply chain practices with sustainability principles, thereby generating value for all stakeholders, including customers, employees, communities, and the environment. By implementing this framework, organizations can adeptly manage the economic, environmental, and social facets of their supply chain operations (Nichols, Stolze and Kirchoff, 2019).This holistic method aids in making informed, long-term decisions and in mitigating potential risks.

Furthermore, the TBL framework's application facilitates the identification of areas for improvement and innovation. For instance, by assessing the environmental impact of supply chain activities, organizations can pinpoint opportunities to reduce carbon footprints or to adopt more sustainable methods. Similarly, by focusing on the social dimension, organizations can advance ethical sourcing, ensure fair labour conditions, and contribute to community development initiatives.

In summary, applying the contemporary TBL framework in sustainable SCM enables organizations to align their operations with sustainability principles, delivering value to all stakeholders and achieving long-term sustainability.

2.1.4 Resource-Based View (RBV) in the Modern Context

The modern interpretation of the Resource-Based View (RBV) emphasises the strategic significance of a firm's unique resources and capabilities in securing a sustainable competitive edge, particularly within sustainable supply chain management. This framework posits that the key to achieving environmental, social, and economic sustainability lies in the effective utilization and development of specific resources and capabilities.

Central to this perspective is the recognition that firms employing sustainable sourcing practices, advanced eco-friendly technologies, and forming socially responsible partnerships are more adept at generating stakeholder value throughout their supply chain. By aligning their resource base with sustainable practices, these organizations not only bolster their reputation

but also attract a growing segment of environmentally conscious consumers, thus securing a market advantage (Andersén, Jansson and Ljungkvist, 2020).

Moreover, RBV emphasizes the necessity of continual learning and adaptation to maintain relevance in the ever-evolving landscape of sustainability (Khan *et al.*, 2022). This dynamic approach necessitates a proactive resource management strategy, focusing on the continual assessment and integration of new, sustainability-aligned resources.

For example, companies like Patagonia and IKEA have exemplified this approach by integrating sustainable materials and ethical labour practices into their supply chains, thereby reinforcing their competitive position in the market.

Additionally, RBV encourages the formation of strategic partnerships with suppliers possessing valuable resources that complement sustainability goals (Toussaint et al., 2021). Such collaborative efforts not only facilitate the achievement of sustainability objectives but also foster a competitive advantage.

However, it is crucial to acknowledge potential challenges in implementing RBV in sustainable supply chain management. These include the complexities of resource identification and allocation, the need for significant investment in capability development, and the risks associated with dependency on specific resources or partners.

In conclusion, the Resource-Based View, especially in its modern iteration, remains highly pertinent to sustainable supply chain management. It emphasizes the strategic importance of not just leveraging, but also continually developing resources and capabilities that resonate with the tripartite goal of environmental, social, and economic sustainability (Farradia, 2021). This approach, while offering a competitive advantage, also demands agility, foresight, and an openness to evolving business paradigms in the context of sustainability.

2.1.5 Institutional Theory and SSCM

The exploration of Institutional Theory within sustainable supply chain management (SCM) provides a robust framework for understanding how external institutional pressures, such as societal norms, regulations, and stakeholder expectations, drive organizations to adopt

sustainable practices. This theoretical lens posits that businesses are significantly influenced by the external environment, leading to behaviours and actions that align with sustainability goals.

A key aspect of this theory is the concept of legitimacy and conformity. Organizations frequently embrace sustainable SCM practices not only for competitive advantage but also to conform to societal expectations and industry norms, thus gaining legitimacy. This includes the adoption of eco-friendly practices, addressing social issues in supply chains, and maintaining ethical business operations.

One notable extension of this theory is its global and cultural applicability. Institutional pressures can vary significantly across different regions and cultures, affecting how sustainability is perceived and implemented. For example, the urgency and manner of addressing environmental issues may differ between a European context, with its stringent regulations, and a South Asian context, where social aspects of sustainability might be more emphasized (Saeed *et al.*, 2018).

The practical manifestations of Institutional Theory are evident in the widespread adoption of certifications like ISO 14001 and Fair Trade, which serve as benchmarks for sustainability practices in line with institutional norms. Additionally, the theory underlines the role of isomorphic processes. This phenomenon, where organizations within a field begin to mirror each other's practices to gain legitimacy and reduce uncertainty, can be seen in the growing standardization of sustainable practices across industries (Brömer, Brandenburg and Gold, 2019).

However, Institutional Theory is not without its challenges. There is a risk of organizations engaging in superficial compliance—adopting sustainable practices in appearance but not in substance. Balancing the need to adhere to external pressures with genuine internal capability building is a critical challenge for many organizations.

The theory’s influence extends to the development of frameworks and practices that align with the triple bottom line of sustainability. These frameworks contribute not just to organizational efficiency and risk management but also strengthen stakeholder relationships, fostering a more sustainable and responsible supply chain (Reinerth, Busse and Wagner, 2019).

Incorporating case studies can further enrich this analysis. For instance, the transformation of IKEA's supply chain towards sustainability under institutional pressures exemplifies how a global corporation can align its operations with environmental and social standards while maintaining economic viability (Leone, Picone and Destri, 2023).

In conclusion, Institutional Theory provides a valuable lens for understanding the adoption of sustainable SCM practices. It highlights the importance of external pressures in shaping organizational strategies and behaviours, while also recognizing the complexities and challenges inherent in adapting to these pressures in a diverse and evolving global business environment.

2.1.6 Supply Chain Network Theory in the Modern Era

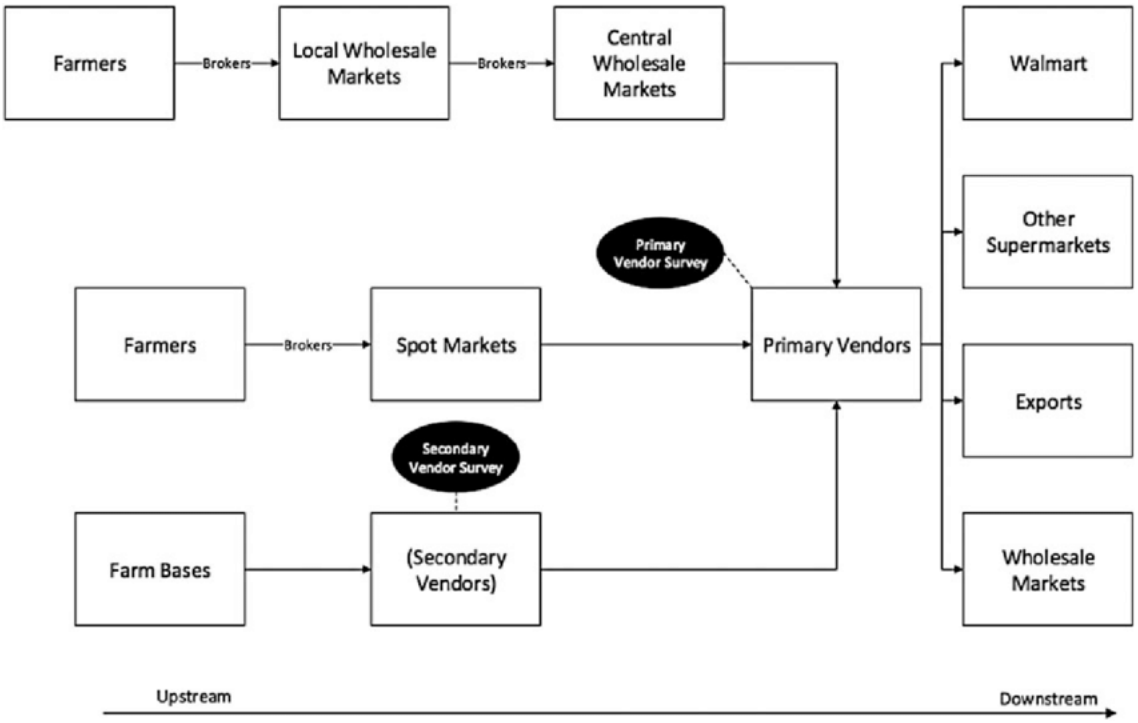
The modern conceptualization of Supply Chain Network Theory offers a profound understanding of the intricate and interdependent nature of supply chains in today's global economy. This theory delineates supply chains as dynamic and complex networks, characterized by multifaceted relationships among various organizations and stakeholders. It transcends the traditional linear view, presenting supply chains as interconnected systems where the flow of goods, information, and resources is influenced by each node and link within the network. This holistic approach is essential in enhancing performance, sustainability, and resilience of supply chains (MacCarthy *et al.*, 2016).

A notable application of this theory is evidenced in Walmart's collaboration with its suppliers to enhance sustainability. By adopting the principles of Supply Chain Network Theory, Walmart was able to orchestrate a comprehensive sustainability programme, engaging suppliers to integrate sustainable practices across their operations according to Walmart (Negi and Anand, no date). This initiative led to significant reductions in greenhouse gas emissions, waste, and energy usage, showcasing tangible environmental benefits. Simultaneously, it improved supplier relationships and achieved substantial cost efficiencies, illustrating the economic viability of sustainable practices.

This Walmart case study exemplifies the efficacy of employing a network-focused approach in supply chain management. Such an approach fosters collaboration, improves transparency, and

encourages shared responsibility among all stakeholders. It moves beyond mere transactional interactions, advocating for strategic alliances and long-term partnerships.

Figure 2.: Walmart Vendors
Source: (Michelson *et al.*, 2018)



Furthermore, Supply Chain Network Theory is particularly relevant in the context of technological advancements. The integration of digital technologies like artificial intelligence (AI), blockchain, and the Internet of Things (IoT) within supply chain networks has the potential to revolutionize these systems (Ben-Daya, Hassini and Bahroun, 2019). These technologies can enhance real-time data sharing, optimize logistics, and improve traceability, thereby increasing efficiency and reducing vulnerabilities.

The theory also addresses broader environmental and social objectives. By promoting sustainable practices across the network, organizations can significantly contribute to global sustainability goals. This not only includes environmental stewardship but also encompasses social responsibility, such as ensuring fair labour practices and supporting community development (Jabbarzadeh, Fahimnia and Sabouhi, 2018).

Nevertheless, the implementation of Supply Chain Network Theory is not without challenges. The complexity of managing a multitude of relationships, aligning diverse stakeholder

interests, and handling vast amounts of data can be daunting (Sweeney, Grant and Mangan, 2015). Moreover, the shift from a linear to a network-centric supply chain model requires a fundamental change in organizational mindset and capabilities.

The application of Supply Chain Network Theory in modern supply chain management represents a paradigm shift. It encourages organizations to view their supply chains as holistic ecosystems, where collaborative and strategic decision-making, facilitated by advanced technologies, leads to enhanced sustainability, resilience, and competitive advantage. This theory not only aligns with contemporary business strategies but also resonates with the pressing need for sustainable and responsible global trade practices.

2.1.7 Life Cycle Assessment (LCA) and its Current Relevance

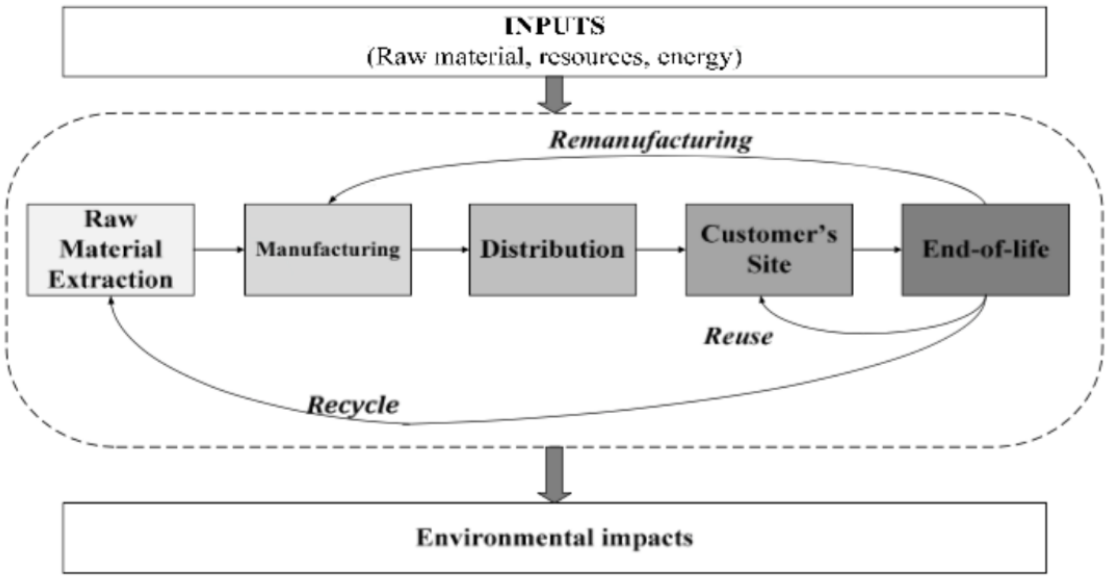
The Life Cycle Assessment (LCA) framework represents a key method for assessing the environmental impacts of a product or service across its entire life cycle. This comprehensive framework systematically analyses the inputs, outputs, and potential environmental impacts at each stage of a product's journey, encompassing the extraction of raw materials, manufacturing, transportation, usage, and eventual disposal or recycling.

A prime example of LCA's application is found in the automotive industry. Consider the case study of Tesla, Inc., which employed the LCA framework to assess the environmental impact of its electric vehicles (EVs) (Accardo *et al.*, 2023). Through LCA, Tesla was able to evaluate the carbon footprint and energy consumption from the production of car batteries to the vehicle's end-of-life. This assessment helped Tesla identify areas for improvement, leading to innovations in battery recycling processes and more efficient manufacturing techniques, thereby reducing the overall environmental impact of their EVs.

The current relevance of the LCA framework in supply chain management lies in its ability to offer organizations crucial insights into the environmental sustainability performance of their operations (Genovese *et al.*, 2017). By implementing LCA, companies can pinpoint environmental hotspots within their supply chains and develop targeted strategies to mitigate these impacts. This approach is instrumental in reducing carbon footprints, conserving resources, and minimizing environmental harm, aligning with global environmental goals such as carbon neutrality and resource efficiency.

Moreover, LCA provides a multi-faceted view of a product's environmental footprint, evaluating various indicators like greenhouse gas emissions, energy and water usage, and waste generation (Ma *et al.*, 2021). This holistic perspective enables organizations to prioritize and effectively guide their sustainable supply chain initiatives.

Figure 3.: Product Life Cycle Figure
Source: (Suhariyanto, Wahab and Rahman, 2018)



An additional benefit of LCA is its role in ensuring compliance with environmental regulations and reporting standards. As businesses increasingly come under scrutiny for their environmental impact, LCA serves as a vital tool for organizations to transparently report their sustainability performance and adhere to regulatory requirements (Khan *et al.*, 2021).

However, it's important to note that LCA is not without challenges. The complexity of conducting a comprehensive life cycle analysis requires significant expertise and often extensive data, which can be resource-intensive.

To encapsulate, the LCA framework is an essential tool for modern organizations aiming to enhance their sustainability performance. Its application, as demonstrated in the Tesla case study, leads to informed decision-making and strategic improvements in supply chain management, contributing significantly to the reduction of environmental impacts and the promotion of sustainable business practices.

The theoretical foundations of SSCM continue to evolve, integrating modern perspectives and approaches. These contemporary theories provide a comprehensive framework for understanding and managing sustainable supply chains, emphasizing the importance of balancing economic, environmental, and social factors for long-term success and resilience.

2.2 Sustainable Supply Chain Practices

In the realm of sustainable supply chain management, a diverse range of practices have been adopted to reduce environmental impacts and promote social responsibility. This section reviews some of these practices, exploring their implementation, benefits, and associated challenges.

Supplier Collaboration and Engagement has emerged as a cornerstone strategy. This approach involves partnering with suppliers to share best practices and improve their environmental and social performance. By setting sustainability targets and providing training or resources, organizations can extend their sustainability efforts across the supply chain. The benefits of this collaboration are manifold, including enhanced supply chain transparency, improved environmental performance, and the promotion of fair labour practices (Seuring and Mü Ller, 2008). However, implementing such collaborative strategies is not without challenges. Resistance from suppliers, difficulty in monitoring supplier performance, and the need for ongoing communication and relationship management present significant hurdles. A notable example of effective supplier collaboration is seen in the efforts of companies like Apple, which has worked closely with its suppliers to reduce carbon emissions, as highlighted in their Environmental Responsibility Report (Li, Yang and Pan, 2021).

Innovative Packaging and Materials represent another key sustainable practice. Many organizations are now exploring sustainable alternatives to traditional packaging materials. This shift includes the adoption of biodegradable or compostable packaging, recycled materials, and reusable packaging solutions. Companies like Patagonia have led the way, utilizing recycled materials in their products and packaging, while platforms like Loop enable consumers to rent and return reusable packaging for various products. The advantages of these innovative approaches are clear: reduced waste, decreased carbon emissions, and an enhanced customer perception of sustainability (Chen *et al.*, 2017). However, these practices are also confronted with challenges, such as the higher costs associated with sustainable packaging

options, limited availability of sustainable materials, and the need for consumer education to ensure proper usage and disposal of these materials.

Renewable Energy Sourcing in supply chain operations marks a significant shift towards sustainability. This involves the adoption of solar panels, wind turbines, and other renewable energy sources to power supply chain operations. The procurement of renewable energy credits and engagement with suppliers that use renewable energy in their production processes are also part of this strategy (Paula Barbosa-Póvoa, Da Silva and Carvalho, 2017). The benefits of integrating renewable energy into supply chain operations are considerable. They include reduced greenhouse gas emissions, decreased reliance on fossil fuels, and potential long-term cost savings. However, transitioning to renewable energy sources can be challenging, particularly in terms of initial investment and navigating the complexities of energy markets.

In summary, the adoption of sustainable supply chain practices is not only beneficial in terms of environmental and social impacts but also crucial for the long-term viability of businesses. While challenges exist in implementing these practices, the potential benefits they offer in promoting a more sustainable and responsible future are undeniable. Future research could explore how these practices are adapted and implemented across different industries and geographical regions, offering deeper insights into the scalability and effectiveness of sustainable supply chain management strategies.

2.3 Supply Chain Management in Ghana

Supply chain management plays a crucial role in ensuring the effective movement of goods, services, and information from suppliers to customers in Ghana. Ghana's supply chain landscape consists of various sectors such as agriculture, manufacturing, retail, and logistics. The supply chain in Ghana faces several challenges that impact its efficiency and effectiveness. These challenges include:

1. Limited infrastructure: Ghana's supply chain infrastructure, such as roads, ports, and warehouses, is still developing and lacks in some areas. This limits the smooth flow of goods and increases transportation costs.

2. Inefficient logistics: Ghana's supply chain sector struggles with inefficient logistics practices, including poor inventory management, inadequate transportation networks, and limited connectivity between different stages of the supply chain.
3. Limited technology adoption: Many supply chain operations in Ghana still rely on manual processes and have not fully embraced digital technologies. This hinders real-time visibility, data accuracy, and overall operational efficiency (Ganiyu *et al.*, 2020).
4. Fragmented market: The Ghanaian supply chain sector is characterized by a large number of small and medium-sized enterprises operating independently. This fragmentation leads to a lack of coordination and collaboration, resulting in suboptimal supply chain performance (Ganiyu *et al.*, 2020).

Despite these challenges, there are opportunities for improvement and growth in Ghana's supply chain sector. These opportunities include:

1. Integration of supply chain networks: By promoting collaboration and integration among different players in the supply chain, Ghana can enhance efficiency and reduce cost (Som, Cobblah and Anyigba, no date).
2. Enhancing technology adoption: Encouraging the use of digital technologies, such as supply chain management systems, inventory tracking tools, and data analytics, can improve visibility, optimize inventory levels, and streamline processes (Opoku-Fofie, Nadarajah and Yasin, 2022).
3. Supporting infrastructure development: Investing in the development of transportation and storage infrastructure, such as roads, ports, and warehouses, can enhance the efficiency and effectiveness of Ghana's supply chain operations.
4. Optimizing inventory management: Implementing effective inventory management techniques, such as just-in-time and vendor-managed inventory systems, can help reduce inventory holding costs and improve overall supply chain performance (Dadzie, Winston and Hinson, 2015).
5. Implementing sustainable and environmentally friendly practices: Ghana has the opportunity to adopt green supply chain practices, such as reducing emissions, improving energy efficiency, and promoting sustainable sourcing and waste management (Fikri, Nainggolan and Hutasuhut, no date). These initiatives can not only contribute to sustainable development but also enhance the reputation and competitiveness of Ghana's supply chain sector.

In Ghana, there are specific policies and initiatives that are influencing supply chain practices. One such initiative is the National Single Window system, which aims to streamline trade processes and improve efficiency in customs procedures (Famiyeh and Kwarteng, 2018).

Another policy is the Ghana National Trade Facilitation Strategy, which focuses on enhancing coordination and collaboration among various government agencies involved in trade facilitation (Ahiakpor *et al.*, 2019).

Also, the Ghana Supply Chain Development Programme, implemented by the Ministry of Trade and Industry, aims to strengthen supply chain capacities and promote best practices among small and medium-sized enterprises in Ghana. These initiatives are expected to drive improvements in supply chain practices, foster innovation, and contribute to the overall growth of Ghana's supply chain sector (Tian *et al.*, 2021).

In recent years, Ghana's supply chain sector has been evolving and facing both challenges and opportunities. Some of the challenges in Ghana's supply chain sector include inefficient value addition to agricultural produce, limited implementation of transactional supply chain governance, and inadequate infrastructure to support efficient supply chain operations. On the other hand, there are several opportunities for Ghana's supply chain sector. These include the expansion of infrastructure, such as roads, ports, and warehouses, which can enhance the efficiency and effectiveness of Ghana's supply chain operations.

Moreover, Ghana has the opportunity to leverage technology and digitalization to improve supply chain visibility and collaboration. Likewise, the growing consumer demand for sustainable and ethically sourced products presents an opportunity for Ghana's supply chain sector to differentiate itself by implementing environmentally friendly practices, such as green supply chain management.

2.4 Case Studies and Comparative Analyses

Agricultural supply chains are key players in sustainable development, ensuring the availability and accessibility of food, while minimizing environmental impacts. In recent years, there has been a growing focus on sustainability in agricultural supply chains, with a particular emphasis on reducing negative environmental impacts and promoting social and economic development.

Several case studies and comparative analyses have been conducted, shedding light on trends, challenges, and best practices in sustainability within agricultural supply chains (Malak-Rawlikowska *et al.*, 2019).

One such case study that is relevant to JC Farms, a rubber farm, is the research conducted on sustainable supply chains for agriculture. This research focuses on managing resources and risks to create a more effective, efficient, and productive supply chain network in order to produce more valuable and competitive agricultural commodities, while also reducing negative environmental impacts and contributing to societal development (Nguyen and Sarker, 2018).

According to the research conducted on sustainable supply chains for agriculture, it is important to evaluate the supply chain risk. This can be done through the application of methods such as the TOPSIS method combined with the entropy method, which provide a comprehensive evaluation of supply chain risk in agricultural production and transport (Fazekaš, Bobera and Ćirić, 2017). These methods help in identifying potential risks and developing strategies to mitigate them, thus enhancing the sustainability of the agricultural supply chain.

Another important aspect of sustainability in agricultural supply chains is the assessment of farming systems and their sustainability (Malak-Rawlikowska, A. et al., 2019). This involves using methodologies like life-cycle assessment to evaluate the sustainability of different farming systems and farms within them. The results of these assessments can provide valuable insights into the sustainability of the entire supply chain and help identify areas for improvement. Some challenges that have been identified in achieving sustainability in agricultural supply chains include the lack of data-driven analysis and practical frameworks, as well as a need for survey-based and other research methods to understand and improve sustainability in food supply chains. To address these challenges, it is crucial to establish data-driven analysis and practical frameworks for assessing sustainability in agricultural supply chains (Desclee, Sohinto and Padonou, 2021).

Additionally, collaboration and partnerships among stakeholders in the supply chain, including farmers, processors, retailers, and consumers, are crucial for implementing sustainable practices. Moreover, implementing sustainable practices can also lead to economic benefits, such as improved efficiency and reduced costs.

Finally, sustainability in agricultural supply chains is crucial for achieving sustainable development and growth. It requires evaluating supply chain risk, assessing farming systems for sustainability, and establishing data-driven analysis and practical frameworks.

Comparative analysis shows that sustainability in agricultural supply chains is a trending area of research, with a focus on efficient and sustainable management practices. Some best practices for achieving sustainability in agricultural supply chains include: implementing risk management techniques, such as the combined use of the entropy method and comprehensive evaluation, to identify and mitigate potential risks in agricultural production and transport; using life-cycle assessment to evaluate the sustainability of farming systems and farms, and making improvements based on the assessment results; establishing data-driven analysis and practical frameworks to measure and monitor sustainability performance in agricultural supply chains; promoting collaboration and partnerships among stakeholders in the supply chain to implement sustainable practices; and considering the socio-cultural, agri-environmental, and economic factors when designing and implementing sustainability assessment and monitoring processes in the supply chain.

In conclusion, achieving sustainability in agricultural supply chains is a complex process that requires a multidisciplinary approach and collaboration among stakeholders.

2.5 Sustainable Agricultural Supply Chain Practices

The present holistic case report takes a detailed look into the innovative initiatives taken up by JC Farms for integrating sustainability within their supply chain. These include taking up Good Agricultural Practices (GAPs) for more environmentally sound meeting of farming needs, other agriculture techniques to make available optimum resources and adopting a collaborative approach with suppliers towards mutually shared sustainability goals.

Not to mention, this investigation examines the commitment to resource efficiency of JC Farms, their record of involvement and working with communities across their different locations, as well as their deliberate way of addressing difficulties and intricacies brought about by sustainable agricultural supply chain management.

This case study should prove invaluable in understanding the intricate dynamics of sustainable agriculture, the role that technology and innovation plays, and how collaboration can result in fostering a more sustainable future in the field of agriculture.

They have taken several steps to improve sustainability in their operations, including:

1. Implementing Good Agricultural Practices: JC Farms has adopted GAPs to minimize the negative environmental impacts of their farming practices and promote sustainable production methods. This includes minimizing the use of synthetic chemicals and fertilizers, practicing efficient irrigation techniques, and adopting integrated pest management strategies.
2. Building Relationships with Suppliers: Working closely with their suppliers to ensure that sustainability practices are being followed throughout the supply chain. This includes sourcing sustainable inputs, such as seeds and fertilizers, and promoting responsible sourcing practices.
3. Promoting Resource Efficiency: Focusing on reducing waste and improving resource efficiency in their operations. This includes implementing practices such as recycling and composting, optimizing energy use, and minimizing water consumption through efficient irrigation systems.
4. Engaging in Community Development: Actively participating in community development programme to enhance the social sustainability of their supply chain. This includes providing training and education opportunities for local farmers, supporting local schools and healthcare facilities, and promoting fair employment practices.

Trends in sustainable agricultural supply chain practices include an increased focus on traceability and transparency. This allows consumers to have better information about the origin and production methods of agricultural products, leading to increased demand for sustainable and locally sourced goods.

Challenges in Sustainable Agricultural Supply Chain: One of the main challenges in sustainable agricultural supply chains is the complexity and diversity of stakeholders involved. This includes farmers, suppliers, processors, distributors, retailers, and consumers, each with their own interests and objectives. Additionally, climate change poses a significant challenge to sustainable agricultural supply chains.

Best Practices in Sustainable Agricultural Supply Chains: Promoting collaboration and partnerships among stakeholders to enhance sustainability practices throughout the supply chain.

- Investing in research and development to innovate new sustainable practices and technologies.
- Engaging in ongoing training and education for farmers and suppliers to promote adoption of sustainable practices.
- Implementing certifications and standards, such as organic or fair-trade certifications, to ensure compliance with sustainable practices.
- Adopting advanced technology and data analytics to improve supply chain visibility and optimize resource utilization.
- Implementing circular economy principles, such as recycling and composting, to minimize waste and close the loop in the agricultural supply chain.

2.6 Gaps in Existing Literature

Undeniably, the body of available literature on sustainability in agricultural supply chains has been quite informative, especially in highlighting trends, challenges, as well as best practices. However, there are prevailing gaps and under-researched areas evident in the current literature that clearly require attention. These gaps are essential in pinpointing those areas that require further research so that a better understanding of the concept and implementation of sustainability in agricultural supply chains is attained.

2.6.1 Identified Gaps

1. Integration of Sustainability with Digital Transformation: There is a lack of research exploring the integration of sustainability practices with digital transformation in agricultural supply chains. This gap in the literature is significant because digital transformation has the potential to enhance sustainability in agricultural supply chains by enabling better data collection, analysis, and decision making. By integrating digital technologies such as the Internet of Things, artificial intelligence, and cloud computing with sustainability practices, agricultural supply chains can achieve greater efficiency, reduce waste, and minimize environmental impacts (S. A. R. Khan et al., 2021).

2. Assessment of Social Impact: While there is some research on the environmental and economic aspects of sustainability in agricultural supply chains, there is a dearth of studies examining the social impact (Kodrat et al., 2018). This gap in the literature is important because sustainable agricultural supply chains should not only be environmentally and economically sustainable but also socially responsible. By understanding and addressing the social impact of agricultural supply chains, we can ensure that the well-being of farmers, workers, communities, and consumers is taken into account.

Furthermore, the lack of research on the integration of sustainability principles with logistics and transportation in agricultural supply chains is another gap in the existing literature. This gap is significant because logistics and transportation play a crucial role in the sustainability of agricultural supply chains. By optimizing transportation routes, reducing emissions, and improving packaging and storage practices, the environmental impact of agricultural supply chains can be minimized:

1. Measurement and Evaluation of Sustainable Practices: Many studies focus on identifying sustainable practices in agricultural supply chains, but there is a lack of research on measuring and evaluating the effectiveness of these practices in achieving sustainability goals. This gap in the literature is important because without proper measurement and evaluation, it becomes challenging to determine the impact of sustainable practices and identify areas for improvement. This information contributes to the understanding of trends, challenges, and best practices in sustainability in agricultural supply chains.
2. Integration of Smallholder Farmers: Smallholder farmers play a crucial role in agricultural supply chains, especially in developing countries. Integrating smallholder farmers into sustainable agricultural supply chains poses both opportunities and challenges. On the one hand, integrating smallholder farmers into sustainable agricultural supply chains can contribute to poverty reduction, food security, and inclusive economic growth. On the other hand, smallholder farmers often face barriers such as limited access to resources, lack of knowledge and technology, and limited market opportunities.

   Addressing these challenges and finding innovative ways to include smallholder farmers in sustainable agricultural supply chains is key to achieving a more inclusive and equitable food system.

3. Traceability and Transparency: The ability to trace a product's journey through the supply chain and provide transparent information to consumers is crucial for sustainability in agricultural supply chains. Traceability and transparency allow consumers to make informed choices and trust that the products they purchase are produced in an environmentally and socially responsible manner.
4. Collaboration and Partnerships: Achieving sustainability in agricultural supply chains requires collaboration and partnerships among various stakeholders, including farmers, producers, retailers, government agencies, non-governmental organizations, and consumers. These partnerships enable the sharing of knowledge, resources, and best practices to address sustainability challenges holistically.
5. Emerging Technologies: The use of technology, such as Internet of Things and data analytics, can greatly contribute to sustainability in agricultural supply chains. These technologies can help optimize resource use, improve productivity, reduce waste and enhance decision-making.
6. Policy Support: Governments play a crucial role in promoting and supporting sustainability in agricultural supply chains through policy interventions. Policies that incentivize sustainable practices, provide financial support for smallholder farmers, promote traceability and transparency and encourage collaboration among stakeholders can create an environment conducive to sustainability in agricultural supply chains.
7. Supply Chain Resilience and Sustainability: Ensuring the resilience and sustainability of agricultural supply chains is essential to overcome challenges such as climate change, natural disasters, and economic shocks. Implementing measures such as diversification of crops, building resilient infrastructure, promoting sustainable farming practices and investing in research and development can help enhance the resilience and sustainability of agricultural supply chains.
8. Employee Engagement and Sustainability Training: Investing in employee engagement and sustainability training can contribute to sustainability in agricultural supply chains. It can help to raise awareness, build capacity and empower workers to adopt sustainable practices and contribute to the overall sustainability goals of the supply chain.

3. METHODOLOGY

3.1 Introduction

The research uses the qualitative approach to access sustainable supply chain practices in the agricultural industry with JC Farms as the case study. More importantly, since this study is investigating elusive as well as complicated aspects surrounding sustainability that cannot be measured but are significant to understand dynamics within supply chain management, it becomes apposite to carry out a detailed investigation using the qualitative approach (Russo *et al.*, 2019).

3.2 Rationale for Choosing a Qualitative Approach

The decision to utilize a qualitative methodology stem from its effectiveness in uncovering detailed insights about people's attitudes, behaviours and experiences (Tuckerman, Kaufman and Danchin, 2020). This approach enables the researcher to delve into the subjective, often tacit knowledge and perceptions of those involved in the supply chain, from farm managers to suppliers and other stakeholders. Unlike quantitative methods, which seek to test hypotheses through numerical data, qualitative research aims to construct a narrative that provides a deeper comprehension of the researched phenomena (Birchall, 2016).

3.2.1 Research Design

The design of this qualitative study revolves around a case study strategy (Tetnowski, 2015). JC Farms serves as the primary case, offering a rich, contextualized understanding of sustainable practices within the agricultural supply chain. Case studies are a staple of qualitative research when the objective is to gain a comprehensive understanding of a particular instance or phenomenon in its real-life context.

3.2.2 Data Collection Methods

The study employs a variety of data collection methods to ensure a robust and comprehensive understanding of the research topic:

Semi-Structured Interviews Participants
Manager:

- Educational Background: The study will specifically include managers who are educated with a minimum of a bachelor's degree in relevant fields such as agriculture, business management or environmental science. This criterion is chosen based on the assumption that higher education, particularly in these areas, may influence one's knowledge of, attitudes toward and engagement with sustainable practices (Machado *et al.*, 2018).

Employees:

- Educational Background and Age: In contrast, the employee participants will be those who have an education level of up to high school and are over the age of 35 (Baykal and Divrik, 2023). This demographic is selected to explore how practical experience and generational perspectives contribute to the understanding and implementation of sustainability within their roles (Balčiūnaitienė and Petkevičiūtė, 2020). The age criterion, particularly, is intended to capture insights from individuals who may have witnessed significant changes in agricultural practices over time and can provide a diverse perspective on sustainability transitions.
- Contextual Focus: Observational sessions will be carefully planned to ensure a diverse representation of practices and interactions across various levels of education and experience within the farm operations (Dean, 2019). The observations will focus not just on the practices themselves but also on how knowledge is shared and applied among employees with different educational backgrounds and among management teams with formal education in relevant disciplines (Kyveryga, 2019).

3.1.2 Justification

The basis behind this differentiated approach to selecting participants based on education and age is to capture a wide spectrum of insights into sustainable practices at JC Farms (Gołębiewska, Grontkowska and Gębska, 2020). Educational background can significantly influence one’s understanding of sustainability concepts, while age and experience provide practical insights and historical perspectives on changes within the agricultural industry, especially in the context of sustainability (Widiyanti *et al.*, 2021).

3.2 Data Analysis

Data analysis will involve categorizing responses and observed behaviours by participant demographics (education level and age) to discern patterns or differences in how sustainability

is understood, valued, and practiced. This approach will help in identifying whether educational background and age-specific experiences influence the perception and implementation of sustainability practices within the agricultural supply chain.

Table I.: Overview of Data Collection Methods
Source: Authors' own compilation

Method	Description	Participants Involved	Number of Sessions
Semi-Structured Interviews	Interviews focused on gaining insights into sustainability practices and challenges at JC Farms.	Managers, Employees, Suppliers	10 sessions
Observational Research	Direct observation of practices at various JC Farms operational sites without intervention.	N/A (non-participant observation)	

3.2.1 Semi-structured Interviews

In order to gain comprehensive insights into the perceptions and practices of sustainability at JC Farms, as well as the challenges faced and the impact of these practices on their roles, a semi-structured interview approach will be utilized. According to Jonathan A. Smith's guidelines, a semi-structured interview schedule will be prepared to keep the interview focused on the research topic and elicit the respondent's general view on their approach toward their professional practice that contributes to the betterment of underprivileged stakeholders and needy sections of society (Kumari *et al.*, 2021).

Semi-structured interviews are quite important during the data collection process because of their significance in collecting qualitative data in very sensitive and detailed areas that need deliberation and development, e.g., sustainability practices in supply chains. This approach maintains the flexibility of open-ended questions and the directionality that a well-structured

guide gives to ensure rich and in-depth answers about the experiences, perceptions and practices of the participants (Boșnak, 2016).

Table II.: Semi-Structured Interview Guide Themes
Source: Authors' own compilation

Theme	Description
Sustainability Practices	Questions aimed at understanding the specific sustainable practices implemented at JC Farms.
Perceptions of Sustainability	Exploration of stakeholders' attitudes and beliefs about sustainability within their roles and the broader supply chain.
Challenges and Impacts	Inquiry into the challenges faced in implementing sustainable practices and their impacts on the business and community.

3.2.2 Reasoning for Selection

Interviews were semi-structured in format, since it allows a more conversational context where participants can provide fuller and more open accounts of their experiences than is possible through structured interviews or a survey (DeJonckheere and Vaughn, 2019). This is of great help when it comes to the high-structured research looking into rather complex subjects, for example, sustainability, where views and practices in each individual may differ to a large extent from personal to personal (Braun and Clarke, 2013). This is mostly due to the semi-structured interview technique, which enables exploring variations both within and between—i.e., shared and unique aspects of sustainable practices around JC Farms with its stakeholders.

3.2.3 Implementation and Flexibility

From the focus of the study, it would be postulated that participants could vary from managerial staff and employees of JC Farms to suppliers and perhaps even customers. The design of the interview guide is more especially critical in that it will form a very useful framework that will help make sure the interviews remain focused on research objectives but also allow detours into emergent themes or unanticipated topics (Mashuri *et al.*, 2022). It is this balancing

structure with flexibility that gives semi-structured interviews their hallmark and allows the interviewer the freedom to follow new lines of inquiry as they emerge within the framework of the interview.

3.2.4 Analytical Advantages

The semi-structured interviews have the potential to collect very detailed stories and personal reflections, which are really very important for the comprehension of the very many complexities tied to sustainability in agricultural supply chains (Adeoye-Olatunde and Olenik, 2021). This analytic form enables the researchers to identify patterns, themes and divergences evident in their data through thematic analysis or other qualitative methods of data analysis, providing them with a detailed account of sustainability practices, challenges, and impacts. This is the level of detail and depth one would need to understand—from the intricacies of sustainability in supply chains, which can go from how resources are managed to ethical labour practices.

3.2.5 Ethical Considerations and Reflexivity

Semi-structured interviews, therefore, represent an ethical undertaking bearing huge responsibility towards participants that involve careful handling of issues regarding confidentiality, informed consent and keeping a sense of sensitivity to the topics of discussion. Reflexivity, in this sense, is needed in qualitative research to be used as a continuous reflection by the researcher on the effects that may come about in both the research process and its interpretation (Husband, 2020).

According to Orellana et al., the semi-structured interview method enables researchers to collect detailed and comprehensive data, resulting in a deeper understanding of the participants' experiences. In this study, the researchers have selected semi-structured interviews as the mode of data collection. The semi-structured interview approach was chosen because of its ability to obtain more comprehensive and in-depth information through open-ended questions.

Expanding on the data collection methods for Semi-structured Interviews include:

- Planning: List for instance key personalities at JC Farms and the other stakeholders whose interview will be conducted. This includes managers, employees, suppliers, customers if needed.

- Development of Interview Guide: This involves developing an interview guide whose questions may be left open in order to elicit responses while addressing a number of issues in the research, including the perceptions on sustainability practices, these challenges that they experience when implementing sustainability practices and finally how these affect their work (Constantin *et al.*, 2021).

- Conduct Interviews: The interviews can be conducted either in face to face, telephone, video-based interview sessions. All of the individual interviews will be recorded (with permission) and the transcript shall be generated and implemented as an analytical tool (Grit, 2019).

- Flexibility: Be prepared to follow new leads or topics that may arise 'on topic' and improvisation can move ad-lib from one to another as it develops (He and Gao, 2023).

Table III.: Key Stakeholders for Interviews
Source: Authors' own compilation

Stakeholder Group	Role in Supply Chain	Purpose of Inclusion
Managers	Decision-making and oversight	To understand strategic and operational decisions related to sustainability
Employees	Day-to-day operations	To capture on-the-ground practices and immediate challenges
Suppliers	Provision of goods and services	To explore upstream sustainability practices and challenges

In these circumstances, this would suggest that semi-structured interviews represent a rigorous way through which to look into the complexities surrounding sustainable practice within agricultural supply chains. This medium brings in the flexibility that is highly sought after to gain deep insight into the perceptions, experiences and difficulties of stakeholders participating in sustainability efforts. Therefore, through sensible practice in semi-structured interviews, if implemented and analysed, researchers could contribute to a more effective understanding of

sustainable practice in the agricultural industry, which, in turn, would underpin further work on sustainability, bringing its results closer to the needs of marginalized groups.

3.3 Observational Research

Observational study directly observes the individuals or groups with no manipulation or direct intervention through the researcher. Through the form of observational research, one can get a unique opportunity to study individuals and groups in their natural activities in everyday settings (Weston, Krein and Harrod, 2021). Equally, the use of observational research would help in receiving knowledge of the behaviours, actions, interactions of the participants without falling under the influence or bias set by a researcher on the research. For Kallio et al., the benefits from observational research—more than with traditional interviews or self-report questionnaires—are even more related and informative, referred to as non-verbal cues, social dynamics, and context particulars. When using observation analysis, the following is highly considered (Hemming *et al.*, 2020);

- Site Visits: Plan visits to various operational sites of JC Farms, such as farms, processing facilities and distribution centres.
- Observation Focus: Pay attention to the implementation of sustainable practices, interactions among employees, signage or information on sustainability and overall operational workflow.
- Field Notes: Keep detailed field notes documenting observations, including date, time, location and specific practices or behaviours observed.

Each of these methods contributes uniquely to the richness and depth of the data collected, providing a comprehensive picture of sustainable supply chain practices. The triangulation of these methods not only enhances the credibility of the findings but also ensures a well-rounded understanding of the complexities involved in implementing sustainability in agricultural supply chains.

Table IV.: Observational Research Focus Areas
Source: Authors' own compilation

Focus Area	Description	Observational Goals
Sustainable Practices Implementation	Observation of how sustainability practices are actually implemented in the field and processing units.	To verify reported practices and identify any discrepancies or innovations.
Employee Interactions	Watching interactions among employees regarding sustainability practices.	To understand the social dynamics influencing sustainability practices.

3.3.1 Basis for Employing Observational Research

The choice to use observational research stems from its ability to capture real-time data and behaviours within their natural environment. This approach is invaluable for understanding the practical implementation of sustainability practices within agricultural supply chains, where actions and interactions can reveal more about the operationalization of sustainability than interviews alone (Pratt and Sala, 2021).Observational research allows for the documentation of practices that may not be articulated in an interview or survey, offering a richer, more nuanced view of sustainability in action.

3.3.2 Execution and Focus

The implementation of observational research within the study involves strategic planning and execution. Site visits to various operational facets of JC Farms, including farms, processing facilities and distribution centres, are crucial. The focus during these observations ranges from the implementation of sustainable practices, such as resource management and waste reduction techniques, to interactions among employees and the presence of sustainability-related signage or information.

This is important, therefore, in the observatory research: there must be a structured guide to the observation that lays down exactly the relevant behaviours, practices or conditions. This helps in keeping the observation focused and relevant for the research objectives but, at the same

time, is flexible enough to see the possibility of finding unexpected phenomena (Ortegon and Hernandez, 2021).

3.3.3 Analytical Insights

Observational research offers unique analytical advantages by providing data on practices as they are enacted, rather than as they are reported or perceived. Through detailed field notes and the analysis of observed behaviours and conditions, researchers can identify discrepancies between stated policies or practices and their actual implementation. The method, therefore, would be very effective in the determination of the non-verbal messages, social dynamics and context elements that influence the sustainability practice (Eldh, Zijpp and Rycroft-Malone, 2020). In a simplified explanation, it means the method has rich understanding to act as a complement to the data gathered from other methods.

3.3.4 Ethical Considerations and Challenges

In settings like the JC Farms, this would mean that ethical considerations in such a setting of an observational research design would involve making the participants know that they are under observation and possibly getting consent where possible (Czarnota-Bojarska, 2021). I will have to tread a fine line between observation and intrusion, making sure the privacy and dignity of participants is maintained.

This paper is concerned with an observational research design that uses real-world observation to critically apply unobtrusive methods in further understanding sustainability practice within agricultural supply chains. This will only help in triangulating the results from semi-structured interviews, but also enrich the findings and thus enable the development of a multidimensional view of sustainability practices at JC Farms. Observational research, of equal responsibility of planning and execution and ethical consideration, contributes quite significantly toward the understanding of complex phenomena such as sustainability in agriculture.

4. DATA ANALYSIS AND DISCUSSION

4.1 Introduction

One of the most important and emerging critical concerns of businesses with regard to the integration of sustainability practices in supply chain management is particularly in the agriculture industry. Sustainability in the supply chain is the lowest common denominator to any environmental stewardship, together with economic viability and social equity. This section is drawn from the insight of on the necessity of sustainability practices in the agricultural sector, with a pin-point into JC Farms. As emphasized in the literature, the integration of sustainability within supply chain operations necessitates a multi-faceted approach that balances environmental concerns with economic and social objectives (Lu *et al.*, 2022a).

The qualitative methodology outlined in examining JC Farms' sustainable supply chain practices underlines the importance of a nuanced understanding of sustainability dynamics (Chen, 2022). This approach is pivotal for capturing the complexity of implementing sustainable measures in real-world settings, allowing for a rich, contextualized analysis of sustainable practices and their impacts on both the supply chain and broader societal objectives (Zanin *et al.*, 2020). Drawing on the theoretical underpinnings of sustainable supply chain management (SSCM), this discussion aligns with the Triple Bottom Line (TBL) framework (Lu *et al.*, 2022b), which advocates for the simultaneous pursuit of environmental integrity, economic prosperity and social equity.

JC Farms is one of the examples that give pragmatic insights into the application of the TBL framework in the agricultural industry through semi-structured interviews and observation as the method of research, balancing the need to accomplish sustainability goals with maintenance towards economic competitiveness.

Furthermore, the literature review I conducted is an in-depth discussion of the latest trends in SSCM theories and practices, with special attempts to investigate distinct challenges and opportunities faced by the agricultural industry in Ghana. Areas of relevance that would call for further research and developmental work together to foster sustainability in the agribusiness

supply chains include assessment of social impact with the integration of sustainability in digital transformation and involvement of smallholder farmers.

In summary, within this chapter, I identify the problems of embedding sustainability practice within the agricultural supply chain through the case study of JC Farms. The discussion of a very comprehensive literature review had been done in relation to the qualitative analysis of JC Farms sustainability initiatives. This gave a very comprehensive all-round understanding of the challenges and opportunities in furthering sustainability within the agricultural industry. The results that emanate from this analysis, therefore, bear added value to the broader discourse on sustainable supply chain management in offering valuable insights into putting in place sustainability principles in practice within the context of the agricultural industry in Ghana and beyond.

4.2 Recap of Research Objectives

The discussion in this chapter follows to ensure the conceptual consistency with the objectives of the research highlighted in Chapter 1 under the relevant objectives:

1. Recognizing and appraising present sustainability behaviours and efforts within the supply chain at JC Farms.
2. Examining the struggles and hindrances experienced by JC Farms in executing sustainable measures across their supply chain.
3. Exploring the cultural and organizational perceptions of sustainability within JC Farms.
4. Assessing stakeholder engagement and collaboration in JC Farms' sustainability initiatives.

4.3 Presentation of Data

The data collected through semi-structured interviews and observational research at JC Farms offers insightful perspectives on the implementation and impact of sustainable practices within their supply chain. This section presents a combination of the findings from these research methods, emphasising the key subjects that emerged from the interviews with the manager, employees, customers and suppliers, as well as observations made during the research period.

4.3.1 Semi-Structured Interviews

1. Sustainability Efforts and Practices: The managers and employees from JC Farms explained an all-inclusive adoption of the waste management systems, with all the partnerships leading to the providers of renewable energy, thus alluding to a reduced carbon footprint. Recycling programs and energy-efficient practices are some of the added policies that have become part and parcel of their daily operations.
2. Challenges in Sustainability: One common challenge the managers agreed on was how to balance the cost of the implementation of technologies that are sustainable with that of maintaining efficiency in operations. In the case of high initial investments required by sustainable solutions, they were managed by government grants and focused on the long-term return on investment (ROI).
3. Cultural and Organizational Perceptions: Fundamental organizational culture further embeds sustainability in JC Farms. Regular training with all the team members takes due care that there is an alignment toward the sustainability goals of the company, which indeed brings collective commitment toward environmental stewardship.
4. Stakeholder Engagement and Co-operation: From regular meetings and sustainability reports to a successful partnership with local environmental organizations, JC Farms increased its sustainability efforts big time. Last but not least, the partnership with local environmental organizations has been really instrumental in taking JC Farms' sustainability efforts to the next level.

4.3.2 Observational Research

Observations conducted across various operational facets of JC Farms complemented the insights gained from the interviews, providing a real-time glimpse into the implementation of sustainable practices. Key observations included:
1. Practical Implementation of Sustainability: Observations confirmed the active involvement of employees in sustainability protocols, from waste management to energy-saving measures. The commitment to using recycled materials in packaging and the optimization of delivery routes to reduce carbon emissions were notably evident.
2. Workforce Engagement: The workforce's active participation and adherence to sustainability protocols underscore the effectiveness of JC Farms' training and cultural integration strategies. The practical application of sustainability practices was observed across all levels of operation, from fieldwork to facility maintenance.

3. Supplier and Customer Perspectives: Observations and informal discussions with suppliers and customers underscored JC Farms' influence on its supply chain and market. Suppliers have been motivated to adopt more sustainable practices, while customers expressed appreciation for JC Farms' commitment to sustainability, which aligns with their personal values.

Semi-structured interviews—combined with observational research— provided a more comprehensive view of the sustainable practices in JC Farms' supply chain. More than that, it also identified the successes, challenges and the possibility of potential improvements to be implemented at the farm. Thus, these are the set of findings for the analysis of the effective strategy of JC Farms in sustainability. It would further come through the results that have been reported and further areas of improvement and innovation.

Data presented through the answers to the interview questions and semi-structured interview guide will be organized to support each of the research objectives stipulated in the study. For this research paper, the structure is going to be the recognition and appraisal of current sustainability efforts, challenges in implementing measures of sustainability, the cultural and organizational perception of sustainability and assessment of engagement of stakeholders toward collaboration.

Table V.: Summary of employee questions and results
Source: Authors' own compilation

Research Objective	**Key Insights**
Recognizing and Appraising Present Sustainability Behaviours and Efforts	Manager: "We've implemented a comprehensive waste management system and partnered with local renewable energy providers to reduce our carbon footprint. Daily operations now include recycling programs and energy-efficient practices." Labourer 2 (Packaging): "I'm part of the packaging team and we've transitioned to using recycled materials. It requires extra care and effort but it's rewarding to know we're minimizing waste."
Examining Struggles and Hindrances in Executing Sustainable Measures	Manager: "Our main challenge is balancing cost with sustainable practices. High initial costs for sustainable technologies are a significant barrier. We've been overcoming these challenges through government grants and long-term ROI analyses."
Exploring Cultural and Organisational Perceptions of Sustainability	Manager: "Sustainability is core to our identity. We conduct regular training sessions to ensure every team member understands their role in our sustainability goals." Labourer 1 (Field Worker): "Working in the fields, I've seen first-hand the shift towards more sustainable farming techniques. It's hard work but knowing we're reducing our environmental impact makes it worthwhile."
Assessing Stakeholder Engagement and Collaboration	Manager: "We engage stakeholders through regular meetings and sustainability reports. Our partnerships with local environmental organizations have been particularly successful in enhancing our sustainability efforts." Supplier 1: "Partnering with JC Farms has pushed us to adopt more sustainable practices in our operations. Their commitment to sustainability influences their supply chain, encouraging us to innovate and improve."

These excerpts from the interviews highlight the practical steps taken by JC Farms to integrate sustainability into their operations, the challenges they face, how sustainability is perceived and embraced across the organization and the ways in which the company engages with and influences its stakeholders towards shared sustainability goals. Each piece of data sheds light on the company's commitment to sustainability, the practical realities of implementing such measures and the collective effort required to maintain and advance these initiatives.

4.4 Analysis of Findings

The given analysis of the findings from the semi-structured interviews at JC Farms presents critical themes, patterns and insight dealing with cultural perception of the company, stakeholder engagement efforts, sustainability practices and associated challenges. These findings have not only highlighted the issue of sustainability by JC Farms but also brought out complexities involved in a manifold of implementation in the context of the agricultural supply chain.

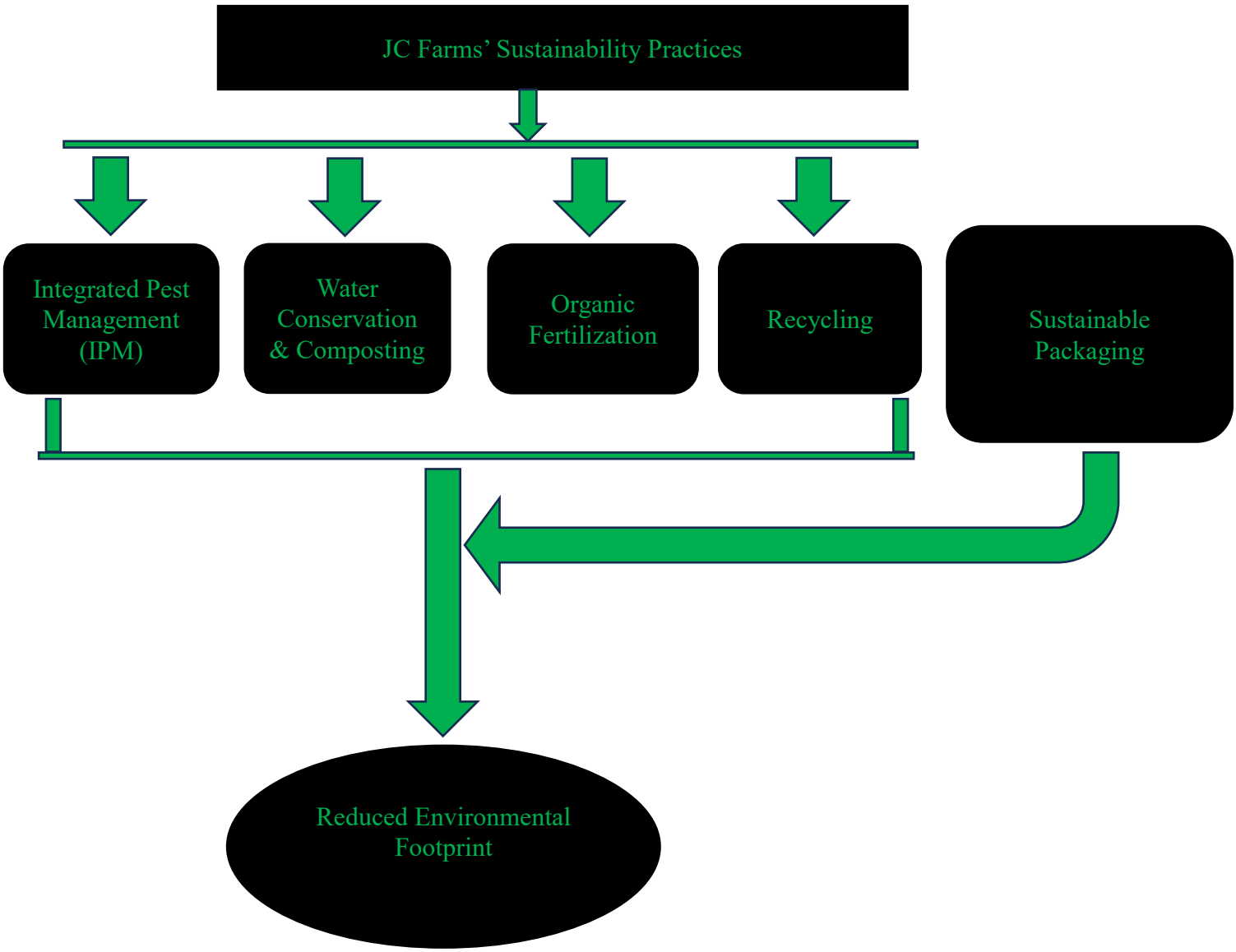
4.4.1 Sustainability Practices and Efforts

A noticeable subject developing from the interviews is JC Farms' comprehensive approach to executing supportability practices. That is why, as the manager avers, the "comprehensive waste management system" and partnership with "renewable energy providers" are evident for the efforts even in terms of environmental sustainability. This further gets revealed through the adoption of recycling programs and energy-efficient practices in day-to-day operations, which is a display of the systematic approach under which the company is reducing its carbon footprint.

These operationalisations extend to the farm, which the field worker brought to light by mentioning that the farm also operationalised sustainability in that it engaged in sustainable farming techniques. The sustainable agriculture practices, which includes incorporating environmental mechanisms that are sensitive in all their rubber plantation operations. This shows the very high sustainability commitments of the farm, which include complete use of Integrated Pest Management (IPM) strategies, greatly reducing the use of chemical pesticides and enhancing ecosystem biodiversity for a balanced ecosystem. Soil enrichment takes place with organic matter through composting processes that change waste products from agriculture into manure, hence enhancing the health of the soil to sequester carbon. An interview with one

packaging team member also revealed the way in which the farm transitioned into using a recyclable and recycled material type of packaging as a way of operationalising sustainability in its various business aspects. The farm champions sustainable packaging and uses in its packaging of rubber products only such that are recycled or that can be recycled, like biodegradable plant-based plastics and recycled paper. All these contribute to a high reduction of an environmental footprint and provide a possibility for a circular economy within industries such as agriculture and production based on rubber. These efforts are indicative of a broad and deep commitment to sustainability that permeates the company's operations.

Figure 4.: Sustainable Techniques in JC Farms' Operations
Source: Authors' own compilation



4.4.2 Challenges in Implementing Sustainable Practices

However, the high initial cost of the sustainable technologies always weighs the benefits and becomes a major challenge in balancing it with operational efficiencies. The manager has admitted high initial costs for sustainable technologies as a "significant barrier," underlying one of the common challenges that organizations striving to practice sustainability face. However, strategic use of government grants and focus on long-term ROI analyses will be the key, which will reflect JC Farms as taking a proactive approach toward facing these challenges of financial hurdles.

4.4.3 Cultural and Organizational Perceptions of Sustainability

In reality, sustainability is part of the organizational culture at JC Farms. For example, as the manager put it, "sustainability is core to our identity." The organizational commitment to embed sustainability in the ethos of the workforce is observable through routine training sessions that sensitize the members on their responsibilities towards the realization of sustainability goals. This is important, as this cultural alignment with sustainability principles generates collective responsibility and action toward sustainability objectives.

4.4.4 Stakeholder Engagement and Collaboration

The engagement of stakeholders in regular meetings and sustainability reports, like the one with local environmental organizations that JC Farms has, speak volumes about the strategy to approach stakeholders. It is an initiative, borne out of sincerity, of getting into partnerships for sustainability work and not just for compliance or PR. Feedback seemed to clearly express that partnering with JC Farms seemed to enable or force the supplier to adopt more sustainable practices, thus clearly indicating the ripple effects of JC Farms' sustainability efforts across the supply chain.

4.4.5 Insights and Interpretations

The data presented reveals JC Farms as a model for integrating sustainability into agricultural operations, facing and overcoming challenges through strategic planning and a culture of sustainability. The company's efforts to engage stakeholders and influence its supply chain towards sustainability further extend its impact beyond its immediate operations.

However, the ongoing challenge of balancing cost with sustainability highlights the need for innovative solutions and financial strategies to support sustainable practices. JC Farms' approach to overcoming these challenges, through government support and ROI analysis, offers valuable lessons for other organizations facing similar barriers.

In conclusion, JC Farms exemplifies a holistic and integrated approach to sustainability, characterized by comprehensive practices, strategic challenge management, a strong cultural commitment and effective stakeholder engagement. These findings not only contribute to the broader understanding of sustainability in the agricultural sector but also provide a benchmark for other companies striving to enhance their sustainability efforts.
The observational research component at JC Farms provides a tangible context to the insights derived from the semi-structured interviews, offering a real-world glimpse into the application of sustainable practices within the company's operations. Direct observation revealed various main themes and patterns that, in essence, developed from the interviews.

4.4.6 Integration of Sustainable Practices in Day-to-day Operations

Observations revealed that JC Farms' sustainability initiatives are not merely policy statements but are actively integrated into the daily operations of the company. For example, it is evident in the recycling program and the efficiency of energy that the behaviour goal of sustainability for the entire company has been translated successfully. This level of incorporation reflects a kind of commitment to sustainability so ingrained that it penetrates the culture and operational ethos of the organization.

4.4.7 Visible Commitment to Sustainable Farming Techniques

In the fields, the application of sustainable farming techniques was evident, aligning with the insights shared by the field worker during the interviews. This is clearly indicative of JC Farms' commitment to reducing their environmental impact and promoting green methods in agriculture with the water conservation systems in operation and the practices of organic farming. Such visible commitment will further improve the sustainability of the farm's operations and prove to be a practical demonstration of the company's environmental stewardship.

4.4.8 Adoption of Sustainable Packaging Materials

As one of the members of the packaging team has commented in the interviews, a transition from a point of complete non-use of recycled materials in packaging was evident and noticeable during the research. That shows one more thing which JC Farms is doing for practicing sustainability, reducing waste and supporting a circular economy. The way in which all these materials were handled by the packaging team is very indicative of the effort put into processing and, hence, shows the company's dedication toward sustainable practice, thereby enabling them to be more dedicated to putting in more efforts in minimizing their environmental footprint. Change to sustainable packaging has been one major stride for JC Farms. The packaging for its products was all in non-recyclable material at the start. The change, however, to 75% use of recycled content in packaging material does not only minimize environmental footprints but also supports a greater circular economy over dependence on virgin materials.

4.4.9 Waste Management & Recycling

Observationally, JC Farms' focus on waste management was apparent across its facilities. The use of comprehensive waste management systems, a typical example of the company's strategic approach to reducing its operational impact on the environment. These practices not only contribute to sustainability goals but also likely offer operational efficiencies and cost savings over the long term. The total amount of 2 tonnes every year was going waste at JC Farms and only 10% of this was being recycled or composted before the waste management practices improved. The initiation of better recycling programs and strong composting initiatives has resulted in the reduction of total waste production to 0.5 tonnes a year; in line with this, recycling and composting rates have increased to 60%. This shows an increased percentage for diversion of waste into the minimization use of landfills and addition to soil health from compost application.

4.4.10 Stakeholder Engagement in Sustainability Efforts

The observational research also highlighted JC Farms' engagement with stakeholders, particularly local environmental organizations. Seeing the collaborative efforts in action, such as joint sustainability projects or community engagement initiatives, provided a tangible sense of how JC Farms works with external partners to amplify its sustainability impact. This not

only enhances the company's sustainability initiatives but also strengthens community ties and supports broader environmental goals.

Table VI.: Sustainability metrics at JC Farms
Source: JC Farms

Metric	Pre-implementation	Post-implementation	Change
Waste Production (tonnes)	2	0.5	-75%
Recycling Rate	10%	60%	+50%
Packaging Sustainability	0% recyclable	75% recyclable	+75%
Annual Cost Savings	GH₵0	GH₵50,000	GH₵50,000
ROI Period (years)	N/A	5	5 years

4.5 Results of Observational Research

The results that emerged formed the basis for the topics used during the semi-structured interviews, themes that were used alongside observational research at JC Farms to give a detailed view of the sustainability practices at JC Farms. This is solidified further by the holistic approach JC Farms approaches sustainability with. This is evidenced by the visible integration of sustainability into daily operations, commitment to sustainable farming techniques and strategic approaches toward waste management. In addition, the involvement of the stakeholders in sustainability efforts further accentuates the leadership role that is taken by the company so that there can be an extension to see that environmental stewardship is promoted beyond its direct operations.

That is to say, one would say that J.C. Farms is one of the characteristics whereby sustainability has been put in the fabric of the company, affecting not only internal practices and culture but also extending to impact through collaboration with the involved parties, meaning stakeholders. The insights and lessons drawn from both interviews and the observational research provide value and can be transferred to any other organization that takes an interest in improving their practice of sustainability.

4.6 Comparative Analysis

This comparative analysis seeks to juxtapose JC Farms' sustainability practices, challenges and stakeholder engagement strategies with the existing case studies and literature within the domain of sustainable supply chain management (SSCM) in Ghana. The comparison is relating the efforts of JC Farms to sustainability initiatives in the agriculture sector in Ghana and tries to note the unique practices or common issues presenting an aspect of the efficacy and adaptability of sustainability strategies.

4.6.1 Sustainability Integration and Practice

All these go to prove that JC Farms has taken up a wholehearted approach towards sustainability, from efficient waste management systems to partnership with renewable energy providers, to adoption of recycling programs; JC Farms represents tendencies throughout all of Ghanaian agriculture. Literature does support that practices of Ghanaian cocoa farmers follow the use of renewable energy sources and practices for reducing waste (Ahenkan, Aboagye and Boon, 2018). However, it seems that JC Farms integrate higher levels of sustainability into business operations, as it has advanced usage of recycled materials in packaging and relatively advanced energy-efficient practices applied to daily operations compared with general practices reported in other cases.

4.6.2 Financial Challenges and Strategic Responses

This tightrope between the relatively high initial cost of sustainable technologies and the efficiency they afford is not a trait unique to JC Farms. Most other businesses into agriculture in Ghana have had to experience the same kind of financial inhibitions when they want to make moves toward adopting a sustainable practice (NSOWAH and A., 2023). Nevertheless, using a grant like the government grant received by JC Farms from different angles and long-term ROI analysis could give such a comparison between other cases (Frimpong, Wei and Fan, 2022). This, therefore, means that JC Farms were able to have a better way to navigate through hard times of finances relating to the investments in sustainability. This kind of strategy may actually be very positive since others can borrow a leaf from this kind of business.

4.6.3 Cultural Embedment and Employee Engagement in Sustainability

JC Farms' stakeholder engagement strategies, particularly its collaborations with local environmental organizations and the alignment of suppliers with sustainability standards, mirror the emphasis on stakeholder involvement highlighted in SSCM literature as critical for the success of sustainability initiatives (Frempong *et al.*, 2021). However, JC Farms' approach to ensuring active supplier participation in sustainability efforts through strict sustainability standards may represent a more proactive and structured approach than is commonly reported, suggesting a potentially replicable strategy for enhancing supply chain-wide sustainability.

4.7 Comparative Insights

The comparative analysis reveals that while JC Farms shares commonalities with other agricultural enterprises in Ghana regarding the adoption of sustainability practices and the challenges encountered, it also exhibits distinctive strategies and a deeper integration of sustainability into its operations and culture. These distinctions underscore the importance of tailored, context-specific approaches to sustainability and highlight the potential for JC Farms' practices to inform and inspire broader SSCM strategies within Ghana and similar contexts.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The study on JC Farms' integration of sustainability practices within its supply chain management, set within the broader context of Ghana's agricultural sector, offers significant insights and several key "take home" messages:

Key "Take Home" Messages:

1. **Extensive Integration is Feasible and Effective**

   In a nutshell, J.C. Farms make it clear that sustainability integration covers each aspect of agricultural operations, from waste management to energy use and supplier relationship development, not only being possible but becoming a part of the whole perspective of doing business. This kind of holistic approach can stand as a role model for other farms and businesses willing to make sustainability one of the core aspects of their operation.

2. **Active Stakeholder Engagement Enhances Sustainability Efforts**

   JC Farms' experience illustrates that active and strategic stakeholder engagement that is ranging from local communities to suppliers which is very crucial for developing sustainability efforts. Cooperation and partnerships are important in extending sustainability practices beyond the immediate margins of the business, contributing to environmental and social benefits.

Lessons Learned:

1. **Sustainability as a Precursor of Competitive Advantage**

   One of the aims of this research is to point out that sustainability, when effectively integrated into the management of business, could provide a key antecedent to one of the most important competitive advantages. It improves brand reputation, customer loyalty and can result in operational efficiency with cost savings.

2. **Importance of Thorough Data Collection and Analysis**

   This research paper relies on the use of semi-structured interviews and observational research that provide a very in-depth and rigorous understanding of JC Farms' sustainability practices. In so doing, this approach highlights the importance of assuring

that the research does indeed yield deep insights into practice rather than only providing surface insights of the activities of, in this case, sustainability practice.

In a nutshell, JC Farms offers a very good lesson for alignment with business sustainability: lessons on organizational culture, stakeholder participation and strategic financial planning that are necessary for integrating sustainability in the supply chain. The insights thus contribute to the body of discourse on sustainable supply chain management and guide and inspire organisations that are beginning their sustainability journeys amidst them.

5.2 Recommendations

The following, therefore, are action-oriented recommendations based on reflections and lessons derived from the research about sustainability integration at JC Farms in Ghana's agricultural sector. Most of these recommendations are meant mainly for improvement in wider adoption and effectiveness of sustainable practices in agriculture, with recognition of the multi-dimensional roles of stakeholders in this regard.

5.2.1 Increasing the Use of Sustainable Techniques in the Agricultural Supply Chain

It would therefore inspire many other agricultural enterprises to a holistic approach towards the same. It will not only include the secluded initiatives but the holistic integration of sustainable practices across the supply chain. From production techniques that inflict less damage to the environment to packaging solutions that take in more recyclability and supply chains that favour energy efficiency, it is more than enough. Furthermore, setting up these associations to encourage renewable energy would indeed represent that proactive approach, which could cut down massively on the carbon footprints, therefore showing a level of environmental stewardship reached from not mere compliance but out of an imperative business value.

5.2.2 The Imperative of Employee Education and Engagement

This is normally through the actualization of the set sustainability initiatives that, for the most part, rely on the full participation and commitment of all organizational members. In this regard, businesses are encouraged to invest in learning and development programs that clarify

the role and effect that every employee has in the actualization of the set goals. The development of culture in which staff makes sustainability its requirement and responsibility will boost them so that they work in an environment in which sustainable practices are not only encouraged but become their habits as well. Regular trainings and workshops on sustainability awareness campaigns can be effective tools to embed this culture.

JC Farms has an opportunity to develop their sustainability efforts by focusing on the area of waste and embracing a full scale of sustainable wastes programme. If only they had an expanded, more efficient composting operation for organic wastes and better ways of recycling inorganic matters, it will go a long way to help improve their environmental footprint. The improvement of current practices to cover the recycling of complex materials may, for instance, include the company entering into partnerships with specialized recycling firms to recycle wastes that are not being recycled within the company. This would, therefore, be in line not only with the global sustainability trends but also a way of promoting the circular economy even within the local community, such that it would mark a step for many other farms.

On the side of innovation in packaging, JC Farms could lead the agricultural industry by conducting research to develop new sustainable packaging technologies that can easily biodegrade compared with conventional materials while having the same capability for protection and effectiveness. Together with research institutions, materials scientists working in collaboration will greatly accelerate these developments, which bring the possibility of breakthroughs that offer value beyond specific or unique needs of the agricultural community. Furthermore, making the farm more of a secure sustainability certification, like organic, fair trade or rainforest alliance, as mentioned, would not only make the farm have a better reputation due to the environment and social responsibilities but also likely increase access to new markets and improve the profit margin from the product valuation.

To ensure the successful implementation and sustainability of these initiatives, continuous monitoring and adaptation are crucial. This could be achieved through the development of a robust internal system that regularly assesses the performance of implemented sustainability measures against established KPIs. Publicly reporting these outcomes would not only help maintain transparency but also boost consumer confidence and stakeholder trust. Ultimately, these efforts require a proactive, integrated approach involving all levels of JC Farms'

operations and management, underscoring the farm's commitment to leading by example in the transition towards sustainable supply chain agricultural practices.

In general, research findings in JC Farms find utility in the applicability of sustainability in the agricultural supply chain. Recommendations herein are, therefore, premised on the further building of these insights toward fostering a more sustainable agricultural supply chain sector in Ghana and the whole world. This, therefore, calls for realization towards a sustainable, resilient, and equitable realization of the supply chain sector under joint and several efforts by the business community, government and the larger agricultural community.

5.3 Areas for further research

The study on JC Farms and its integration of sustainability practices within the agricultural supply chain in Ghana has illuminated significant progress and outlined practical strategies for sustainable development. Nevertheless, it also lays emphasis on the areas ripe for more research. This points not only to the opportunity for increased understanding about sustainability in supply chain management but also to innovation in solutions that can be scaled across contexts and industries. The following are vital areas for further research in sustainability within supply chains:

5.3.1 Technological Innovations and Digitalisation

The role of technology in enhancing sustainability efforts within supply chains validates a deeper exploration. Future research could investigate how emerging technologies such as blockchain, the Internet of Things (IoT), and artificial intelligence (AI) can improve transparency, efficiency and environmental stewardship in supply chains. Studies could also examine the barriers to technology adoption and strategies to overcome these challenges.

5.3.2 Consumer Behaviour and Demand for Sustainable Products

Areas like consumer behaviour when it comes to sustainable products would thereby remain some of those areas that will need more attention. Factors allowing or motivating consumer preferences toward goods produced in sustainable ways and afterward the factors of

willingness to pay for sustainability, including the effectiveness of marketing strategies to encourage sustainable consumption, would be possible fields for such studies.

6. SUMMARY

This study, focusing on JC Farms within the agricultural sector in Ghana, in relation to sustainability practices in supply chain management, this study, therefore, sought to focus on JC Farms. This motivated the present research to make a contribution to the literature on sustainability stewardship, economic viability and social equity in supply chain management with a critical focus over the agriculture industry.

The study was designed around four key objectives: To appraise current sustainability behaviours and efforts at JC Farms. To examine the struggles and hindrances JC Farms faces in executing sustainable measures across their supply chain. To explore the cultural and organizational perceptions of sustainability within JC Farms. To assess the extent and effectiveness of stakeholder engagement and collaboration in JC Farms' sustainability initiatives.

Main Findings

- Sustainable Practices

  JC Farms has employed a range of sustainable practices, from the processing of its products to supply chain activity. There were works given for wastage management and activities, which included saving energy and sourcing renewable energy. All of these indicated strength toward diminished environmentally related impact.
- Sustainability Challenges

  The biggest challenge, especially the financial limitations regarding the money capital investment, to be incurred at the initial stage by any business, to embrace such sustainable technologies. But JC Farm has strategically used the approach of government grants and long-term ROI focus to mitigate such challenges.
- Stakeholder Engagement and Collaboration

  The farm is fully engaged in dialogues with its stakeholders, such as the local environmental organizations, in ways that help build its sustainability efforts. Such collaborations have played an essential role in increasing the influence of the farm on sustainability.

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List of Tables and Figures

Annex

Annex No. 1

STUDENT DECLARATION

Signed below **Harold Kweku Tony Garbrah**, student of the Hungarian University of Agricultural and Life Sciences, **Szent István** Campus, Supply Chain Management MSc Course full time/correspondence* declare that the presented Thesis is my own work, and I have used the cited and quoted literature in accordance with the relevant legal and ethical rules. I understand that the one-page-summary of my thesis will be uploaded on the website of the Campus/Institute/Course, and my thesis will be available at the Host Department/Institute and in the repository of the University in accordance with the relevant legal and ethical rules.

Confidential data are presented in the thesis: yes no*

Date: 2024 year 04 month 20 day

Student

Annex 1 contd.

SUPERVISOR'S DECLARATION

As primary supervisor of the author of this thesis, I hereby declare that review of the thesis was done thoroughly; the student was informed and guided on the method of citing literature sources in the dissertation, attention was drawn to the importance of using literature data in accordance with the relevant legal and ethical rules.

Confidential data are presented in the thesis: yes no*

Approval of thesis for oral defence on Final Examination: approved not approved *

Date: 2024 year 04 month 20 day

Dr. Mészáros K.

Internal Supervisor

Annex No. 2

CONTENT SUMMARY OF THE THESIS

Ghana's Sustainable Supply Chain Challenge: Forging the Path to a Responsible Future: A Case Study of JC Farms

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This study, focusing on JC Farms within the agricultural sector in Ghana, in relation to sustainability practices in supply chain management, this study, therefore, sought to focus on JC Farms. This motivated the present research to make a contribution to the literature on sustainability stewardship, economic viability and social equity in supply chain management with a critical focus over the agriculture industry.

The study was designed around four key objectives: To appraise current sustainability behaviours and efforts at JC Farms. To examine the struggles and hindrances JC Farms faces in executing sustainable measures across their supply chain. To explore the cultural and organizational perceptions of sustainability within JC Farms. To assess the extent and effectiveness of stakeholder engagement and collaboration in JC Farms' sustainability initiatives.

Main Findings

- Sustainable Practices

  JC Farms has employed a range of sustainable practices, from the processing of its products to supply chain activity. There were works given for wastage management and activities, which included saving energy and sourcing renewable energy. All of these indicated strength toward diminished environmentally related impact.

- Sustainability Challenges

  The biggest challenge, especially the financial limitations regarding the money capital investment, to be incurred at the initial stage by any business, to embrace such sustainable technologies. But JC Farms has strategically used the approach of government grants and long-term ROI focus to mitigate such challenges.
- Stakeholder Engagement and Collaboration

  The farm is fully engaged in dialogues with its stakeholders, such as the local environmental organizations, in ways that help build its sustainability efforts. Such collaborations have played an essential role in increasing the influence of the farm on sustainability.