SUSTAINABILITY INTEGRATION, DIGITIZATION AND FIRM COMPETITIVENESS IN FOOD AND BEVERAGES MANUFACTURING FIRMS IN KENYA

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MASTER OF BUSINESS ADMINISTRATION (CORPORATE MANAGEMENT)

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DECLARATION

I declare that this dissertation is my original work and has not been previously published or submitted elsewhere for award of a degree. I also declare that this contains no material written or published by other people except where due reference is made and author duly acknowledged.

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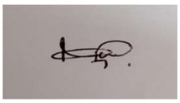
Signature…  ……Date: 02/09/2025

I do hereby confirm that I have examined the master's dissertation of

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And have certified that all revisions that the dissertation panel and examiners recommended have been adequately addressed

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ABSTRACT

Kenya's food and beverages manufacturing sector plays a vital role in the economy but struggles with weak competitiveness due to poor integration of environmental, social, governance, and digitalization sustainability. Food and beverage exports have remained stagnant at around 15% of total manufactured exports, limiting global competitiveness. This slow growth was driven by inefficiencies in operational processes, high energy costs, and restricted access to international markets due to stringent regulatory requirements. Thus, this study examined the impact of sustainability integration and digitization on firm competitiveness in the sector. Specifically, it explores environmental sustainability integration, social sustainability integration, governance sustainability integration, and digitalization sustainability integration. anchored in natural resource-based view theory, agency theory, contingency theory, and schumpeter's theory of innovation, the study adopts a descriptive research design. The target population consists of food and beverage manufacturing firms in Kenya, with a census covering 248 firms. Data was collected using a structured questionnaire through the drop-and-pick method. Analysis involved was descriptive and inferential statistics, with findings presented in frequency tables and charts to provide insights into the role of sustainability and digitalization in enhancing firm competitiveness. The findings indicate that environmental sustainability integration is applied at a moderate level, with water conservation and efficiency measures showing stronger adoption, while pollution control remains weak. Social sustainability integration is partly achieved through fair wages and workplace safety, but limited attention to employee welfare and CSR weakens its overall impact. Governance sustainability integration shows progress in ethical leadership and accountability, yet gaps in regulatory compliance and consistent reporting limit its effectiveness. Digitalization sustainability integration benefits from IoT adoption, yet limited data-driven practices and inconsistency hinder its contribution to sustainable efficiency. The study recommended that firms integrate environmental, social, and governance sustainability with digitization to enhance competitiveness in the food and beverages manufacturing sector. Aligning digital tools with sustainability goals can improve operational efficiency, stakeholder trust, and ethical oversight when implemented through coordinated strategies.

Keywords: Digitalization Sustainability Integration, Environmental Sustainability Integration, Firm Competitiveness, Governance Sustainability Integration, Social Sustainability Integration

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DEDICATION

This study is dedicated to my wife, daughter, son, parents, friends, and classmates for their unwavering support, prayers, sacrifices, understanding, and patience during times when I could not be there as I should have been.

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ABBREVIATIONS AND ACRONYMMS

AI:	Artificial intelligence
CSR:	Corporate Social Responsibility
EPZs:	Export Processing Zones
ESG:	Environmental, Social, and Governance
FBM:	Food and Beverages Manufacturing
IoT:	Internet of Things
NRBV:	Natural Resource-Based View
SDG:	Sustainable Development Goals
UK:	United Kingdom
KAM:	Kenya Association of Manufacturers

OPERATIONAL DEFINITION OF TERMS

Digitalization Sustainability Integration: involves IoT solutions, digital platforms, AI integration, cybersecurity, and data analytics to enhance efficiency and decision-making. Adopting digital tools helps firms improve production, reduce waste, secure data, and stay competitive in a rapidly evolving market (Muriithi & Kariuki, 2022).

Environmental Sustainability Integration: involves practices like waste management, water conservation, sustainable sourcing, and pollution control to reduce environmental impact. In Kenya's food and beverage manufacturing firms, these initiatives enhance resource efficiency, regulatory compliance, and eco-friendly operations, strengthening competitiveness (Chikan, et al. 2022).

Firm Competitiveness: is driven by innovation capacity, customer satisfaction, operational productivity, revenue growth, and market share. Kenyan food and beverage firms that integrate sustainability and digitalization gain a competitive edge by improving efficiency, reducing costs, and meeting evolving consumer demands (Shvindina, 2022).

Governance Sustainability Integration: focuses on board diversity, ethical leadership, transparency policies, regulatory compliance, and code enforcement to ensure responsible corporate conduct. Strong governance in Kenya's food and beverage sector fosters trust, minimizes risks, and supports sustainable business growth (El Khatir, 2021).

Social Sustainability Integration: includes consumer protection, health programs, employee welfare, workplace safety, and community engagement to ensure ethical and responsible business practices. By prioritizing stakeholder well-being, firms enhance brand reputation, customer loyalty, and workforce productivity, driving long-term success (Mantje, et al., 2023).

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Firm competitiveness is a critical determinant of business success, influencing a company's ability to sustain growth, adapt to market dynamics, and outperform rivals. In an increasingly globalized economy, firms must continuously enhance their competitiveness to survive and thrive amid intense competition, technological advancements, and shifting consumer preferences. Studying firm competitiveness is essential because it provides insights into the factors that drive business performance, including innovation, operational efficiency, strategic positioning, and resource utilization (Shvindina, 2022). By understanding these elements, businesses, policymakers, and researchers can develop strategies to improve productivity, enhance market share, and foster sustainable economic development. Without a clear understanding of firm competitiveness, organizations risk stagnation, declining profitability, and potential failure in volatile market conditions (Muriithi & Kariuki, 2022).

Companies in the United States, for instance, are adopting advanced technologies and innovation-driven business models to enhance productivity and profitability, while simultaneously integrating sustainability goals such as reducing carbon emissions and improving supply chain transparency (Hermundsdottir &Aspelund, 2021). While these strategies help firms maintain competitiveness in global markets, they are also pressured to align with stricter sustainability regulations. This dual focus on competitiveness and sustainability is evident in the European Union, where firms must innovate while adhering to ambitious sustainability policies, thus reinforcing the importance of balancing both dimensions (Boikova, *et al.,* 2021).

Similarly, in Japan, firms like Toyota demonstrate how competitiveness can be sustained through technological advancement while embedding sustainability into their business operations. Through initiatives such as energy-efficient manufacturing and electric vehicle production, firms can reduce their environmental impact and enhance their market position (Shvindina, 2022). However, firms face the challenge of ensuring that their sustainability efforts do not compromise profitability. In fact, sustainability integration can sometimes serve as a driver of innovation, particularly in industries like renewable energy, where firms in developed economies are competing to provide cutting-edge solutions that address both markets demands and environmental concerns (Ninduwezuor-Ehiobu, *et al.,*2023). This illustrates how sustainability and competitiveness can be strategically aligned, fostering long-term success.

Many African countries, firm competitiveness is a crucial factor for economic growth and development, particularly as businesses seek to expand in the global market. Firms in South Africa, for example, are leveraging innovation and technology to enhance productivity, which has allowed them to maintain a competitive edge despite challenges such as political instability and market fluctuations (Mantje, *et al.,* 2023). South African companies, especially in sectors like mining, agriculture, and manufacturing, are integrating sustainability practices such as water conservation and energy efficiency to align with international standards, thus reinforcing their competitiveness in a sustainable way (Abdullahi, *et al.,* 2022). Similarly, Nigerian firms in the oil and gas sector are increasingly adopting new technologies and improving operational efficiency, yet they are also integrating environmental and social considerations to address concerns over pollution and community welfare. This integration of sustainability into the business model does not only fulfill regulatory requirements but also helps firms gain a competitive advantage by attracting conscientious investors and consumers.

While sustainability is increasingly prioritized, the primary driver of business success in many African countries remains firm competitiveness. In countries like Egypt and Morocco, firms are focusing on innovation, human capital development, and market expansion to stay competitive in regional and global markets. Moroccan textile companies, for instance, have enhanced their competitiveness by adopting environmentally friendly production techniques and focusing on export markets (El Khatir, 2021). Similarly, firms in Egypt are investing in digital technologies and renewable energy, positioning themselves as leaders in the competitive global market while addressing the country's sustainability challenges (Mohamed and Eltohamy, 2022). The integration of sustainability is recognized as a means to improve firm competitiveness, as it helps companies meet both regulatory expectations and evolving consumer preferences, ultimately driving long-term profitability.

In Kenya, firm competitiveness remains a critical element for business success, particularly as companies strive to compete in both local and global markets. Firms in key sectors such as agriculture, manufacturing, and telecommunications are increasingly adopting innovative strategies to improve efficiency, productivity, and profitability. The mobile banking sector, led by companies like Safaricom and its M-Pesa platform, is a prime example of how Kenyan firms have enhanced competitiveness through technological innovation, providing a competitive edge in East Africa and beyond (Muriithi & Kariuki, 2022). Similarly, Kenyan companies in the agricultural sector are leveraging new technologies and efficient practices to improve product quality, reduce costs, and expand into regional markets. However, in the pursuit of competitiveness, firms also face the challenge of balancing these objectives with the integration of sustainability practices, which are becoming more significant due to global environmental and social expectations.

1.1.1 Firm Competitiveness

Firm competitiveness in the food and beverages manufacturing sector is primarily measured using key indicators such as market share, product quality, innovation, cost efficiency, and customer satisfaction. According to Chikan, *et al.,* (2022) a firm's ability to maintain a competitive edge depends on its ability to differentiate itself through superior product quality, branding, and cost leadership. In the Kenyan food and beverage industry, firms enhance their competitiveness by adopting cost-effective production techniques, maintaining high product quality, and ensuring efficient distribution networks to meet consumer demand. Market share is a critical measure of competitiveness, as firms with a larger share typically have stronger brand recognition, economies of scale, and customer loyalty (Hermundsdottir & Aspelund, 2021). Consequently, measuring firm competitiveness using market share provides insights into a company's ability to outperform its rivals in the industry.

In addition to market share, innovation and operational efficiency are crucial determinants of firm competitiveness in the food and beverage manufacturing sector. Firms that invest in research and development and adopt modern production technologies tend to be more competitive, as they can introduce new products, improve efficiency, and reduce costs (Le & Ikram, 2022). For instance, the adoption of automated production lines and advanced packaging technologies enhances product quality and minimizes waste, leading to a competitive advantage (Hermundsdottir & Aspelund, 2021). Furthermore, firms that innovate in terms of product diversification and health-conscious offerings are better positioned to capture emerging market trends, particularly with the increasing consumer demand for organic and fortified foods (Chikan, *et al.,* 2022). Therefore, measuring firm competitiveness through innovation metrics, such as

product development frequency and investment in research and development provides a comprehensive view of a firm's ability to sustain its market position.

The essential measure of competitiveness is customer satisfaction and brand loyalty, which reflects a firm's ability to meet consumer needs and preferences. According to Adomako and Tran, (2022) firms that maintain high levels of customer satisfaction enjoy better retention rates and repeat purchases, directly impacting their competitive position. In Kenya's food and beverage industry, companies such as Brookside Dairy and Coca-Cola Beverages Africa maintain strong competitiveness by ensuring consistent product quality and engaging in aggressive marketing strategies (Ndung'u & Muturi, 2019). Additionally, cost efficiency and supply chain effectiveness play a crucial role in maintaining a competitive edge, as firms with optimized logistics and procurement strategies can minimize costs and maximize profitability (Chikan, *et al.,* 2022).

1.1.2 Sustainability Integration

Sustainability integration has become a critical aspect of modern organizational strategy, encompassing multiple dimensions that influence long-term operational success. According to Negri, *et al.,* (2021) the triple bottom line framework underscores sustainability's three main pillars: environmental, social, and economic. However, recent studies have expanded this conceptualization to include governance and digitalization as essential components of sustainability integration. Environmental sustainability integration focuses on minimizing negative ecological impacts through resource efficiency, carbon footprint reduction, and sustainable supply chains (Bibri, *et al.,* 2023). Social sustainability integration emphasizes equitable labor practices, human rights, community engagement, and stakeholder inclusivity (Torkayesh, *et al.,* 2021). Governance sustainability integration pertains to ethical leadership, corporate transparency, compliance with regulatory frameworks, and responsible decision-making

(Aguilera, *et al.,* 2021). Additionally, digitalization sustainability integration plays a transformative role in sustainability by leveraging technology to optimize processes, reduce waste, and enhance efficiency (Broccardo, *et al.,* 2023). These components collectively shape sustainability integration within organizations, reflecting an interdisciplinary approach to achieving long-term resilience and competitive advantage.

The academic discourse on sustainability integration highlights the need for organizations to adopt a holistic approach that harmonizes these four dimensions to drive sustainability performance (Negri, *et al.,* 2021). Environmental sustainability integration is essential for mitigating climate change risks and resource depletion, aligning with global sustainability frameworks such as the United Nations sustainable development goals (Bibri, *et al.,* 2023). Social sustainability integration is pivotal in fostering corporate social responsibility initiatives and ensuring ethical treatment of employees and communities (Torkayesh, *et al.,* 2021). Governance sustainability integration enhances investor confidence and mitigates risks associated with unethical corporate behavior, as evidenced in the works of Broccardo, et al., (2023). Digitalization sustainability integration has emerged as a disruptive force that facilitates data-driven decision-making, real-time monitoring of sustainability metrics, and predictive analytics for sustainability forecasting (Negri, *et al.,* 2021). While each of these dimensions contributes uniquely to sustainability integration, selecting relevant variables for empirical analysis requires careful consideration of industry-specific challenges and research gaps.

As sustainability becomes increasingly important, Kenyan firms are integrating environmentally and socially responsible practices into their operations to remain competitive in the global market. The manufacturing sector, particularly companies in Nairobi and Mombasa, are adopting cleaner production technologies and energy-efficient processes to reduce their

environmental impact and comply with national environmental regulations (Kimiti & Muathe, 2021). For instance, East African Breweries has introduced sustainable practices, such as water management systems and recycling initiatives, to align with international sustainability standards while maintaining competitiveness (Mumbi, *et al.,* 2021). Similarly, Kenya's horticulture and floriculture industries, which are key export sectors, have integrated sustainability through certifications like Fair Trade enhancing their competitiveness by meeting international demand for sustainably sourced products (Muriithi & Kariuki, 2022). This integration of sustainability helps firms in Kenya not only attract ethical consumers but also improve their operational efficiencies, further strengthening their competitive positions.

Despite the growing emphasis on sustainability, the primary focus for many Kenyan firms remains on enhancing competitiveness, often driven by the need to innovate and adapt in an increasingly globalized business environment. However, challenges such as limited access to capital, weak infrastructure, and fluctuating market conditions hinder firms from fully realizing the potential of sustainability integration. For instance, while companies in the technology sector are incorporating digital solutions for growth, they often struggle to secure the resources required for large-scale sustainable initiatives (Mumbi, *et al.,* 2021).

In this study, the selected variables are environmental sustainability integration, governance sustainability integration, Social sustainability intergration and digitalization sustainability integration. These variables are justified based on their critical influence on firm competitiveness of food and beverages manufacturing firms. These variables align with existing literature and provide a robust foundation for investigating sustainability integration's effectiveness in the given research context.

1.1.3 Sustainability Integration, Digitization and Firm Competitiveness

Sustainability integration is expected to influence firm competitiveness by enhancing operational efficiency, reducing costs, and improving brand reputation. Firms that incorporate sustainable practices, such as resource efficiency, waste reduction, and ethical sourcing, can lower production costs while appealing to environmentally and socially conscious consumers. Additionally, sustainability-driven firms are more likely to comply with regulatory requirements, reducing the risk of legal and financial penalties. This strategic positioning can improve customer loyalty, attract investors, and differentiate firms from competitors, ultimately strengthening their market position (Mumbi, *et al.,* 2021).

However, the impact of sustainability on competitiveness depends on several factors, including industry type, regulatory environment, and consumer demand. In sectors where sustainability is a key purchasing criterion such as food, fashion, and energy firms that fail to integrate sustainable practices may struggle to remain competitive. Conversely, in industries with weak consumer emphasis on sustainability, firms might view sustainability efforts as an unnecessary cost burden. Additionally, if sustainability initiatives are poorly executed or result in high operational costs without a clear return on investment, they may weaken rather than enhance competitiveness (Chikan, *et al.,* 2022).

Digitization can significantly alter the relationship between sustainability integration and firm competitiveness by enabling more efficient and data-driven decision-making. Technologies such as artificial intelligence, blockchain, and the Internet of Things (IoT) allow firms to track their environmental impact, optimize supply chain operations, and enhance transparency in

sustainable practices. Digitization also enables firms to engage consumers through digital platforms, showcasing their sustainability efforts and fostering stronger customer relationships. These capabilities help firms derive greater value from sustainability initiatives, improving cost efficiency and competitive advantage (Thuita, *et al.,* 2023).

Nevertheless, the interplay between digitization, sustainability, and competitiveness is not always straightforward. The benefits of digitization in sustainability integration depend on factors such as technological infrastructure, investment capacity, and digital literacy. Firms that lack the resources to implement digital tools effectively may struggle to leverage sustainability for competitive advantage (Negri, *et al.,* 2021). Additionally, if digitization leads to increased energy consumption or data security concerns, it may create new challenges that offset the benefits of sustainability efforts. Therefore, while digitization has the potential to enhance the competitiveness of sustainable firms, its effectiveness depends on a firm's ability to integrate technology strategically and efficiently.

1.1.4 Food and Beverages Manufacturing Firms in Kenya

The Food and Beverages Manufacturing (FBM) sector in Kenya plays a significant role in the country's economy, contributing approximately 3.2% to the national GDP and accounting for nearly 40% of the total manufacturing output (Kimaru, *et al.,* 2022). The sector comprises both large-scale multinational firms and small and medium-sized enterprises that produce a wide range of processed foods, dairy products, beverages, and edible oils. These firms benefit from Kenya's agricultural base, which supplies key raw materials such as maize, wheat, milk, and sugarcane. However, fluctuating raw material prices, high production costs, and regulatory challenges continue to affect the sector's growth and sustainability (Mogaka, 2023).

Kenya's FBM firms operate in a highly dynamic market influenced by evolving consumer preferences, increasing health consciousness, and growing demand for convenience foods. Recent years have seen a shift toward organic, fortified, and plant-based products, driven by a rising middle-class population and urbanization (Thuita, *et al.,* 2023). Additionally, firms are increasingly adopting modern processing technologies and automation to enhance efficiency and meet stringent quality standards required for both domestic and export markets. Despite these advancements, challenges such as inadequate infrastructure, inconsistent power supply, and logistical inefficiencies continue to hinder the sector's full potential (Ngetich, *et al.,* 2022).

Sustainability concerns are also shaping the operations of food and beverage manufacturers in Kenya, with firms increasingly integrating environmental, social, and governance principles into their business models. Many companies are investing in renewable energy, waste management solutions, and water conservation practices to align with global sustainability trends (Thuita, *et al.,* 2023). Furthermore, social sustainability initiatives, such as fair labor practices and corporate social responsibility programs, are being embraced to enhance brand reputation and customer loyalty.

The regulatory environment in Kenya has also influenced the sector's trajectory, with policies such as the food, drugs, and chemical substances act and the standards act guiding food safety, labeling, and product certification (Mogaka, 2023). Firms must adhere to these regulations to access both local and international markets, particularly in the East African Community. Despite these opportunities, the sector faces stiff competition from imported food products, particularly from countries with lower production costs and more developed manufacturing ecosystems (Thuita, *et al.,* 2023).

1.2 Statement of the Problem

Firm competitiveness is crucial for the success and sustainability of food and beverage manufacturing firms in an increasingly dynamic and globalized market. These firms operate in a highly competitive industry where factors such as cost efficiency, product innovation, quality assurance, and supply chain resilience determine their market position. (Kimaru, et al., 2022). Competitive firms can leverage technological advancements, optimize production processes, and implement effective marketing strategies to meet evolving consumer demands. Additionally, regulatory compliance, sustainability practices, and brand differentiation contribute to maintaining a strong competitive edge Chebichii, *et al.,* 2022). Without sustained competitiveness, firms risk losing market share, facing declining profitability, and struggling to adapt to industry disruptions. Therefore, enhancing firm competitiveness is essential for ensuring long-term growth and resilience in the food and beverage manufacturing sector (Kanyingi & Waithaka, 2023).

Despite its significant role in Kenya's economy, the food and beverages manufacturing (FBM) sector struggles with weak firm competitiveness due to poor integration of environmental, social, governance, and digitalization sustainability. Kimaru et al. (2022) indicate that the sector's growth rate has been inconsistent, with an average annual growth rate of only 4.5% over the past five years compared to the broader manufacturing sector's average of 6.2% (Mogaka et al., 2022). Additionally, Kenya's food and beverage exports have remained stagnant at around 15% of total manufactured exports, limiting global competitiveness (Chebichii et al., 2022). Beyond weak export performance, internal challenges such as outdated production technologies, limited innovation capacity, low investment in research and development, weak linkages between small and large firms, inadequate quality assurance systems, and poor infrastructure especially in transport and energy continue to undermine competitiveness. A notable gap is the subdued

emphasis on digitization, which remains an underexplored area despite its potential to enhance efficiency, traceability, and market access. This digital lag, alongside bureaucratic regulatory processes, inconsistent policy implementation, and limited access to affordable financing, further hampers the sector's ability to scale and compete globally (Kanyingi & Waithaka, 2023).

Previous studies have explored various aspects of firm competitiveness in Kenya's food and beverages manufacturing (FBM) sector but have not fully addressed the role of sustainability integration. Mogaka et al. (2022) examined functional integration and competitive advantage but relied on a narrow operational framework that emphasized efficiency and supply chain coordination, overlooking how sustainability integration could theoretically strengthen competitive positioning. Their study lacked a clear conceptual linkage between integration strategies and sustainability outcomes, leaving a gap in understanding the broader competitiveness drivers. Irario (2023) analyzed sustainable logistics management practices and their effect on competitive advantage but adopted a methodological focus limited to transportation and distribution. This approach failed to capture governance, social, and digitalization dimensions, exposing a conceptual gap in evaluating sustainability as a multidimensional construct. Muiruri et al. (2021) investigated the influence of human capital on competitiveness but used a descriptive design that did not explore sustainability-driven workforce strategies or their long-term performance implications, creating both a methodological and theoretical gap.

Unlike these studies, this research focused on environmental, social, governance, and digitalization sustainability integration as key drivers of firm competitiveness. Additionally, while prior studies primarily examined Nairobi County, this study adopts a broader scope across Kenya's FBM sector. By addressing these gaps, the study provides a more comprehensive understanding

of how sustainability integration influences firm competitiveness, offering practical insights for industry stakeholders.

1.3 General Objective of the Study

The general objective was to examine sustainability integration, digitization and firm competitiveness in food and beverages manufacturing firms in Kenya.

1.3.1 Objectives of the Study

i. To examine the effect of environmental sustainability integration on firm competitiveness in food and beverages manufacturing firms in Kenya.
ii. To assess the influence of social sustainability integration on firm competitiveness in food and beverages manufacturing firms in Kenya.
iii. To evaluate the effect of governance sustainability integration on firm competitiveness in food and beverages manufacturing firms in Kenya.
iv. To determine moderating effect of digitalization on the relationship between sustainability integration and firm competitiveness in food and beverages manufacturing firms in Kenya.

1.4 Research Question

i. What is the effect of environmental sustainability integration on the firm competitiveness in food and beverages manufacturing firms in Kenya?
ii. How does social sustainability integration influence the firm competitiveness in food and beverages manufacturing firms in Kenya?
iii. What is the effect of governance sustainability integration on the firm competitiveness in food and beverages manufacturing firms in Kenya?

iv. What is the moderating effect of digitalization on the relationship between sustainability integration and firm competitiveness in food and beverages manufacturing firms in Kenya?

1.5 Significance of the Study

1.5.1 Food and Beverages Manufacturing Firms in Kenya

The study directly benefits food and beverage manufacturing firms by identifying the specific ways in which environmental, social, and governance sustainability integration enhances competitiveness. It examines how environmental sustainability integration can help firms reduce operational costs, improve efficiencies, and strengthen market positions. Additionally, the study will demonstrate how social sustainability integration fosters better customer loyalty and brand reputation through social responsibility practices. By exploring governance sustainability, the research will show how firms can achieve regulatory compliance and improve their corporate reputation, leading to enhanced trust from stakeholders. Ultimately, this research helps firms understand how to leverage sustainability for long-term competitiveness in a challenging market environment.

1.5.2 Policy Makers

The study offers a robust foundation for policymakers to design regulations and incentives that encourage sustainability practices within the food and beverage manufacturing sector. The exploration of the moderating effect of digitalization on sustainability integration will be crucial for policymakers looking to understand the role of technology in facilitating sustainable practices. By identifying the link between digital tools and sustainability, policymakers can promote digital transformation initiatives, such as digital reporting standards, sustainability certification programs, and government-backed digital infrastructure, to support the industry's competitiveness. Moreover,

the study's findings will help in crafting policies that enforce environmental, social, and governance standards, enabling sectoral growth and aligning with national goals for sustainable industrialization.

1.5.3 Future Academicians

For future researchers and academicians, this study fills existing knowledge gaps by linking sustainability integration to competitiveness, a topic that is underexplored in Kenya's food and beverage manufacturing sector. It will help advance academic understanding in the fields of sustainability, digital transformation, and competitive strategy. The research will also stimulate further inquiries into how different dimensions of sustainability affect firm performance in emerging markets. The study's methodology and findings will offer a foundation for future studies, offering a framework for assessing sector-specific challenges and opportunities, and guiding academic work in the areas of sustainability in developing economies.

1.6 Scope of the Study

This study examined the relationship between sustainability integration and firm competitiveness in food and beverages manufacturing firms in Kenya, focusing on environmental, social and governance as the independent variables, and digitalization sustainability integration as the moderating variables. It assessed how these dimensions influence competitive positioning by targeting staff from human resource, finance/accounts, operations, and top management, as they play key roles in strategic decision-making and implementation of sustainability initiatives. The study covered food and beverages manufacturing firms across Kenya to provide a comprehensive industry perspective. The research was conducted from January to August 2025, encompassing data collection, analysis, and reporting.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter examined sustainability integration, digitization and firm competitiveness in food and beverages manufacturing firms in Kenya by reviewing existing research. The theoretical review explores key concepts, while the empirical review analyzed relevant studies to identify gaps in the literature. The gaps and summary section highlight unexplored areas, and the conceptual framework illustrates the relationships between variables.

2.2 Theoretical Framework of the Research Study

The study is founded in natural resource-based view theory, agency theory, contingency theory and Schumpeter's theory of Innovation which offers guidance to the research framework and data analysis.

2.2.1 Natural Resource-Based View Theory

The Natural Resource-Based View (NRBV) theory was first proposed by Stuart Hart in 1995 as an extension of Jay Barney's Resource-Based View (RBV) (Samadhiya et al., 2023). While Barney emphasized internal firm resources such as technology, human capital, and organizational capabilities as drivers of competitive advantage, Hart argued that these traditional resources were insufficient in the face of growing environmental concerns. His proposition integrated environmental sustainability into the competitive strategy discourse by positing that firms must develop capabilities to address ecological challenges. Hart's NRBV framework emerged at a time when global attention was increasingly directed toward issues such as climate change, pollution, and natural resource depletion. By situating environmental responsibility at the core of competitive

strategy, Hart (1995) provided a new lens through which businesses could pursue both profitability and ecological stewardship simultaneously (Johnson-Hall et al., 2022).

Since its introduction, the NRBV theory has evolved into a widely recognized framework that emphasizes three interconnected strategies: pollution prevention, product stewardship, and sustainable development. Pollution prevention focuses on minimizing inefficiencies and waste in production processes, which reduces costs while ensuring regulatory compliance (Samadhiya et al., 2023). Product stewardship broadens responsibility across the product lifecycle, encouraging firms to adopt practices such as eco-friendly packaging, sustainable sourcing of raw materials, and responsible disposal methods (Johnson-Hall et al., 2022). The third and most advanced strategy, sustainable development, calls for firms to innovate by creating environmentally friendly technologies and business models that drive long-term ecological and economic benefits. Over time, the NRBV has been strengthened by empirical studies showing that firms adopting these practices achieve improved operational efficiency, enhanced corporate reputation, and greater resilience to market volatility. Furthermore, its integration into modern sustainability reporting frameworks has reinforced its relevance in aligning corporate goals with global sustainability agendas (Mishra et al., 2021).

One of the key strengths of the NRBV theory lies in its holistic approach to competitive advantage, which moves beyond economic performance to consider environmental and social dimensions. This makes it particularly relevant in today's business environment, where firms are under pressure from governments, consumers, and investors to operate sustainably. Another strength is its adaptability, as the three strategic pathways—pollution prevention, product stewardship, and sustainable development—can be tailored to firms across diverse industries and contexts. However, the theory also faces criticism. Scholars argue that while the NRBV provides

a strong conceptual foundation, its operationalization is often vague, leaving managers uncertain about how to effectively measure and implement its principles. Critics also note that the NRBV assumes firms have sufficient resources and technological capacity to invest in sustainable strategies, which may not hold true for small and medium-sized enterprises (SMEs) or firms in developing economies (Johnson-Hall et al., 2022). Furthermore, the dynamic nature of environmental challenges means that strategies identified as sustainable today may quickly become obsolete, raising questions about the long-term stability of the NRBV framework.

The NRBV theory was highly relevant to this study, which focuses on environmental sustainability and competitiveness in the food and beverage manufacturing sector in Kenya. Many firms in this sector have adopted pollution prevention practices such as energy-efficient machinery and waste minimization techniques, enabling them to cut costs while meeting regulatory standards. Product stewardship is evident through initiatives like the use of biodegradable packaging, fair-trade sourcing, and environmentally responsible distribution, all of which appeal to an increasingly eco-conscious consumer base. At the same time, companies investing in renewable energy solutions, water recycling systems, and circular economy models are positioning themselves as market leaders. By applying the NRBV framework, this study assesses how these strategies not only enhance operational efficiency but also strengthen firms' competitive positioning in a rapidly changing Kenyan market landscape. The theory provides a robust lens for understanding how sustainability-driven practices can transform environmental responsibility into a sustainable source of competitive advantage, aligning well with both global and local business trends.

2.2.2 Agency Theory

Agency theory was first conceptualized by Stephen Ross in 1973 and later refined by Michael Jensen and William Meckling in 1976 through their seminal work on the principal-agent

relationship (Dong et al., 2021). Ross initially introduced the idea to explain how incentives influence decision-making under uncertainty, laying the groundwork for a systematic understanding of relationships where one party delegates authority to another. Jensen and Meckling advanced this by focusing on the conflicts of interest between principals (owners or shareholders) and agents (managers), especially in firms where ownership and control are separated. Their work emphasized how managers, when left unchecked, may act in ways that prioritize personal gain at the expense of shareholders' wealth. The theory emerged as a direct response to governance challenges caused by information asymmetry, where one party typically the agent has more information than the principal, making it difficult to ensure aligned objectives (Seaborn et al., 2021).

Over time, agency theory has developed into a central framework for analyzing corporate governance, organizational design, and financial management. The theory posits that agency costs arise when principals incur monitoring expenses, bonding costs, and residual losses to control opportunistic behavior by agents (McMullen et al., 2021). Firms have responded to these challenges by developing governance structures such as performance-based compensation contracts, executive shareholding schemes, audits, and board oversight to align managers' actions with shareholders' interests (Dong et al., 2021). The theory also sheds light on moral hazard, where agents take risks knowing that principals bear the consequences, and adverse selection, where principals may unknowingly hire agents with hidden weaknesses. Beyond corporate governance, agency theory has been widely applied in fields such as economics, political science, and supply chain management, showing its adaptability across contexts. Its development reflects a broader recognition that incentive alignment and accountability mechanisms are necessary for reducing inefficiencies and ensuring organizational success.

A major strength of agency theory is its ability to explain conflicts of interest and inefficiencies that emerge in modern organizations, especially in publicly traded firms where ownership is separated from control. It provides a practical framework for designing incentive systems, monitoring mechanisms, and contractual arrangements that reduce opportunism and improve accountability. Its wide application in governance and management studies demonstrates its theoretical and practical value. However, the theory has also attracted criticism for its underlying assumptions. It portrays agents as inherently self-serving and opportunistic, thereby neglecting ethical, cultural, and social dimensions of human behavior (Seaborn et al., 2021). Critics argue that overemphasizing financial incentives reduces complex human motivations to economic terms and ignores intrinsic factors such as trust, organizational culture, and shared values. Furthermore, implementing monitoring and incentive mechanisms can be costly and may not entirely eliminate agency problems. The theory also faces limitations in contexts where cooperation, relational trust, or social contracts play a more significant role than financial contracts in regulating behavior.

Agency theory was particularly relevant to this study, which examined how social sustainability integration influenced competitiveness in Kenya's food and beverage manufacturing firms. In this context, agency costs arose from reputational risks, poor labor practices, or lack of compliance with social and regulatory expectations. By adopting socially responsible practices such as fair labor standards, ethical sourcing, and corporate social responsibility initiatives, firms mitigated these risks and enhanced transparency. Such practices acted as governance mechanisms that not only aligned the interests of managers with shareholders but also built trust with employees, consumers, and regulators. For example, companies that prioritized employee welfare and community development were less likely to face labor unrest or consumer backlash, thereby

reducing hidden agency costs. Integrating social sustainability within corporate strategy also enhanced stakeholder trust and brand loyalty, which were critical for long-term competitiveness in an increasingly socially conscious market. Thus, agency theory provided a robust framework for understanding how governance mechanisms rooted in social responsibility balanced profit-driven motives with broader societal expectations in Kenya's evolving food and beverage sector.

2.2.3 Contingency Theory

Contingency theory was developed in the 1950s and 1960s by a number of scholars who sought to challenge the prevailing idea of universal management principles. Fred Fiedler played a pioneering role by introducing the concept of contingency leadership in his influential work A Theory of Leadership Effectiveness (1964), which examined how leadership effectiveness varies depending on situational factors. Other scholars, such as Joan Woodward (1958), Paul Lawrence and Jay Lorsch (1967), and James Thompson (1967), extended the theory into broader management and organizational contexts (Abedin, 2022). Their collective work highlighted that no single best way exists to manage organizations effectively. Instead, managerial practices and leadership approaches must be adapted to fit specific organizational circumstances and external conditions. The theory arose as a response to the shortcomings of classical and universalist approaches, offering a more dynamic and context-sensitive perspective on management effectiveness (Gunarathne & Lee, 2021).

Since its introduction, contingency theory has undergone significant development and refinement. At its core, the theory posits that organizational success depends on the fit between internal practices and external environmental conditions. It rejects the one-size-fits-all approach, advocating instead for flexibility and adaptability to market dynamics, industry structures, and technological advances (Abedin, 2022). Fiedler's contingency model of leadership became a

central aspect of this theory, arguing that leadership styles must vary according to situational demands rather than adhering rigidly to a universal model (Chatterjee et al., 2024). Similarly, Woodward's research demonstrated that effective organizational structures differ based on technology and production methods, while Lawrence and Lorsch emphasized the role of environmental uncertainty in shaping management practices. Over time, contingency theory has been applied across multiple fields including organizational behavior, strategic management, and leadership underscoring its enduring relevance in explaining how adaptability enhances performance.

One of the major strengths of contingency theory is its practical orientation, which recognizes that organizational effectiveness depends on context-specific factors. By encouraging managers to tailor strategies to unique situations, the theory has improved understanding of how organizations can respond to environmental uncertainty and complexity. It also provides a flexible framework that accommodates diversity across industries and organizational types, making it widely applicable. However, the theory has been criticized for its lack of precision in identifying which contingencies matter most in different contexts, creating ambiguity for practitioners (Gunarathne & Lee, 2021). Critics also argue that the assumption that managers can always correctly diagnose and respond to environmental conditions is unrealistic, as real-world contexts are often uncertain and unpredictable. Furthermore, the theory has been faulted for being more descriptive than prescriptive, offering broad guidelines rather than concrete tools for decision-making. These limitations suggest that while contingency theory advances understanding of situational management, it may fall short in providing actionable frameworks for all contexts.

In this study, contingency theory was applied to examine how governance sustainability integration affected competitiveness in food and beverage manufacturing firms in Kenya. The

theory was relevant because it explained how firms enhanced their competitive advantage by aligning governance sustainability strategies with industry-specific contingencies. For example, companies that integrated governance sustainability were able to improve regulatory compliance, minimize corruption-related risks, and strengthen investor confidence. A flexible governance approach that considered both market demands and institutional requirements allowed these firms to achieve long-term growth, organizational resilience, and a sustainable competitive edge. By situating governance practices within the unique social, economic, and regulatory contexts of Kenya, contingency theory provided a useful framework for understanding how adaptability to external conditions contributed to sustained competitiveness in the sector.

2.2.4 Schumpeter's Theory of Innovation

Schumpeter's theory of innovation was developed by Joseph Schumpeter in 1942, when he introduced the concept of creative destruction as a fundamental driver of economic development. According to Schumpeter, innovation was the key source of long-term economic growth, as entrepreneurs disrupted existing industries by introducing new products, processes, markets, and business models (Callegari & Nybakk, 2022). His theory emphasized the role of entrepreneurs as agents of change who transform economies through their ability to challenge established structures and create novel opportunities. Schumpeter argued that economic progress occurs not in a smooth, linear fashion, but rather through cycles of destruction and renewal, where outdated firms and practices are replaced by more innovative and efficient ones. His ideas challenged traditional economic models that emphasized equilibrium and stability, laying the foundation for contemporary theories of innovation, technological change, and entrepreneurship.

Over time, Schumpeter's theory evolved and expanded into a cornerstone of innovation studies and economic theory. He categorized innovation into five distinct forms: the introduction

of new products, the adoption of new methods of production, the discovery of new markets, the acquisition of new sources of raw materials, and the creation of new industry structures (Langroodi, 2021). The notion of creative destruction became central to explaining why firms and industries must continually innovate to maintain competitiveness. Subsequent scholars built upon Schumpeter's ideas, recognizing that innovation was not only the result of individual entrepreneurs but could also emerge from corporate research and development, collaborative networks, and technological ecosystems. Modern extensions of the theory highlight the importance of open innovation, digital transformation, and knowledge-sharing among stakeholders such as governments, research institutions, and consumers (Ma et al., 2024). These developments reflect the increasing complexity of innovation processes in contemporary economies, where success often depends on collective and systemic efforts rather than individual ingenuity alone.

The primary strength of Schumpeter's theory lies in its dynamic explanation of economic change, which highlights the transformative role of innovation in driving progress. It provides a compelling account of how technological advancement and entrepreneurial activity disrupt traditional industries and generate long-term growth. The theory's emphasis on creative destruction has proven particularly useful in understanding technological revolutions, such as the rise of digitalization and renewable energy. However, the theory has also faced criticism. Scholars argue that Schumpeter placed excessive emphasis on the role of individual entrepreneurs, neglecting the influence of broader institutional, regulatory, and cultural contexts (Peng, 2023). Additionally, the focus on radical innovation and disruption sometimes overlooks the importance of incremental improvements that sustain competitive advantage over time. Another weakness is that Schumpeter's framework assumes that innovation automatically translates into economic progress, yet in practice, innovation can also lead to negative outcomes such as unemployment,

inequality, or environmental degradation. These critiques suggest that while Schumpeter's theory is foundational, it requires adaptation to contemporary realities that recognize the complex, multi-stakeholder nature of innovation.

In this study, Schumpeter's theory of innovation was applied to examine how digitalization sustainability integration affected competitiveness in food and beverage manufacturing firms in Kenya. The theory was relevant because it explained how firms that leveraged digital technologies gained competitive advantages by improving operational efficiency, reducing costs, and enhancing product quality. By incorporating digital sustainability strategies, firms adapted to shifting market demands, ensured compliance with regulatory frameworks, and strengthened consumer trust. In line with Schumpeter's principle of creative destruction, digital transformation allowed these firms to replace outdated practices with innovative approaches that fostered long-term growth and resilience. This study therefore assessed the extent to which the adoption of digital solutions enabled firms in Kenya's food and beverage sector to remain competitive in an increasingly dynamic and technology-driven business environment.

2.3 Empirical Review

2.3.1 Environmental Sustainability Integration and Firm Competitiveness

Environmental sustainability integration is expected to influence firm competitiveness in the food and beverage manufacturing sector by improving operational efficiency, reducing costs, and enhancing brand reputation, as firms adopting eco-friendly practices comply with regulations, attract investors, and differentiate their products. Chouaibi et al. (2022) conducted a study on the relationship between ESG factors and corporate financial performance, focusing on green innovation as a mediator in the UK and Germany. The study aimed to examine whether ESG practices influence financial performance and how green innovation strengthens this relationship.

Using a quantitative research design, the researchers analyzed panel data from firms operating under different legal systems. The findings indicated that firms with strong ESG commitments achieved better financial outcomes, with green innovation enhancing efficiency and sustainability-driven growth. However, the study did not explore environmental sustainability integration within Kenya's food and beverage manufacturing sector or its impact on firm competitiveness, presenting a gap in understanding how ESG and digitization influence market performance in emerging economies.

Integrating environmental sustainability into business operations enhances firm competitiveness by fostering resource efficiency, minimizing waste, and strengthening consumer trust, especially in industries like food and beverage manufacturing, where sustainability concerns influence purchasing behavior. Mohammad and Wasiuzzaman (2021) investigated the impact of ESG disclosure on firms' competitive advantage and financial performance in Malaysia, aiming to assess how ESG transparency affects market positioning. Using a panel data approach, the study analyzed ESG disclosure scores and financial performance indicators from publicly listed companies. The findings revealed that firms with higher ESG disclosure experienced a competitive edge and improved financial outcomes due to increased investor confidence and stakeholder trust. However, the study did not specifically address sustainability integration within manufacturing firms or the role of digitization in enhancing ESG practices, leaving a gap in understanding how digital sustainability strategies contribute to firm competitiveness in Kenya's food and beverage sector.

Sustainability integration enhances firm competitiveness by driving cost efficiency, regulatory compliance, and consumer preference for eco-friendly products, which is particularly

relevant in industries with high environmental impact, such as food and beverage manufacturing. Fatoki (2021) explored the relationship between environmental orientation and green competitive advantage among hospitality firms in South Africa, with green innovation as a mediating variable. The study aimed to understand how environmentally driven strategies enhance competitiveness. Using a survey-based quantitative methodology, the research collected data from hospitality businesses and applied regression analysis. Findings demonstrated that environmental orientation significantly improves competitive advantage, with green innovation reinforcing this effect. However, the study did not address the role of digital tools or sustainability integration in manufacturing firms, creating a gap in knowledge regarding how these factors affect the food and beverage sector's competitiveness in Kenya.

The adoption of environmental sustainability practices within firms is influenced by governance structures, which can shape strategic decisions and long-term competitiveness by ensuring compliance with sustainability standards. Oyewo, Tawiah, and Hussain (2023) examined the drivers of environmental and social sustainability accounting practices in Nigeria from a corporate governance perspective. The objective was to assess how governance structures influence sustainability accounting adoption. Using qualitative and quantitative analysis, the study reviewed financial reports and conducted interviews with industry experts. Findings revealed that corporate governance mechanisms play a crucial role in enhancing environmental and social sustainability practices. However, the study did not explore digitization's role in integrating sustainability practices or its impact on competitiveness, leaving a research gap regarding how digital sustainability strategies shape firm performance in Kenya's food and beverage industry.

Firms that integrate environmental sustainability into their operations often achieve a competitive edge through cost savings, regulatory compliance, and improved brand reputation. This is particularly crucial in the food and beverage sector, where resource efficiency and waste reduction can significantly enhance profitability. Khan et al. (2023) explored the relationship between green capabilities, green purchasing, and the triple bottom line performance, emphasizing their role in environmental sustainability. The study aimed to establish how green purchasing practices enhance economic, social, and environmental outcomes. Employing a quantitative approach, the researchers used structural equation modeling to analyze survey data collected from manufacturing firms. The findings indicate that green capabilities significantly influence green purchasing, which in turn improves triple bottom line performance by reducing environmental impact and increasing operational efficiency. However, the study does not address the role of digitization in strengthening sustainability integration and competitiveness, particularly within the food and beverage manufacturing sector in Kenya, where digital tools could enhance supply chain efficiency and traceability.

Environmental sustainability can drive firm competitiveness by ensuring compliance with environmental regulations, reducing costs associated with waste management, and improving resource efficiency. Yadav et al. (2017) examined how corporate environmental performance contributes to sustaining competitive advantage. The study sought to determine whether proactive environmental strategies lead to long-term competitiveness. Utilizing a mixed-method approach, the researchers conducted case studies and statistical analyses of firm-level data. The findings reveal that firms with robust environmental performance maintain a higher competitive advantage due to regulatory compliance and resource efficiency, which lower production costs and enhance sustainability-driven market differentiation. However, while the study provides valuable insights

into environmental sustainability and competitiveness, it does not explore the interplay between sustainability integration and digitization in food and beverage manufacturing firms in Kenya, a crucial gap considering the role of digital technologies in optimizing green operations.

Companies that collaborate with stakeholders to implement green initiatives often achieve better environmental performance and financial returns, as sustainability-driven innovations enhance efficiency and brand value. Dangelico and Pontrandolfo (2015) examined the impact of environmental actions and collaborations on firm performance, particularly focusing on the extent to which green practices contribute to financial and operational efficiency. The study employed a survey-based research design, gathering data from firms implementing green initiatives. The findings suggest that collaboration with suppliers and stakeholders strengthens environmental and financial performance by improving resource utilization, reducing emissions, and lowering costs. However, the study does not consider how digitization can streamline green initiatives and enhance the competitiveness of food and beverage manufacturing firms in Kenya. This gap is significant as digital tools, such as blockchain and IoT, could play a pivotal role in monitoring sustainability practices and optimizing resource use in manufacturing firms.

Green procurement practices can drive competitive advantage by improving operational efficiency, reducing costs, and enhancing a firm's sustainability credentials. Thiga et al. (2023) investigated the relationship between green procurement and the performance of food and beverage manufacturing firms in Kenya. The study sought to determine the extent to which green procurement influences operational and financial outcomes. Using a descriptive research design, the researchers collected primary data from firms engaged in green procurement practices. The findings indicate that adopting green procurement enhances efficiency, reduces waste, and

improves sustainability outcomes by ensuring responsible sourcing and minimizing resource consumption. Despite these contributions, the study does not consider the integration of digitization in green procurement and its potential impact on firm competitiveness. This omission is critical, as digital platforms and analytics could enhance green procurement by enabling real-time tracking of supplier sustainability performance and optimizing procurement decisions.

Internal green integration within firms can improve environmental performance by fostering sustainability-driven innovations, resource efficiency, and regulatory compliance. Shah and Soomro (2021) analyzed internal green integration and its effect on environmental performance, with a focus on proactive environmental strategy, supplier greening, and environmental collaboration. The study employed a quantitative approach, utilizing survey data from firms across various industries. The findings reveal that internal green integration significantly enhances environmental performance by promoting sustainability-oriented decision-making, reducing waste, and improving energy efficiency. However, the study does not explore how digitization can enhance sustainability integration and its role in the competitiveness of food and beverage manufacturing firms in Kenya. This gap is significant, as digital innovations, such as AI-driven energy management and IoT-enabled monitoring, could further strengthen sustainability integration and offer a competitive advantage by optimizing resource utilization and reducing environmental risks.

2.3.2 Social Sustainability Integration and Firm Competitiveness

Social sustainability integration influences firm competitiveness by fostering long-term resilience, enhancing consumer trust, and ensuring regulatory compliance. In Kenya's food and beverage manufacturing sector, firms that prioritize ethical labor practices, community engagement, and

responsible sourcing can differentiate themselves in a competitive market. This integration enhances brand reputation, attracts socially conscious consumers, and minimizes supply chain disruptions. However, poor sustainability integration such as token CSR efforts without meaningful impact can lead to reputational damage, regulatory penalties, and loss of consumer confidence, ultimately weakening competitiveness. Lu and Abeysekera (2021) conducted a study on the valuation of strategic corporate social responsibility (CSR) disclosures by investors and analysts in China, aiming to examine whether these disclosures influence perceptions of firm value. Using an empirical methodology that analyzed financial data and CSR reports from Chinese-listed firms, the study found that strategic CSR disclosures positively impact firm valuation by enhancing investor confidence and analyst forecast accuracy. The findings suggest that firms engaging in well-structured CSR initiatives are likely to benefit from improved financial performance. However, the study did not explore how sustainability integration and digitization influence firm competitiveness, particularly in the food and beverage manufacturing sector in Kenya, leaving a gap in understanding the broader strategic implications of social sustainability on firm performance.

A firm's competitiveness in the food and beverage manufacturing sector in Kenya is increasingly tied to its ability to integrate social sustainability into its operations. Companies that prioritize fair labor practices, ethical sourcing, and community engagement can strengthen consumer trust, enhance brand loyalty, and comply with evolving regulatory requirements, thereby gaining a competitive edge. Conversely, firms that fail to incorporate social sustainability may face reputational damage, reduced market share, and regulatory fines, ultimately diminishing their competitiveness. Blay Jnr et al. (2023) examined the impact of competitive strategies on achieving the Sustainable Development Goals (SDGs) in Ghanaian construction firms. Their objective was

to assess how competitive strategies, including differentiation and cost leadership, contribute to sustainability. The study employed a mixed-methods approach, combining surveys and interviews with industry professionals, to analyze how strategic positioning affects sustainability integration. The findings revealed that competitive strategies significantly influence firms' ability to embed sustainability into their operations, highlighting that firms adopting sustainability-driven competitive strategies can improve efficiency, attract investors, and enhance their market position. However, the study did not explore the role of digitization in sustainability integration and its impact on firm competitiveness in the food and beverages manufacturing industry in Kenya, leaving a gap in understanding how digital transformation can enhance social sustainability initiatives and improve overall firm performance.

Social sustainability integration enhances firm competitiveness by fostering customer loyalty, strengthening brand reputation, and ensuring compliance with evolving market expectations, which can lead to long-term profitability. However, if poorly managed or costly to implement, it may strain financial resources and reduce short-term competitiveness. Mapokotera et al. (2023) explored the relationship between corporate social responsibility (CSR) and competitiveness among service-based enterprises in Zimbabwe, aiming to determine how CSR practices enhance competitive advantage in the service industry. Using qualitative interviews and survey data from service enterprises, the study revealed that firms engaging in CSR initiatives experienced improved customer loyalty, brand reputation, and long-term profitability. However, the study did not consider the impact of digitization on CSR integration or its implications for competitiveness within food and beverage manufacturing firms in Kenya, presenting a significant knowledge gap in this area.

Social sustainability integration enhances firm competitiveness by promoting ethical sourcing, employee well-being, and environmental stewardship, which strengthen brand loyalty and market differentiation. However, if poorly managed, it can lead to high compliance costs and resistance from supply chain partners, weakening competitiveness. Mogaka et al. (2022) examined the role of customer integration in enhancing the competitive advantage of food and beverage manufacturing firms in Kenya, assessing how customer engagement, feedback mechanisms, and co-creation of products influence firms' market position. Using a descriptive research design and structured questionnaires targeting supply chain managers, the study found that firms integrating customers into their supply chain experienced improved product innovation, responsiveness, and market positioning. However, the study did not explicitly address social sustainability integration, leaving a gap in understanding how ethical labor practices, community engagement, and environmental responsibility contribute to competitiveness in Kenya's food and beverage sector.

Social sustainability integration enhances firm competitiveness by promoting ethical supply chain practices, environmental stewardship, and social responsibility, which can improve brand reputation and customer loyalty. However, if sustainability initiatives are costly or misaligned with core business operations, they may strain financial resources and reduce short-term competitiveness. Kimaru et al. (2024) investigated the impact of networking capability on the sustainable competitive advantage of small and medium food manufacturing enterprises in Kenya, aiming to determine how business networks, partnerships, and information sharing contribute to long-term competitiveness. Using a mixed-methods approach combining surveys and interviews, the study found that firms with strong networking capabilities had better access to resources, market opportunities, and innovation. However, the study did not address the role of sustainability-focused collaborations in enhancing competitiveness, leaving a gap in understanding how

environmentally and socially responsible partnerships contribute to firm performance in Kenya's food and beverage sector.

Social sustainability integration strengthens firm competitiveness by ensuring responsible sourcing, fair labor practices, and waste reduction, which enhance operational efficiency and compliance with global sustainability standards. Conversely, if poorly managed, sustainability initiatives may introduce supply chain disruptions or increase operational costs, negatively impacting financial performance. Mulweye et al. (2024) explored supplier collaboration and its effect on the performance of food and beverage manufacturing firms in Kenya, focusing on how supplier partnerships influence cost reduction, efficiency, and product quality. Using a survey research design with data from procurement and supply chain professionals, the study found that firms with strong supplier collaborations achieved better cost efficiency, reduced lead times, and enhanced product innovation. However, the study did not assess the role of sustainability-oriented supplier partnerships in boosting competitiveness, overlooking the potential of ethical sourcing and environmentally friendly procurement practices in driving long-term firm success within the industry.

Integrating social sustainability into business strategies strengthens firm competitiveness by enhancing stakeholder trust, ensuring regulatory compliance, and fostering brand differentiation. Conversely, neglecting social sustainability can lead to reputational risks, regulatory penalties, and loss of market opportunities, ultimately weakening a firm's competitive position. Njuguna et al. (2024) examined the effects of horizontal integration strategies on the competitiveness of firms operating in Export Processing Zones (EPZs) in Kenya, aiming to determine how mergers, acquisitions, and strategic alliances impact firm performance. Using a

case study approach that involved in-depth analysis through interviews and document reviews, the study found that horizontal integration led to economies of scale, market expansion, and improved financial performance. The findings suggest that firms adopting horizontal integration strategies gain a competitive edge by leveraging shared resources and expanded market access. However, the study did not consider how sustainability integration and digital transformation affect the success of horizontal integration strategies, presenting a gap in evaluating the role of emerging trends in firm competitiveness, particularly in Kenya's food and beverage manufacturing sector.

Firms that incorporate social sustainability through environmental responsibility and ethical business practices enhance their long-term resilience and competitive advantage. On the other hand, a lack of investment in sustainability efforts can result in higher operational costs, negative consumer perception, and regulatory non-compliance, which hinder firm performance. Le (2022) investigated how corporate social responsibility (CSR) and green innovation contribute to sustainable firm performance, with the objective of assessing the extent to which environmental responsibility and green innovation drive long-term competitiveness. The study employed a quantitative research methodology, collecting data from firms across various industries and applying structural equation modeling for analysis. The findings revealed that firms investing in CSR and green innovation reported higher profitability, improved brand reputation, and stronger stakeholder relationships, emphasizing the role of sustainability in enhancing firm competitiveness. However, the study did not explore how sustainability integration and digitization specifically impact food and beverage manufacturing firms in Kenya, leaving room for further research in this domain to understand the direct implications of digital transformation on sustainability-driven competitiveness.

2.3.3 Governance Sustainability Integration and Firm Competitiveness

Governance sustainability integration enhances firm competitiveness by promoting transparency, ethical decision-making, and regulatory compliance, which improve stakeholder trust and financial stability. However, weak governance mechanisms may lead to poor sustainability implementation, increasing reputational risks and regulatory penalties, ultimately harming competitiveness. Agarwal et al. (2023) conducted a study examining the impact of environmental, social, and governance (ESG) activities on the financial performance of healthcare firms in India, incorporating competition as a moderating variable. Using a panel data approach with regression analysis, the study found that ESG initiatives positively influenced financial performance, with competition reinforcing this effect. Although the study highlights the significance of governance sustainability integration in firm success, it does not explore the role of digitization in enhancing sustainability or its specific application in food and beverage manufacturing firms in Kenya. The unique sustainability and competitive pressures within this sector necessitate further research to determine how governance practices impact firm competitiveness in Kenya's food and beverage industry.

Strong governance sustainability integration ensures accurate sustainability reporting, risk management, and operational accountability, enhancing long-term competitiveness. Conversely, if governance structures are weak, firms may struggle with greenwashing, financial mismanagement, and regulatory non-compliance, eroding their competitive advantage. Donkor et al. (2021) investigated the impacts of combined assurance on integrated, sustainability, and financial reporting qualities among listed firms in South Africa. Using a quantitative research design and regression models, the study found that combined assurance significantly improves the reliability and credibility of sustainability and financial reports, strengthening transparency and

investor confidence. However, the study does not examine the influence of digitization in facilitating combined assurance mechanisms or how governance sustainability integration affects firm competitiveness in the food and beverage manufacturing sector in Kenya. The differences in corporate governance and regulatory environments between South Africa and Kenya further highlight the need for industry-specific research on governance sustainability integration in Kenyan firms.

Governance sustainability integration supports firm competitiveness by aligning corporate governance structures with environmental and social responsibility, driving sustainable growth and risk mitigation. However, if governance frameworks lack strategic direction, firms may face inefficiencies in sustainability initiatives, leading to increased operational costs and reduced competitive positioning. Aguilera et al. (2021) examined corporate governance and environmental sustainability, proposing a more integrated approach to research in this area. Using a systematic literature review methodology, the study found that governance mechanisms, such as board composition and ownership structures, significantly influence firms' environmental sustainability strategies. While the study provides valuable insights into governance and sustainability, it does not consider the role of digital innovations in governance sustainability integration or how such practices impact firm competitiveness in Kenya's food and beverage manufacturing sector. This gap underscores the need for further research on governance structures tailored to industry-specific sustainability challenges and competitive dynamics in Kenya.

Governance sustainability integration fosters firm competitiveness by aligning corporate strategies with ethical, social, and environmental considerations, leading to improved brand reputation and stakeholder trust. However, weak governance structures that fail to integrate sustainability may result in regulatory penalties, operational inefficiencies, and declining market

positioning. Jan et al. (2021) explores the integration of sustainability practices into Islamic corporate governance for sustainable firm performance, using agency and stakeholder theories. The study adopts a mixed-method approach, combining surveys and case studies from firms practicing Islamic corporate governance. Findings indicate that Islamic governance principles enhance sustainability performance, but the study's focus on Sharia-compliant firms limits its relevance to conventional corporate governance models in Kenya. Additionally, it does not consider how governance sustainability integration influences the competitiveness of food and beverage manufacturing firms in Kenya, nor does it address the role of digitization in strengthening sustainability practices.

Effective governance sustainability integration enhances firm competitiveness by improving risk management, regulatory compliance, and operational efficiency, ultimately driving long-term profitability. Conversely, a lack of governance integration may expose firms to financial risks, reputational damage, and reduced market share. Puni and Anlesinya (2020) investigate corporate governance mechanisms and firm performance in a developing country, focusing on governance practices such as board independence and audit committee effectiveness. Employing an empirical research design with secondary data analysis, the study finds a positive correlation between strong governance structures and financial performance. However, the study does not integrate sustainability as a core governance factor, leaving a gap in understanding its role in competitive positioning. Additionally, it does not explore the influence of digitization on governance effectiveness or how governance sustainability integration affects the competitiveness of food and beverage manufacturing firms in Kenya.

Governance sustainability integration strengthens firm competitiveness by enhancing accountability, environmental stewardship, and strategic decision-making, leading to higher

investor confidence and market expansion. However, governance frameworks that neglect sustainability considerations may hinder innovation, limit stakeholder engagement, and reduce long-term viability. Outa and Waweru (2016) examine compliance with corporate governance guidelines and its impact on financial performance among listed firms in Kenya. Using a quantitative research approach, the study analyzes financial statements and governance compliance reports, revealing that higher compliance levels correlate with improved financial performance. However, it does not address the integration of sustainability into governance frameworks or its impact on firm competitiveness in Kenya's food and beverage manufacturing sector.

Integrating sustainability into governance enhances firm competitiveness by driving innovation, cost efficiency, and regulatory adherence, positioning firms for long-term growth. In contrast, governance structures that fail to prioritize sustainability may lead to inefficiencies, legal challenges, and reduced competitive advantage. Wekesa (2019) investigates the effect of liquidity, corporate governance, and competitiveness on financial performance in Kenya's sugar industry using panel data analysis. The findings highlight the crucial role of governance structures in fostering firm competitiveness, yet the study is limited to the sugar sector and lacks insights into governance sustainability integration in the broader manufacturing industry. Additionally, the study does not explore how sustainability and digitization interact to enhance governance and competitiveness in Kenya's food and beverage manufacturing firms. This gap underscores the need for further research on governance sustainability integration as a driver of competitive advantage in Kenya's food and beverage manufacturing firms.

2.3.4 Digitalization Sustainability Integration and Firm Competitiveness

Integrating digitalization with sustainability enhances firm competitiveness by improving operational efficiency, reducing environmental impact, and aligning with evolving market expectations. However, if digital transformation is not aligned with sustainability goals, firms may incur high costs without realizing long-term benefits, leading to inefficiencies and competitive disadvantages. Xie and Jin (2023) examine the role of digitalization, sustainability, natural resources, and political globalization in shaping economic well-being in China, Japan, and South Korea. Using panel data analysis and econometric modeling, they find that digitalization enhances economic growth by optimizing resource utilization, while sustainability initiatives contribute to long-term stability. Despite highlighting the positive impact of sustainability integration and digitalization on economic performance, the study does not specifically address their influence on firm competitiveness in the food and beverage manufacturing sector in Kenya. This leaves a gap in understanding how these variables interact in a developing economy with unique regulatory and resource constraints.

Digitalization sustainability integration strengthens firm competitiveness by fostering innovation, reducing operational costs, and ensuring compliance with environmental regulations. However, if firms encounter barriers to digital adoption, such as high costs or inadequate infrastructure, they may struggle to leverage sustainability for competitive advantage. Rakgoale, Bag, and Pretorius (2024) explore barriers to digitalization implementation in South Africa using the interpretive structural modeling (ISM) approach, identifying key challenges such as high implementation costs, lack of infrastructure, and resistance to change. While their study offers insights into digital adoption challenges, it does not examine how digitalization, when successfully integrated with sustainability, influences competitiveness in the food and beverage sector in

Kenya. This highlights the need for further research into how firms can overcome digitalization barriers to enhance both sustainability and competitive advantage in the industry.

Firms that integrate digitalization with sustainability-oriented innovations achieve long-term competitive advantages by enhancing efficiency, reducing waste, and improving brand reputation. Conversely, neglecting sustainability within digital transformation strategies may lead to reputational risks and regulatory non-compliance, limiting competitiveness. Hermundsdottir and Aspelund (2021) conduct a systematic literature review on sustainability innovations and their impact on firm competitiveness, identifying that firms adopting eco-friendly processes and renewable energy solutions experience financial and reputational benefits. However, the study does not provide a contextual analysis of the food and beverage manufacturing sector in Kenya, particularly regarding the interplay between digitalization and sustainability. This gap suggests the need for further research into how sustainability-driven digital innovations can enhance competitiveness in Kenya's food and beverage industry.

Digitalization sustainability integration enhances firm competitiveness by fostering innovation, operational efficiency, and regulatory compliance, thereby creating long-term value. However, if digitalization efforts are not aligned with sustainability goals, firms may face regulatory penalties, high costs, and reputational risks that undermine their competitive advantage. Knudsen et al. (2021) assess the impact of digitalization on sustaining competitive advantage in turbulent business environments by conducting a longitudinal analysis using secondary data and econometric modeling. Their findings indicate that digitalization supports resilience by improving agility, customer engagement, and efficiency, thereby sustaining competitive advantage. However, the study does not explore the intersection of digitalization and sustainability efforts, particularly within Kenya's food and beverage manufacturing sector, highlighting a need for further research

on how firms in this industry can integrate digital sustainability strategies to maintain competitiveness.

Sustainability-oriented digitalization fosters firm competitiveness by reducing waste, lowering costs, and ensuring compliance with evolving environmental regulations. Conversely, firms that fail to integrate sustainability into digital strategies risk inefficiencies and loss of market trust, limiting their competitive position. Al-Omush et al. (2023) explore the link between digitalization and sustainable competitive performance in SMEs through a quantitative survey and structural equation modeling. Their findings reveal that digitalization significantly enhances firm performance when combined with sustainability-focused strategies, emphasizing the synergistic effect of digital adoption and sustainability on competitiveness. However, the study does not provide industry-specific insights into Kenya's food and beverage sector, leaving a gap in understanding how digital sustainability integration impacts firm competitiveness in this specific context.

Digitalization enables firms to adapt their business models and achieve sustainability objectives, strengthening competitive advantage by fostering efficiency and market differentiation. However, without proper alignment, digital investments may fail to yield sustainable benefits, leading to short-term gains but long-term instability. Li et al. (2023) examine how digitalization and network capability drive business model innovation and sustainability performance using a survey-based methodology and regression analysis. Their results suggest that firms with strong digital and networking capabilities are better positioned to integrate sustainability into their operations, enhancing competitiveness. However, the study does not offer insights specific to the food and beverage sector in Kenya, indicating a need for further research on how digital strategies can optimize sustainability and competitiveness in this industry.

Firms in the food and beverage sector that integrate digitalization with sustainability gain a competitive edge through enhanced productivity, cost efficiency, and consumer trust. However, neglecting sustainability within digital adoption strategies may lead to regulatory challenges and reduced long-term competitiveness. Mogaka et al. (2024) analyze the role of technology integration in enhancing competitiveness within Kenya's food and beverage sector using a mixed-method approach comprising qualitative interviews and quantitative surveys. Their findings indicate that digital adoption improves productivity, supply chain coordination, and customer satisfaction, ultimately strengthening firm competitiveness. However, the study notes a gap in sustainability-focused digitalization, as most firms prioritize efficiency over environmental and social sustainability, underscoring the need for research into how digital sustainability integration can optimize competitive advantage in Kenya's food and beverage industry.

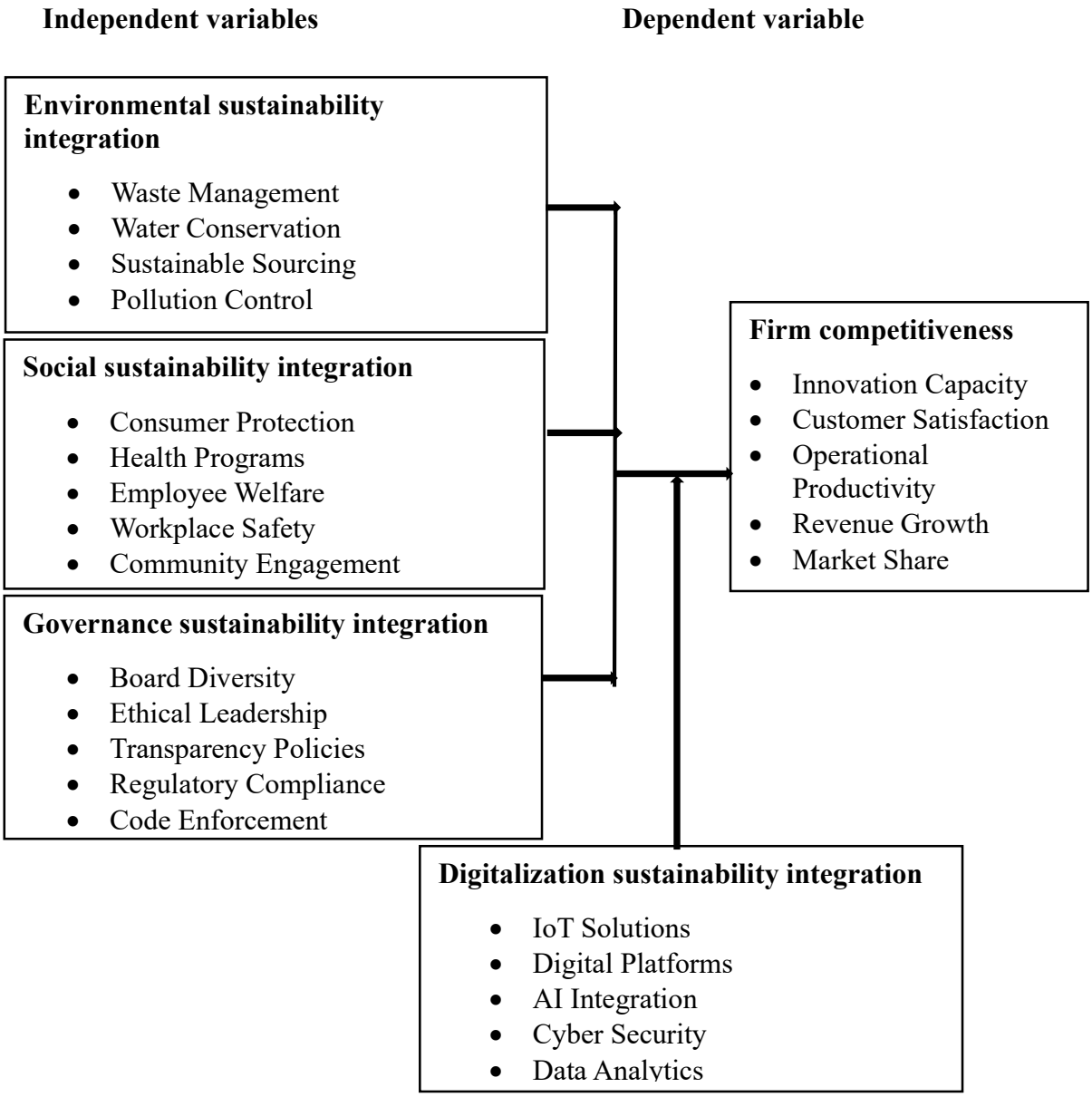
2.4 Conceptual Farmwork

The conceptual framework links environmental sustainability integration, social sustainability integration, governance sustainability integration (independent variables) and digitalization sustainability integration (moderating variables) to firm competitiveness (dependent variable)

Independent variables **Dependent variable**

FIGURE 2.1

Conceptual Farmwork



2.5 Research Gap and Summary of Literature Review

Literature shows a strong link between environmental sustainability and firm competitiveness through efficiency, cost savings, compliance, and brand value. Chouaibi et al. (2022), Mohammad & Wasiuzzaman (2021), and Khan et al. (2023) confirm that green innovation and procurement boost performance. However, limited research explores this in Kenya's food and beverage sector, especially the role of digital tools in enhancing ESG practices and firm competitiveness. Studies like those by Lu & Abeysekera (2021) and Blay Jnr et al. (2023) link social sustainability with improved brand reputation, customer loyalty, and compliance. While CSR and competitive strategies benefit firms, there's little focus on how digitization supports social sustainability in Kenya's food and beverage industry highlighting a key research gap. Governance integration enhances competitiveness by promoting transparency, ethics, and compliance. Research by Agarwal et al. (2023), Donkor et al. (2021), and others shows governance's positive effects on performance. Yet, studies rarely examine the role of digital tools in governance within Kenya's food and beverage sector, revealing a gap that needs targeted investigation. Research confirms that combining digitalization with sustainability boosts efficiency, innovation, and compliance. Studies by Xie & Jin (2023), Rakgoale et al. (2024), and others support this. However, most overlook Kenya's food and beverage sector and don't fully explore how digital transformation supports sustainability, indicating a clear research gap.

2.6 Operationalization of Variables

TABLE 2.1

Operationalization of Variables

Type of Variable	Variable	Variable indicator	Measurement Scale	Type of Analysis
Independent Variables	Environmental sustainability integration	• Waste Management • Water Conservation • Sustainable Sourcing • Pollution Control	Interval scale	Descriptive/ Statistics
	Social sustainability integration	• Consumer Protection • Health Programs • Employee Welfare • Workplace Safety • Community Engagement	Interval scale	Descriptive Statistics
	Governance sustainability integration	• Board Diversity • Ethical Leadership • Transparency Policies • Regulatory Complianc • Code Enforcement	Interval scale	Descriptive Statistics
Moderating Variables	Digitalization sustainability integration	• IoT Solutions • Digital Platforms • AI Integration • Cyber Security • Data Analytics	Interval scale	Descriptive Statistics
Dependent Variable	Firm competitiveness	• Innovation Capacity • Customer Satisfaction • Operational Productivity • Revenue Growth • Market Share	Interval scale	Descriptive statistics

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discussed the research design, target population, sample size and sampling methods, data collection procedures, data analysis techniques, and ethical considerations.

3.2 Research Design

Descriptive research design is a research method used to systematically describe a population, situation, or phenomenon (Muzari et al., 2022). Unlike experimental approaches that seek to establish cause-and-effect relationships, descriptive design focuses on providing accurate details about "what is" within a given context (Pentang, 2023). For the current study, the researcher considered this design highly suitable because it enabled an in-depth understanding of sustainability integration, digitization, and firm competitiveness in food and beverage manufacturing firms in Kenya. The descriptive design was particularly appropriate as it allowed the researcher to capture and present the existing practices in sustainability and digitalization without manipulating variables, thereby reflecting the real-world industry context. Moreover, this design supported the systematic collection of quantitative data, making it possible to establish patterns, trends, and relationships between sustainability integration and competitiveness. By adopting a descriptive approach, the researcher was able to generate detailed insights that accurately reflected the industry's current state, which was essential for drawing meaningful conclusions and policy implications.

3.3 Population

In research, the population refers to the entire group of individuals, objects, or events that a researcher is interested in studying (Hossan et al., 2023). The population serves as the foundation

from which a representative sample is drawn for analysis. According to the Kenya Association of Manufacturers (KAM) 2025 database, there were 248 active members in food and beverage manufacturing firms in Kenya. These firms, spread across different regions of the country, formed the fundamental unit of analysis and constituted the target population for this study.

To ensure representativeness, the study population was stratified based on firm size, categorized into small, medium, and large-scale manufacturers as classified by KAM. Firm size was considered an appropriate stratification attribute because sustainability practices and levels of digitalization often vary according to the scale of operations and resource availability. This approach ensured that the sampling captured the diversity within the industry, providing a balanced view of how sustainability integration and digitalization affected competitiveness across different categories of firms. The stratified population therefore comprised 248 food and beverage manufacturing firms, with detailed distribution provided in Appendix VI and summarized in Table 3.1.

TABLE 3.1

Categories of Firms

Categories of Firms	Number in Each Category
Beverages (Alcoholic)	11
Beverages (Non-Alcoholic)	25
Confectionery & Snacks	10
Dairy Products	18
Edible Oils & Fats	11
Flour & Milled Products	12
Fruits & Vegetables Processing	17
Meat & Meat Products	13
Processed & Packaged Foods	9
Spices, Condiments & Sauces	5
Sugar & Sweeteners	16
Bakery & Cereal-Based Products	6
Animal Feeds & Pet Food	27
Coffee & Tea Processing	7
Frozen & Convenience Foods	4
Water Bottling	31
Food Additives & Ingredients	4
Miscellaneous Food Companies	22
Total	**248**

Source: Kenya Association of Manufacturers 2025 database

3.4 Sample and Sampling Technique

3.4.1 Sampling Procedure and Sample Size

According to Rahman et al. (2022), the sampling procedure is the process of selecting individuals or units from a population to participate in a study, with the goal of obtaining a representative sample that reflects the characteristics of the entire population. However, in this study, the concept of sampling procedure and sample size was not applicable because a census design was adopted. Data was collected from all 248 food and beverage manufacturing firms in Kenya, ensuring complete coverage of the target population. Since the unit of analysis was the firm, data was obtained from a single representative per firm, with each firm receiving one questionnaire. By using a census approach, the study eliminated the need for sampling while at the same time

reducing the risk of sampling bias. This ensured greater accuracy, reliability, and comprehensiveness of the findings on sustainability integration, digitization, and firm competitiveness in the food and beverage manufacturing sector.

3.5 Research Instrumentation

Research instrumentation refers to the tools, techniques, and methods used to collect data in a study (Pentang, 2023). The study utilized a structured questionnaire as the primary research instrument. The questionnaire was designed to capture data on sustainability integration, digitization, and firm competitiveness in food and beverages manufacturing firms in Kenya. It consisted of closed-ended questions to allow for comprehensive data collection. The questionnaire was divided into sections based on key study variables, including demographic information, sustainability practices, digitization efforts; environmental, social, governance, and digitalization sustainability integration, and competitive performance metrics. A five-point Likert scale was used to measure responses where applicable.

3.6 Pilot Study

A pilot study is a small-scale, preliminary study conducted before the main research to test the feasibility, validity, reliability, and potential issues of the research design, methodology, and instruments (Reiss, 2023). It helps researchers identify and correct problems before committing to a full-scale study. For this study, a pilot was conducted using 10 food and beverage manufacturing firms that were not part of the final census population to avoid contamination of results. The selection of these pilot respondents was done randomly from firms operating in the same sector but excluded from the main study sample frame, thereby ensuring that they shared similar characteristics with the target population. This approach allowed the researcher to maintain the integrity of the census design while still benefiting from the insights of a pilot. The results

from the pilot were used to refine the questionnaire, enhance clarity, and ensure that all items were well understood by respondents before rolling out data collection in the full census.

3.6.1 Test of Validity

Validity testing is the process of determining whether a measurement instrument such as questionnaire accurately measures what it is intended to measure. It ensures that research findings are credible and applicable to real-world scenarios (Hossain, et al. 2024). Validity testing was conducted to ensure that the research instrument accurately measures the intended variables. Content validity was established by seeking expert opinions from professionals in the food and beverages manufacturing sector and academia. Construct validity was assessed to verify whether the questionnaire items align with the theoretical constructs of sustainability integration, digitization, and firm competitiveness.

3.6.2 Test of Reliability

A Test of reliability is a statistical measure used to assess the consistency and stability of a measurement instrument, such as a questionnaire, across different conditions (Reiss, 2023). It ensures that the data collection tool produces consistent results when used repeatedly under similar conditions. Reliability testing was conducted using Cronbach's alpha coefficient to determine the internal consistency of the questionnaire items. A Cronbach's alpha value of 0.7 or higher was considered acceptable, indicating that the questionnaire items produce consistent results over repeated applications.

3.7 Data collection

KCA University issued an authorization letter for introduction to the National Commission for Science, Technology, and Innovation. This authorization letter, along with a copy of the research proposal, was submitted for processing the research permit. Upon obtaining the permit, the study sort consent from participants through the human resource department in food and beverage manufacturing firms. Data was collected through self-administered questionnaires distributed physically to the respondents within one month. Respondents were given a specified duration to complete and return the questionnaires. Follow-ups was conducted to ensure a high response rate.

3.8 Data Analysis and Presentation

Data was analyzed using both descriptive and inferential statistics. Descriptive statistics such as mean, standard deviation, and frequency distributions was summarized while inferential analysis was conducted using Ordinary Least Square (OLS) model to establish relationships between study variables (Devore, et al. 2021). The findings were presented inform of frequency of tables. This relationship was expressed through baseline model and moderation model as follows;

Baseline Model

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where:

$Y =$ Firm competitiveness

$\beta_0 =$Constant (coefficient of intercept)

$X_1 =$ Environmental sustainability integration

$X_2 =$ Social sustainability integration

$X_3 =$ Governance sustainability integration

Moderation Model

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 Z + \beta_5 X_1 * Z + \beta_6 X_2 * Z + \beta_7 X_3 * Z + \varepsilon$$

Where:

$Y =$ Firm competitiveness

$\beta_0 =$Constant (coefficient of intercept)

$X_1 =$ Environmental sustainability integration

$X_2 =$ Social sustainability integration

$X_3 =$ Governance sustainability integration

$Z =$ Digitalization sustainability integration

3.9 Research Ethics

Ethical considerations were observed throughout the study to ensure the protection and respect of all participants. Recruitment was done purposively by targeting individuals with relevant knowledge and experience in manufacturing firms, and they were contacted through official communication channels. Prior to data collection, participants were fully informed about the study's purpose, and informed consent was obtained, with assurances of anonymity and the right to withdraw at any time without facing any consequences. All information obtained was treated with strict confidentiality, with data securely stored and used solely for academic purposes. Ethical approval was sought from the relevant Institutional Review Board to ensure compliance with ethical research standards (Drolet et al., 2023). The study upheld principles of honesty, integrity,

and respect for respondents' dignity and well-being. Additionally, the findings were disseminated to the community and shared with manufacturing firms to support evidence-based decision-making and promote sustainable improvements in the sector.

3.10 Diagnostic Tests

Diagnostic tests were crucial in ensuring the validity and reliability of the statistical analysis used in the study. These tests helped verify whether the assumptions of regression analysis were met, thereby improving the accuracy of the results and conclusions drawn (Sulaiman et al., 2021).

3.10.1 Normality Test

The normality test checked whether the residuals (errors) of the regression model were normally distributed. This assumption was critical for valid statistical inference, particularly in estimating p-values and constructing confidence intervals (Demir, 2022). If the residuals were not normally distributed, hypothesis tests could become unreliable, leading to incorrect conclusions. The study used the Shapiro-Wilk and Kolmogorov-Smirnov tests for this purpose. If non-normality was detected, data transformations (e.g., logarithmic or square root) were applied to improve normality.

3.10.2 Linearity Test

This test assessed whether the relationship between the independent and dependent variables was linear, as required in linear regression models (Sulaiman et al., 2021). If the relationship was non-linear, the regression model could produce biased estimates and low predictive accuracy. The study used correlation coefficients and visual inspection through scatterplots or partial regression plots to test linearity. If significant deviations were found, alternative models such as polynomial regression or non-linear transformations were considered to capture the true relationship.

3.10.3 Multicollinearity Test

Multicollinearity occurrs when two or more independent variables were highly correlated. This undermines the model's ability to distinguish the individual effect of each predictor, resulting in unstable regression coefficients, inflated standard errors, and misleading significance tests (Sulaiman et al., 2021; Bayman & Dexter, 2021). The study used the Variance Inflation Factor (VIF) and Tolerance values to assess multicollinearity. A VIF > 10 or Tolerance < 0.1 signaled the presence of multicollinearity.

3.10.4 Homoscedasticity

Homoscedasticity refers to the assumption that the variance of the error terms is constant across all levels of the independent variables. When this assumption is met, the model's predictions are more reliable, and the estimated coefficients remain efficient and unbiased. A violation, known as heteroscedasticity, leads to inefficient estimates and biased standard errors, which may distort hypothesis testing and confidence intervals (Gujarati, 2021; Wooldridge, 2020). The study tested for homoscedasticity using graphical methods such as scatter plots of standardized residuals against predicted values, as well as statistical tests including the Breusch–Pagan and White tests. A random scatter of residuals with no clear pattern indicated homoscedasticity, while systematic patterns suggested the presence of heteroscedasticity.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presented the findings through the response rate, diagnostic tests, and demographic analysis. It also included descriptive and inferential analysis to interpret the results.

4.2 Response Rate

Out of the 248 targeted respondents drawn from active members of the Kenya Association of Manufacturers (KAM) in the food and beverages manufacturing sector across Kenya, a total of 225 questionnaires were successfully returned, representing a high response rate of 90.7%. Only 23 questionnaires, or 9.3%, were not returned. This strong participation reflects a high level of engagement and interest from firms across the country in the study, which focused on the integration of sustainability practices, adoption of digitization, and their combined influence on firm competitiveness. The robust response rate enhances the reliability and generalizability of the findings, offering a credible basis for insights into how these firms are navigating the evolving industrial landscape (Chikan, et al., 2022).

TABLE 4.1

Response Rate

Response Rate	**No.**	**Percentages**
Returned questionnaire	225	90.7
Unreturned questionnaire	23	9.3
Total	**248**	**100**

4. 3 Pilot Test Results

4.3.1 Validity of Data Collection Instrument

The validity of the questionnaire was ensured through several steps. Content validity was established by aligning the items with the study's objectives and theoretical framework (Ahmed & Ishtiaq, 2021). Face validity was confirmed by manufacturing firm professionals who reviewed the instrument for clarity and relevance. Construct validity was assessed by comparing the key constructs; environmental sustainability, social sustainability, governance sustainability, digitization and firm competitiveness with existing literature to ensure accurate measurement. This layered approach strengthens the credibility and generalizability of the research findings.

4.3.2 Reliability Results

The reliability analysis results indicate that all constructs demonstrate high internal consistency, as reflected by Cronbach's alpha values exceeding the recommended threshold of 0.7. Specifically, Environmental Sustainability achieved an alpha of 0.820 across 8 items, Social Sustainability recorded 0.819 for its 10 items, and Governance Sustainability had the highest reliability at 0.825 for 10 items. Additionally, Digitization exhibited strong reliability with an alpha of 0.823 for 10 items, while Firm Competitiveness also showed acceptable consistency with an alpha of 0.807 across 10 items. These results confirm that the measurement scales used in this study are reliable and suitable for further analysis.

TABLE 2.2

Reliability Results

Reliability Results Variable	Number of Items	Alpha
Environmental Sustainability	8	0.820
Social Sustainability	10	0.819
Governance Sustainability	10	0.825
Digitization	10	0.823
Firm Competitiveness	10	0.807

4.4 Demographic Information

Although the firm was the primary unit of analysis, information on respondent age was collected to verify the credibility of the data provided. The age distribution of the 225 respondents shows a balanced mix of experience levels within Kenya's food and beverages manufacturing sector, indicating that the individuals supplying firm-level information hold positions suited to informed responses. The largest group, 29.8%, were aged 45 to 54 years, a bracket likely to include senior or managerial staff with extensive industry knowledge. Respondents aged 25 to 34 years (22.2%) and 35 to 44 years (20.4%) represented mid-level professionals actively involved in operational and strategic decision-making. A further 16.0% were below 25 years, contributing perspectives from younger employees familiar with emerging trends, while 11.6% were 55 years and above, bringing long-term industry insight. This spread across generations reinforces the reliability of the firm-level data by ensuring input from respondents with diverse experience and decision-making roles.

The demographic analysis of this study considered both the characteristics of the respondents and the firms to ensure the reliability and contextual relevance of the data. Although the unit of analysis is the firm, respondent demographics provide important background

information, as they validate the competence of individuals supplying the data. The findings on educational attainment show that 44.44% of respondents held diploma or certificate qualifications, while 43.56% possessed bachelor's degrees, and 12.00% fell into the "others" category, which includes postgraduate qualifications and professional certifications. This distribution indicates that the majority of respondents had formal training and academic grounding, suggesting that they were capable of understanding and accurately reporting on firm-level strategies such as sustainability integration and digitalization. Thus, while individual demographics are not the focus of the study, they strengthen confidence in the quality and reliability of the firm-level data collected (Ningi, 2022).

The firm-level demographic data, which directly aligns with the unit of analysis, reveal a diverse ownership structure among the 225 food and beverages manufacturing firms surveyed. Private ownership accounted for the largest share at 30.67%, followed closely by joint ventures at 30.22%. Publicly owned firms represented 15.11%, while the remaining 24.00% fell under the "others" category, including cooperatives, family-owned enterprises, and hybrid models. This variation highlights the complex organizational landscape of the sector, characterized by diverse governance systems, investment orientations, and strategic priorities. Such ownership diversity has direct implications for how firms approach sustainability and digitalization. For instance, private firms and joint ventures may demonstrate greater agility and adaptability in adopting innovative practices, while public and cooperative models may prioritize long-term stability and compliance. By focusing on these firm-level characteristics, the analysis provides meaningful insights into the structural conditions shaping competitiveness within Kenya's food and beverages manufacturing sector (Adeniran & Onasanya, 2024).

The demographic characteristics of the firms provide critical contextual insights into the structural and operational landscape of Kenya's food and beverages manufacturing sector. Since the unit of analysis is the firm, variables such as years of operation, size, and primary market of operation are directly relevant in explaining differences in the adoption of sustainability and digitalization strategies. The findings on years of operation show that 30.22% of firms are less than five years old and 33.78% have operated for between five and ten years, indicating a sector with a significant share of young and agile enterprises. At the same time, 22.22% of firms have been active for eleven to twenty years and 13.78% for more than twenty years, representing more established businesses with deeper institutional knowledge. This distribution is important because firm age may influence openness to innovation—while younger firms may be more receptive to new practices, older firms may leverage experience and stability when implementing sustainability and digitalization initiatives (Ningi, 2022).

Firm size further strengthens the relevance of the demographic analysis. Medium-sized enterprises dominate the sector at 68.00%, with small firms accounting for 24.89% and large firms for only 7.11%. Unlike respondent demographics, firm size is directly aligned with the unit of analysis because it reflects the scale of resources, management capacity, and organizational flexibility available to support innovation. Medium-sized firms, which balance resource availability with operational agility, are positioned as key drivers of change in the sector. Small firms may be highly flexible but constrained by resources, while large firms, though resource-rich, may be slower to adapt. These structural realities explain how size influences the pace and nature of sustainability integration and digitalization, making size a critical demographic factor for firm-level analysis (Adeniran & Onasanya, 2024).

The primary market of operation also holds firm-level relevance by revealing the competitive environments in which businesses operate. Over half of the firms (51.56%) serve only the local market, 23.56% operate regionally within East Africa, and 24.89% have reached international markets. Market scope reflects differing levels of exposure to competitive pressures and regulatory requirements, which in turn shape firm strategies. For example, firms in regional and international markets are more likely to face stringent sustainability standards and technological demands, prompting them to adopt advanced practices. Conversely, firms serving local markets may face fewer external pressures but still benefit from sustainability and digital adoption as a pathway to resilience and growth. This demographic characteristic therefore enriches the analysis by linking market exposure directly to firm-level competitiveness (Mogaka, 2023).

Although the unit of analysis in this study is the firm, examining the years of experience of respondents is relevant as a contextual validation measure. The findings show that 45.8% of respondents have over six years of experience in the food and beverages manufacturing industry, 27.1% have 3–5 years, and another 27.1% have less than three years. This distribution indicates that the data was sourced from a respondent pool that balances long-term industry expertise with perspectives from newer entrants. The strong presence of seasoned professionals enhances confidence in the accuracy and depth of the information provided, since experienced employees are more likely to have a comprehensive understanding of their firms' strategies, operations, and competitiveness. At the same time, the representation of respondents with fewer years of experience ensures that the study captures emerging attitudes and contemporary approaches to sustainability integration and digitalization. Thus, while years of experience are not a firm-level characteristic, this demographic variable strengthens the credibility and validity of the firm-level data collected (Thuita et al., 2023).

TABLE 4.4

Demographic Information

Demographic Information	Category	Frequency	Percentage
Age Bracket	Below 25 years	36	16.00
	25 – 34 years	50	22.22
	35 – 44 years	46	20.44
	45 – 54 years	67	29.78
	55 years and above	26	11.56
Total		**225**	**100.00**
Education Level	Certificate/Diploma	100	44.44
	Bachelor's Degree	98	43.56
	Other Specify	27	12.00
Total		**225**	**100.00**
Ownership	Private	69	30.67
	Public	34	15.11
	Joint	68	30.22
	Others	54	24.00
Total		**225**	**100.00**
Years of Operation	Less than 5 years	68	30.22
	5 – 10 years	76	33.78
	11 – 20 years	50	22.22
	More than 20 years	31	13.78
Total		**225**	**100.00**
Firm Size (Employees)	Less than 50	56	24.89
	50 – 249	153	68.00
	250 and above	16	7.11
Total		**225**	**100.00**
Primary Market of Operation	Local Market Only	116	51.56
	East Africa	56	24.89
Total		**225**	**100.00**
Years of Experience	Less than 3 years	61	27.1
	3 – 5 years	61	27.1
	6 years and above	103	45.8
Total		**225**	**100.00**

4. 5 Discriptive Statistics results

4.5.1 Environmental Sustainability Integration

The analysis of environmental sustainability integration shows moderate implementation across different practices, with mean values ranging from 2.99 to 3.13, and standard deviations indicating

the level of variation in responses. The highest mean of 3.13 for the adoption of water-saving technologies is accompanied by an SD of 1.11, suggesting that respondents generally agree on this aspect with relatively low variability. This finding resonates with Chouaibi et al. (2022), who highlight that firms adopting green innovations, such as water-saving technologies, not only improve efficiency but also strengthen the link between sustainability and financial performance, showing that such practices can yield both environmental and economic benefits.

Proper waste disposal and recycling practices have a mean of 3.12 and an SD of 1.18, reflecting more variation than water-saving measures, which indicates differing levels of adoption across respondents. This mirrors the argument by Mohammad and Wasiuzzaman (2021) that consistent ESG disclosure and sustainable practices enhance firms' competitiveness. The variation seen here suggests that while some firms benefit from improved stakeholder trust through recycling and waste management, others lag in adoption, creating uneven competitive advantages within the market. Water conservation efforts enhancing regulatory compliance have a mean of 3.11 with an SD of 1.11, showing consistent perceptions similar to water-saving initiatives. This aligns with Fatoki (2021), who demonstrated that environmentally driven strategies positively influence competitive advantage. Water conservation measures not only ensure compliance but also support firms in signaling environmental orientation, which is increasingly becoming a basis for competitive differentiation in resource-intensive industries.

The use of sustainably sourced raw materials records a mean of 3.10 and an SD of 1.16, meaning responses are slightly more dispersed, possibly due to inconsistent implementation. Chouaibi et al. (2022) emphasized that firms integrating sustainability in their sourcing practices create pathways for innovation-driven efficiency, which further links ESG factors to improved corporate performance. The observed variation suggests that while some firms leverage

sustainable sourcing for innovation and efficiency, others may face challenges such as cost implications or supply chain constraints. Collaboration with sustainable suppliers also has a mean of 3.10, but the SD is slightly higher at 1.17, indicating greater variation in views despite the same overall mean. This reflects Mohammad and Wasiuzzaman's (2021) argument that transparency and sustainable partnerships increase investor confidence. Firms collaborating with sustainable suppliers can enhance their reputational value and market positioning, but inconsistency in adoption shows that this benefit is not evenly realized across the organization.

Pollution control measures have a mean of 3.00 and the highest SD of 1.20, suggesting considerable disagreement and uneven application across the firm. According to Fatoki (2021), green-oriented practices, when consistently applied, strengthen a firm's competitive advantage. The lack of consensus on pollution control points to missed opportunities where firms could otherwise leverage environmental orientation to achieve both regulatory compliance and enhanced competitiveness. Finally, compliance with pollution control regulations shows the lowest mean at 2.99 with an SD of 1.15, signifying lower overall agreement and moderate variability, which points to areas requiring improvement. This weakness is critical since Chouaibi et al. (2022) and Mohammad and Wasiuzzaman (2021) both underscore that ESG integration, particularly in environmentally sensitive areas like pollution control, directly contributes to improved financial performance and investor confidence. Weak compliance undermines the broader ESG strategy, highlighting the need for stronger enforcement mechanisms and green innovations that can close the gap between environmental responsibility and business growth.

These findings can further be explained through the Natural Resource-Based View (NRBV) theory, which emphasizes that competitive advantage in modern firms is derived not only from internal resources but also from environmental capabilities (Hart, 1995; Samadhiya et al.,

2023). The firm's strengths in water conservation and waste management reflect elements of pollution prevention, a foundational NRBV strategy that improves efficiency and ensures regulatory compliance. However, the weaknesses in sustainable sourcing and pollution control reveal a failure to fully embrace product stewardship and pollution prevention, which are essential for building resilience and long-term competitiveness (Johnson-Hall et al., 2022). Firms in Kenya's food and beverage sector that adopt NRBV principles such as using biodegradable packaging, ethical raw material sourcing, and investing in renewable energy have been shown to enhance market appeal and operational performance (Mishra et al., 2021).

TABLE 4.5

Environmental Sustainability Integration

Statement Environmental Sustainability Integration	Min	Max	Mean	SD
The firm has implemented effective waste reduction strategies to enhance competitiveness.	1	5	3.09	1.18
Proper waste disposal and recycling practices have improved the firm's brand reputation and market position.	1	5	3.12	1.18
The firm has adopted water-saving technologies that contribute to cost efficiency.	1	5	3.13	1.11
Water conservation efforts have enhanced regulatory compliance and operational efficiency.	1	5	3.11	1.11
The use of sustainably sourced raw materials has improved the firm's competitive advantage.	1	5	3.10	1.16
Collaboration with sustainable suppliers has strengthened the firm's supply chain resilience.	1	5	3.10	1.17
The firm's pollution control measures have positively impacted its market acceptance.	1	5	3.00	1.20
Compliance with pollution control regulations has improved the firm's operational sustainability.	1	5	2.99	1.15

4.5.2 Social Sustainability Integration

The results on social sustainability integration indicate moderate adoption of practices, with mean scores ranging from 2.88 to 3.05, and the corresponding standard deviations showing differences

in perceptions. The firm's provision of fair wages and benefits has the highest mean of 3.05 with an SD of 1.10, while maintaining strict safety measures records the same mean but with a higher SD of 1.20, indicating greater variability in responses. Transparent labeling and ethical marketing practices as well as participation in community development projects both have a mean of 3.04, with SDs of 1.14 and 1.15 respectively, showing moderate agreement with some variation. These findings resonate with Lu and Abeysekera (2021), who showed that strategic CSR disclosures, such as fair wages, ethical communication, and community engagement, enhance investor confidence and improve firm valuation. This suggests that consistent adoption of such social sustainability practices can yield reputational and financial benefits when positioned as structured CSR initiatives.

Other practices such as employee health programs and workplace wellness initiatives each record a mean of 3.02 with a relatively low SD of 1.08, indicating consistent responses. Ensuring product quality and safety also shows a mean of 3.02 but with a slightly higher SD of 1.16, while investments in workplace safety have a lower mean of 2.98 with an SD of 1.14. These results highlight areas where adoption is present but not strongly embedded across the firm. Blay Jnr et al. (2023) observed that competitive strategies significantly influence sustainability integration, meaning that firms embedding wellness, safety, and product quality measures as part of sustainability-driven strategies can enhance efficiency, attract investors, and improve their competitive positioning. The moderate means here suggest that although these practices exist, they are not yet leveraged strategically enough to drive stronger sustainability outcomes.

Corporate social responsibility initiatives show a mean of 3.00 with an SD of 1.19, reflecting noticeable variation in perceptions, while the lowest mean of 2.88 relates to employee welfare initiatives, with an SD of 1.15, suggesting weak emphasis and inconsistency in adoption.

Mapokotera et al. (2023) emphasized that CSR practices tied to employee welfare and community engagement improve customer loyalty, brand reputation, and long-term profitability. The weak results on employee welfare indicate a missed opportunity for the firm to align with such outcomes.

The interpretation of these findings can be strengthened through agency theory, which underscores the conflicts that arise when managers act in their own interests rather than those of owners or stakeholders (McMullen et al., 2021). Weak enforcement of employee welfare initiatives and inconsistent CSR integration reflect potential agency problems where short-term cost savings are prioritized over long-term reputational and competitive benefits. As Dong et al. (2021) note, governance structures such as policies, audits, and accountability systems can reduce these agency costs, ensuring that social sustainability is embedded within firm strategies. In this study, initiatives like fair labor practices, ethical sourcing, and community engagement act as mechanisms to mitigate risks linked to reputational damage, regulatory penalties, and stakeholder mistrust. By embedding these practices, firms not only align managers' decisions with broader stakeholder interests but also strengthen brand loyalty and trust, improving competitiveness in Kenya's evolving food and beverage industry.

TABLE 4.5

Social Sustainability Integration

Statement on Social Sustainability Integration	Min	Max	Mean	SD
The firm ensures product quality and safety to enhance consumer trust and competitiveness.	1	5	3.02	1.16
Transparent labeling and ethical marketing practices have strengthened the firm's market position.	1	5	3.04	1.14
The firm invests in employee health programs to improve productivity and competitiveness.	1	5	3.02	1.08
Implementing workplace wellness initiatives has enhanced employee retention and performance.	1	5	3.02	1.08
The firm provides fair wages and benefits, contributing to workforce stability and competitiveness.	1	5	3.05	1.10
Employee welfare initiatives have improved job satisfaction and overall firm performance.	1	5	2.88	1.15
The firm maintains strict safety measures to ensure employee well-being and regulatory compliance.	1	5	3.05	1.20
Investments in workplace safety have reduced operational risks and improved firm reputation.	1	5	2.98	1.14
The firm actively participates in community development projects to enhance brand loyalty and competitiveness.	1	5	3.04	1.15
Corporate social responsibility initiatives have strengthened the firm’s relationship with stakeholders.	1	5	3.00	1.19

4.5.3 Governance Sustainability Integration

The findings on governance sustainability integration show moderate application of governance practices, with mean values ranging from 2.99 to 3.13, and the standard deviations indicating varying levels of agreement among respondents. The highest mean of 3.13 relates to leadership upholding ethical business practices, accompanied by an SD of 1.11, suggesting relatively strong adoption and consistent views across respondents. This finding reflects Agarwal et al. (2023), who showed that governance practices such as ethical leadership positively influence firm performance, particularly when competition is present, as strong ethical leadership reinforces accountability and strategic decision-making. Closely following is the impact of ethical leadership on stakeholder

confidence, which has a mean of 3.11 and an SD of 1.11, showing similar consistency in perceptions. These results also align with Donkor et al. (2021), who found that credible governance practices such as combined assurance strengthen transparency and improve investor trust, highlighting the role of ethical leadership in building stakeholder confidence.

A diverse board contributing to strategic growth records a mean of 3.12 with an SD of 1.18, reflecting more variability compared to ethical leadership. Ensuring diversity in board composition also scores 3.09 with an SD of 1.18, showing a similar level of variation in opinions. These results are consistent with Aguilera et al. (2021), who argued that governance mechanisms such as board composition significantly shape sustainability strategies. The variation seen here suggests that while diversity is acknowledged as a governance strength, its adoption is uneven across the firm. Transparency policies fostering trust have a mean of 3.10 and an SD of 1.16, indicating moderate consistency, while open communication and disclosure of financial information also record 3.10 with an SD of 1.17, showing slightly higher dispersion in responses. Donkor et al. (2021) support these findings by emphasizing that robust assurance and transparent governance reporting enhance credibility, ensuring that stakeholders perceive firms as reliable and accountable.

The enforcement of a code of conduct registers a mean of 3.05 and the highest SD of 1.22, pointing to significant differences in perception among respondents. Adherence to industry regulations scores 3.00 with an SD of 1.20, showing a mix of agreement and disagreement, while compliance with regulatory requirements has the lowest mean of 2.99 with an SD of 1.15, indicating lower agreement and moderate variability across respondents. Agarwal et al. (2023) demonstrated that adherence to governance frameworks, when effectively applied, enhances financial outcomes, though weak compliance undermines the positive impact of governance on firm performance. Similarly, Aguilera et al. (2021) note that strong governance structures are

central to shaping sustainability outcomes, but variability in adherence suggests gaps in implementation. Overall, while the findings indicate moderate governance integration, the uneven application across areas such as codes of conduct and compliance underscores the need for stronger mechanisms to align governance practices with sustainability-driven competitiveness.

Theoretically, these findings can be interpreted through contingency theory, which stresses that governance practices must align with industry-specific environmental factors (Abedin, 2022). While ethical leadership is effective in building trust, compliance and enforcement mechanisms are crucial in regulated sectors like food and beverage manufacturing, where consumer safety and investor confidence are directly tied to governance practices. Fiedler's contingency model supports this situational approach, suggesting that leadership effectiveness depends on context (Chatterjee et al., 2024).

TABLE 4.6

Governance Sustainability Integration

Statement on Governance Sustainability Integration	Min	Max	Mean	SD
The firm ensures diversity in board composition to enhance decision-making and competitiveness.	1	5	3.09	1.18
A diverse board has contributed to the firm's strategic growth and market adaptability.	1	5	3.12	1.18
The firm's leadership upholds ethical business practices that enhance its reputation and competitiveness.	1	5	3.13	1.11
Ethical leadership has improved stakeholder confidence and long-term business success.	1	5	3.11	1.11
The firm implements transparency policies that foster trust among stakeholders.	1	5	3.10	1.16
Open communication and disclosure of financial information have improved investor confidence.	1	5	3.10	1.17
The firm strictly adheres to industry regulations, enhancing operational sustainability.	1	5	3.00	1.20
Compliance with regulatory requirements has reduced legal risks and improved market competitiveness.	1	5	2.99	1.15
The firm enforces a code of conduct to maintain ethical standards in all operations.	1	5	3.05	1.22

4.5.4 Digitalization Sustainability Integration

The analysis of digitalization sustainability integration indicates moderate adoption of digital technologies, with mean values ranging from 3.00 to 3.16, and standard deviations showing how responses vary. The highest mean of 3.16, related to the utilization of IoT solutions to enhance operational efficiency, is paired with an SD of 1.08, suggesting relatively strong agreement and low variability among respondents. This finding is supported by Xie and Jin (2023), who found that digitalization enhances economic growth by optimizing resource utilization, showing that IoT integration not only drives efficiency but also contributes to long-term sustainability. The integration of AI technologies to optimize production follows with a mean of 3.13 and an SD of 1.17, indicating moderate consistency but slightly higher variation compared to IoT solutions. This reflects Hermundsdottir and Aspelund (2021), who emphasize that digital-driven sustainability innovations, such as AI in production, can significantly improve competitiveness by fostering operational excellence and reputational value.

Investment in cybersecurity measures scores 3.11 with an SD of 1.17, showing a reasonable level of agreement, though some respondents view this differently. The use of digital platforms for market expansion and engagement records a mean of 3.07 and the highest SD of 1.23, reflecting significant variability and possible uneven implementation. Similarly, e-commerce and digital payment solutions have a mean of 3.08 with an SD of 1.14, showing relatively moderate agreement and less variability compared to digital platforms. These patterns highlight Rakgoale, Bag, and Pretorius (2024), who identified barriers such as infrastructure limitations and resistance to change as common challenges in digitalization adoption. The variability in perceptions suggests that while some firms capitalize on market expansion and digital finance tools, others are still constrained by implementation challenges that slow down adoption.

AI-driven analytics show a mean of 3.00 with an SD of 1.14, indicating consistent perceptions but lower adoption compared to other technologies. Cybersecurity implementation for protecting digital assets scores 3.04 with an SD of 1.13, reflecting moderate agreement and uniformity. Data analytics for improving market insights records a mean of 3.08 and an SD of 1.19, suggesting slightly more variation in responses. Data-driven decision-making registers a mean of 3.02 and the lowest SD of 1.09, indicating consistent but lower perceived adoption. Lastly, IoT-driven automation for productivity and cost management shows a mean of 3.01 with an SD of 1.19, suggesting variability in how respondents view its impact. These findings resonate with Hermundsdottir and Aspelund (2021), who argue that firms adopting sustainability-oriented digital innovations can strengthen both their financial and reputational standing. However, as Rakgoale, Bag, and Pretorius (2024) noted, high implementation costs and resistance to change may explain the moderate levels of adoption across these practices, showing that despite the proven potential of digitalization (Xie & Jin, 2023), firms in this context face structural and strategic barriers that must be overcome to fully realize its benefits.

These insights can be better understood through Schumpeter's theory of innovation, which positions digitalization as a form of "creative destruction" where firms that fail to embrace technological progress risk obsolescence (Callegari & Nybakk, 2022). The findings that AI, analytics, and automation remain inconsistently applied highlight the risk of stagnation, as competitors adopting advanced digital tools may disrupt existing business models. Schumpeter identified innovation in production techniques, new products, and industry structures as key drivers of competitiveness (Langroodi, 2021), which aligns with how IoT solutions are streamlining efficiency and digital platforms are reshaping market engagement. However, the uneven digital adoption reflects a partial process of transformation, leaving some departments or

functions behind. Critics of Schumpeter note that innovation is not solely the work of entrepreneurs but is also shaped by institutional and collaborative networks (Peng, 2023). In this light, the uneven adoption of digital tools in the firm may also stem from weak ecosystem support, such as inadequate training, policy frameworks, or collaboration with technology partners.

TABLE 4.7

Digitalization Sustainability Integration

Statement on Digitalization Sustainability Integration	Min	Max	Mean	SD
The firm utilizes IoT solutions to enhance operational efficiency and competitiveness.	1	5	3.16	1.08
IoT-driven automation has improved the firm's productivity and cost management.	1	5	3.01	1.19
The firm leverages digital platforms to expand market reach and customer engagement.	1	5	3.07	1.23
E-commerce and digital payment solutions have strengthened the firm’s competitive advantage.	1	5	3.08	1.14
The firm integrates AI technologies to optimize production and enhance decision-making.	1	5	3.13	1.17
AI-driven analytics have improved demand forecasting and supply chain efficiency.	1	5	3.00	1.14
The firm has implemented robust cybersecurity measures to protect digital assets and maintain competitiveness.	1	5	3.04	1.13
Investment in cybersecurity has strengthened stakeholder trust and compliance with data protection regulations.	1	5	3.11	1.17
The firm utilizes data analytics to improve market insights and strategic decision-making.	1	5	3.08	1.19
Data-driven decision-making has contributed to operational efficiency and business growth.	1	5	3.02	1.09

4.5.5 Firm Competitiveness in Food and Beverage Manufacturing Firms

The analysis of firm competitiveness shows moderate implementation of competitiveness strategies, with mean values ranging from 2.96 to 3.31 and standard deviations indicating varying levels of agreement among respondents. The highest mean of 3.31 is linked to the firm’s ability to

respond to market changes through innovative practices, with an SD of 1.13, suggesting relatively strong adoption with low variability. This finding reflects Knudsen et al. (2021), who demonstrated that digitalization supports resilience by improving agility, efficiency, and customer engagement, thereby enabling firms to adapt to changing market dynamics more effectively. Expansion into new markets and product segments follows with a mean of 3.17 and an SD of 1.23, reflecting significant variation in perceptions and possible differences in implementation across firms. This resonates with Aguilera et al. (2021), who found that governance structures influence sustainability strategies, which in turn shape strategic growth and market expansion decisions. High customer satisfaction contributing to brand loyalty records a mean of 3.12 and an SD of 1.19, indicating moderate consistency in responses, a result that ties to Khan et al. (2023), who revealed that sustainable practices, such as green purchasing, improve operational efficiency and strengthen long-term customer loyalty.

Investments in technology and automation have a mean of 3.11 and an SD of 1.18, showing moderate adoption with slight variability. This finding aligns with Knudsen et al. (2021), who emphasized that technology integration reinforces competitiveness by driving efficiency and enabling firms to better navigate turbulent environments. Optimization of production processes scores 3.08 with an SD of 1.15, reflecting fairly uniform responses, while prioritization of customer feedback shows a mean of 3.04 and an SD of 1.19, suggesting some disagreement among respondents. These findings echo Khan et al. (2023), who argued that firms developing green capabilities and integrating customer-centered sustainability practices enhance triple bottom line performance, supporting both operational and competitive outcomes. Consistent revenue growth due to strategic decisions has a mean of 3.01 and the highest SD of 1.25, indicating that views on revenue consistency vary greatly. This links with Donkor et al. (2021), who highlighted that

transparency in financial and sustainability reporting strengthens investor confidence, ultimately improving financial outcomes and supporting consistent revenue performance when governance systems are effectively applied.

Increasing market share by outperforming competitors records a mean of 3.05 with an SD of 1.12, showing moderate adoption and relatively low variability. This aligns with Oyewo, Tawiah, and Hussain (2023), who found that governance structures enhance sustainability adoption, which can improve a firm's market competitiveness by aligning financial performance with environmental and social responsibility. Lastly, continuous investment in research and development has the lowest mean of 2.96 and an SD of 1.18, suggesting limited implementation and moderate differences in opinion across respondents. This weak adoption contrasts with Knudsen et al. (2021), who highlighted the importance of ongoing innovation through digitalization as a critical driver of sustained competitiveness in volatile markets. The limited emphasis on R&D suggests that while firms recognize the role of innovation in competitiveness, challenges such as resource constraints or strategic priorities may be limiting its implementation, leaving untapped potential for enhancing long-term resilience and market advantage.

TABLE 4.8

Firm Competitiveness in Food and Beverage Manufacturing Firms

Statement on Firm Competitiveness in Food and Beverage Manufacturing Firms	Min	Max	Mean	SD
The firm continuously invests in research and development to enhance product innovation.	1	5	2.96	1.18
Innovative practices have improved the firm's ability to respond to market changes.	1	5	3.31	1.13
The firm prioritizes customer feedback to improve product quality and service delivery.	1	5	3.04	1.19
High customer satisfaction has contributed to increased brand loyalty and competitiveness.	1	5	3.12	1.19
The firm has optimized its production processes to increase efficiency and reduce costs.	1	5	3.08	1.15
Investments in technology and automation have enhanced operational productivity.	1	5	3.11	1.18
The firm has experienced consistent revenue growth due to strategic business decisions.	1	5	3.01	1.25
Expanding into new markets and product segments has contributed to revenue growth.	1	5	3.17	1.23
The firm has successfully increased its market share by outperforming competitors.	1	5	3.05	1.12

4.5.6 Description for the Averages of each Constructs

Descriptive statistics were computed for the major constructs of sustainability integration (environmental, social, and governance), digitization, and firm competitiveness using composite scores derived from the average of their respective Likert-scale items. The findings reveal that Firm Competitiveness had the highest mean score of 3.57 (SD = 0.27), suggesting a strong overall agreement among respondents on their firms' ability to maintain a competitive edge within the sector. Digitalization followed closely with a mean of 3.56 (SD = 0.28), indicating that most firms have embraced technology to a significant extent, which may be instrumental in enhancing operational efficiency and innovation.

Social Sustainability recorded a mean of 3.55 (SD = 0.24), showing that firms are increasingly aware of and integrating social aspects such as employee welfare, community engagement, and ethical practices. Environmental Sustainability had a mean score of 3.54 (SD = 0.32), reflecting similar perceptions regarding efforts to reduce environmental impact. Governance Sustainability, with a mean of 3.52 (SD = 0.27), also received favourable ratings, highlighting the adoption of ethical leadership, accountability, and compliance frameworks. These findings echo Yadav et al. (2017), who argued that firms with strong environmental performance not only achieve regulatory compliance but also strengthen their long-term competitiveness by lowering operational costs and leveraging sustainability as a differentiator in the marketplace. This implies that the proactive environmental efforts of Kenyan food and beverage firms are contributing to their stable competitive outlook.

The relatively low standard deviations across all constructs suggest a high level of consistency in respondents' views. These findings align with Adeniran and Onasanya (2024), who emphasized that integrating sustainability with digital tools fosters better competitive outcomes for firms. Similarly, Dangelico and Pontrandolfo (2015) highlighted those green initiatives, particularly when supported by collaboration with suppliers and stakeholders, enhance financial and operational performance through improved efficiency and reduced emissions. While their study did not fully explore the role of digitization, the present findings indicate that digital adoption complements such sustainability initiatives by streamlining processes and reinforcing competitiveness. The consistently high mean values therefore imply that food and beverage manufacturing firms in Kenya are progressive in both sustainability and digital transformation, positioning them well for long-term growth and resilience.

TABLE 4.9

Description for the Averages of each Constructs

Variable	Description	Mean	Std. Dev.
Mean_A	Environmental Sustainability	3.54	0.32
Mean_B	Social Sustainability	3.55	0.24
Mean_C	Governance Sustainability	3.52	0.27
Mean_D	Digitalization	3.56	0.28
Mean_E	Firm Competitiveness	3.57	0.27

4.6 Diagnostic Tests

4.6.1 Test for Normality

To assess whether the residuals of the regression model were normally distributed, a Shapiro-Wilk test was performed. The test produced a W statistic of 0.992 and a p-value of 0.233. Since the p-value is greater than 0.05, the null hypothesis that the residuals are normally distributed is not rejected. This indicates that the residuals follow a normal distribution, satisfying one of the key assumptions of linear regression. As a result, the model's estimates, hypothesis tests, and confidence intervals can be considered valid and interpretable.

Table 4.10: Test for Normality

Variable	Obs	W	V	z	Prob > z
Residuals	225	0.992	1.369	0.727	0.233

4.6.2 Test for Multicollinearity

The multicollinearity diagnostics show that all predictor variables; governance (VIF = 1.01), environmental (VIF = 1.01), and social (VIF = 1.00) have Variance Inflation Factor (VIF) values

close to 1. The mean VIF is 1.00, indicating that there is no evidence of multicollinearity among the independent variables. Additionally, the corresponding 1/VIF values are 0.993 for governance, 0.995 for environmental, and 0.998 for social, all very close to 1, which further confirms the absence of multicollinearity. These results suggest that the independent variables do not exhibit redundancy and can be included in the regression model without concern for multicollinearity issues.

TABLE 4.11

Test for Multicollinearity

Variable	VIF	1/VIF
Environmental Sustainability	1.01	0.993
Social Sustainability	1.01	0.995
Governance Sustainability	1.00	0.998
Mean VIF	**1.00**	

4.6.3 Homoscedasticity

The Breusch-Pagan/Cook-Weisberg test for heteroskedasticity was conducted to assess whether the variance of the residuals is constant. The test produced a chi-square statistic of 0.03 with a p-value of 0.868. Since the p-value is greater than the conventional significance level of 0.05, we fail to reject the null hypothesis of constant variance. This indicates that there is no evidence of heteroskedasticity in the model, and the assumption of homoscedasticity is satisfied.

TABLE 4.12

Homoscedasticity

Statistic	Value
$chi^2(1)$	0.03
Prob > chi^2	0.868

4.7 Inferential Results

4.7.1 Baseline Model

The regression model evaluating the impact of environmental, social, and governance practices on competitive advantage is statistically robust. The R-squared value of 0.881indicates that the predictors collectively explain approximately 88.08% of the variation in competitive advantage, while the Adjusted R-squared is 0.879, confirming the model's strong explanatory power after adjusting for the number of predictors. The Root Mean Square Error (Root MSE) is 0.346, reflecting a relatively low level of residual error, which suggests high model accuracy.

The overall significance of the model is confirmed by the ANOVA results, with F(3, 221) = 544.4 and a p-value < 0.000. This indicates that the model is statistically significant and that environmental, social, and governance factors jointly have a meaningful effect on competitive advantage. The Model Sum of Squares (SS) is 195.409, compared to the Residual SS of 26.440, highlighting that most of the variation in competitive advantage is explained by the predictors rather than by error.

TABLE 4.13

Baseline Model

Source	SS	df	MS	Number of obs	=	225
Model	195.409	3	65.136	F (3, 221)	=	544.440
Residual	26.440	221	0.120	Prob > F	=	0.000
Total	221.849	224	0.990	R-squared	=	0.881
				Adj R-squared	=	0.879
				Root MSE	=	0.346

4.6.2 Coefficients of regression on Baseline Model

The regression coefficients demonstrate that all three predictors; environmental, social, and governance practices have positive and statistically significant effects on competitive advantage.

The study examined the effect of environmental sustainability integration on firm competitiveness and found that environmental practices have a strong positive influence (β = 0.384, t = 23.03, p < 0.000, CI [0.351, 0.417]). This means that firms that adopt robust environmental practices gain a competitive edge by enhancing efficiency, innovation, and reputation. The finding is consistent with Fatoki (2021), who showed that environmental orientation improves competitive advantage through green innovation, and Khan et al. (2023), who linked green capabilities and purchasing to improved triple bottom line performance. It also complements Oyewo, Tawiah, and Hussain (2023), who emphasized governance in promoting sustainability, by showing that actual environmental integration itself directly drives competitiveness.

The study assessed the effect of social sustainability integration on firm competitiveness and established that social practices have a significant positive impact (β = 0.265, t = 15.86, p < 0.000, CI [0.232, 0.298]). This suggests that firms investing in social initiatives such as employee welfare, community engagement, and fair labor practices strengthen their competitiveness by

improving reputation, stakeholder trust, and long-term stability. The findings are in line with Lu and Abeysekera (2021), who showed that strategic CSR disclosures enhance firm valuation by boosting investor confidence, and Blay Jnr et al. (2023), who found that sustainability-driven competitive strategies improve efficiency and market position.

The study assessed the effect of governance sustainability integration on firm competitiveness. Findings show that governance practices are the strongest predictor of competitiveness ($\beta = 0.468$, $t = 28.00$, $p < 0.000$), with a 95% confidence interval [0.435, 0.501]. This implies that firms with strong governance structures are more competitive due to improved accountability, risk management, and transparency. The results agree with Agarwal et al. (2023), who found that ESG activities, including governance, positively affect financial performance in healthcare firms, and with Donkor et al. (2021), who showed that strong assurance practices enhance reporting quality and investor confidence.

Finally, the constant term is also significant (0.213, $p = 0.015$), suggesting that even in the absence of these predictors, the baseline competitive advantage remains positive.

TABLE 4.14

Coefficients of regression on Baseline Model

Predictor	Coef. (B)	Std. Err.	t	p	95% CI for B
Environmental Sustainability	0.384	0.017	23.03	0.000	[0.351, 0.417]
Social Sustainability	0.265	0.017	15.86	0.000	[0.232, 0.298]
Governance Sustainability	0.468	0.017	28.00	0.000	[0.435, 0.501]
Constant	0.213	0.086	2.46	0.015	[0.042, 0.383]

4.6.3 Moderation Model

The regression model assessing the role of digitization as a moderator is statistically significant, as evidenced by the F-statistic, $F(7, 217) = 239.44$, $p < 0.000$, indicating that the combined effect of the predictors explains a substantial portion of the variance in the dependent variable. The model demonstrates a strong explanatory power with an R-squared value of 0.885 and an Adjusted R-squared of 0.882, meaning that approximately 88.54% of the variation in competitive advantage is accounted for by the predictors. Additionally, the Root MSE is 0.342, reflecting a relatively low prediction error.

TABLE 4.15

Moderation Model

Source	SS	df	MS	Number of obs	=	225
Model	196.419	7	28.060	F (7, 217)	=	239.440
Residual	25.430	217	0.117	Prob > F	=	0.000
Total	221.849	224	0.990	R-squared	=	0.885
				Adj R-squared	=	0.882
				Root MSE	=	0.342

4.6.4 Coefficients of regression on Moderation Model

Examining the main effects, environmental practices exhibit a positive and statistically significant impact on competitive advantage, with a coefficient of 0.346 and a p-value < 0.000, supported by a 95% confidence interval of [0.237, 0.455]. Similarly, social practices also show a significant positive effect, with a coefficient of 0.304, a t-value of 5.46, and a confidence interval of [0.193, 0.410]. Governance emerges as the strongest predictor in the model, with a coefficient of 0.606, a high t-value of 11.59, and a confidence interval of [0.503, 0.709], all significant at $p < 0.000$. Conversely, digitization alone does not significantly influence competitive advantage, as indicated by its coefficient of 0.136, $t = 1.42$, and $p = 0.156$.

Regarding the moderation effects, most interaction terms between digitization and sustainability dimensions are not statistically significant. For instance, the interaction between environmental practices and digitization (Env_Dig) has a coefficient of 0.0123, with p = 0.471, while social practices and digitization (Soc_Dig) show a coefficient of -0.014, with p = 0.444, indicating no significant moderating effects. However, the interaction between governance and digitization (Gov_Dig) is statistically significant and negative, with a coefficient of -0.046, t = -2.80, and p = 0.006, suggesting that digitization weakens the positive impact of governance on competitive advantage.

Overall, the findings indicate that environmental, social, and governance practices positively and significantly influence competitive advantage, with governance being the strongest determinant. While digitization alone does not exert a significant effect, its moderating role is evident only in governance, where it reduces its positive contribution to competitive advantage. This implies that digitization strategies should be carefully aligned with governance mechanisms to avoid diminishing their effectiveness.

TABLE 4.16

Coefficients of regression on Moderation Model

Predictor	Coef. (B)	Std. Err.	t	p	95% CI for B
Env	0.346	0.056	6.27	0.000	[0.237, 0.454]
Soc	0.302	0.055	5.46	0.000	[0.193, 0.410]
Gov	0.606	0.052	11.59	0.000	[0.503, 0.709]
Dig	0.136	0.095	1.42	0.156	[-0.052, 0.323]
Env × Dig	0.013	0.018	0.72	0.471	[-0.023, 0.048]
Soc × Dig	-0.014	0.017	-0.77	0.444	[-0.085, 0.021]
Gov × Dig	-0.047	0.017	-2.80	0.006	[-0.080, -0.014]
Constant	-0.180	0.302	-0.59	0.554	[-0.774, 0.416]

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter offers the summary of major finding, conclusions and recommendations to sustainability integration, digitization and firm competitiveness in food and beverages manufacturing firms in Kenya.

5.2 Summary of Major Findings

5.2.1 Environmental Sustainability Integration and Firm Competitiveness

The findings from the analysis of environmental sustainability integration reveal that firms are making moderate efforts to embed green practices into their operations, though the extent of adoption varies across different areas. Waste reduction and recycling initiatives have been identified as important practices that not only improve operational efficiency but also enhance a company's reputation and market positioning. Similarly, the adoption of water-saving technologies and conservation practices contributes to cost efficiency while supporting compliance with regulatory requirements, making such measures critical for long-term competitiveness. Furthermore, the use of sustainably sourced raw materials and partnerships with sustainable suppliers strengthens supply chain resilience, which is increasingly vital in today's globalized markets. Despite these positive strides, pollution control measures and compliance with related regulations appear to lag behind other areas, suggesting that firms may still struggle with fully aligning their environmental practices to meet both market expectations and sustainability goals. This indicates that while sustainability initiatives are gaining traction, more consistent and

deliberate efforts are needed to ensure that environmental practices comprehensively support both competitiveness and regulatory adherence.

5.2.2 Social Sustainability Integration and Firm Competitiveness

The results on social sustainability integration show that firms are making deliberate efforts to align their practices with both internal and external stakeholder expectations, thereby enhancing competitiveness. Emphasis is placed on ensuring product quality and safety, which builds consumer trust and strengthens market credibility. Similarly, transparent labeling and ethical marketing practices have emerged as important strategies that allow firms to differentiate themselves in competitive markets while maintaining integrity in their operations. Internally, companies are investing in employee health and workplace wellness programs, which contribute to improved productivity, retention, and overall workforce performance. Fair wages and benefits further support workforce stability, while employee welfare initiatives enhance job satisfaction and commitment to organizational goals. In addition, firms are upholding strict safety standards in the workplace, which not only safeguard employee well-being but also help maintain compliance with regulatory requirements. Beyond the workplace, engagement in community development projects and corporate social responsibility activities has proven instrumental in fostering brand loyalty and strengthening relationships with various stakeholders. Collectively, these practices highlight the interconnected nature of social sustainability, where investments in people, ethics, and community ultimately translate into stronger reputational capital and long-term business competitiveness.

5.2.3 Governance Sustainability Integration and Firm Competitiveness

The findings on governance sustainability integration reveal that firms are increasingly recognizing the importance of ethical, transparent, and inclusive governance structures in driving competitiveness and long-term success. Diversity in board composition has been highlighted as a critical factor that enhances decision-making by bringing in varied perspectives, ultimately contributing to strategic growth and adaptability in changing markets. Leadership that consistently upholds ethical business practices reinforces the firm's reputation while also building trust among both internal and external stakeholders. Such ethical leadership not only strengthens confidence in the firm but also lays the foundation for sustained business growth. Transparency policies and open communication, particularly regarding financial disclosure, play an important role in fostering credibility and boosting investor confidence. Moreover, strict adherence to industry regulations ensures operational sustainability by minimizing legal risks and maintaining market legitimacy. The enforcement of a clear code of conduct further guarantees that all operations remain aligned with established ethical standards, reinforcing accountability throughout the organization. Together, these governance practices demonstrate how embedding sustainability into leadership, ethics, compliance, and transparency provides a strong framework that supports stakeholder trust, enhances competitiveness, and ensures the resilience of the firm in the face of evolving market and regulatory pressures.

5.2.4 Digitalization Sustainability Integration and Firm Competitiveness

The results on digitalization sustainability integration demonstrate that firms are increasingly embedding advanced technologies into their operations to strengthen competitiveness and long-term growth. The adoption of Internet of Things (IoT) solutions has been pivotal in enhancing efficiency and streamlining processes, while automation has supported improved productivity and

cost management. Digital platforms have become powerful tools for expanding market reach and fostering stronger customer engagement, with e-commerce and digital payment solutions further consolidating competitive advantage in rapidly evolving markets. The integration of artificial intelligence (AI) technologies has enabled firms to optimize production processes and improve decision-making, while AI-driven analytics have contributed significantly to accurate demand forecasting and supply chain optimization. Cybersecurity measures have also emerged as a critical priority, ensuring the protection of digital assets and fostering compliance with data protection standards, which in turn reinforces stakeholder trust. In addition, firms are increasingly harnessing the potential of data analytics to generate deeper market insights and support strategic planning, with data-driven decision-making playing a central role in enhancing operational efficiency and driving sustainable growth. Collectively, these practices highlight the transformative role of digitalization in sustainability, positioning firms to remain competitive, resilient, and adaptive in an increasingly digital business environment.

5.3 Conclusions

The study concluded that environmental sustainability integration positively influences firm competitiveness in Kenya's food and beverages manufacturing sector. The findings showed that this effect becomes even stronger when firms adopt digitization tools such as IoT-based monitoring systems, waste tracking technologies, and data-driven compliance solutions. These digital approaches enhance the strategic value of environmental initiatives, making them more impactful. The evidence supports the natural resource-based view theory, which argues that environmentally responsible practices create a sustainable competitive edge when they are valuable, rare, and hard to replicate. The high statistical significance and strong factor loadings in the model highlight the critical role of environmental sustainability in shaping performance outcomes. This is reinforced

by the regression results, which indicate that environmental practices have a positive and statistically significant effect on competitive advantage, meaning that even a moderate increase in environmental initiatives produces a measurable and reliable improvement in firm competitiveness.

The study concluded that social sustainability integration showed a more complex relationship in food and beverages manufacturing firms in Kenya. While social sustainability practices like employee welfare, community outreach, and fair labor are important, their impact on competitiveness was found to be negative when combined with high levels of digitization. This suggests that digital transformation efforts may unintentionally sideline socially focused initiatives, reducing their effectiveness as competitive tools. In contrast, governance sustainability was strongly linked to better performance, supporting the view from agency theory that good governance reduces internal inefficiencies and improves firm outcomes. The regression analysis further shows that social practices, when considered independently, exert a significant positive effect. However, the moderating effect of digitization implies that digital adoption does not reinforce social practices, and in fact may dilute their contribution, suggesting that firms need deliberate alignment to prevent social priorities from being overshadowed by technology-driven efficiency goals.

The study concluded that governance sustainability integration plays a critical role in enhancing firm competitiveness in Kenya's food and beverages manufacturing sector. Yet, the interaction with digitization revealed a strong negative effect, suggesting that when digital tools are introduced without proper coordination, they may undermine or overlap existing governance functions like compliance monitoring, internal audits, or ethical controls. This conflict can lead to inefficiencies or weaken the integrity of governance systems. The results point to a possible digital

governance gap, where technology is applied without aligning it to the organization's ethical and strategic frameworks. These insights align with Schumpeter's idea that innovation reshapes systems not only directly, but also by shifting the way other functions operate together. The regression evidence underscores governance as the strongest independent predictor of competitiveness. Yet the interaction term indicates that digitization significantly erodes the strength of governance practices, raising a practical concern: unless digital tools are carefully aligned with governance mechanisms, the very practices that offer firms the highest competitive advantage risk being undermined.

5.4 Recommendations

The study recommended environmental sustainability integration as a core part of business strategy for food and beverages manufacturing firms in Kenya. Firms should invest in digital tools that support environmental initiatives for example, using smart sensors to track energy and water use in production or adopting blockchain for transparent supply chain emissions reporting. These technologies not only help meet regulatory standards but also improve operational efficiency and brand reputation. Companies like Kevian Kenya or Coca-Cola Beverages Africa could benefit from aligning their sustainability goals with digital innovations to build long-term competitiveness in a market that increasingly values green operations.

The study recommended social sustainability integration be managed more intentionally to ensure it strengthens rather than weakens firm competitiveness. Firms in the food and beverages manufacturing sector should align their digital investments with socially responsible practices rather than allowing one to undermine the other. For example, instead of using automation purely to cut labor costs, firms can apply it to improve workplace safety or reduce repetitive injuries. HR analytics platforms can be used to monitor employee satisfaction, reduce turnover, and support fair

performance evaluations. Community engagement can also be enhanced through digital tools such as mobile platforms for sourcing local feedback or tracking the impact of CSR initiatives. Additionally, firms should invest in training programs that prepare workers for digital roles, ensuring they are not left behind by automation. By embedding social values into the digital transformation process, firms can achieve both efficiency and stakeholder trust, which are critical for long-term competitiveness.

The study recommended governance sustainability integration be designed to work hand-in-hand with digitization rather than operating in separate tracks. For example, firms like Del Monte Kenya or Kenya Breweries should ensure that digital risk assessment tools are embedded within existing governance procedures, rather than bypassing them. Technology like blockchain or AI can improve oversight, but should be guided by strong governance policies that define roles, accountability, and ethical safeguards. Training for management on digital ethics, clear reporting structures, and regular evaluations of system compatibility are also important. In addition, firms should create cross-functional teams that bring together IT and governance experts to co-design digital solutions that enhance transparency and internal control. Periodic audits should assess not only compliance outcomes but also the integrity and ethical use of digital systems. By ensuring that digital tools complement rather than compete with governance frameworks, firms can avoid inefficiencies, reduce risk, and strengthen their competitive position in a dynamic market.

5.5 Recommendations for Future Research

Future research should explore how different types of digital tools affect specific sustainability outcomes. It would be useful to study how technologies like blockchain or AI influence governance practices in Kenyan manufacturing firms. Researchers could also examine the long-term impact of digital sustainability strategies on firm competitiveness. More case studies on firms

that have successfully integrated all three elements sustainability, digitization, and competitiveness would add practical insights. Lastly, researchers could compare firms across regions to see if the findings in Kenya apply more broadly.

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APPENDIX

Appendix I: Ethical Approval

RESEARCH, INNOVATION, AND OUTREACH DIVISION

KCA UNIVERSITY SCIENTIFIC AND ETHICS REVIEW COMMITTEE

REQUEST FOR ETHICAL REVIEW FORM

The request must include the following information for the research to be considered for approval:

Name, institution, and contact details (email and phone number) of the principal/lead investigator/researcher:	KELVIN MBUGUA WANJIRU
If it is a thesis, include also the name(s), institution(s), and contact details (emails and phone numbers) of the supervisor(s):	KCA UNIVERSITY DR. Peter Kariuki – 0720 325 766 pkariuki@kcau.ac.ke
Date of request:	17/03/2025
Title of the Research:	SUSTAINABILITY INTEGRATION, DIGITIZATION AND FIRM COMPETITIVENESS IN FOOD AND BEVERAGES MANUFACTURING FIRMS IN KENYA.
Planned or confirmed source of funding:	Personal
Members of the research group and their roles in the implementation of the study, as well as possible cooperation with other universities, research institutes, or similar organizations:	**Research Group Members and Roles** 1. **Principal Investigator (PI):** Leads the study, ensures ethical compliance, oversees data collection, analysis, and reporting. 2. **Data Collection Coordinator:** Manages data collection processes and ensures accuracy. 3. **Data Analyst:** Analyzes data and prepares reports.

	4. **Research Assistant(s):** Supports with literature reviews, interviews, and documentation. 5. **Ethics Officer:** Ensures ethical compliance and participant consent. **Cooperation with Other Organizations** • **Universities/Research Institutes:** Provide expertise, resources, and peer review. • **Government Agencies:** Supply regulatory insights and access to data
What is the level of risk presented by your research?	Please indicate whether the research risk assessment (Check risk document) stated on the application is: ☑ Low risk (*Research has no foreseeable risk of harm, discomfort, or inconvenience to respondents*) ☐ Medium risk (*Research has potential risk of unexpected negative consequences, harm or discomfort, but where appropriate steps can be taken to mitigate the risk*) ☐ High risk (*Research with real and foreseeable risk of harm and discomfort to participants and or the research team, and which may lead to serious adverse consequences if these risks are not managed in a responsible manner. It involves highly sensitive topics and/or the participation of very vulnerable and marginalized individuals/groups*)
Would you like to bring any aspects of the applications to the Ethics Review Committee's attention?	There are no specific aspects of the application that require immediate attention. The research does not involve vulnerable populations or sensitive topics. All foreseeable risks have been mitigated through clear procedures and guidelines.
What research data will be collected?	Primary data
What personal data and confidential information will be processed?	Demographic Information: Age, (to understand participant profiles and provide context for the research).
Specify any special category or sensitive data that will be collected (tick all that apply)	☐ Ethnicity

	☐ Mental Health (status, medical records conditions, to include disability) ☐ Physical Health (status, medical records conditions, to include disability) ☐ Sexual Orientation/Sexual life ☐ Genetic Data (to include DNA data) ☐ Biometric data (such as facial scan, iris scan, or fingerprint data used to identify a participant) ☐ Political opinions ☐ Trade Union membership ☐ Religious or philosophical beliefs ☐ Criminal Convictions and offences (to include alleged offences and convictions) ☑ None ☐ Other – Please specify below
How will data be stored and transferred during the research?	Data will be stored and managed using both SPSS and Microsoft Excel, with access limited to authorized personnel only.
Specify who will be able to access the identifying information and how you will ensure they process the information securely	• Only the Principal Investigator and authorized research team members will have access to identifying information. • Access will be controlled through secure login credentials, and all team members will be trained on data protection protocols to ensure the secure processing of information.
How will research data be preserved and shared on completion of the project? (NB: *Enter N/A in this section unless results will be published*)	*N/A*
Describe the measures that will be taken to ensure data are suitable for sharing, e.g., securing consent, anonymizing data prior to deposit/sharing, and sharing	• Participants will be informed about the purpose of the research, how their data will be used, and the potential for sharing anonymized data with third parties.

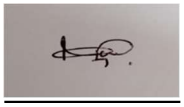
confidential or high-risk information using a controlled access repository.	• All identifying information, such as names, addresses, and contact details, will be removed or replaced with unique codes before data is shared. • Any confidential or high-risk information will be shared via a secure, controlled access repository. • Before sharing, all data will undergo a thorough review to ensure completeness, accuracy, and consistency. • Agreements will be established with recipients of the data to specify how the data may be used, limitations on its usage, and the requirement to maintain confidentiality. • Data will be transferred securely using encrypted channels (e.g., secure file transfer
State how long you plan to retain personal data and any confidential information after the end of the project. Indicate also how the data will be disposed	• Personal and confidential data will be retained for **5 years** after the completion of the project for potential audit and compliance purposes. • After this period, all data will be securely deleted using appropriate methods (e.g., shredding hard copies, permanent deletion of digital files).

As the Principal Investigator of this study, I declare that I take full responsibility for the proposed study and will conduct it according to the documented proposal and in line with KCAUSERC ethical guidelines.

By signing this document, I agree that:

a) All documents submitted with this application are true representations of the study and have not been falsified.
b) This study will not commence in any way, and no participant will be recruited until final official approval is received from KCAUSERC
c) The study will be conducted according to the protocol submitted. All participants will be recruited and consented to according to the protocol.
d) Any protocol deviations or protocol violations to the submitted study must be reported to KCAU in writing by email to KCAUSERC immediately. Within five (5) business days of the deviation or violation, the Deviation/Violation Must be reported to the ISERC office.
e) Any study-related unexpected or serious adverse event must be reported to the ISERC Office by email within twenty-four (24) hours after the PI becomes aware of the

event.

Principal Investigator's Signature  Date 17/03/2025

INFORMED CONSENT FOR RESEARCH PARTICIPATION

Introduction

You are invited to participate in a research study. This document provides information about the study so that you can make an informed decision about your participation. Please take the time to read the information below. If you have any questions, feel free to ask the researcher.

Purpose of the Study

This study examines how sustainability integration affects firm competitiveness in Kenya's food and beverage manufacturing sector. It focuses on environmental, social, governance, and digitalization sustainability.

Study Procedures

If you agree to participate, you will be asked to

- Complete a survey in regarding stainability integration, digitization and firm competitiveness in food and beverages manufacturing firms in Kenya.
- The study will take place from January to August 2025, with specific engagement sessions scheduled at mutually convenient times.

Potential Risks and Discomforts

There may be some risks associated with participation in this study which are minimal. These may include the time commitment required to complete the survey or interview. Every effort will be made to minimize any inconvenience, and you are free to withdraw at any time without penalty.

Potential Benefits

This study may not directly benefit you, but it can help in the following ways:

- Food and Beverages Manufacturing firms in Kenya will gain insights on how sustainability enhances competitiveness. The study will highlight cost reduction, efficiency improvement, and market expansion strategies. Firms can attract investors, build strong brands, and ensure long-term growth.
- Policymakers will use the findings to develop better sustainability policies. The study emphasizes the need for incentives, improved regulations, and enforcement of environmental and governance standards to promote industry growth.
- Future academicians will benefit from the study by filling research gaps on sustainability and competitiveness. It will provide a foundation for further studies on sector-specific challenges and long-term impacts.

Confidentiality

Your participation will be kept confidential. Any data collected will be stored securely and only accessible to the research team. Your identity will not be revealed in any publication or presentation resulting from this research.

Voluntary Participation

Participation in this study is completely voluntary. You have the right to withdraw from the study at any time without any negative consequences or loss of benefits to which you are otherwise entitled.

Questions

If you have any questions about this study, your participation, or your rights as a participant, please contact the principal investigator at 0728 039 787 or Via email 1400213@students.kcau.ac.ke

Consent

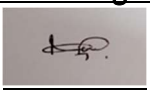
By signing below, you indicate that you have read the information provided above, understand the purpose and procedures of the study, and voluntarily agree to participate. You can withdraw from the study at any time without penalty.

Participant Statement:

I, the undersigned, consent to participate in this study.
Name of Participant: _____
Signature of Participant: _____
Date: _____

Researcher (Principal Investigator –P1) Statement:

I, the undersigned, confirm that I have explained the nature of this study to the participants, answered all questions, and ensured that they understand the information provided.
Name of Researcher: **Kelvin Mbugua Wanjiru**

Signature of Researcher: 

Date: _____

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KCA UNIVERSITY SCIENTIFIC AND ETHICS REVIEW COMMITTEE

REF: **KCAU/SERC/71** **Date: 24th APRIL 2025**
TO: **KELVIN MBUGUA WANJIRU (14/00213)**

Dear Sir/Madam

RE: SUSTAINABILITY INTEGRATION, DIGITIZATION AND FIRM COMPETITTIVENESS IN FOOD AND BEVERAGES MANUFACTURING FIRMS IN KENYA

This is to inform you that KCA University Scientific Ethics Review Committee (KCAUSERC) has reviewed and approved your above research proposal. Your application approval number is ***KCAUSERC*** **SOB71**. The approval period is ***24th APRIL 2025 – 24th APRIL, 2026.***
This approval is subject to compliance with the following requirements;

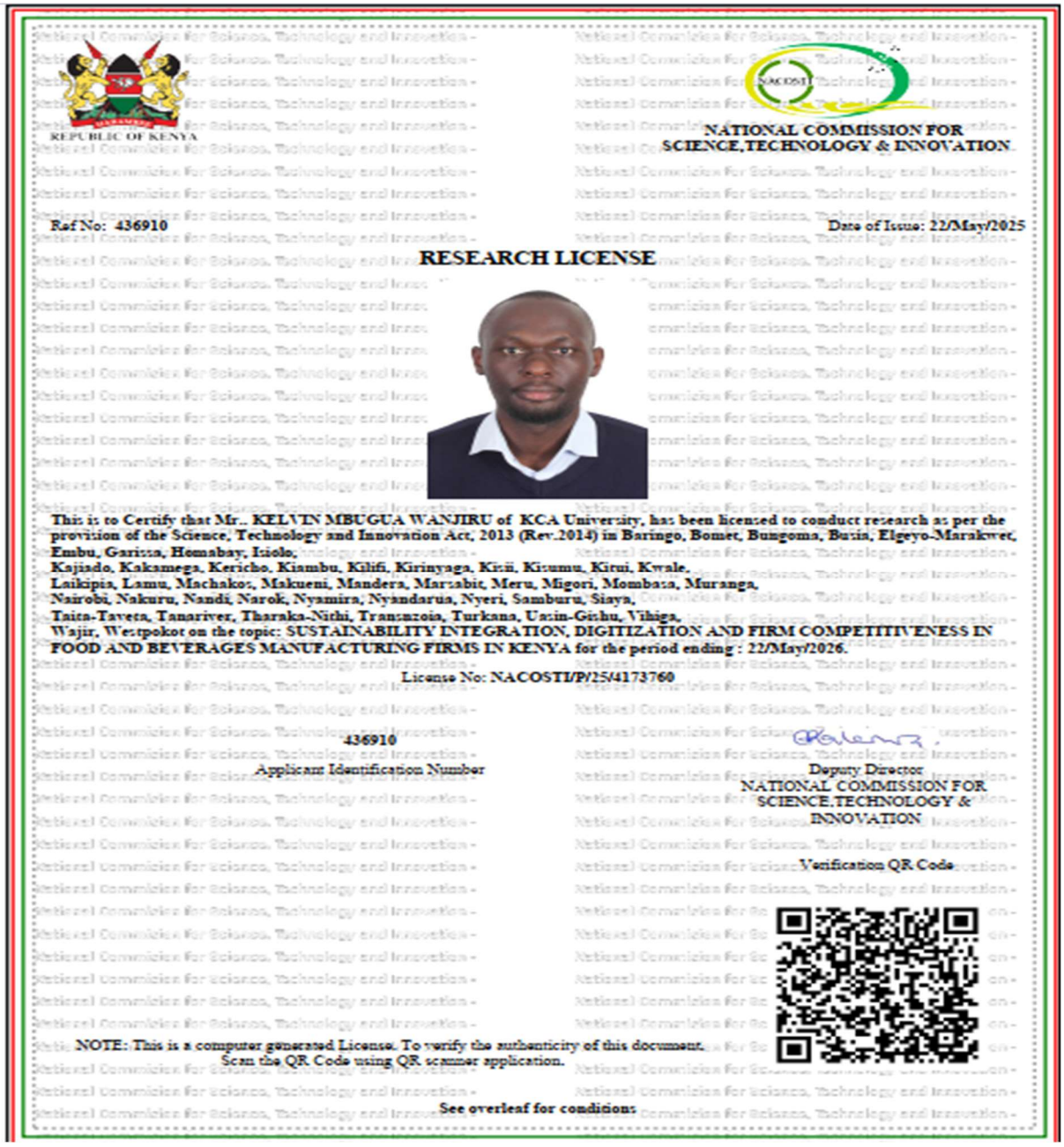
i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***KCAUSERC***.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to KCAU***SERC*** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***KCAUSERC*** within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to ***KCAUSERC***.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://research-portal.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

Dr. Caroline Ntara
Chairperson, KCA University Scientific And Ethics Review Committee

Appendix II: NACOSTI LICENSE



REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 436910

Date of Issue: 22/May/2025

RESEARCH LICENSE

This is to Certify that Mr.. KELVIN MBUGUA WANJIRU of KCA University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Baringo, Bomet, Bungoma, Busia, Elgeyo-Marakwet, Embu, Garissa, Homabay, Isiolo, Kajiado, Kakamega, Kericho, Kiambu, Kilifi, Kirinyaga, Kisii, Kisumu, Kitui, Kwale, Laikipia, Lamu, Machakos, Makueni, Mandera, Marsabit, Meru, Migori, Mombasa, Muranga, Nairobi, Nakuru, Nandi, Narok, Nyamira, Nyandarua, Nyeri, Samburu, Siaya, Taita-Taveta, Tanariver, Tharaka-Nithi, Transnzoia, Turkana, Uasin-Gishu, Vihiga, Wajir, Westpokot on the topic: SUSTAINABILITY INTEGRATION, DIGITIZATION AND FIRM COMPETITIVENESS IN FOOD AND BEVERAGES MANUFACTURING FIRMS IN KENYA for the period ending : 22/May/2026.

License No: NACOSTI/P/25/4173760

436910

Applicant Identification Number

Deputy Director
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

Appendix III: Research Questionnaire

Introduction

This questionnaire is designed to collect data relevant to the study on **sustainability integration, digitization, and firm competitiveness in food and beverage manufacturing firms in Kenya**. The information provided will be used for academic research purposes only and will remain confidential.

Section A: Background Information

1. **Age Bracket:**

- Below 25 years
- 25 – 34 years
- 35 – 44 years
- 45 – 54 years
- 55 years and above

2. **Highest Level of Education Attained:**

- Certificate/Diploma
- Bachelor's Degree
- Other (Specify) _____

3. **Type of Ownership:**

- Private
- Public
- Joint Venture
- Other (Please specify) _____

4. **Years of Operation:**

- Less than 5 years

- 5 – 10 years
- 11 – 20 years
- More than 20 years

5. **Firm Size (Number of Employees):**

- Less than 50 (Small)
- 50 – 249 (Medium)
- 250 and above (Large)

6. **Primary Market of Operation:**

- Local Market Only
- Regional Market (East Africa)
- International Market

6. **Years of Experience in the Food and Beverage Manufacturing Industry:**

- Less than 3 years
- 3 – 5 years
- 6 – 10 years
- More than 10 years

Section B: Effect of Environmental Sustainability Integration on Firm Competitiveness

This section seeks to assess the effect of environmental sustainability integration on firm competitiveness in food and beverage manufacturing firms in Kenya. Please indicate the extent to which you agree with the following statements by ticking (✓) the appropriate response, where:

1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Statements	**1**	**2**	**3**	**4**	**5**
The firm has implemented effective waste reduction strategies to enhance competitiveness.	☐	☐	☐	☐	☐
Proper waste disposal and recycling practices have improved the firm's brand reputation and market position.	☐	☐	☐	☐	☐
The firm has adopted water-saving technologies that contribute to cost efficiency.	☐	☐	☐	☐	☐
Water conservation efforts have enhanced regulatory compliance and operational efficiency.	☐	☐	☐	☐	☐
The use of sustainably sourced raw materials has improved the firm's competitive advantage.	☐	☐	☐	☐	☐
Collaboration with sustainable suppliers has strengthened the firm's supply chain resilience.	☐	☐	☐	☐	☐
The firm's pollution control measures have positively impacted its market acceptance.	☐	☐	☐	☐	☐
Compliance with pollution control regulations has improved the firm's operational sustainability.	☐	☐	☐	☐	☐

Section C: Effect of Social Sustainability Integration on Firm Competitiveness

This section seeks to assess the effect of social sustainability integration on firm competitiveness in food and beverage manufacturing firms in Kenya. Please indicate the extent to which you agree with the following statements by ticking (✓) the appropriate response, where:

1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Statements	**1**	**2**	**3**	**4**	**5**
The firm ensures product quality and safety to enhance consumer trust and competitiveness.	☐	☐	☐	☐	☐
Transparent labeling and ethical marketing practices have strengthened the firm's market position.	☐	☐	☐	☐	☐
The firm invests in employee health programs to improve productivity and competitiveness.	☐	☐	☐	☐	☐
Implementing workplace wellness initiatives has enhanced employee retention and performance.	☐	☐	☐	☐	☐
The firm provides fair wages and benefits, contributing to workforce stability and competitiveness.	☐	☐	☐	☐	☐
Employee welfare initiatives have improved job satisfaction and overall firm performance.	☐	☐	☐	☐	☐
The firm maintains strict safety measures to ensure employee well-being and regulatory compliance.	☐	☐	☐	☐	☐
Investments in workplace safety have reduced operational risks and improved firm reputation.	☐	☐	☐	☐	☐
The firm actively participates in community development projects to enhance brand loyalty and competitiveness.	☐	☐	☐	☐	☐
Corporate social responsibility initiatives have strengthened the firm's relationship with stakeholders.	☐	☐	☐	☐	☐

Section D: Effect of Governance Sustainability Integration on Firm Competitiveness

This section seeks to assess the effect of governance sustainability integration on firm competitiveness in food and beverage manufacturing firms in Kenya. Please indicate the extent to which you agree with the following statements by ticking (✓) the appropriate response, where:

1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Statements	**1**	**2**	**3**	**4**	**5**
The firm ensures diversity in board composition to enhance decision-making and competitiveness.	☐	☐	☐	☐	☐
A diverse board has contributed to the firm's strategic growth and market adaptability.	☐	☐	☐	☐	☐
The firm's leadership upholds ethical business practices that enhance its reputation and competitiveness.	☐	☐	☐	☐	☐
Ethical leadership has improved stakeholder confidence and long-term business success.	☐	☐	☐	☐	☐
The firm implements transparency policies that foster trust among stakeholders.	☐	☐	☐	☐	☐
Open communication and disclosure of financial information have improved investor confidence.	☐	☐	☐	☐	☐
The firm strictly adheres to industry regulations, enhancing operational sustainability.	☐	☐	☐	☐	☐
Compliance with regulatory requirements has reduced legal risks and improved market competitiveness.	☐	☐	☐	☐	☐
The firm enforces a code of conduct to maintain ethical standards in all operations.	☐	☐	☐	☐	☐
Strict enforcement of ethical guidelines has improved corporate governance and competitiveness.	☐	☐	☐	☐	☐

Section E: Effect of Digitalization Sustainability Integration on Firm Competitiveness

This section seeks to assess the effect of digitalization sustainability integration on firm competitiveness in food and beverage manufacturing firms in Kenya. Please indicate the extent to which you agree with the following statements by ticking (✓) the appropriate response, where:

1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Statements	**1**	**2**	**3**	**4**	**5**
The firm utilizes IoT solutions to enhance operational efficiency and competitiveness.	☐	☐	☐	☐	☐
IoT-driven automation has improved the firm's productivity and cost management.	☐	☐	☐	☐	☐
The firm leverages digital platforms to expand market reach and customer engagement.	☐	☐	☐	☐	☐
E-commerce and digital payment solutions have strengthened the firm’s competitive advantage.	☐	☐	☐	☐	☐
The firm integrates AI technologies to optimize production and enhance decision-making.	☐	☐	☐	☐	☐
AI-driven analytics have improved demand forecasting and supply chain efficiency.	☐	☐	☐	☐	☐
The firm has implemented robust cybersecurity measures to protect digital assets and maintain competitiveness.	☐	☐	☐	☐	☐
Investment in cybersecurity has strengthened stakeholder trust and compliance with data protection regulations.	☐	☐	☐	☐	☐
The firm utilizes data analytics to improve market insights and strategic decision-making.	☐	☐	☐	☐	☐
Data-driven decision-making has contributed to operational efficiency and business growth.	☐	☐	☐	☐	☐

Section F: Firm Competitiveness in Food and Beverage Manufacturing Firms

This section seeks to assess firm competitiveness in food and beverage manufacturing firms in Kenya. Please indicate the extent to which you agree with the following statements by ticking (✓) the appropriate response, where:

Statements	**1**	**2**	**3**	**4**	**5**
The firm continuously invests in research and development to enhance product innovation.	☐	☐	☐	☐	☐
Innovative practices have improved the firm's ability to respond to market changes.	☐	☐	☐	☐	☐
The firm prioritizes customer feedback to improve product quality and service delivery.	☐	☐	☐	☐	☐
High customer satisfaction has contributed to increased brand loyalty and competitiveness.	☐	☐	☐	☐	☐
The firm has optimized its production processes to increase efficiency and reduce costs.	☐	☐	☐	☐	☐
Investments in technology and automation have enhanced operational productivity.	☐	☐	☐	☐	☐
The firm has experienced consistent revenue growth due to strategic business decisions.	☐	☐	☐	☐	☐
Expanding into new markets and product segments has contributed to revenue growth.	☐	☐	☐	☐	☐
The firm has successfully increased its market share by outperforming competitors.	☐	☐	☐	☐	☐
Competitive pricing and product differentiation have strengthened the firm's market position.	☐	☐	☐	☐	☐

The end thank you

Appendix VI: Food and beverages manufacturing firms in Kenya

Beverages (Alcoholic)

- Africa Spirits Ltd
- Ahero Gin Distillers Ltd
- Bia Tosha Distributors Ltd
- Brewing Kenya Ltd
- Coca-Cola Beverages Africa (Alcoholic Division)
- East African Breweries Ltd
- Kenya Wine Agencies Ltd
- Keroche Breweries Ltd
- London Distillers (K) Ltd
- Rift Valley Winery
- Savannah Brands Ltd

Beverages (Non-Alcoholic)

- Aquamist Ltd
- Bio Foods Products Ltd (Juice Division)
- Coca-Cola Beverages Africa (Soft Drinks Division)
- Highlands Drinks Ltd
- Kevian Kenya Ltd
- Maisha Beverages Ltd
- Milly Fruit Processors
- Nairobi Bottlers Ltd
- Premier Foods Ltd (Juice & Non-Alcoholic Beverages)
- Softa Bottling Company Ltd
- Unilever Kenya Ltd (Tea Division)

Confectionery & Snacks

- Britania Foods Ltd
- Cadbury Kenya Ltd
- Confini Ltd
- Deepa Industries Ltd
- House of Manji Ltd
- Jambo Biscuits (K) Ltd
- Kenafric Industries Ltd
- Nairobi Flour Mills Ltd (Snack Division)
- Nuvita Biscuits Ltd
- Trident Snacks Ltd

Dairy Products

- Bio Food Products Limited

- Brookside Dairy Ltd
- Buffalo Millers
- Doinyo Lessos Creameries Ltd
- Githunguri Dairy Farmers Co-operative Society
- Happy Cow Ltd
- Kabianga Dairy Ltd
- Kinangop Dairy Limited
- Lattana Dairy Ltd
- New Kenya Co-Operative Creameries Ltd
- Palmhouse Dairies Ltd
- Raka Milk Processors

Edible Oils & Fats

- Bidco Africa Ltd
- Golden Africa Kenya Ltd
- Kapa Oil Refineries Ltd
- Menengai Oil Refineries Ltd
- Pwani Oil Products Ltd

Flour & Milled Products

- Alpha Grain Millers Ltd
- Bakex Millers Ltd
- Capwell Industries Ltd
- Grain Industries Ltd
- Kensal Rise Ltd
- Kitui Flour Mills Ltd
- Maisha Flour Mills Ltd
- Mombasa Maize Millers Ltd
- Nairobi Flour Mills Ltd
- Pembe Flour Mills Ltd
- Premier Flour Mills Ltd
- Unga Group Ltd

Fruits & Vegetables Processing

- Afya Feeds Ltd
- Bio Foods Products Ltd (Processed Fruits Division)
- Del Monte Kenya Ltd
- Equator Fruits Ltd
- Fruitways Kenya Ltd
- Kakuzi PLC
- Kenya Orchards Ltd
- Milly Fruit Processors Ltd
- Njoro Canning Factory Ltd

Meat & Meat Products

- Alpha Fine Foods Ltd
- Farmer's Choice Ltd
- Halal Meat Products Ltd
- Hurlingham Butchery Ltd
- Kenchic Ltd
- Kenya Meat Commission
- Kuku Foods East Africa Ltd
- Quality Meat Packers Ltd

Processed & Packaged Foods

- Bidco Africa Ltd (Food Division)
- Broadway Bakery Ltd
- Capwell Industries Ltd (Cereals Division)
- Cereal Millers Association (Members)
- Kenafric Industries Ltd (Processed Foods)
- Kenya Nut Company Ltd
- Mjengo Limited
- Nakuru Industries Ltd
- Premier Foods Ltd

Spices, Condiments & Sauces

- Akshar Impex Ltd
- Deepa Industries Ltd (Spices Division)
- Kenya Nut Company Ltd (Spices & Condiments)
- McEnnedy Ltd
- Tropical Heat Ltd

Sugar & Sweeteners

- Butali Sugar Mills Ltd
- Chemelil Sugar Company Ltd
- Kibos Sugar & Allied Industries Ltd
- Kwale International Sugar Company Ltd
- Mumias Sugar Company Ltd
- Nzoia Sugar Company Ltd
- Sony Sugar Company Ltd
- Sukari Industries Ltd
- Transmara Sugar Company Ltd
- West Kenya Sugar Co. Ltd

Bakery & Cereal-Based Products

- Broadway Bakery Ltd
- Capwell Industries Ltd (Cereal Division)
- DPL Festive Ltd
- Kenblest Ltd
- Mini Bakeries Ltd
- Uzuri Foods Ltd

Animal Feeds & Pet Food

- Alfema Feeds Ltd
- Bimeda Ltd
- Bunda Feeds Ltd
- Kenya Seed Company Ltd (Animal Feeds)
- Unga Farm Care Ltd

Coffee & Tea Processing

- Africa Tea & Coffee Ltd
- Chai Trading Company Ltd
- Eastern Produce Kenya Ltd
- James Finlay (Kenya) Ltd
- Kenya Tea Development Agency (KTDA)
- Kericho Gold Ltd
- Sasini Tea & Coffee Ltd

Frozen & Convenience Foods

- Alpha Fine Foods Ltd (Frozen Division)
- Farmer's Choice Ltd (Frozen Division)
- Kenchic Ltd (Frozen Products)
- Kenya Meat Commission (Frozen Meat)

Water Bottling

- Aquamist Ltd
- Keringet Water Ltd
- Mount Kenya Bottlers Ltd
- Quencher Beverages Ltd
- Rift Valley Water Ltd

Food Additives & Ingredients

- Chemserve Cleaning Services Ltd
- DSM Nutritional Products
- Ingredion Kenya Ltd
- Kerry Ingredients Ltd

Miscellaneous Food Companies

- AAR Healthcare (Nutrition Division)
- Bio Food Products Ltd (Multiple Divisions)
- HACO Industries Kenya Ltd
- PZ Cussons Kenya Ltd
- Wrigley Kenya Ltd