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Adoption of Green Innovation and International Market Access among Horticultural Agribusiness Smes in Kenya: Evidence from A Case-Study

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Abstract: Kenya's horticultural sector is a major contributor to foreign exchange earnings and rural employment, yet small and medium-sized enterprises (SMEs) in this sector face mounting pressure to comply with increasingly stringent international sustainability and environmental standards. This article examines how green innovation practices influence international market access for a horticultural agribusiness SME in Kiambu County, Kenya. The study adopts a descriptive single-case design and draws on primary data from semi-structured interviews and questionnaires administered to management and technical staff, complemented by secondary data from export records and regulatory documents. Green innovation is conceptualised through four dimensions –eco-friendly farming practices, resource efficiency practices, green product and process innovations, and environmental management systems and certifications – with government regulation examined as a moderating factor. The findings indicate that the SME has substantially adopted green innovation practices, which have enhanced product quality, compliance with international standards, buyer confidence, and export growth, although challenges related to certification costs, regulatory complexity, and financing constraints persist. The article argues that green innovation functions simultaneously as a strategic response to global value-chain pressures and a source of competitive advantage for horticultural SMEs, but its effectiveness remains contingent on supportive regulatory and institutional frameworks. Implications are drawn for SME managers, policymakers, and development partners seeking to leverage green innovation for export competitiveness.

Keywords: Green innovation, Horticultural agribusiness, SMEs, International market access, Government regulation.

I. Introduction

Kenya's horticultural agribusiness sector plays a central role in the national economy by generating foreign exchange earnings and creating employment opportunities, especially in rural areas (Nzomoi et al., 2022). Over the past two decades, the sector has become increasingly integrated into global value chains, supplying fruits, vegetables, and herbs to high-value markets in the European Union (EU), the Middle East, and beyond (Henson & Humphrey, 2010; Nzomoi et al., 2022). However, this integration has also exposed horticultural exporters to stringent sustainability, traceability, and food-safety requirements imposed by public regulators and private standards systems such as GlobalG.A.P and Fair Trade (Githiga, Elias, & Yasunobu, 2024; Henson & Humphrey, 2010). For small and medium-sized enterprises (SMEs), these evolving demands present both opportunities and risks: compliance can unlock access to premium markets, whereas non-compliance can lead to shipment rejections, revoked certifications, and exclusion from lucrative market segments (Cheruiyot & Motari, 2024; Owoko, 2025).

Green innovation has emerged as a key strategic response to these global pressures. It refers to the adoption of products, processes, and managerial practices that reduce environmental impacts while sustaining or improving firm performance (Chen, Lai, & Wen, 2006; Shahzad, Qu, Rehman, & Zafar, 2022). In agriculture, this encompasses eco-friendly farming practices, resource-efficient production, environmentally sound packaging, and robust environmental management systems (Chawla, Dhakad, & Meena, 2025; Hiywotu, 2025; Moshood et al., 2022). For horticultural SMEs, green innovation is not simply a normative ideal; it has become a market requirement and a basis for long-term competitiveness in global markets where buyers increasingly demand verifiable sustainability credentials (Irungu, Kamau, & Chege, 2024; Nzomoi et al., 2022). Yet many Kenyan SMEs continue to face technical, financial, and institutional barriers in adopting green

innovations at scale, including limited access to capital, inadequate training, and complex regulatory standards (Irungu et al., 2024; Kukubo & James, 2020).

Existing empirical work links various aspects of sustainable practice – such as quality control, post-harvest handling, resource efficiency, and certification – to improved export performance, but several gaps remain. Studies in Kenya's South Rift region, for example, show that stronger quality control and better post-harvest handling are associated with horticultural export growth, highlighting the role of eco-friendly and disciplined farming practices in meeting international standards (Cheruiyot & Motari, 2024; Cheruiyot, Mboya, & Wafula, 2024). Other research underscores the contribution of resource efficiency and eco-innovation to competitiveness in global agri-food chains (Albort-Morant, Leal-Millán, & Cepeda-Carrión, 2016; Cainelli, D'Amato, & Mazzanti, 2020; Nweje & Taiwo, 2025). Nonetheless, much of this literature focuses either on large exporters or on broader sustainability themes, without explicitly examining how distinct dimensions of green innovation interact with regulatory frameworks to shape international market access for horticultural SMEs in specific county contexts such as Kiambu (Bitok, Nyariki, & Amwata, 2023; Irungu et al., 2024).

Theoretically, the relationship between green innovation and export performance has been explained using frameworks such as the Natural Resource-Based View (Hart, 1995), Ecological Modernization Theory (Mol & Sonnenfeld, 2007), Institutional Theory (DiMaggio & Powell, 1983), and Porter's Hypothesis (Porter & van der Linde, 1995). These perspectives collectively suggest that firms can build competitive advantage by developing capabilities for pollution prevention and resource efficiency, leveraging environmental challenges as innovation drivers, conforming to evolving institutional pressures, and responding constructively to well-designed regulations (Albort-Morant et al., 2016; Darnall, Henriques, & Sadorsky, 2008; Hart, 1995; Mol & Sonnenfeld, 2007; Porter & van der Linde, 1995). However, empirical applications often treat green innovation as a single, aggregate construct, limiting understanding of how specific practices—such as eco-friendly farming, green packaging, or formal environmental management systems—contribute to different dimensions of market access, including export volume growth, market diversification, and competitive positioning (Rennings, 2000; Wang, She, & Peng, 2025).

This article addresses these gaps by investigating how the adoption of green innovation practices influences international market access for a horticultural agribusiness SME located in Kiambu County, Kenya. The SME, which exports fruits and herbs to multiple international destinations, operates under strict buyer and regulatory requirements but cannot be named for confidentiality reasons. Green innovation is examined along four dimensions: eco-friendly farming practices, resource efficiency practices, green product and process innovations, and environmental management systems and certifications. Government regulation – encompassing export standards, compliance policies, and incentives – is analysed as a moderating factor that can either amplify or constrain the impact of green innovation on market access (Akama, 2023; Bundi, Awuor, & Machoka, 2024).

The study is guided by five objectives: (a) to assess the effect of eco-friendly farming practices on international market access by horticultural agribusiness SMEs in Kiambu County; (b) to determine the effect of resource efficiency practices on international market access; (c) to evaluate the influence of green product and process innovations on international market access; (d) to examine the effect of environmental management systems and certifications on international market access; and (e) to determine the moderating effect of government regulation on the relationship between green innovation adoption and international market access. By situating these objectives within an integrated theoretical framework and a rich single-case design, the article contributes context-specific evidence on how horticultural SMEs in Kenya navigate the demands of green global value chains. It also offers practical and policy insights on how green innovation strategies can be supported to enhance export competitiveness, advance national sustainability goals, and protect the livelihoods that depend on horticultural exports (HCD, 2022; UNEP, 2025).

II. Literature review and theoretical framework

2.1 Green innovation and international market access

Green innovation is commonly defined as the development and application of products, processes, and managerial practices that minimise environmental harm while sustaining or improving organisational performance (Chen et al., 2006; Chen, Lai, & Wen, 2008). In agriculture, green innovation spans eco-friendly farming practices, resource-efficient production, environmentally responsible packaging, and structured environmental management systems and certifications (Chawla et al., 2025; Hiywotu, 2025; Moshood et al., 2022). For horticultural SMEs integrated into global value chains, such practices have moved from being voluntary initiatives to becoming de facto market entry conditions, particularly in high-value export destinations (Irungu et al., 2024; Nzomoi et al., 2022).

Empirical studies in Kenyan horticulture increasingly underscore the link between sustainable practices and export performance. Cheruiyot and Motari (2024) report that comprehensive quality control measures across pre-production, production, and post-harvest stages are positively associated with growth in horticultural exports among smallholder farmers, largely because they improve conformity with stringent international buyer standards. In a related study, Cheruiyot et al. (2024) demonstrate that improved post-harvest handling, including better packaging and hygiene, is significantly associated with increased participation in export markets, suggesting that on-farm and post-harvest practices jointly shape export outcomes. Beyond Kenya, evidence from global agri-food value chains indicates that eco-innovation and green process upgrading can enhance brand value, buyer confidence, and access to premium market segments (Albort-Morant et al., 2016; Cainelli et al., 2020; Zailani et al., 2015). Nevertheless, many horticultural SMEs in Kenya continue to encounter barriers to green innovation, including financial constraints, limited technical capacity, and weak institutional support (Irungu et al., 2024; Kukubo & James, 2020).

2.2 Eco-friendly farming practices

Eco-friendly farming practices encompass methods that conserve resources, reduce pollution, and maintain ecological balance while safeguarding productivity, such as organic farming, integrated pest management (IPM), and water-saving irrigation (Chawla et al., 2025; Hiywotu, 2025). In export-oriented horticulture, these practices are closely linked to compliance with maximum residue limits, food-safety standards, and environmental requirements imposed by importing markets (Githiga et al., 2024; Henson & Humphrey, 2010). Studies in East Africa show that farmers who perceive eco-friendly practices as enhancing market access and reducing long-term costs are more likely to adopt them, particularly when they are embedded in support programmes and value-chain arrangements (Cheruiyot et al., 2025; Irungu et al., 2024).

For Kenyan horticultural SMEs, eco-friendly practices serve dual purposes. On one hand, they contribute to environmental objectives such as soil health, biodiversity conservation, and reduced chemical loads in water bodies (UNEP, 2025). On the other hand, they function as risk-management tools that lower the probability of export rejections and strengthen reputational capital with buyers (Cheruiyot & Motari, 2024; Githiga et al., 2024). However, uptake remains uneven due to the costs of transitioning from conventional inputs, the need for specialised knowledge, and the limited availability of extension and advisory services tailored to export-oriented green production (Kukubo & James, 2020).

2.3 Resource efficiency practices

Resource efficiency refers to the optimal use of inputs such as water, energy, fertilisers, and packaging materials to achieve desired outputs with minimal waste and environmental impact (OECD, 2018, 2025). Within the Natural Resource-Based View (NRBV), capabilities for pollution prevention and resource conservation are considered important drivers of competitive advantage, especially in markets where customers value sustainability (Hart, 1995; Albort-Morant et al., 2016). In horticulture, resource-efficient practices include energy-saving technologies, water-efficient irrigation, recycling of organic waste, and judicious use of fertilisers and agrochemicals (Madhav, 2024; Nzomoi et al., 2022).

Empirical work suggests that firms adopting resource-efficient systems often achieve lower production costs and improved compliance with environmental standards, which can strengthen their export competitiveness (Albort-Morant et al., 2016; Cainelli et al., 2020). In Kenya, efforts to promote climate-smart and water-efficient horticulture have been linked to both resilience and export readiness, although SMEs frequently lack the capital to invest in advanced technologies such as renewable energy or precision irrigation (Bitok et al., 2023; Nweje & Taiwo, 2025). Consequently, many SMEs follow incremental trajectories of resource-efficiency upgrading, focusing on relatively low-cost changes with visible returns.

2.4 Green product and process innovations

Green product and process innovations involve changes in product design and production processes that reduce resource use and pollution across the product life cycle (Cater et al., 2025; Rennings, 2000). In export horticulture, this includes the adoption of biodegradable or recyclable packaging, eco-friendly post-harvest handling, and improved cold-chain and logistics solutions (Moshood et al., 2022; Zailani et al., 2015). Ecological Modernization Theory (EMT) posits that environmental challenges can drive such innovations, generating "win–win" outcomes by simultaneously improving environmental performance and economic competitiveness (Mol & Sonnenfeld, 2007).

Studies of global agri-food chains show that retailers and lead firms increasingly prefer suppliers that demonstrate innovation in environmentally responsible packaging and low-impact logistics, as these innovations help them meet their

own corporate sustainability commitments (Cainelli et al., 2020; Zailani et al., 2015). For SMEs, however, the transition to green packaging and advanced post-harvest processes often entails higher unit costs, the need for new technical knowledge, and dependence on external service providers or donor programmes (Moshood et al., 2022; Nweje & Taiwo, 2025). The capacity to implement such innovations therefore depends not only on firm-level motivation but also on the availability of supportive networks and financing.

2.5 Environmental management systems, certifications and institutional pressures

Environmental management systems (EMS) and certifications such as GlobalG.A.P, Fair Trade, and organic standards provide structured frameworks and third-party validation for environmental performance (ISO, 2015). Institutional Theory suggests that organisations adopt such arrangements in response to coercive, normative, and mimetic pressures, seeking legitimacy, resources, and survival within their organisational fields (DiMaggio & Powell, 1983; Hatanaka, 2010). In global horticultural trade, certifications frequently function as gatekeepers to high-value markets: without them, SMEs may be excluded from premium supermarket channels regardless of product quality (Githiga et al., 2024; Henson & Humphrey, 2010).

Evidence from Kenya indicates that certification has helped some horticultural producers secure stable contracts and price premiums, particularly when combined with strong buyer relationships and inclusive value-chain arrangements (Githiga et al., 2024; Irungu et al., 2024). At the same time, the costs and complexity of certification processes—including audit fees, record-keeping requirements, and recurrent compliance investments—can be prohibitive for smaller firms, potentially reinforcing patterns of exclusion (Bitok et al., 2023; Hatanaka, 2010). This ambivalence positions certifications as both pathways to and barriers against international market access, depending on firm capabilities and support mechanisms.

2.6 Government regulation and Porter's Hypothesis

Government regulation in export horticulture takes the form of environmental policies, export standards, phytosanitary protocols, and incentive schemes implemented by agencies such as the Horticultural Crops Directorate (HCD) and the Kenya Bureau of Standards (KEBS) (Akama, 2023; Bundi et al., 2024). Porter's Hypothesis posits that well-designed environmental regulations can stimulate innovation and efficiency, thereby improving firm competitiveness, rather than merely imposing costs (Porter & van der Linde, 1995). Applied to horticulture, this suggests that stringent but predictable and supportive regulatory frameworks could motivate SMEs to invest in green innovation that ultimately enhances their export performance (Darnall et al., 2008; Nweje & Taiwo, 2025).

In practice, the effects of regulation on SMEs are mixed. On one hand, export and environmental standards clarify expectations, reduce information asymmetries, and can be complemented with training and incentive programmes that lower adoption barriers (Akama, 2023; Bundi et al., 2024). On the other hand, fragmented institutional mandates, complex procedures, and limited coordination among agencies often generate compliance burdens that weigh heavily on firms with limited administrative and financial capacity (Bitok et al., 2023; Kukubo & James, 2020). Understanding regulation as a moderating factor is therefore critical: it can amplify the positive impact of green innovation on market access when supportive, or dampen it when overly burdensome.

2.7 Integrated theoretical framework

The study integrates five theoretical perspectives to explain how green innovation affects international market access in the case-study SME. Diffusion of Innovations Theory (Rogers, 2003) illuminates adoption patterns of eco-friendly farming practices, emphasising perceived relative advantage, compatibility, complexity, trialability, and observability. The Natural Resource-Based View (Hart, 1995) explains how capabilities for resource efficiency underpin competitive advantage in sustainability-sensitive markets. Ecological Modernization Theory (Mol & Sonnenfeld, 2007) highlights how environmental challenges can drive product and process innovations that yield both environmental and economic gains. Institutional Theory (DiMaggio & Powell, 1983) frames EMS and certifications as responses to external pressures that confer legitimacy and access to resources. Finally, Porter's Hypothesis (Porter & van der Linde, 1995) positions government regulation as a potential catalyst, or constraint, for innovation that conditions the relationship between green practices and export outcomes. The theories suggest that horticultural SMEs can leverage green innovation to strengthen their position in international markets, but that outcomes are mediated by institutional, regulatory, and capability factors. This integrated framework guides both the empirical design and the interpretation of findings in the subsequent sections.

III. Methodology

3.1 Research design and case selection

The study employed a descriptive single-case study design to enable an in-depth examination of how green innovation practices shape international market access within their real-world organisational and institutional context (Yin, 2014; Creswell & Creswell, 2018). The focal case is a medium-sized horticultural agribusiness SME located in Kiambu County, Kenya, engaged in the production and export of fruits and herbs to multiple international markets. For confidentiality, the enterprise is referred to as "the case-study horticultural SME." The SME was selected purposively because it had an active export portfolio, had invested in various green innovation initiatives, and operated under formal environmental and food-safety certifications, making it an information-rich case for the study objectives.

3.2 Target population, sampling and data collection

The target population comprised management and technical staff directly involved in production, post-harvest handling, quality assurance, and export operations at the case-study SME, complemented by institutional perspectives from regulatory and industry bodies. Within the firm, these roles included production managers, agronomists, quality assurance officers, packhouse supervisors, and export/logistics officers. Purposive sampling was used to identify fifteen respondents with direct experience in implementing green innovation initiatives and managing export requirements, ensuring that participants could provide rich, practice-based insights into both sustainability and market access dynamics.

Primary data were collected using a mixed approach. Semi-structured interviews captured detailed narratives on the adoption of eco-friendly practices, resource efficiency measures, product and process innovations, environmental management systems, and experiences with government regulation (Bryman, 2016). Structured questionnaires were used to collect quantitative data on the prevalence and perceived effectiveness of specific practices, as well as indicators of international market access such as export growth, market diversification, and buyer relationships. Secondary data were drawn from firm documents (including export records, certification reports, and internal policies) and from regulatory and industry sources such as Horticultural Crops Directorate (HCD) circulars and Fresh Produce Exporters Association of Kenya (FPEAK) guidelines, which provided contextual information on standards and market conditions.

3.3 Data analysis and quality assurance

Quantitative data from the questionnaires were analysed using descriptive statistics, including frequencies, percentages, and means, to summarise the prevalence and perceived influence of different green innovation practices and regulatory factors. These results were tabulated and used to structure the thematic interpretation of qualitative findings. Qualitative interview data were transcribed and subjected to thematic analysis, with codes derived both deductively from the conceptual framework (eco-friendly farming, resource efficiency, green product and process innovation, environmental management systems, government regulation, market access) and inductively from emergent patterns in respondents' accounts.

Data triangulation across interviews, questionnaires, and documentary sources was used to enhance credibility and internal validity, allowing convergence and divergence across evidence streams to be systematically examined. Anonymity and confidentiality were assured to all respondents, and the SME's identity was masked, helping to reduce social desirability bias and encourage candid discussion of challenges as well as achievements. Ethical clearance procedures at the university level were followed, and informed consent was obtained prior to data collection.

IV. Findings and discussion

4.1 Eco-friendly farming practices and international market access

Descriptive results show a high level of agreement among respondents that the SME has adopted a range of eco-friendly farming practices, including integrated pest management, careful pesticide selection, water-efficient irrigation, and soil conservation measures. The majority of respondents indicated that these practices had improved product quality, reduced pesticide residues, and lowered the risk of consignment rejection in export markets. Qualitative narratives further emphasised that compliance with buyer-specified codes of practice on pest and disease management was seen as indispensable for continued participation in stringent markets, particularly in the European Union.

These findings are consistent with Diffusion of Innovations Theory, which suggests that adoption is more likely when practices are perceived to offer clear relative advantage and compatibility with existing operations (Rogers, 2003). Respondents framed eco-friendly practices not merely as environmental choices but as strategies to secure and stabilise international demand, highlighting observable benefits such as fewer complaints, smoother audits, and repeat orders. This pattern resonates with evidence from other Kenyan horticultural regions, where improved on-farm quality control

and eco-friendly methods have been linked to export growth and reduced non-compliance with international standards (Cheruiyot & Motari, 2024; Cheruiyot et al., 2024). At the same time, several respondents noted that the transition to such practices involved learning costs, experimentation, and a need for ongoing agronomic support—factors that can slow uptake among SMEs lacking extension services or donor-backed programmes (Irungu et al., 2024; Kukubo & James, 2020).

4.2 Resource efficiency practices and cost-competitiveness

Survey data indicated strong endorsement of resource efficiency measures, with respondents reporting consistent efforts to optimise water use, manage energy consumption in production and packhouse operations, and recycle organic waste where feasible. Many participants associated these practices with reductions in operating costs and improved environmental performance, aligning with the NRBV's emphasis on capabilities for pollution prevention and resource conservation as bases for competitive advantage (Albort-Morant et al., 2016; Hart, 1995). Interview accounts highlighted practical examples, such as scheduling irrigation based on crop water needs, using more efficient pumps and lighting, and re-using organic residues as compost to reduce dependence on synthetic fertilisers.

However, respondents also stressed that more capital-intensive technologies—such as large-scale solar systems, advanced water-harvesting structures, or fully automated climate-control infrastructure—remained beyond the SME's current financial reach. This mirrors broader Kenyan and international experience, where SMEs often pursue incremental rather than transformative resource-efficiency upgrades due to credit constraints and risk aversion (Bitok et al., 2023; Nweje & Taiwo, 2025; OECD, 2018, 2025). Even so, the case suggests that relatively low-cost resource-efficiency practices can still support international market access by aligning the firm with buyer expectations regarding carbon footprints, water stewardship, and responsible input use. In this sense, resource efficiency operates at the intersection of cost discipline and environmental compliance, reinforcing the economic rationale for green innovation in export-oriented horticulture.

4.3 Green product and process innovations as market signals

With regard to green product and process innovations, descriptive statistics showed broad agreement that the firm had upgraded its packaging and post-harvest handling systems in response to market and regulatory pressures. Respondents pointed to shifts toward more environmentally friendly packaging materials, improved labelling and traceability, better hygiene protocols, and more systematic cold-chain management. These innovations were widely perceived to have reduced post-harvest losses, enhanced product presentation, and strengthened relationships with international buyers.

From an Ecological Modernization perspective, these changes illustrate how environmental concerns can act as catalysts for technological and organisational innovation that has both ecological and economic benefits (Mol & Sonnenfeld, 2007; Zailani et al., 2015). Interviewees noted, for instance, that reducing plastic usage and adopting recyclable or biodegradable materials not only responded to buyer sustainability policies but also distinguished the SME from competitors still relying on older packaging formats. This aligns with research indicating that green packaging and eco-friendly logistics upgrades can enhance brand image and buyer confidence in global agri-food chains (Cainelli et al., 2020; Moshood et al., 2022; Zailani et al., 2015). At the same time, respondents reported that green packaging options were often more expensive and sometimes harder to source locally, highlighting the trade-offs and supply-chain dependencies that SMEs face when attempting to implement such innovations (Nweje & Taiwo, 2025).

4.4 Environmental management systems, certifications and buyer legitimacy

The findings reveal that environmental management systems and certifications occupy a central place in the SME's export strategy. Survey responses showed strong consensus that certifications such as GlobalG.A.P and Fair Trade had significantly enhanced the firm's credibility with international buyers and were essential for accessing certain supermarket chains and niche ethical markets. Respondents indicated that these certifications had institutionalised environmental and quality controls within the firm, leading to more robust record-keeping, routinised monitoring, and regular internal audits.

These observations align with Institutional Theory's claim that organisations respond to coercive, normative, and mimetic pressures by adopting structures and practices that confer legitimacy and access to resources (DiMaggio & Powell, 1983; Hatanaka, 2010). In the context of global horticultural trade, certification acts as a powerful institutional script: without appropriate logos and audit reports, SMEs may be excluded from high-value channels irrespective of underlying product quality (Githiga et al., 2024; Henson & Humphrey, 2010). Respondents in this study clearly saw certification as a gateway to such channels but also emphasised the significant costs involved, including audit fees, training requirements, infrastructure upgrades, and time-consuming documentation. These burdens are consistent with concerns raised in other

research that certification systems, while enabling green market access for some, may reinforce exclusion for less-resourced SMEs (Bitok et al., 2023; Hatanaka, 2010; Irungu et al., 2024). The case thus underscores the dual role of EMS and certifications as both enablers and constraints in the pursuit of international market access.

4.5 Government regulation as a moderating force

The study also examined how government regulation moderates the relationship between green innovation adoption and international market access. Respondents generally agreed that regulatory agencies such as HCD and KEBS play a critical role in setting and enforcing standards that push firms towards greener practices and higher levels of export readiness. Many participants reported that trainings, guidelines, and inspections linked to export standards and environmental policies had raised awareness of international requirements and pressured the firm to formalise its systems. This reflects Porter's Hypothesis, which proposes that well-designed regulation can stimulate innovation and enhance competitiveness rather than simply imposing costs (Darnall et al., 2008; Porter & van der Linde, 1995).

Yet interviewees also highlighted regulatory shortcomings, including bureaucratic delays, overlapping mandates, and limited coordination among agencies, which sometimes increased compliance costs and uncertainty. Smaller horticultural SMEs without the case-study firm's experience and networks were seen as particularly vulnerable to these administrative burdens, which can discourage investment in green innovation or push firms into informal export channels (Akama, 2023; Bundi et al., 2024; Kukubo & James, 2020). In this sense, regulation acts as a double-edged moderator: when coupled with supportive measures such as capacity-building, subsidised audits, and streamlined procedures, it amplifies the positive impact of green practices on market access; when poorly coordinated or under-resourced, it risks dampening or even reversing those gains. The case therefore illustrates that the effectiveness of green innovation in enhancing export performance is contingent not only on firm-level choices but also on the design and implementation of public policy frameworks.

4.6 International market access outcomes

Across indicators of international market access, respondents reported that green innovation had contributed positively to the SME's export performance. Most participants agreed that adoption of eco-friendly farming practices, resource efficiency measures, product and process innovations, and formal environmental management systems had supported growth in export volumes, strengthened relationships with existing buyers, and enabled entry into additional markets. Descriptive statistics indicated perceived improvements in market diversification and competitive positioning, with respondents attributing these gains to enhanced compliance, reduced rejection risks, and greater buyer trust.

Nonetheless, the case also revealed enduring vulnerabilities. Several respondents pointed to the high and escalating costs of maintaining certifications, the volatility of international demand and prices, exposure to currency fluctuations, and a continuing dependence on a limited number of strategic markets. These observations resonate with wider literature on the structural risks faced by export-oriented horticulture in developing countries, where even relatively sophisticated SMEs operate within asymmetrical power relations and volatile global value chains (Githiga et al., 2024; Henson & Humphrey, 2010; Owoko, 2025). The evidence from this case suggests that green innovation is necessary—but not sufficient—for long-term resilience; it must be complemented by broader strategies of market diversification, financial risk management, and collective institutional support targeting SMEs.

V. Conclusion

This article examined how the adoption of green innovation practices influences international market access for a horticultural agribusiness SME in Kiambu County, Kenya, under conditions of growing environmental scrutiny and demanding buyer standards. Drawing on a descriptive single-case design, the study found that the SME has implemented a broad portfolio of eco-friendly farming practices, resource-efficiency measures, green product and process innovations, and formal environmental management systems and certifications, all of which contribute positively to its export performance. Respondents strongly associated these practices with improved product quality, reduced rejection risks, enhanced legitimacy with buyers, and greater access to high-value markets, consistent with the propositions of the Natural Resource-Based View, Ecological Modernization Theory, and Institutional Theory (Albort-Morant et al., 2016; DiMaggio & Powell, 1983; Hart, 1995; Mol & Sonnenfeld, 2007).

At the same time, the findings highlight persistent constraints and vulnerabilities. The costs and complexity of certification, the capital intensity of advanced resource-efficiency and packaging technologies, and the administrative burdens of navigating regulatory systems all weigh heavily on SMEs, potentially limiting the depth and pace of green upgrading. Furthermore, exposure to volatile international demand, currency fluctuations, and concentration in a

relatively narrow set of export markets means that even successful adopters of green innovation remain structurally exposed to external shocks (Bitok et al., 2023; Hatanaka, 2010; Owoko, 2025). Government regulation emerges as a critical moderating factor: when designed and implemented in ways that combine clear standards with targeted support, it amplifies the benefits of green innovation for market access; when fragmented or excessively burdensome, it risks undermining the very outcomes it seeks to promote (Akama, 2023; Bundi et al., 2024; Darnall et al., 2008).

5.1 Implications for practice

For horticultural SME managers, the case underscores the importance of treating green innovation not as a peripheral compliance task but as a central pillar of export strategy. First, prioritising eco-friendly farming and robust post-harvest practices helps reduce the likelihood of non-compliance incidents and strengthens trust-based relationships with demanding buyers, especially in the EU and Middle Eastern markets (Cheruiyot & Motari, 2024; Githiga et al., 2024). Second, incremental but systematic investments in resource efficiency—such as optimised irrigation, energy-saving measures, and waste recycling—can deliver both cost savings and reputational benefits, even when large-scale technologies remain unaffordable (Albort-Morant et al., 2016; OECD, 2018, 2025). Third, managers should view certifications and environmental management systems as strategic assets that require careful planning, budgeting, and internal capacity-building, potentially through pooling resources and knowledge with peer firms or producer groups to manage costs and share learning.

The case also suggests that SMEs should proactively engage with buyers, auditors, and service providers to negotiate realistic implementation timelines and seek technical assistance where needed. Building long-term partnerships with exporters, retailers, and supporting organisations can help distribute the costs and risks of green innovation more equitably, while opening access to new technologies and market information (Githiga et al., 2024; Irungu et al., 2024). Internally, embedding environmental and quality responsibilities across departments—rather than confining them to a single compliance unit—can support continuous improvement and resilience in the face of shifting standards.

5.2 Policy implications

For policymakers and regulatory agencies, the findings point to the need for an integrated policy mix that combines stringent but predictable standards with practical support for SME compliance. Streamlining regulatory procedures, clarifying institutional mandates, and improving coordination among agencies such as HCD, KEBS, and county-level departments would help reduce transaction costs and uncertainty for exporters (Akama, 2023; Bundi et al., 2024). At the same time, expanding targeted support instruments—such as subsidised audits, technical assistance for certification, concessional finance for green technologies, and tailored training on eco-friendly farming and post-harvest management—would strengthen SMEs' capacity to comply with environmental and food-safety requirements (Bitok et al., 2023; Kukubo & James, 2020).

There is also scope for public–private partnerships that bring together government, industry associations like FPEAK, development partners, and lead firms to co-design programmes that reduce the fixed costs of green innovation for SMEs. Such collaborations could, for instance, support shared infrastructure (e.g., cold-chain facilities, waste-management systems), collective certification schemes, and digital traceability platforms, thereby enhancing both environmental performance and export competitiveness at scale (Githiga et al., 2024; Nzomoi et al., 2022; UNEP, 2025). Aligning these efforts with national commitments under the Sustainable Development Goals would further legitimise investments in green horticulture as contributors to inclusive, low-carbon development.

5.3 Implications for research

The single-case design used in this study provides rich, context-specific insights but also limits the generalisability of findings. Future research could extend this work through comparative multi-case studies across different horticultural sub-sectors, counties, and market orientations, enabling systematic analysis of how variations in scale, ownership structures, and value-chain positions shape green innovation pathways and export outcomes. Quantitative studies employing larger samples of horticultural SMEs could test the relationships suggested here—between specific green practices, regulatory conditions, and dimensions of international market access—using econometric or structural equation modelling approaches (Cainelli et al., 2020; Nweje & Taiwo, 2025).

Further research may also explore the social dimensions of green innovation, including implications for labour conditions, gender dynamics, and smallholder inclusion within export-oriented supply chains. Finally, longitudinal designs tracking firms over time would allow scholars to assess how shocks such as climate variability, currency volatility, or shifts in

international regulations interact with green innovation trajectories and export resilience. Such work would deepen understanding of how horticultural SMEs in Kenya and similar contexts can harness green innovation not only to access international markets but also to sustain equitable and climate-compatible development.

References

[1] Akama, E. M. (2023). Does stringent environmental regulations influence export performance in a low technical capacity economy? A quasi-natural experiment based on Kenya's new environmental protection law. *Research Square, V.1*,

[2] Albort-Morant, G., Leal-Millán, A., & Cepeda-Carrión, G. (2016). The antecedents of green innovation performance: A model of learning and capabilities. *Journal of Business Research, 69*(11), 4912–4917. https://doi.org/10.1016/j.jbusres.2016.04.052

[3] Bhateria, R. (2024). *Environmental Management System (EMS). In: Environmental Impact Assessment*. Springer, Cham. https://doi.org/10.1007/978-3-031-66797-8_9

[4] Bitok, E. K., Nyariki, D. M., & Amwata, D. A. (2023). The nature and extent of adoption of climate-smart agriculture technologies in Murang'a County, Kenya: A case of Kiharu Constituency. *Journal of Emerging Technologies and Innovative Research, 10*(9), c1–c12.

[5] Bryman, A. (2016). *Social research methods* (5th ed.). London: Oxford University Press.

[6] Bundi, M. S., Awuor, E., & Machoka, P. (2024). Moderating effect of regulatory framework on the relationship between integrative leadership and performance of fresh tomato agribusiness in Kenya Lake Region Economic Bloc. *International Journal of Research Publication and Reviews, 5*(10), 892–898.

[7] Cainelli, G., D'Amato, A., & Mazzanti, M. (2020). Resource efficient eco-innovations for a circular economy: Evidence from EU firms. *Research Policy, 49*(1), 103827. https://doi.org/10.1016/j.respol.2019.103827

[8] Cater, T., Ursic, D., Cater, B., & Zabkar, V. (2025). The nexus of technological innovation, green product/process innovation and environmental strategy: the path towards sustainability-based competitive advantage. *Technology Analysis & Strategic Management,* 1–15. https://doi.org/10.1080/09537325.2025.2486010

[9] Chawla, H., Dhakad, A., & Meena, R. (2025). Eco-friendly approaches in horticulture. In *Modern horticultural practices and applications* (pp. 173–202). Textify Publishers.

[10] Chen, Y. S., Lai, S. B., & Wen, C. T. (2006). The influence of green innovation performance on corporate advantage in Taiwan. *Journal of Business Ethics, 67*(4), 331–339. https://doi.org/10.1007/s10551-006-9025-5

[11] Cheruiyot, P., & Motari, Y. O. (2024). Growth of horticultural export market: The implication of quality control practices among small scale farmers in South Rift, Kenya. *African Journal of Business and Management, 9*(1, Special Issue), 23–32.

[12] Cheruiyot, P., Mboya, T., & Nyaboga, Y. B. (2025). Contribution of traceability to horticultural export growth: Insights from small-scale farmers in South Rift, Kenya. *International Journal of Economics, Business and Management Research, 9*(6), 232–246.

[13] Cheruiyot, P., Mboya, T., & Wafula, J. (2024). Growth of horticultural export market: The implication of post-harvest handling practices among small scale farmers in South Rift, Kenya. *Journal of Marketing and Communication, 7*(1), 33–45.

[14] Creswell, J.W., & Creswell, J.D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage, Los Angeles.

[15] Darnall, N., Henriques, I., & Sadorsky, P. (2008). Do environmental management systems improve business performance in an international setting? *Journal of International Management, 14*(4), 364–376. https://doi.org/10.1016/j.intman.2007.09.006

[16] DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review, 48*(2), 147–160. https://doi.org/10.2307/2095101

[17] Githiga, J., Elias, A., & Yasunobu, K. (2024). The effect of GlobalGAP certification on horticulture production in Kenya. *International Journal of Environmental and Rural Development, 15*(1), 8–13.

[18] Hart, S. L. (1995). A natural-resource-based view of the firm. *Academy of Management Review, 20*(4), 986–1014. https://doi.org/10.5465/amr.1995.9512280033

[19] Hatanaka, M. (2010). Certification, partnership, and morality in an organic shrimp network: Rethinking transnational alternative agrifood networks, *World Development, 38* (5), 706-716, https://doi.org/10.1016/j.worlddev.2009.11.001.

[20] Henson, S., & Humphrey, J. (2010). Understanding the complexities of private standards in global agri-food chains as they impact developing countries. *J Dev Stud. 2010;46*(9):1628-646. doi: 10.1080/00220381003706494. PMID: 21328807.

[21] Hiywotu, A. M. (2025). Advancing sustainable agriculture for goal 2: zero hunger - a comprehensive overview of practices, policies, and technologies. *Agroecology and Sustainable Food Systems, 49*(7), 1027–1055.

[22] Irungu, J. W., Kamau, G. G., & Chege, C. N. (2024). Impact of foreign market entry strategies in globalizing agribusinesses: A case study of Kiambu County, Kenya. *The International Journal of Business Management and Technology, 8*(5), 23–240.

[23] Kothari, C.R. (2019) *Research methodology: Methods and techniques*. 4th Edition, New Age International Publishers, New Delhi.

[24] Kukubo, E. N., & James, R. (2020). Critical success factors and the sustainability of small-scale horticulture projects in Kiambu County, Kenya. *International Journal of Business and Social Science, 11*(4), 93–102. https://doi.org/10.30845/ijbss.v11n4p10

[25] Madhav (2024). Greening Agribusiness: Strategies for Environmentally Responsible Farming Practices. *AgriSustain: An International Journal, 2*(1), 07-13.

[26] Mol, A. P. J., & Sonnenfeld, D. A. (2007). Ecological modernization around the world: An introduction. *Environmental Politics, 9*(1), 3–16.

[27] Moshood, T. D., Nawanir, G., Mahmud, F., Mohamad, F., Ahmad, M. H., AbdulGhani, A., & Kumar, S. (2022). Green product innovation: A means towards achieving global sustainable product within biodegradable plastic industry. *Journal of Cleaner Production, 363,* 132506. https://doi.org/10.1016/j.jclepro.2022.132506

[28] Nweje, U., & Taiwo, M. (2025). Supply chain management: Balancing efficiency and environmental responsibility. *World Journal of Advanced Research and Reviews, 25*(1), 1547–1564. https://doi.org/10.30574/wjarr.2025.25.1.0212

[29] Nzomoi, J., Mutua, J., Kiprop, H., & Kathambi, A. (2022). An economic analysis of Kenya's horticulture export performance 2010–2021. *International Journal of Economics, 7*(1), 63–75. https://doi.org/10.47604/ijecon.1659

[30] OECD (2025). *Resource efficiency and circular economy*. Paris: OECD Publishing. Retrieved from: https://www.oecd.org/en/topics/resource-efficiency-and-circular-economy.html

[31] OECD. (2018). *Green growth indicators 2017*. Paris: OECD Publishing.

[32] Ordorica, S. (2023, October 19). *International market entry strategies for businesses*. Forbes. https://www.forbes.com/sites/forbesbusinesscouncil/2023/10/19/international-market-entry-strategies-for-businesses/

[33] Otieno, M. (2024). Post-harvest handling technologies. In: *Sustainable Agroecological Practices in Sub-Saharan Africa in the Face of Climate Change. Advances in Geographical and Environmental Sciences.* Springer, Cham. https://doi.org/10.1007/978-3-031-70472-7_11

[34] Owoko, L. (2025). Kenya vegetable exports hit by tough EU market rules. Business Daily, Wednesday, September 03, 2025

[35] Porter, M. E., & van der Linde, C. (1995). Toward a new conception of the environment–competitiveness relationship. *Journal of Economic Perspectives, 9*(4), 97–118.

[36] Rennings, K. (2000). Redefining innovation: Eco-innovation research and the contribution from ecological economics. *Ecological Economics, 32*(2), 319–332.

[37] Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.

[38] Saunders, M.N.K., Lewis, P., & Thornhill, A. (2019). *Research methods for business students*. 8th Edition, Pearson, New York.

[39] Shahzad, M., Qu, Y., Rehman, S. U., & Zafar, A. U. (2022). Adoption of green innovation technology to accelerate sustainable development among manufacturing industry. *Journal of Innovation & Knowledge, 7*(4), 100231. https://doi.org/10.1016/j.jik.2022.100231

[40] UNEP (2025). *Goal 8: Decent Work and Economic Growth.* Retrieved from: https://www.unep.org/topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-8

[41] Wang, W., She, Y., Peng, Y. et al. (2025). Unleashing green technology innovation in agribusiness: traditional environmental regulations, carbon trading, or synergies?. *Humanities and Social Sciences Communications, 12*, 116. https://doi.org/10.1057/s41599-024-04149-0

[42] Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Thousand Oaks, CA: Sage.

[43] Zailani, S., Govindan, K., Iranmanesh, M., Shaharudin, M. R., & Chong, Y. S. (2015). Green innovation adoption in automotive supply chain: Empirical evidence from Malaysia. *Journal of Cleaner Production, 108*, 1115–1122.