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Somalia–UK Eco-Trade Synergies: Linking Somalia's Organic Farming and the UK's Green Innovation

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Abstract
Somalia possesses significant untapped potential for organic and low-input agricultural production; however, structural, institutional, and infrastructural constraints continue to limit its effective participation in high-value global markets. In contrast, the United Kingdom represents a highly innovative economy with advanced green technologies, established certification systems, and increasing demand for sustainably sourced products. This study examines the potential for environmentally aligned trade partnerships between Somalia and the United Kingdom by identifying complementary value chains and assessing their economic, environmental, and institutional feasibility. The research adopts a traditional literature review approach, complemented by value chain analysis and qualitative synthesis of secondary stakeholder data across agriculture, fisheries, certification, and green technology sectors. The study identifies several high-potential complementary value chains, including organic sesame, pollinator-friendly honey, frankincense and myrrh, small-scale fisheries and seaweed, insect-derived protein, and drought-smart horticulture. Findings indicate that these value chains offer substantial opportunities to support climate mitigation and adaptation objectives through reduced greenhouse gas emissions, enhanced biodiversity conservation, improved water-use efficiency, and strengthened circular economy practices. At the same time, the study highlights critical constraints, including weak infrastructure, limited certification capacity, governance gaps, and exposure to climate risks, which may hinder scalability. The study concludes that with appropriate institutional strengthening, targeted investments, and the adoption of blended financing mechanisms, Somalia–UK eco-trade partnerships can generate mutually beneficial outcomes. Beyond commercial gains, such partnerships provide a practical pathway for aligning trade with environmental sustainability, offering a scalable model for cooperation between low-income, resource-rich economies and high-innovation markets.

Keywords: Complementary Trade, Comparative Advantage, Organic Agriculture, Green Technology, Somalia, United Kingdom, Climate-Smart Agriculture, Circular Economy

1. Introduction

Global trade systems have become increasingly central to shaping pathways of economic development, environmental sustainability, and climate resilience. Beyond facilitating economic growth, trade functions as a critical mechanism for the transfer of technology, knowledge, and sustainable production practices across countries (Canton, 2021) [9]. However, the structure of global trade remains deeply asymmetrical. Conventional trade relationships between developed and developing

economies have historically prioritized efficiency, scale, and cost competitiveness, often at the expense of environmental sustainability and inclusive development outcomes (Rodrik, 2018; Jomo, 2023) [29]. Consequently, many low-income countries remain locked into low-value segments of global value chains, while simultaneously bearing a disproportionate burden of environmental degradation, climate vulnerability, and resource depletion (UNEP, 2018; World Bank, 2020) [40].

Somalia exemplifies these structural constraints. Despite possessing considerable natural capital and demonstrating moderate economic growth—projected to reach approximately $13.9 billion in GDP by 2026, with annual growth rates above 3%—the country remains characterized by low-input production systems, weak infrastructure, and limited value addition. Its trade structure continues to reflect high import dependence and limited export diversification, reinforcing persistent trade imbalances and vulnerability to external shocks (Canton, 2021) [9].

In contrast, the United Kingdom represents a highly advanced, consumption-driven economy that is increasingly oriented toward sustainable and responsible sourcing. This shift is driven by regulatory frameworks, climate commitments—including net-zero targets—and growing consumer demand for traceable and environmentally certified products (Munir *et al*., 2024) [35]. Despite these complementary characteristics, trade and investment linkages between Somalia and the United Kingdom remain limited in scale and depth. According to recent official statistics, total bilateral trade reached £87 million in the four quarters to the end of Q3 2025, representing a significant increase of 102.3% compared to the previous year (Hantzsche *et al*., 2018) [23]. However, Somalia remains only the United Kingdom's 163rd largest trading partner, accounting for less than 0.1% of total UK trade, underscoring the marginality of the relationship within global trade networks. Similarly, foreign direct investment flows are negligible, with UK investment stock in Somalia estimated at approximately £1 million and Somali investment in the UK below £500,000 (UK Government, 2026).

Moreover, the composition of bilateral trade reveals significant structural imbalances. UK exports to Somalia are dominated by goods—accounting for over 78% of total exports—including high-value products such as scientific instruments and pharmaceuticals. In contrast, UK imports from Somalia are overwhelmingly concentrated in services, which account for nearly all imports, while goods exports from Somalia remain negligible (UK Government, 2026)). This asymmetry reflects deeper constraints in Somalia's productive capacity, value chain participation, and ability to meet international quality and sustainability standards. It also indicates missed opportunities for leveraging trade as a mechanism for environmental upgrading and value addition. The critical gap in existing trade relationships: increases in trade volume do not necessarily translate into sustainable, inclusive, or climate-aligned development outcomes. While the literature on global value chains highlights the importance of upgrading, governance, and institutional support (Gereffi, 2019; Kaplinsky & Morris, 2016) [18, 30], there remains limited research on how bilateral trade partnerships between structurally unequal economies can be deliberately designed to integrate environmental sustainability with economic development—particularly in fragile contexts such as Somalia.

This study addresses this gap by advancing the concept of eco-aligned trade partnerships between Somalia and the United Kingdom. The novelty of this approach lies in reconceptualizing trade not merely as an exchange of goods and services, but as a strategic platform for co-creating environmental and socio-economic value. By linking Somalia's natural resource potential with the United Kingdom's technological, financial, and regulatory capabilities, such partnerships can facilitate the development of sustainable value chains that enhance export competitiveness, reduce environmental pressures, and support climate resilience.

2. Methodology and Research Questions

2.1. Traditional Literature Review Method

To address the research objectives, this study adopts a traditional literature review methodology, supported by clearly defined research questions that guide the analytical framework. The study seeks to answer the following: (1) what complementary value chains exist between Somalia and the United Kingdom that can simultaneously generate economic returns and environmental benefits; (2) what environmental gains can be realized through such trade partnerships; (3) what key risks and constraints, ecological, social, financial, and logistical, may hinder the development of eco-trade, and how they can be mitigated; and (4) which policies, institutions, and financing mechanisms are most effective in scaling sustainable trade between the two countries. Methodologically, the study employs a traditional (narrative) literature review to synthesize existing knowledge on sustainable trade, eco-innovation, and climate-smart value chains. This approach enables the integration of diverse sources, including peer-reviewed studies, policy documents, and institutional reports, without the rigid constraints of systematic review protocols (Jesson *et al*., 2011; Li & Wang, 2018) [28]. The choice of this method is particularly appropriate given the limited and fragmented literature on Somalia–UK trade relations.

2.2. Trade and Sustainability: Theoretical Foundations

According to comparative advantage theory, countries benefit from specializing in sectors where they possess relative efficiency, thereby enhancing gains from trade (Liargovas, 2023) [31]. In this context, Somalia demonstrates a comparative advantage in low-input and organic agricultural production, while the United Kingdom possesses strengths in green innovation, certification systems, and value-added processing (Sarkar, 2025; Jones, 2023). The interaction of these complementary capabilities creates a foundation for mutually beneficial and sustainability-oriented trade partnerships. However, contemporary perspectives from environmental economics emphasize that trade must also account for ecological externalities, including carbon emissions, land degradation, and biodiversity loss, which are particularly relevant in fragile and resource-dependent economies such as Somalia (Felbermayr *et al*., 2025; Ali *et al*., 2017) [17, 4].

Sustainability science further strengthens this framework by promoting climate-smart agriculture, regenerative systems, and circular economy principles. These approaches emphasize productivity growth alongside environmental resilience and reduced ecological impact (Zheng *et al*., 2024; Otasowie *et al*., 2024) [41]. Evidence from EU–Somalia cooperation highlights that integrating sustainability into

trade and development strategies contributes to long-term economic stability, peacebuilding, and environmental management (Ismail, 2023). Similarly, broader EU policy approaches stress the importance of linking trade, governance, and sustainable development within fragile contexts, reinforcing the need for holistic and environmentally aligned trade systems (Ehrhart & Petretto, 2012) [14].

From a UK–Somalia perspective, trade relationships must also be understood within a broader political economy shaped by fragility, informality, and historical dependence. Studies highlight that weak institutions, conflict dynamics, and reliance on primary commodity exports have historically constrained Somalia's ability to fully benefit from global trade. Additionally, informal trade systems and trust-based financial networks continue to play a significant role in facilitating economic exchange, particularly in the absence of strong formal institutions. Environmental and security considerations are deeply intertwined with trade in Somalia. Activities such as charcoal trade, illegal resource extraction, and piracy have been shown to undermine both environmental sustainability and formal trade systems (Ali *et al*., 2017) [4]. UK and EU engagement in Somalia increasingly reflects a comprehensive approach that integrates trade, security, and development objectives to address these interconnected challenges (Jones, 2023; Holla & Gower, 2014) [24].

3. Agricultural and Natural Resource Profile of Somalia

Somalia's agricultural landscape is highly diverse, shaped by pastoral, agro-pastoral, and coastal ecosystems. Rainfall in the country is irregular and often unpredictable, compelling communities to adopt drought-tolerant crops and mobile livestock systems to ensure resilience (Michalscheck, *et al*., 2016; Abdullahi & Arısoy, 2022) [32, 3]. The country's riverine areas, particularly along the Juba and Shabelle rivers, support horticulture and tree-crop production, forming the backbone of smallholder farming (Boitt *et al*., 2018) [7]. In semi-arid regions, acacia woodlands flourish, producing high-value resins such as frankincense and myrrh, which have long been integral to Somalia's trade networks. Coastal zones provide rich fisheries and seaweed habitats, essential both for local consumption and potential export markets (Yonis, 2012)

Most of Somalia's agricultural production remains inherently organic or low-input due to limited access to synthetic fertilizers, pesticides, and modern farming technologies (Abdullahi & Arısoy, 2022) [3]. This creates both challenges and opportunities. On one hand, the organic nature of production provides a comparative advantage in international markets demanding eco-friendly products; on the other hand, limited capital, insufficient certification systems, and poor infrastructure constrain the country's ability to scale up production for export. Key exportable commodities include sesame, bananas, dates, honey, frankincense, myrrh, fisheries products, and seaweed. However, structural and climatic challenges such as floods, droughts, cyclones, and inadequate cold-chain logistics continue to limit potential revenue generation (Osman & Shire, 2026) [39].

Agricultural expansion in Somalia has also been linked to environmental degradation, including soil erosion, deforestation, and overgrazing (Nor & Yusof, 2025) [38]. Sustainable management practices, such as conservation agriculture, rotational grazing, and climate-smart crop systems, are therefore critical to maintaining productivity while minimizing ecological impacts. Leveraging modern GIS-based agro-climatic assessments can help identify optimal locations for high-value crops and mitigate risks associated with unpredictable weather (Boitt *et al*., 2018) [7].

Table 1: Overview of Key Agricultural Investment Opportunities in Somalia (Source: FAO, 2025)

Opportunity	Invest (USD)	NPV (USD)	IRR (%)	ROI	Payback (yrs)	Direct Beneficiaries	Income (USD)	Carbon (tCO_2e)
Sesame	82.1 M	5.33 M	27	3.4	3.8	172,118	500–750	-155,963
Maize	81.3 M	4.12 M	25	3.1	3.9	118,086	800–1,200	-7,025
Dairy	4.82 M	1.84 M	32	4.2	3.5	49,668	135	+17,291
Fodder	15.0 M	2.46 M	23	2.8	3.8	1,740,252	440–505	+14,046
Total	183.2 M	13.76 M	23–32	3.4	3.5	2,040,624	N/A	-131,651

* DM = Dry Matter (fodder)
* NPV = Net Present Value; IRR = Internal Rate of Return; ROI = Return on Investment
* Income increase per capita represents expected additional earnings for beneficiaries through improved production and value chain efficiency
* Carbon balance indicates estimated net CO_2 emissions reduction (negative values) or increase (positive values)

Building on Somalia's strategic agricultural potential, the FAO Hand-in-Hand Initiative (2025) identifies four high-impact value chains—sesame, maize, dairy, and fodder—as priority investment opportunities to enhance food security, economic growth, and climate resilience. Sesame, cultivated primarily in Lower Juba and Middle Shabelle, aims to increase production by 50% over five years through improved seeds, mechanization, irrigation, and oil processing, directly benefiting over 170,000 people and 700,000 indirectly. Maize, a staple crop, targets expansion in irrigation and processing to reduce import dependence, increasing output from 80,000 to 120,000 tons and supporting 118,000 farmers directly. The dairy sector, addressing over $200 million in annual powdered milk imports, seeks to boost fresh milk production from 3,460 to 7,900 liters per day through improved breeds, cold chain systems, and processing facilities, benefiting 8,000 livestock keepers directly. Fodder production tackles the 34% feed deficit in the livestock sector, producing 38,000 tons of dry matter annually via climate-resilient crops and integrated processing units, directly impacting nearly 196,000 people. Collectively, these initiatives represent a $183.2 million investment portfolio, with expected internal rates of return of 23–32%, substantial net present value, and a combined carbon mitigation potential exceeding 94,000 tCO_2e, demonstrating Somalia's capacity to transform its agri-food systems while advancing inclusive economic development and climate resilience (FAO, 2025) [16].

4. The United Kingdom: Green Innovation and Market Demand

The United Kingdom has emerged as a global leader in green innovation, driven by a combination of robust research activity, regulatory incentives, and evolving market demand for environmentally sustainable products. Empirical evidence shows that UK firms are more likely to engage in eco

innovation when faced with strong regulatory frameworks and market expectations, particularly in sectors such as renewable energy, sustainable logistics, and low carbon technologies (Dixon *et al*., 2022; Ramzan *et al*., 2023) [13]. This trend aligns with broader global shifts in industrial innovation trajectories, where research and development (R&D) in environmental technologies are recognized as essential to achieving national climate targets and securing competitive advantage (Shapira *et al*., 2014; Roper & Tapinos, 2016). Quantitative studies indicate that green innovation contributes directly to ecological sustainability and energy transition in the UK economy. For instance, investments in clean energy technologies and resource efficient systems are positively associated with reductions in carbon intensity and improved environmental performance at the firm and national levels (Ramzan *et al*., 2023; Staton *et al*., 2024).

The UK market also demonstrates distinctive demand side dynamics that reinforce the incentives for sustainable production. Research in business strategy highlights that firms responding to shifting technology, regulatory, and consumer demands achieve higher rates of eco innovation adoption, suggesting that market pressure and sustainability expectations significantly shape corporate innovation decisions (Dangelico *et al*., 2019) [11]. In particular, industries linked to agriculture and food supply chains, such as organic produce, certified sustainable imports, and climate friendly processed goods, are influenced by UK consumers' willingness to pay premiums for environmentally responsible products, incentivizing exporters to align with higher environmental standards to access this market. Historical analyses further underscore the role of institutional and economic demand in driving green innovation. Early work on technological trajectories in the UK finds that economic demand and regulatory regimes have long influenced firms' adoption of environmental technologies, reinforcing the country's comparative advantage in sustainable industries (Green *et al*., 1994) [20].

5. Trade Landscape and Policy Architecture

Trade relations between Somalia and the United Kingdom remain modest and narrowly concentrated, with the majority of current exchanges focused on livestock and a limited range of agricultural products (Ibrahim, 2025) [25]. Despite recent growth in bilateral trade volumes, structural and institutional barriers continue to impede deeper economic integration and diversification. Somalia's informal and fragmented institutional framework, shaped by decades of conflict, weak central governance, and limited regulatory coherence, has historically constrained its ability to engage competitively in formal international markets, including the UK (Jones, 2023; Hagmann & Stepputat, 2023) [22].

A central challenge in expanding trade with the UK lies in compliance with stringent sanitary, phytosanitary, and sustainability standards that govern market access. UK import regimes require adherence to organic certification systems, internationally recognized food safety protocols such as Hazard Analysis and Critical Control Points (HACCP), robust traceability mechanisms, and, for certain sectors, sustainability certifications such as Marine Stewardship Council (MSC) or Aquaculture Stewardship Council (ASC) approvals. These requirements reflect broader changes in global trade architecture, where non tariff measures and quality standards increasingly shape competitive entry conditions for agricultural exports (Sarkar, 2025). In addition to product specific requirements, the UK's corporate due diligence frameworks around environmental protection, deforestation, forced labor, and human rights further condition trade relationships. These regulatory expectations, embedded within UK and EU trade governance, exercise growing influence on importer behavior and sourcing decisions, compelling suppliers to demonstrate sustainable production practices and supply chain transparency (Dangelico *et al*., 2019) [11].

The broader policy architecture also reflects institutional fragmentation within Somalia itself. Weak customs systems, inconsistent regulatory enforcement, and the absence of harmonized trade policies have historically diminished Somalia's leverage in negotiating favorable trade terms (Musa, 2020; Hagmann & Stepputat, 2016) [36, 21]. Efforts such as the Customs Reform and Trade Enhancement in Somalia (CRATES) Programme, supported by development partners, aim to strengthen customs administration, improve revenue generation, and enhance compliance with international trade norms, but progress remains incremental (Jones, 2023).

6. High-Potential Complementary Value Chains

6.1. Organic Sesame and Oilseeds

Organic sesame (Sesamum indicum L.) is a strategically important crop for Somalia due to its adaptability to the country's semi-arid climate and low-input farming systems, particularly in regions such as Middle Shabelle, Afgoi, and the Somali Regional State (Mohamud *et al*., 2025a; Ismaan *et al*., 2020) [33, 26]. Sesame cultivation contributes to rural livelihoods by providing a high-value cash crop suitable for oil production, bakery products, and tahini, while simultaneously supporting soil fertility when integrated with organic manures and crop rotations (Jama & Kahraman, 2024) [27]. Despite its potential, sesame yields in Somalia remain below expectations due to challenges such as limited access to improved varieties, suboptimal sowing dates, and insufficient technical support (Ismaan *et al*., 2020) [26]. Research indicates that targeted interventions, including the application of organic compost, nitrogen-phosphorus-sulfur-boron (NPSB) fertilizers, optimized row spacing, and the use of improved varieties, can significantly enhance growth, yield, and oil quality while maintaining sustainable soil management (Elmi, 2025; Muthoni & Shimelis, 2025) [15, 37]. The UK can play a complementary role by providing technical assistance for organic certification, facilitating cold-pressed, solvent-free processing, and promoting environmentally friendly packaging, thereby creating market opportunities for Somali organic sesame (Sanni *et al*., 2025). To mitigate production risks such as price volatility, weak certification infrastructure, and potential contamination, it is crucial to implement contract farming arrangements, internal control systems, and capacity-building programs for farmers (Mohamud *et al*., 2025a; Ismaan *et al*., 2020) [33, 26].

6.2. Honey and Pollinator-Friendly Agroforestry

Honey production in Somalia has considerable potential due to the country's diverse natural landscapes and the reliance on traditional beekeeping practices, particularly in areas such as Jambalul, Afgoi district, Lower Shabelle region (Mohamud *et al*., 2025; Bhandari *et al*., 2025) [34, 6]. Studies indicate that most beekeepers rely on traditional hives (66.7%) and semi-traditional hives (33.3%), and while

beekeeping is primarily used for business purposes, productivity is constrained by limited technical skills, lack of modern equipment, and inadequate forage management (Mohamud *et al*., 2025b) [34]. Integrating honey production with pollinator-friendly agroforestry enhances biodiversity, restores habitats, and supports pollinator populations, which in turn improves both ecological and agricultural resilience (Pradhan *et al*., 2025). To address these challenges, recommendations include improving hive management, introducing modern beehives, enhancing bee forage, providing supplementary feed and water, and planting bee-friendly flora to sustain pollinator health (Mohamud *et al*., 2025; Bruno *et al*., 2025) [34, 8]. Additionally, the United Kingdom could strengthen this value chain by investing in quality assurance, advanced analytical testing, branding, and environmentally responsible packaging, thereby enabling Somali honey to access high-value export markets (Bhandari *et al*., 2025; Aoun, 2020) [6, 5].

6.3. Frankincense and Myrrh (Non-Timber Forest Products)

Frankincense and myrrh, harvested primarily from wild Acacia and Boswellia woodlands in northeastern Somalia and Somaliland, are culturally and economically significant non-timber forest products (NTFPs) that sustain local livelihoods, traditional medicine, and international fragrance and cosmetics industries. Despite extensive global research on the role of Traditional Ecological Knowledge (TEK) in resource management (Ghazanfari *et al*., 2004; Osei-Tutu, 2017) [19], TEK within the Somali frankincense sector remains underexplored, although context-specific knowledge—including sustainable harvesting techniques and tree management practices—is crucial for biodiversity conservation, forest regeneration, and carbon storage objectives (Stephenson & Moller, 2009; Tiu, 2007). Field studies in Somaliland during 2010, 2016, and 2017, using rapid assessment techniques, revealed both sustainable and unsustainable harvesting practices, with overharvesting and adult tree mortality observed alongside some regeneration of young trees (DeCarlo *et al*., 2020) [12]. Rising market prices, from $1/kg in 2010 to $6–$9/kg in 2016/2017, intensified harvesting pressures, although systemic poverty, large family sizes, and kinship-based wealth distribution limited improvements in local livelihoods. Resource tenure insecurity, competition among harvesters, and social factors such as khat consumption further contributed to unsustainable practices. Sustainable harvesting practices informed by TEK and comparative studies of Boswellia sacra in Oman and B. papyrifera in Ethiopia include controlled incisions, rotational tapping, and monitoring tree health, as summarized in Table 3.

Table 2: Classification of Frankincense Trees in Northeastern Somalia

Tree Status	Age of Tree	Duration of of Status	Number of Incisions	Placement of Incision
Hal-hogle	12 years	2–3 years	1 incision	Vertically on trunk
Labo-hogle	14–15 years	2 years	2 incisions	Vertically on trunk, spaced 30–40 cm apart
Irmaan	17 years	Remains constant	3–8 incisions	Vertically on trunk, each spaced 30–40 cm apart

International trade, particularly with the United Kingdom, plays a pivotal role in the frankincense market. The UK's fragrance, cosmetics, and natural health product industries provide both a lucrative export market and an opportunity to promote sustainable, traceable, and certified supply chains. However, fluctuating international prices, competition among exporters, and inconsistent certification practices, such as organic labels versus Fair Wild certification, often create short-term incentives for unsustainable harvesting. The integration of market mechanisms through trade agreements and the UJ concept—which emphasizes equitable benefit-sharing, traceable supply chains, and community participation—can incentivize responsible practices by linking higher-quality, sustainably sourced resins to premium prices in the UK market. By adopting blockchain or digital traceability systems, UK importers can verify sourcing practices, reward communities adhering to sustainable practices, and encourage long-term stewardship of Boswellia populations. This combination of TEK, supply-chain transparency, and targeted market incentives is crucial to breaking the vicious cycle of declining adult trees, limited per capita resource availability, and economic pressures, thereby aligning ecological sustainability with economic development objectives (DeCarlo *et al*., 2020; Ibrahim, 2023).

6.4. Small-Scale Fisheries, Seaweed and Insect Protein

Somalia's extensive coastline offers considerable potential for the development of sustainable, low-carbon livelihoods through small-scale fisheries and seaweed cultivation. Artisanal fisheries not only provide an important source of dietary protein but also operate with minimal carbon emissions, making them a key component of climate-smart food systems. Complementing this, seaweed farming contributes to marine biodiversity, enhances habitat complexity, and supports blue-carbon sequestration, thereby mitigating climate impacts while providing valuable ecosystem services. The United Kingdom is well positioned to support the sustainable expansion of these sectors through its experience in cold-chain logistics, HACCP compliance, eco-certification, and the processing of seaweed-derived products, such as hydrocolloids and food additives (Fallon *et al*., 2022; Corrigan *et al*., 2024) [10]. Knowledge transfer in best practices for aquaculture and fisheries management, coupled with UK investment in community-based monitoring and solar-powered cold storage infrastructure, could significantly reduce post-harvest losses and contamination risks. Furthermore, seaweed cultivation presents export opportunities to the UK market, particularly for high-value applications in animal feed, fertilizers, and functional foods, providing additional income streams for coastal communities and incentivizing conservation of marine ecosystems. Policy interventions that combine regulatory oversight, technical assistance, and market incentives can therefore simultaneously enhance food security, promote climate resilience, and improve livelihoods for small-scale fishers and seaweed farmers in Somalia (Bruno *et al*., 2025; Abdi *et al*., 2025) [8, 1].

7. Environmental Benefit Pathways

There is a wide range of benefits that are likely to be experienced in Somalia and the UK if both countries successfully form an eco-trade. Firstly, climate gains are likely because of reduced emissions to the atmosphere due to the adoption of efficient irrigation, diminished post-harvest losses, increased use of circular feeds such as BSF protein, and adoption of low-carbon logistics (Sarkar, 2025).

Biodiversity benefits are also bound to be experienced due to the agroforestry systems, sustainable management of non-timber forest products, pollinator habitat restoration, and reduced bycatch in fisheries (DeCarlo *et al*., 2020) [12]. Water conservation is also likely to be experienced through deficit irrigation, greenhouse water-recycling systems, and selection of drought-tolerant crops. Additionally, due to crop rotation, cultivation of cover crops and use of organic inputs such as compost and frass, soil health and conservation are expected. Several indicators measure these projected benefits. They include;

- The number of tonnes of CO_2 equivalent avoided annually
- The percentage reduction in post-harvest losses
- The number of hectares under nature-positive management
- The measured improvement in pollinator diversity indices
- The efficiency of water use per unit of production
- The volume of certified environmentally responsible products exported.

8. Risk Assessment

Among the environmental risks that have to be mitigated are the likelihood of unsustainable harvesting of non-timber forest products, overfishing or habitat degradation in marine ecosystems, and pesticide drift in agricultural zones (Ibrahim, 2024). Adoption of harvest quotas, marine no-take zones and promotion of integrated pest-management techniques are among the solutions that can be employed in curbing the identified risks. Additionally, the conduction of third-party audits is also crucial to ensure that compliance is verified. There are climate risks such as droughts, floods and cyclones which may disrupt production and damage the infrastructure. Use of climate-indexed insurance schemes, diversification of crops and livelihoods, and the implementation of early-warning systems will be beneficial in preparing the producers on how to deal with extreme weather events appropriately and effectively. Socio-economic risks such as land conflicts and unequal inclusion of all community groups in decision-making processes, especially the women and youths, are among the risks likely to occur. These risks can be addressed by ensuring that there are transparent communication and information sharing systems within the community to ensure all community members have access to the same information and are involved in decision-making processes without discrimination. It is also crucial to ensure that land rights and resources are legally clarified and that there are cooperative structures in place to ensure equal community benefit. Market-related risks include price volatility, exposure to currency fluctuations, and the relatively high upfront costs associated with certification. These challenges can be reduced by putting forward contracts in place to stabilise pricing, making selective use of hedging instruments, and spreading certification expenses across producer cooperatives through group certification models supported by blended finance mechanisms. Operational risks are also significant and include limited cold-chain capacity, congestion and delays at ports, and unreliable access to electricity Blended finance approaches that combine concessional funding with private capital can play a key role in reducing risk for early-stage investors while supporting the development of essential infrastructure, such as cold-chain systems or black soldier fly (BSF) facilities. Revenue models may include contract farming arrangements, pay-as-you-grow irrigation services, and results-based financing mechanisms that are linked to clearly defined environmental outcomes. In addition, impact-oriented financial instruments, including nature-linked premiums, can provide supplementary income streams for producers who meet sustainability benchmarks. Within this framework, collaboration between Somalia and the UK creates opportunities to mobilise diaspora bonds and corporate social responsibility co-investment from UK-based retailers. These mechanisms not only enhance revenue generation but also strengthen the long-term financial sustainability of eco-trade initiatives in Somalia (Abdullahi, 2025) [2].

9. Conclusion

Overall, the proposed Somalia-UK eco trade model shows that countries can gain major trade benefits from such partnerships, but also the process involves many trade-offs. Certification systems, for instance, as noted from the study, are costly, especially in the initial phases; hence, it is important to take into consideration that aspect and ensure that ecological thresholds are still maintained to prevent resource depletion. Also, the model shows that indeed such a partnership is possible for replication in other countries, but it has to be tailored to align with the resources and needs of each country entering into the partnership. Besides, for such a trade partnership to be executed successfully, governance structures play a crucial role since they influence community rights, equitable benefit sharing, and transparency.

Looking ahead, this project highlights several priority areas for Somalia. Strengthening producer cooperatives, formalising resource tenure systems, and investing in laboratory infrastructure and certification capacity are essential next steps. In addition, greater emphasis is needed on services that support sustainability and traceability across value chains. For the UK, there is a clear opportunity to reinforce this partnership by prioritising the procurement of certified, nature-positive products, providing targeted technical assistance to exporters, offering concessional finance for green infrastructure, and recognising group certification models that reduce costs for smallholder producers.

Private-sector actors and non-governmental organisations also have an important role to play. Long-term off-take agreements, greater transparency in pricing, and shared-risk arrangements can help stabilise supply chains and improve producer outcomes. At the same time, investments in capacity building and the use of digital traceability tools can strengthen accountability and build trust across the eco-trade system.

Despite these opportunities, notable knowledge gaps remain. Limited data on crop yields, biodiversity baselines, and emissions estimates in Somalia constrain accurate impact assessment. In addition, attributing environmental outcomes solely to certification remains challenging, particularly, in the

absence of long-term monitoring systems. Future research would benefit from longitudinal ecological studies, more advanced life-cycle assessment (LCA) modelling, and comparative analyses across different eco-trade corridors.

In conclusion, eco-trade between Somalia and the UK represents a promising pathway for shared economic development while advancing climate and biodiversity objectives. By aligning Somalia's natural resource base with the UK's technological expertise and the growing global demand for sustainable products, both countries stand to gain. However, the success of this partnership ultimately depends on effective governance, strong collaboration, inclusive financing mechanisms, and robust environmental accountability. If these conditions are met, this model has the potential to demonstrate a practical and scalable approach to sustainable globalization.

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