
# Green finance for youth employment

## A food systems analysis of 14 counties in Kenya

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Investing in rural people

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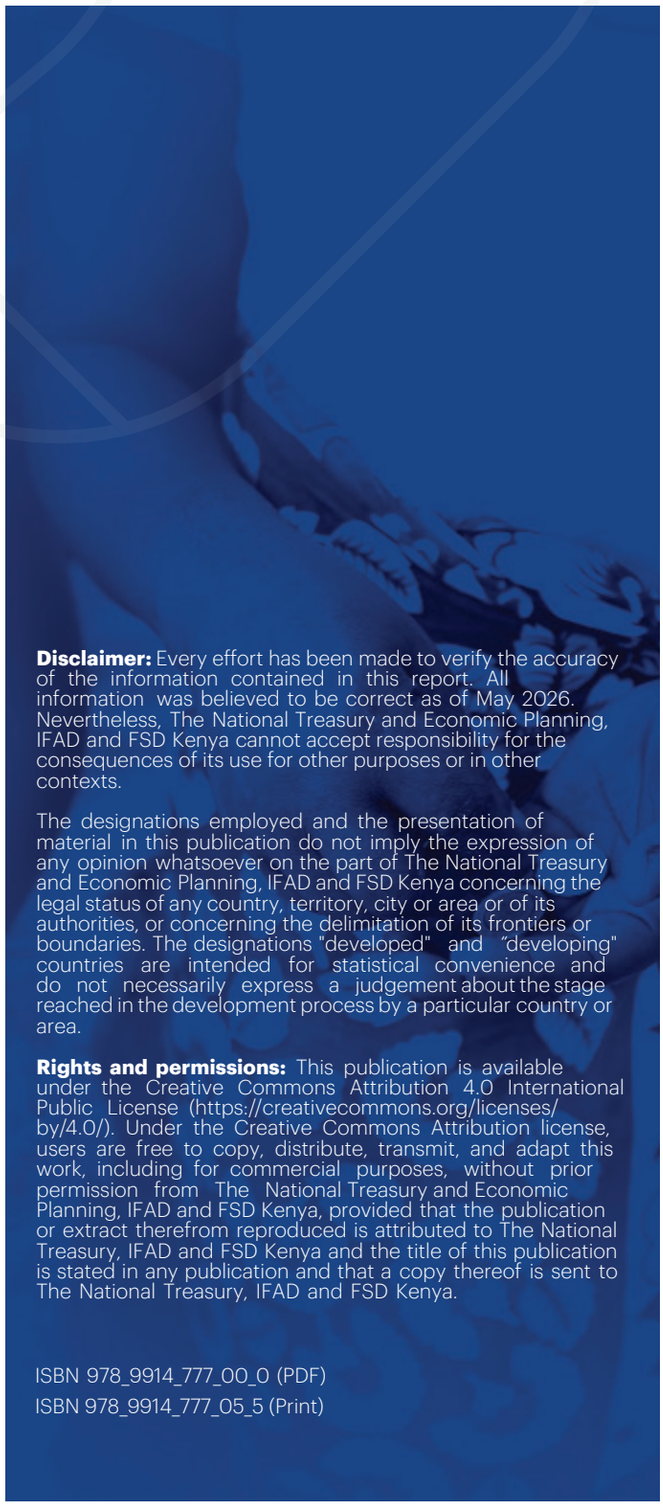
Kenya





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This study was conducted by FSD Kenya, IFAD and The National Treasury and Economic Planning for the Green Finance for Youth Employment (GFYE) programme.

The GFYE programme (2024–2027), funded by the Ministry for Foreign Affairs of Finland through International Fund for Agricultural Development (IFAD) and implemented by FSD Kenya in partnership with AGRA and Cordaid Kenya, is embedded within the IFAD-funded Rural Kenya Financial Inclusion Facility (RK-FINFA), overseen by The National Treasury and Economic Planning. It aims to support at least 8,000 rural youth and 500 youth-led or youth-employing enterprises by expanding access to green finance and strengthening enterprise capacity.

The recommendations from the study are expected to provide guidelines and a framework for the planning and implementation of the project-financed capacity building and financing activities by The National Treasury and Economic Planning (through RK-FINFA PMU) AGRA, Cordaid, the Agricultural Finance Corporation (AFC) and by extension, participating financial institutions (PFIs).

**Cover photo credit:** Hello Tractor

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# Abbreviations and **Acronyms**

| | |
|---|---|
| **AGRA** | Alliance for Green Revolution in Africa (AGRA) |
| **BSF** | Black Soldier Fly |
| **CIDP** | County Integrated Development Plan |
| **CRB** | Credit Reference Bureau |
| **FGD** | Focus Group Discussion |
| **FSD** | Financial Sector Deepening |
| **GDP** | Gross Domestic Product |
| **GFYE** | Green Finance for Youth Employment |
| **IFAD** | International Fund for Agricultural Development |
| **KALRO** | Kenya Agricultural and Livestock Research Organisation |
| **KEPHIS** | Kenya Plant Health Inspectorate Service |
| **KII** | Key Informant Interview |
| **KNBS** | Kenya National Bureau of Statistics |
| **KEMFRI** | Kenya Marine Fisheries Research Institute |
| **NAVCDP** | National Agricultural Value Chain Development Program |
| **NGO** | Non-Governmental Organisation |
| **NPL** | Non-Performing Loan |
| **PAYGO** | Pay-As-You-Go |
| **PFI** | Participating Financial Institution |
| **PWD** | People with Disabilities |
| **RK-FNFA** | Rural Kenya Financial Inclusion Facility |
| **SACCO** | Savings and Credit Cooperative Organisation |
| **SMEs** | Small and Medium Sized Enterprises |

# Executive summary

Photo/FSD Kenya

> **"The purpose of the analysis was to provide evidence for use in creating decent and sustainable entrepreneurship and employment for rural youth operating in agri-food value chains for the selected counties by leveraging green investments."**

## Study overview

This report presents the findings from an analysis of food systems in 14 counties (Meru, Tharaka Nithi, Embu, Kirinyaga, Nyeri, Machakos, Nakuru, Kisii, Siaya, Nandi, Kakamega, Busia, Bungoma and Trans Nzoia) in Kenya. The purpose of the analysis was to provide evidence for use in creating decent and sustainable entrepreneurship and employment for rural youth operating in agri-food value chains for the selected counties by leveraging green investments.

The analysis sought to identify sustainable, scalable and bankable business and employment opportunities for the youth in selected agri-food value chains. Further, the analysis so examined the financial solution offerings of the financial institutions, businesses and enterprise support organisations that finance and support agri-enterprises in the food systems.

The report provides guidelines and a framework for the planning and implementation of the GYFE's capacity building and financing activities by National Treasury (through RK-FINFA PMU) AGRA, Cordaid, the Agricultural Finance Corporation (AFC) and by extension, participating financial institutions (PFIs).These activities are closely linked to parallel workstreams by FSD Kenya within the Rural Kenya Financial Inclusion Facility (RKFINFA).

## Research methodology

Using a value chain and market systems approach, the study employed mixed methods techniques to assess

five priority agri-food value chains: dairy, horticulture, poultry, aquaculture and fisheries, and apiculture to identify sustainable, scalable, and bankable business models and labour market opportunities for youth including women, and persons with disabilities. Data was collected through interviews with 1,210 agri-enterprises of which 40% were youth owned (15% women), and 44% women owned (11% youth aged 15-35 years), 45 green technology providers across the priority value chains in addition to 88 in-depth key informant interviews with industry actors and 28 Focus Group Discussions with the youth. The findings have been triangulated with related studies such as; published data by the Kenya Bureau of Statistics and the FinAccess Surveys.

## Main findings - Analysis of priority market systems

The study revealed several entry points that have the potential to integrate Kenya's youth including women and persons with disabilities in active, full scale, sector wide economic development in Kenya's food systems. The findings show that young men and women as well as persons living with disabilities can be integrated into the food systems. The findings are summarised as follows:

1. **Exclusion is significant and uneven.** 53% of agri-enterprises cite lack of collateral; 43% cite irregular income and 16% cite weak financial records as barriers to credit. Persons with disabilities had zero representation across all sampled sectors, and 70% cited workplaces that did not accommodate their needs.
2. **Production and marketing of poultry products, dairy, apiculture, and aquaculture -** Demand for various agricultural products exceed supply across priority value chains. For instance, annual deficits for eggs in Kenya stands at 5 billion eggs (a 56% gap), 6.5 to 7.5 billion litres of milk, 340,000 metric tonnes of fisheries & aquaculture and 5,500 metric tonnes of honey. Imports currently fill these shortfalls, and they offer immediate entry points for youth led enterprises.
3. **Production of alternative feeds -** There is a strong demand for alternative feeds by farmers yet input supply systems remain underdeveloped. Alternate innovations such as using black soldier fly as circular protein feed substitute is a good illustration. For selected small enterprises interviewed in this study, this innovation, if supported as a hub-based circular infrastructure where organic waste is concentrated, can be sustainable in medium to longer term. Replacing conventional poultry feed with Black Soldier Fly (BSF) protein and grid power with solar heaters cuts monthly costs by 42% and more than doubles ROI from 108% to 260%. This system works best if designed as a dual-output system producing both larvae and frass. Demand for solar milk chillers (38%), Polyvinylchloride (PVC) for fisheries & aquaculture cages (35%) and solar freezers (40%) and Langstroth hives for apiculture (73% adoption in apiculture). Tailored asset finance and financial literacy trainings will be required to catalyse adoption.
4. **Designing innovative financial products that favour engagement of young men and women as well as persons with disability and align to the agri-production cycles –** Design financial products that fit agri-production cycles and work for young men, young women, and farmers with disabilities. They should help people save, build resilience, and borrow to support value-addition and adaptation. Most young farmers and agri-entrepreneurs interviewed had real commercial potential, but existing products didn't match their needs. A 20-hive apiary, for example, nets KShs. 159,900 a season, yet respondents said standard loan terms didn't work for them because of the rigid repayment schedules and the absence of a grace period, among other downsides.
5. **Develop the agri- skills and agri-capacities of the youth -** Skills development for young people in Kenya's agri-food systems is constrained by capacity and capability gaps. Two capacity building models were observed during the analysis, currently being implemented that offer opportunity for project scale and impact: (1) the Technical Service Provider (TSP) cohort approach supported by AGRA and Cordaid, and (2) the Mentor-Mentee model[1]. The latter matches established youth enterprises with early stage agri-enterprises and has demonstrated practical value in linking training to market access. Long term solutions such as re-calibration of TVET curricula to build capacity of competent technicians for installation, maintenance and repair of green technologies with require multifaceted collaboration with training institutions, government and the private sector. This will complement university education and offer value adding capabilities in the market.

## Conclusions and Recommendations

A summary of main conclusions and recommendations are made below:

1. **Create and structure market linkages that can support agri-enterprise lending** aided by formal produce offtake arrangements with upstream buyers has potential to surmount stringent collateral requirements preferred by financial service providers. To achieve this, the project should work with their Technical Service Providers (TSPs) to formalise produce offtake agreements between youth-led agri-enterprises and anchor buyers, such as established cooperatives, processors and supermarket supply chains. These agreements would provide enterprises with reliable market access and a stronger basis for accessing credit without relying on land titles as collateral.
2. **Develop and deploy models that incorporate alternative data in credit and underwriting.** Innovation in Kenya has focussed immensely

1 https://practicalaction.org/our-work/projects/ray/

in strengthening the existing systems for conventional consumer behaviours, an approach that has simultaneously reinforced the exclusion of consumers with atypical financial behavioural usage patterns – where agri-enterprises and agribusinesses lie. Cashflow data sitting within digital wallets e.g., MPESA, till numbers, farm records can answer this question. Determination of available cashflows for capacity to make all major lending decisions for these segments would allow integration into formal lending mechanisms. GFYE should consider supporting FSPs to deploy and deploy alternative data such as mobile money transaction histories, cooperative delivery records, and producer platform data into credit underwriting frameworks as substitutes for land title requirements.

3. **Financial solutions targeting agri-food systems need to be aligned to seasonal cash flow cycles.** The project should provide targeted technical assistance to financial service providers to design loan products with repayment schedules linked to enterprise cash flows, such as grace periods of 6–12 months for poultry enterprises, 7–12 months for aquaculture enterprises, and biannual repayment schedules for apiculture enterprises. This will ensure that repayment timelines reflect cash flow patterns. The project could also support insurance underwriters to develop sector-specific index-based insurance products covering risks such as poultry mortality, colony loss, aquaculture mortality, and weather-related shocks, with these insurance products bundled together with credit facilities.
4. **Strengthening agri-food systems requires investments in alternative feed systems and green technologies.** GFYE (both AGRA and Cordaid) through the TSPs should strengthen capacity of youth and women-led enterprises to establish hub-based feed production systems, including black soldier fly circular feed enterprises designed as dual-output operations producing both larvae and frass, in partnership with Kenya Agricultural and Livestock Research Organization and relevant market actors. This would directly address the high input costs constraining profitability, particularly in poultry and aquaculture value chains where feed represents a major production expense. Adoption of green technologies, such as solar milk chillers, aquaculture cages, solar freezers, and Langstroth hives should also be promoted through tailored asset financing and financial literacy programmes targeting youth and women-led enterprises.
5. **Proven skills development & delivery models such as the technical service provider and mentor–mentee approach be adapted and scaled.** It would be useful to explore fee-for-service for these models for sustainability longer term. In addition, TVET curricula should be reviewed in consultation with the Technical and Vocational Education and Training Curriculum Development, Assessment and Certification Council (TVET CDACC) and the National Industrial Training Authority (NITA) to incorporate dedicated modules on renewable energy appliance installation and maintenance. Building on the Dual Training model set out in the National Dual Training Policy approved in 2025 and supported by Finland and Germany, TVET institutions and renewable energy companies should establish formal partnerships to deliver jointly designed dual training programmes in solar equipment installation, repair, and maintenance.
6. **Critically, exclusions effects are embedded within the regulatory dimensions.** While interventions in this area may extend beyond the immediate GFYE implementation period, it is important to highlight a few for immediate follow through:

- Support the National Treasury and Central Bank of Kenya to revise prudential guidelines by introducing differentiated risk weightings for green loans and lending targeted at youth, women, and persons with disabilities. The current uniform 100% capital charge increases the cost of lending to underserved groups and limits financial inclusion.
- Harmonise cross-county taxation and cess policies that currently result in double taxation of agricultural commodities and significantly erode producer margins. Addressing this barrier will require coordinated policy advocacy through sector platforms such as the Agricultural Sector Network, Council of Governors, and Kenya National Chamber of Commerce and Industry.
- Financial service providers should establish underwriting and approval systems for green finance products at branch level to ensure consistent assessment and reduce rejection of viable green investments. Currently, green finance decisions are often made at the headquarters without standardised criteria, leading to inconsistent lending outcomes. GFYE should support Financial Service Providers (FSPs) to develop unified underwriting frameworks and sector-specific appraisal guidelines for green technologies, to catalyse improved access to finance for youth- and women-led agri-enterprises.

Chapter 1

# Introduction

Photo/FSD Kenya

> **Food systems in Kenya support about 5.6 million smallholder farmers and the livelihoods of millions more in complex multilayered value chains spanning production, processing, aggregation, trade and distribution, but loses significant value at every stage.**

## 1.1. Background information

Agriculture is the backbone of Kenya's economy, making up a third of annual Gross Domestic Product (GDP) and employing 70% of rural people. Agricultural output is dominated by smallholder farmers who supply both domestic and export markets. The system faces four substantial challenges.

First, post-harvest losses are estimated at 12% to 20% because of inadequate storage and cold chain infrastructure.[2] Second, value addition and processing remain limited, with most outputs sold in primary form. Third, informal trade channels account for around 80% of household food access. Finally, climate shocks and price volatility weigh disproportionately on low-income households. These constraints, together with broader structural barriers such as skills gaps, continue to deter youth, women, and persons with disabilities from participating in agri-food systems and accessing gainful employment opportunities within the sector.

Food systems in Kenya support about 5.6 million smallholder farmers and the livelihoods of millions more in complex multilayered value chains spanning production, processing, aggregation, trade and distribution, but loses significant value at every stage[3].

## 1.2. Youth employment context in Kenya

Kenya's youth challenge has both demographic and structural sides. Rural young women and men aged between 18 and 35 years make up 67% of the population, but youth unemployment is more than

2 FAO (2023). Food Loss and Waste in Kenya: Assessment and Pathways Forward. Food and Agriculture Organization of the United Nations.
3 https://www.ifad.org/en/w/countries/kenya

twice the national average[4]. While Agriculture in Kenya contributes 38.6% of total employment, the sector is yet to absorb an increasingly bulging youth population entering into productive labour force. Rural youth, for instance, account for 45.5% of Kenyans who remain financially excluded[5].

The FinAccess 2024 Household Survey reports that 9.9% of Kenyan adults remain financially excluded, with rural youth accounting for nearly half (45.5%) of this group. On the supply side, financial institutions lack the tools and incentives to understand, price and serve the seasonal, climate exposed and frequently informal agri-enterprises. The result is mismatched solutions: young people are excluded from opportunities to invest in green technologies, value addition and agribusiness innovation. Weak linkages between youth employment initiatives, agricultural policies and financial institutions reinforce this fragmentation, while the climate crisis continues to intensify risks in agriculture and discourage private investment in rural enterprises.

The Green Finance for Youth Employment (GFYE) Project recognises that meaningful youth participation in food systems requires systemic market intelligence rather than isolated interventions which the project aims to address in the three components.

## 1.3. Project overview

The Green Finance for Youth Employment Project (GFYE) (2024–2027) is funded by the Ministry for Foreign Affairs for Finland through IFAD and is implemented by Financial Sector Deepening Kenya, AGRA, Cordaid Kenya and the National Treasury. The project's main target is rural youth aged between 18 and 35 years old, particularly women (≥50% women) who are engaged in on- and off-farm food system activities across 14 counties in Kenya.

It is expected that through implementation of the project, capabilities, skills and incentives will be better designed to enhance Kenya's green finance ecosystem[6]. At least 8,000 youth and 500 youth-led/employing MSMEs are earmarked on targeted financial literacy and capacity building efforts including an estimated additional 10,000 as indirect beneficiaries (e.g. employees or suppliers).

The project utilises the Green Taxonomy developed within the RK-FINFA to ensure that financed activities contribute to environmental sustainability.

The project has three mutually reinforcing components:

**Component 1: Scalable green business models and products for youth**

This component focuses on identifying scalable green business models and developing youth-tailored financial products. It aims to build a robust evidence base on viable green investment opportunities that can be financed through the PFIs which includes an analysis of food systems and youth employment across the 14 counties. This component is implemented by FSD Kenya.

**Component 2: Capacity building on green investment for youth employment**

This component, implemented by both Agra and Cordaid Kenya, purposes to strengthen the capacity of young entrepreneurs, youth-led and youth-employing MSMEs, and Participating Financial Institutions (PFIs) to access and deliver green finance. This component consists of two main interventions:

a. Institutional capacity building: Building the capacity of at least four MFBs/MFIs and eight DT-SACCOs to design and roll out youth-tailored green finance with specific emphasis on risk assessment, product design, business planning, and the use of digital and mobile technologies to reach underserved youth.
b. Youth and MSME Capacity Building: Capacity building of at least 8,000 rural youth entrepreneurs and small producers, as well as 500 youth-led or youth-employing MSMEs, on business planning, financial management, and climate-smart investments. These trainings will be conducted jointly with PFIs to ensure a clear linkage between youth trainees and financial institutions.

**Component 3: De-risking for increased green financing**

This component seeks to incentivise green asset lending to the project's target groups through a de-risking instrument, namely the Youth Incentive Fund (YIF). The YIF requires borrowers to complete project supported business training before loan approval, reflecting the evidence that technical assistance improves youth business outcomes. It is expected that at least 50% of trained MSMEs and 40% of rural youth entrepreneurs will access finance during the project period, while others will benefit indirectly through improved employability or later access to finance. This component is implemented by the RKFINFA PMU.

At the background of the challenges that befall the youth empowerment, FSD commissioned a study to provide evidence for use in creating decent and sustainable entrepreneurship and employment for rural youth operating in agri-food value chains for the selected counties by leveraging green investments. The analysis sought to -

i. Identify sustainable, scalable and bankable business and employment opportunities for the youth in selected agri-food value chains.
ii. Examine the financial solution offerings of the financial institutions, businesses and enterprise support organisations that finance and support agri-enterprises in the food systems.
iii. Provides guidelines and a framework for the planning and implementation of the GYFE's capacity building and financing activities by National Treasury (through RK-FINFA PMU), AGRA, Cordaid, the Agricultural Finance Corporation (AFC) and by extension, participating financial institutions (PFIs).

4 Kenya National Bureau of Statistics, Census Analytical Report (2019): https://www.knbs.or.ke/wp-content/uploads/2024/05/2019-Kenya-population-and-Housing-Census-Analytical-Report-on-Youth-and-AdolescentsVol.XII_.pdf
5 FinAccess Household Survey Report (2024): 2024 FinAccess Household Survey Report
6 https://www.ifad.org/documents/38714170/40185546/How+to+do+Loan+Guarantee+Funds.pdf/0b21a24e-7ed6-4962-9620-7810d11be862

## 1.4. Summary of approach and methodology

To identify sustainable, scalable and bankable business and employment opportunities for the youth in selected agri-food value chains, this study followed strands of value chain and market systems approach to identify challenges and opportunities along the focus value chains and leverage them to the market and identify green climate investments that would spur economic growth.

The analysis is based on five priority value chains: dairy, horticulture, poultry, fisheries aquaculture, and apiculture and aimed to identify sustainable, scalable and bankable business models and demand for labour in agrifood systems for young women and men as well as persons with disabilities.

The sampling combined snowballing and purposive selection relying on referrals from partner programmes (Cordaid, AGRA, IFAD, MasterCard Foundation). A total of 1,210 agri-enterprises were reached for structured interviews, 88 Key Informants and 28 FGDs conducted. Both quantitative and qualitative data were used in this study.

- Quantitative data was collected through in-depth structured and semi-structured interviews were carried out with 1,210 agri-enterprises of which 40% are youth owned (15% women), and 44% women owned (11% youth aged 18 to 35 years), 45 green technology providers across the priority value chains. This data provided the quantitative parameters used in this study.
- Qualitative data was collected through Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs). 88 key informant interviews (KIIs) were carried out with 36 government institutions, seven implementing organisations, 23 tertiary training institutions and 18 financial institutions (four Banks, two MFIs, 10 SACCOs, two Public Lenders). Additional qualitative evidence was gathered through 28 focus group discussions with the youth & women farmers across the 14 counties. The interviews were conducted in local languages and included 56 enumerators under the supervision of 16 county focal persons.
- The qualitative data and information from KIIs and FGDs were used to complement the quantitative findings by generating insights into the interconnected nature of all components in the agri-food system and the inter-dependence, feedback-loops and trade-offs between the elements and indicators at various levels.

Chapter 2

# Food systems analysis of priority sectors

Photo/FSD Kenya

> **The analysis of GFYE target counties reveals significant county-level variation in market maturity, infrastructure, dominant enterprise models, and green technology priorities.**

This chapter presents a detailed analysis of the selected priority market systems. The section begins with county-level analyses, followed by sector-wide assessments focusing on the structure of each Agri-food system, supporting functions, skills requirements, policies, and market relationships that shape actor behaviour and sector performance. Each section concludes with an overview of key constraints and opportunities for capacity strengthening and green financing interventions, including analysis of the financial access landscape.

## 2.1. A contextual analysis GFYE target counties

The analysis reveals significant county-level variation in market maturity, infrastructure, dominant enterprise models, and green technology priorities.

### 2.1.1. Mt Kenya and Aberdares Region Economic Bloc

The study included Kirinyaga, Meru and Nyeri from the Mt Kenya and Aberdares Region Economic Bloc. This cluster embodies Kenya's most mature dairy and horticulture belt. Kirinyaga and Meru record the highest dairy yields nationally (16 to 20 litres per animal per day)[7], supported by improved breeds and genetics and active cooperative networks. Horticulture was ranked second in a longlist of eleven value chains with potential to create decent jobs for the youth in all three implementation counties.

Nyeri has the most diversified agri-food economy, with 145 actors sampled across 11 sub sectors. Meru hosts the Meru Central Dairy Farmers Cooperative Union, one of the country's largest milk processors. Kirinyaga's proximity to Nairobi gives it the strongest last mile market

7 https://livestock.africa/wp-content/uploads/2024/09/Meru-Dairy-Co-operative-Union-Breeding-Strategy-1.pdf

linkages for agri-food systems produce and products. More than 80% of cooperative chillers leverage on grid electricity, which makes solar milk chillers, biogas and solar cold rooms priority technologies to minimise cost of processing while advancing adoption of green energy technology solutions in the sector. Financing needs centre on mid-range asset leasing with repayment aligned to daily milk sales and seasonality.

These green solutions present significant opportunities for youth capacity development and employment across multiple areas, such as extension and advisory service provision, transport and logistics services, equipment installation, maintenance and repair, as well as value addition and agro-processing enterprises.

*Table 1: Priority value chains in the Mt Kenya and Aberdares Region Economic Bloc*

| County | Priority value chains | Distinguishing context |
|---|---|---|
| Nyeri | Horticulture, Dairy | Active poultry and aquaculture alongside core dairy |
| Kirinyaga | Dairy, Horticulture | Highest dairy yields (16 to 20 L per day); strong cooperatives |
| Meru | Horticulture, Dairy | Meru Central DFCU (leading processor); high altitude advantage |

### 2.1.2. The Lake Region Economic Bloc

The study included Bungoma, Busia, Kakamega, Kisumu, Kisii, and Siaya from the Lake Region Economic Bloc (LREB). Fisheries and aquaculture dominate four of the five focus counties in this cluster. Cage aquaculture on Lake Victoria contributes 76.4% of national farmed Fisheries & Aquaculture output, with Kisumu as the commercial hub. Kisii occupies a transitional position with a mixed horticulture, apiculture and aquaculture economy that requires diversified financing.

Two innovation anchors set the cluster apart. Busia hosts Hydrovictoria®, a pioneering women led **Black Soldier Fly larvae enterprise** that produces one tonne a year. Bulk production of larva and frass cuts feed costs for the aquaculture farmers by up to 40%. Kakamega county on the other hand, operates a **county bulk feed procurement scheme** that retails feed at affordable rates. Since feed accounts for 60% to 70% of costs in poultry and aquaculture, these innovations are directly replicable and scalable to support these value chains.

These opportunities provide strong potential to build the capacity of youth and women to establish and operate feed production hubs using alternative solutions such as black soldier fly, as well as support enterprises involved in cage installation and the installation, maintenance, and repair of cold chain technologies and strengthening youth-led enterprises in hatchery management and chick brooding as a business.

*Table 2: Priority value chains in the Lake Region Economic Bloc*

| County | Priority value chains | Distinguishing context |
|---|---|---|
| Busia | Fisheries & aquaculture, poultry | BSF pioneer (Hydrovictoria); cross border trade; prevalent double cross county taxation |
| Kakamega | Poultry, Fisheries & Aquaculture | County bulk feed model; strongest poultry; apiculture tradition |
| Kisumu | Fisheries & Aquaculture | Lake Victoria cage culture hub; waste management focus |
| Siaya | Fisheries and aquaculture, Poultry | Fisheries & Aquaculture dominant (cage aquaculture); renewable energy priority |
| Bungoma | Fisheries& Aquaculture, Horticulture | Diversified portfolio; apiculture tradition |
| Kisii | Aquaculture | Mixed economy; aquaculture and apiculture present |

### 2.1.3. The Mt Kenya and Aberdares Region Economic Bloc and the South Eastern Kenya Economic Bloc counties

The study included Embu and Tharaka Nithi from the Mt Kenya and Aberdares Region Economic Bloc and Machakos from the South Eastern Kenya Economic Bloc. Water stress defines this cluster. Horticulture is priority in all three counties but faces acute vulnerability, since 96% of horticultural crops nationally are rain fed[8]. Priority technologies are solar drip irrigation, rainwater harvesting, biological pest controls, certified climate

8 KNBS National Agriculture Production Report (2024).

resilient seedlings and solar cold rooms. Extension of seasonal horticulture input credits is widely adopted as the most appropriate financing structure by financial service providers. Feasible capacity strengthening opportunities for the youth include scaling climate smart trainings through mentor-mentee models, offtake market formalisation and record keeping and overall financial management skills.

*Table 3: Priority value chains in the Mt Kenya and Aberdares Region Economic Bloc and the South Eastern Kenya Economic Bloc counties*

| County | Priority value chains | Distinguishing context |
|---|---|---|
| Machakos | Horticulture, Poultry | Semi-arid; horticulture despite water stress |
| Tharaka Nithi | Horticulture, | Diverse; apiculture and horticulture integration |
| Embu | Horticulture | Highest agroforestry concentration; Mt. Kenya advantage |

### 2.1.4. The Mt Kenya and Aberdares Region Economic Bloc and the Lake Region Economic Bloc

The study included  of Nakuru from the Mt Kenya and Aberdares Region Economic Bloc, and Nandi, Trans-Nzoia and Kisii from the Lake Region Economic Bloc, supported by strong grassroot dairy cooperatives and proximity to the Kenya National Dairy Training Institute in Naivasha. Trans Nzoia in Kenya ranks well in cereal production, which makes solar milling equipment and hermetic storage priority technologies. Priority technologies include solar chaff cutters, solar milk chillers, biogas especially from dairy farming, electric bikes for milk transport and solar milling equipment. The stable daily cash flows from dairy align well with monthly repayment, but green technology adoption requires upfront asset finance delivered through cooperative leasing or pay per litre models. These solutions also present opportunities to build capacity of the youth on installation, maintenance and repair of the renewable energy solutions and engaging women in operating related businesses such as milling using green technologies. Financial literacy cuts across all the sectors.

*Table 4: Priority value chains: The Mt Kenya and Aberdares Region Economic Bloc and the Lake Region Economic Bloc counties*

| County | Priority value chains | Distinguishing context |
|---|---|---|
| Nakuru | Dairy, Poultry | Balanced tri-sector economy; strongest inputs supply base |
| Nandi | Dairy, Poultry | Dairy and poultry dual focus; strong cooperatives |
| Trans Nzoia | Horticulture ,Dairy | Cereals breadbasket; largest inputs supply |

### 2.1.5. Cross cutting implications for GFYE implementation

Five patterns emerge from the county level analysis.

1. **Agro ecological zoning drives value chain selection.** The highlands favour dairy, the lakeside favours fisheries and aquaculture, and the semi-arid counties lean toward drought resilient horticulture and apiculture. Green technology packages and financial products need to be designed in alignment with the cluster priorities rather than standardised nationally.
2. **Infrastructure maturity varies sharply.** Cooperatives in the Central Highlands can absorb green technology through asset leasing, whereas the Western Lakeside cluster requires simultaneous investment in feed innovation, such as Black Soldier Fly and cold chain to unlock aquaculture returns.
3. **Horticulture is the most universal entry point for young people.** It ranks highly in all 14 counties, has the lowest capital barrier and the shortest cycles. However, 30-40% post-harvest loss rate[9] make profitability contingent on cold chain and aggregation investment.
4. **Financing mismatches differ by cluster:** mid-range asset finance in the Highlands; patient capital with grace periods in the lake region; seasonal plus long-term capital in the eastern region; and cooperative leasing bridging stable cash flows to upfront technology costs in the rift region.

**“Horticulture is the most universal entry point for young people. It ranks highly in all 14 counties, has the lowest capital barrier and the shortest cycles.**

9 GFYE Food Systems Analysis Primary Data (2026)

## 2.2. Analysis of priority market systems

### 2.2.1. The poultry market system

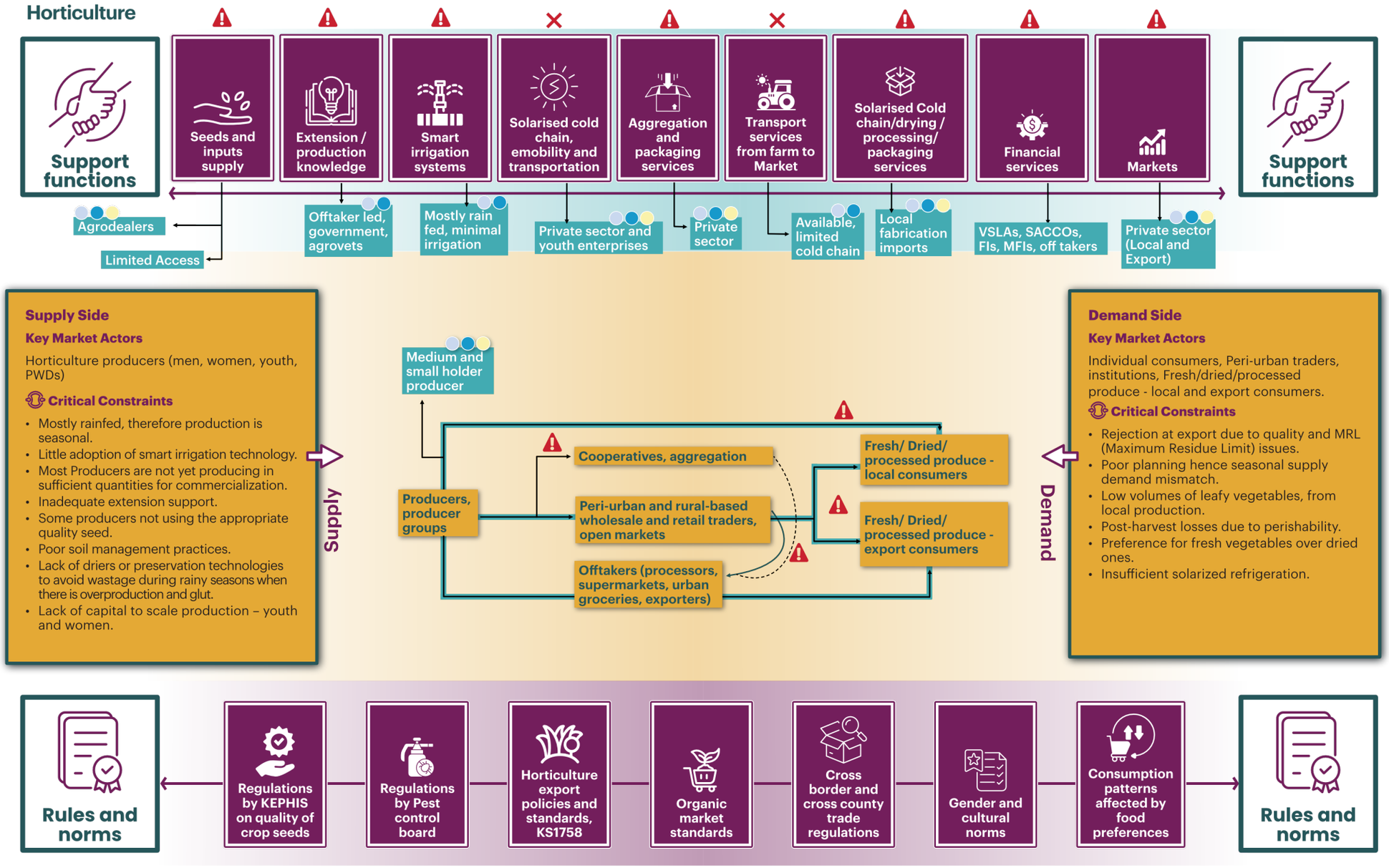
A review of major outputs of this value chain reveals significant deficit of eggs and poultry meat products within the market. This is a potential pathway for youth agribusiness to exploit. National egg demand, for instance is 9 billion annually against local production of approximately 4 billion, a gap of 5 billion eggs or 56%[10], that is currently bridged by imports from neighbouring countries. Broiler meat production of 105,000 metric tonnes falls well short of the 170,000 metric tonnes required to meet a market driven by 4% annual urbanisation[10] and the rapid expansion of quick service restaurants. This analysis specifically focuses on egg production using improved poultry breeds, which present commercially viable business models for youth and women while also offering enhanced productivity and climate resilience.

#### 2.2.1.1. Structure of the poultry market system

The system is organised around the core functions of production, aggregation, processing, distribution and retail of eggs, meat and related products from farmers to consumers. These functions are supported by input supply, finance, training, transport, information services and research. The system is governed by formal rules (government regulations, licensing and biosecurity protocols) and informal norms (market practices, cooperative agreements and cultural preferences).

10 https://www.kenyachamber.or.ke/2025/02/21/cracking-the-egg-crisis-kncci-champions-sustainable-poultry-farming/
11 Kenya National Bureau of Statics Agriculture Production Report (2024)

*Graphic 1: Structure of the poultry market system*




Mobility challenge was the primary characteristic of differently abled persons encountered in this research. This legend relies on that for positioning within market systems

### 2.2.1.2. Core functions

The structural shortage in poultry products is compounded by a shift in consumer preference toward improved indigenous chicken. Indigenous chicken numbers grew 9.2% even as commercial broilers declined due to high cost of imported feeds. The local or mixed breed Kienyeji now accounts for 75% of the total poultry population, valued at over KShs. 68.6 billion[12]. The population of broiler chicken decreased by 8.7% in 2024 while the population of layer and indigenous chicken increased by 7.4% and 9.2%, respectively compared to 2023[13].

For young entrepreneurs the opportunity lies in transitioning from traditional free-range scavenging to semi-intensive commercialisation using high yielding dual purpose breeds, such as Sasso, where hens lay up to 260 eggs a year, a major leap from the 60 to 100 of traditional breeds. Intensification can be combined with efficient feeding and poultry health systems, on farm waste use, nutrient recycling and reduced pressure on land resources.

**Profitability Analysis**

Table 5 shows the profitability analysis from a survey of poultry farmers. Interviews with 299 producers confirm that poultry farming is financially viable under conventional management. A median flock of 120 egg laying birds generates a monthly net profit of KShs. 28,000 and cumulative net profit of KShs. 448,000 over a 16-month laying cycle. Production efficiency averages 89%. Feed is the single largest expense at 58% of monthly costs, followed by labour (17%), transport (12%), heating (8%) and vaccines (6%). The net return per bird is KShs. 3,733 over the 16 months production cycle, yielding a return on investment of 108%[14].

Returns improve substantially through targeted input substitution. Replacing conventional feed with alternative feeds such as Black Soldier Fly protein and grid heating through solar installation cuts monthly expenses by 42% or a decline from KShs. 26,000 to KShs. 15,000. Monthly net profit rises by 40% to KShs. 39,000 and the cumulative profit over the production cycle shifts to KShs. 624,000, and return on investment more than doubles from 108 to 260%[15].

The additional capital expenditure of KShs. 229,000 (KSHS 50,000 for solar heaters and KShs. 179,000 for a solar milling machine) generates return on investments within a single production cycle: 1.3 months for the heaters and 4.6 months for the milling machine, leaving 10 to 11 months of enhanced returns.

Photo/FSD Kenya

12 Kenya National Bureau of Statics Agriculture Production Report (2024)

13 Kenya National Bureau of Statistics Agriculture Production Report (2024) https://www.knbs.or.ke/wp-content/uploads/2025/10/National-Agriculture-Production-Report-2025.pdf#:~:text=National%20Agriculture%20Production%20Report%202025,olein%20RBD%2C%20as%20well%20ashttps://www.knbs.or.ke/wp-content/uploads/2025/10/National-Agriculture-Production-Report-2025.pdf#:~:text=National%20Agriculture%20Production%20Report%202025,olein%20RBD%2C%20as%20well%20as

14 Computations from GFYE primary data

15 Computations from GFYE primary data

*Table 5: Comparative profit margin between conventional poultry production and BSF + solar heaters*

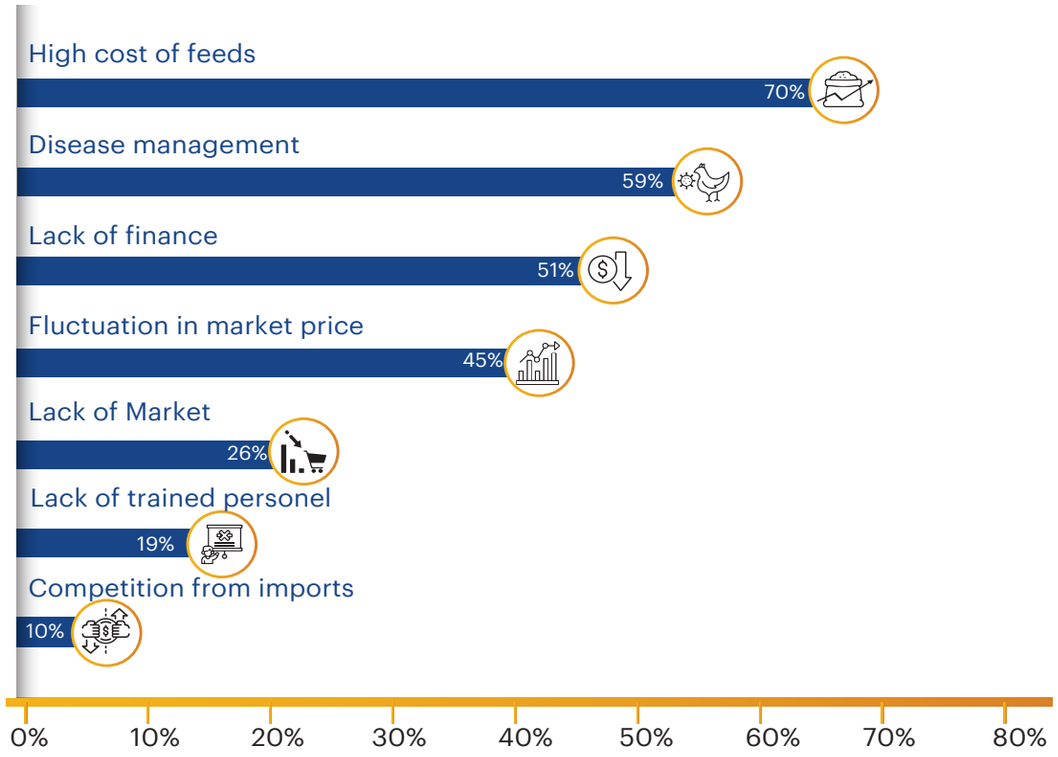
| | Conventional Production Methods | Green solutions Substitution (BSF + Solar) | Change |
|---|---|---|---|
| **Production Parameters** | | | |
| Number of laying birds | 135 | **135** | — |
| Eggs produced/day | 120 | **120** | — |
| Eggs produced/month | 3,600 | **3,600** | — |
| Laying efficiency | 89% | **89%** | — |
| Selling price/egg (KShs.) | 15 | **15** | — |
| Gross revenue/month (KShs.) | 54,000 | **54,000** | — |
| **Monthly Expenses (KShs.)** | | | |
| Feeds | 15,000 (58%) | **6,000 (40%)** | −60% |
| Labour | 4,500 (17%) | **4,500 (30%)** | — |
| Transport & other | 3,000 (12%) | **3,000 (20%)** | — |
| Heating | 2,000 (8%) | **0** | −100% |
| Vaccines | 1,500 (6%) | **1,500 (10%)** | — |
| Total monthly expenses | 26,000 | **15,000** | −42% |
| **Profitability** | | | |
| Net profit / month (KShs.) | 28,000 | **39,000** | +39% |
| Laying period (months) | 16 | **16** | — |
| Cumulative profit / cycle (KShs.) | 448,000 | **624,000** | +176,000 |
| Profit per bird / cycle (KShs.) | 3,733 | **5,200** | +39% |
| ROI (net revenue / expenses) | 108% | **260%** | +152 pp |
| **Capital Investment & Payback** | | | |
| Solar heaters (KShs.) | — | **50,000** | |
| Solar milling machine (KShs.) | — | **179,000** | |
| Total additional CAPEX (KShs.) | — | **229,000** | |
| Payback — solar heaters | — | **1.3 months** | |
| Payback — solar mill | — | **4.6 months** | |

*Source: Food Systems Analysis primary data (2026): Data triangulation Ministry of Agriculture, Livestock and Fisheries & Aquaculture (2025)*

### Production Challenges

Producers cited high cost of feeds (70%), disease invasion (59%) and lack of finance (51%) as their main constraints, alongside fluctuating market prices (45%), limited market access (26%), insufficient trained personnel (19%) and import competition (10%).

*Figure 1: Production challenges in the poultry sector*




These challenges define pathways to test and scale green solutions. Adoption of green technologies and specialised feed solutions such as black soldier fly larvae frass offer new business and employment avenues. Circular bioreactors, demonstrated at Hydrovictoria Fisheries & Aquaculture Farm in Busia, convert organic waste into high protein feed, reducing costs and environmental impact. Scaling such solutions requires moving beyond financing individual enterprises to supporting entire value chains in a hub model, since collective efficiency across producers, processors, aggregators, recyclers and markets determines success. This points toward blended financing approaches that crowd in capital for adoption of circular technologies by youth-led enterprises.

### 2.2.1.3. Support functions

#### Hatcheries

The hatchery layer determines the consistency and quality of day-old chick supply. Large scale operators (such as Uzima Poultry and Engoho Chicken operating in Kisumu and Kakamega) run structured distribution networks of agents, many of them young people acting as distributors, brooders and commission agents. Each hatchery employs about 12 agents (7 young people on average), with further linkages to village level last mile delivery. Rising demand for day old chicks has opened space for medium scale hatcheries run by young people. The 47 operators interviewed hatch around 375 chicks every 21 days, selling each at KShs. 115, earning a gross revenue of roughly KShs. 43,125 per cycle. Their key constraint is grid dependence. Solar powered incubators would enable production of 500 chicks per cycle and raise profitability to KShs. 57,500 per cycle, with the KShs. 67,500 asset cost paying back within two production cycles.

### 2.2.1.4. Rules and norms

The poultry policy environment combines national frameworks, county regulations and sector specific standards designed to modernise production, safeguard animal health and improve market quality. Policies such as the Agricultural and Livestock Development Policy and the Kenya Poultry Regulations open the way for commercialisation, youth engagement and renewable energy adoption, yet enforcement, coordination and compliance costs remain challenging, particularly for smallholders. Specific constraints include high taxes on poultry feeds, double taxation on cross border poultry trade, weak enforcement of animal health regulations and inconsistent county level rules. These complexities also create avenues for innovation and local enterprise development.

*Table 6: Constraints and opportunities in the poultry market system*

| Constraint | Opportunity |
|---|---|
| High feed costs (70%) | Investment in alternative feed systems such as black soldier fly larvae frass production (proven by Hydrovictoria, Busia) and solar powered local feed milling (Agsol, KShs. 179,000) cut feed costs by up to 40% and dependence on commercial feeds. |
| Disease management (59%) | Improved biosecurity, capacity building and a shift to hardier dual-purpose breeds such as Sasso. |
| Inappropriate financial solutions (51%) | Redesign products: leasing and harvest aligned repayment remove the collateral barrier for youth enterprises. |
| Fluctuating market prices (45%) | Contract farming with quick service restaurants, hotel chains and institutional buyers stabilises offtake; digital marketplaces improve price information sharing. |
| Limited market access (26%) | Distribution networks led by young people, online marketing platforms and formalised partnerships with quick service restaurants and institutional buyers. |
| Insufficient personnel capacity (19%) | Agriflock 360 enables farmers to track performance, receive disease alerts and access market data. County governments and NGOs already provide training to farmers, a delivery infrastructure ready for scale. |
| Grid dependence in hatcheries | Solar powered incubators make hatcheries run by young people Transitioning to solar provides a pathway to enhance profitability from the current KShs.. 43,125 to KShs.. 57,500 per hatching cycle. |
| Limited access to training | Agriflock 360, Mkulima Sharp and providers of bundled training (BDS providers such as East Africa Market Development Associates (EAMDA), Fineline Systems) extend reach; county extension serves areas with limited digital access. |
| High green technology costs | Asset backed leasing and pay as you hatch repayment structures. |
| High feed taxes/ double taxation | 1 Build local feed production capacity through county bulk procurement (Kakamega model), cooperative feed milling and Black Soldier Fly enterprises; complemented with evidence-based advocacy for feed tax reduction. Work with Agriculture Sector Network (ASNET) towards harmonisation of cess.<br>2 Partner with the Kenya National Chamber of Commerce and Industry (KNCCI) & the Council of Governors to push for a removal of inter-county trade barriers, including intercounty commerce fees as a recommendation. |

*Table 7: Intervention for the poultry market system*

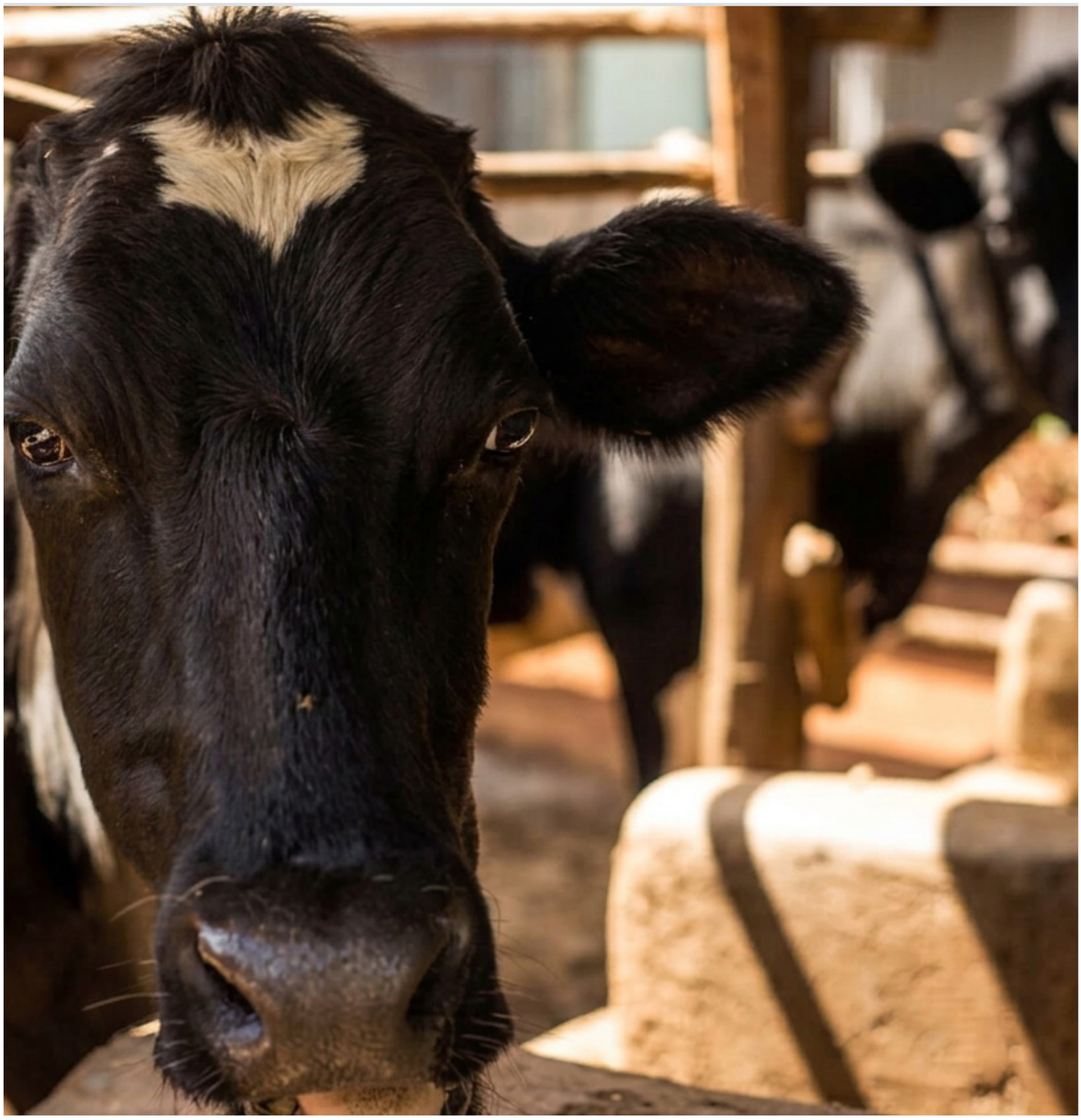
| Timeframe | Key Activities | Possible implementing partners |
|---|---|---|
| **1. Value chain coordination and market access** | | |
| **Short-term (0–12 months)** | • Facilitate anchor companies such as Uzima Poultry, Silverland, and Engoko Chicken to extend their brooder agent networks, drawing youth in as day old chick distributors in target counties.<br>• Support hatcheries and input suppliers to bundle agent onboarding with chick-rearing, vaccination, and record-keeping training as part of the agency package.<br>• Support anchor companies to deploy commission-based payment models tracked through M-PESA so agents earn directly from sales. | Uzima Poultry<br>Silverland<br>Engoho Chicken |
| **Medium-term (1–3 years)** | • Support lead offtakers such as Kenchic, quick service restaurants, franchises, and hotel chains to source from youth-run farmer service centres acting as aggregation hubs through structured poultry offtake arrangements<br>• Facilitate medium-term supply chain sub-contracting arrangements between organised women and youth producer groups and commercial buyers, with agreed price and volume frameworks. | Kenchic,<br>Service restaurants franchises<br>Hotel chains<br>County governments |
| **2. Green technology adoption** | | |
| **Short-term (0–12 months)** | • Facilitate green technology providers such as Agsol and other solar equipment suppliers to extend asset-finance lease offerings for solar heaters and incubators to youth hatcheries.<br>• Partner with alternative feed production enterprises such as Hydrovictoria to expand its BSF community-based production hub model into new counties through women-led backyard units.<br>• Support alternative feed producer groups (E.g BSF producers) and youth hatcheries to enter supply arrangements with prices indexed to commercial feed. | Hydrovictoria (BSF, Busia)<br>Agsol (solar technology) |
| **Medium-term (1–3 years)** | • Facilitate solar technology providers such as Agsol and feed manufacturers to expand distribution networks of solar feed milling units accessible to youth feed enterprises through lease finance.<br>• Embed training modules delivered by TSPs to incorporate climate-smart practices in poultry including; operation of solar powered incubators, poultry cages, integrating circulatory in the production systems | Agsol<br>Hydrovictoria<br>Kilimo<br>Eco-Incubators |
| **3. Access to finance** | | |
| **Short-term (0–12 months)** | • Facilitate MFIs and SACCOs to extend asset-leasing for solar incubators, cages, and heaters, with repayment aligned to production cycles.<br>• Engage poultry asset-finance lenders on lower collateral thresholds for the 18–35 age group.<br>• Support mobile money providers and lenders to develop working capital products for feed and DOC, scored on production records and M-PESA sales.<br>• Connect youth groups to MFIs for joint loans on DOC purchase and brooder house construction.<br>• Facilitate 30–60-day trade credit arrangements between feed millers and youth-run input retailers, with cooperatives co-signing. | MFIs<br>SACCOs<br>PFIs<br>Mobile money providers |

| | | |
|---|---|---|
| **Medium-term (1–3 years)** | • Strengthen capacity of commercial lenders to deploy invoice-backed lending products against confirmed buyer purchase orders, with repayment deducted at buyer settlement.<br>• Provide technical assistance to solar equipment financiers to offer pay-as-you-hatch lease contracts repaid from chick sale cycles.<br>• Work with insurers to underwrite index-based poultry mortality cover triggered by county veterinary outbreak declarations, bundled with credit.<br>• Connect youth (women) led poultry cooperatives to WEF, AFC Women's Window, and Uwezo Fund credit windows.<br>• Support participating financial institutions, SACCOs in design of green lending windows for solar poultry infrastructure. | Commercial banks<br>Women Enterprise Fund<br>AFC Women's Window<br>Insurance providers<br>Kilimo, Eco-Incubators |
| **4. Business development services** | | |
| **Short-term (0–12 months)** | • Partner with TSPS such as EAMDA, Fineline Systems, and similar private BDS providers to bundle agronomic training with equipment and input sales, with cost recovered through product margins. | EAMDA<br>Fineline Systems |
| **Medium-term (1–3 years)** | • Enhance capacity of farmer service centre managers to embed feed, vaccination, and record-keeping advisory alongside aggregation services.<br>• Enhance replication by coaching lead managers who in turn extend practices to peers across the network through the mentor-mentee model | EAMDA<br>Fineline Systems<br>Input suppliers |
| **5. Digital platforms and information systems** | | |
| **Short-term (0–12 months)** | • Partner with digital technology providers such as Agriflock 360 and other digital platform developers to extend daily prices, disease alerts, and buyer demand information to producers.<br>• Incentivise digital platform developers through technology co-financing grants to build USSD short codes, voice prompts, and screen-reader support into every release, with PwD user testing before rollout. | Agriflock 360 (private sector)<br>Digital platform developers |
| **Medium-term (1–3 years)** | • Build capacity of digital platforms and lenders to integrate production records into credit scoring pipelines for automated lending, under data-sharing agreements.<br>• Enhance capacity of digital platform providers such as Agriflock 360 to add contract management and automated payment reconciliation modules. | Mobile money providers<br>Agriflock 360<br>PFIs |
| **6. Social inclusion (cross-cutting)** | | |
| **Short-term (0–12 months)** | • Establish partnerships with youth across enterprise streams: brooder agents within hatchery distribution chains, digital platform operators, BDS agents, and e-bike logistics operators.<br>• Work with farmer service centres and hatcheries on home-based poultry models and accessible workstations for PwD operators. | All partners above<br>County governments |
| **Medium-term (1–3 years)** | • Build capacity of performing brooder agents to move into farmer service centre management and feed milling enterprise.<br>• Facilitate linkage between youth/women poultry cooperatives to WEF, AFC Women's Window, and Youth/Uwezo Fund loan products.<br>• Enhance capacity of aggregation firms to formalise PwD digital coordinator roles as paid positions. | Women Enterprise Fund<br>AFC Women's Window<br>MFIs |

### 2.2.2. Dairy market system

#### 2.2.2.1. Structure of the dairy market system

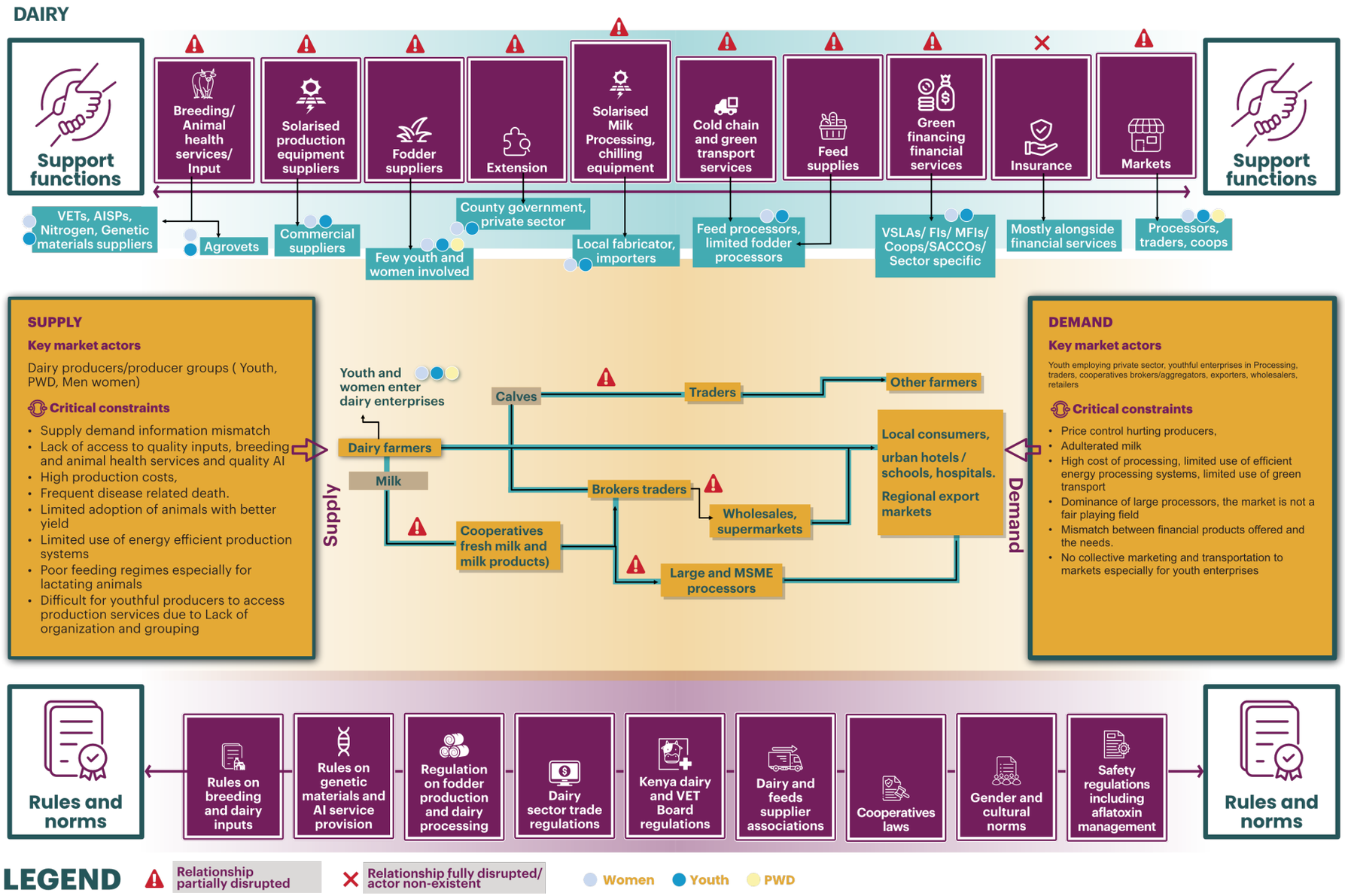
Kenya's dairy sector contributes approximately 5% of Kenya's GDP and supports more than 4 million people directly and indirectly. National annual production is around 5.2 to 5.5 billion litres against demand of 11 to 13 billion litres, leaving a deficit of 6.5 to 7.5 billion litres. Smallholders account for over 80% of total output, supported by 862 registered dairy cooperatives and a network of mini dairies and processors. The market is also evolving toward formal processing and value addition, although informal raw milk sales still account for 70% of marketed milk[16].



Photo/FSD Kenya

16 Kenya National Dairy Master Plan (2024)

*Graphic 2: Structure of the dairy market system*




Mobility challenge was the primary characteristic of differently abled persons encountered in this research. This legend relies on that for positioning within market systems

### 2.2.2.2. Core functions

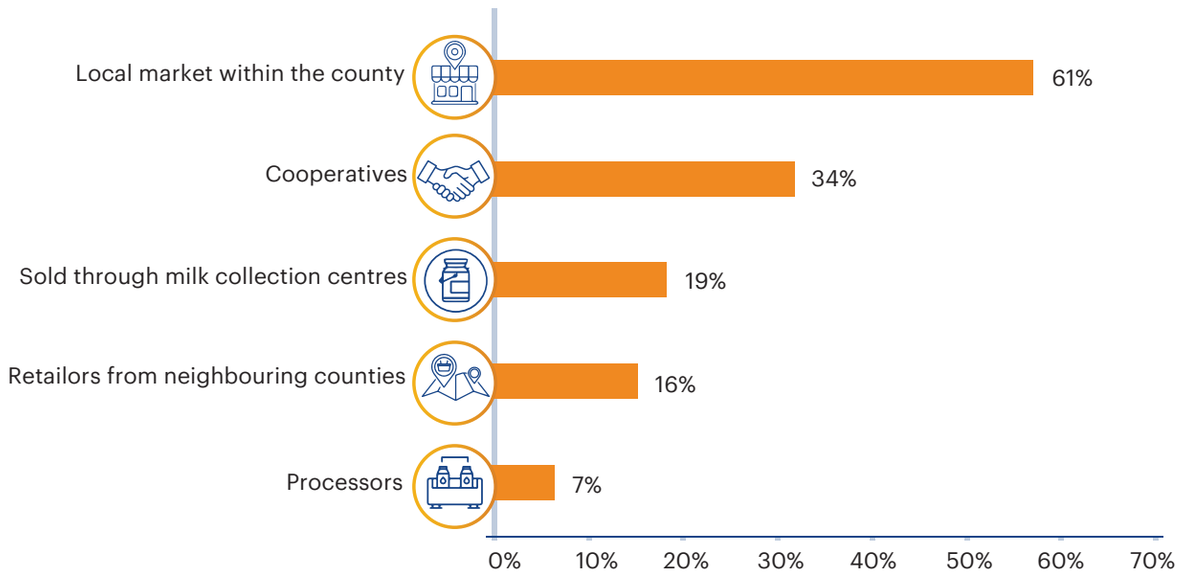
**Production:** The analysis indicates that dairy farmers keep an average of three dairy animals producing between 16–20 litres of milk per day. On average, farmers surveyed earn approximately KShs. 63,900 per month from milk sales against monthly production costs of about KShs. 20,000, largely driven by feed expenses, which account for nearly 40% of total costs. This generates an estimated net monthly income of KShs. 43,900. The relatively consistent cash flow associated with dairy enterprises presents a strong opportunity to pilot cash flow-backed lending models and develop alternative credit scoring systems based on milk delivery records and payment histories.

**Milk Collection and aggregation.** The dairy sector relies on over 862 registered producer cooperatives in addition to rural milk collection informal groups. Cooperative clusters in the production regions aggregate an average of 500 litres of milk daily from 40 to 50 farmers[17]. Milk is collected at the farm gate by cooperative affiliated youth motorcycle riders or delivered directly by farmers. Only a few aggregators have small solar powered chillers mounted on motorbikes; more than 80% of cooperative chillers run on grid electricity[18].

**Processing.** Kenya has 43 active processors, 133 mini dairies and several cottage processors, processing 30% of marketed milk, with a capacity utilization of 50%. The market leaders processing 85% to 90% of processed milk are Brookside, New KCC, Githunguri, Sameer Daima and Meru Central DFCU[19].

**Marketing and distribution.** Dairy products end markets comprise of supermarkets, shops, kiosks, informal markets and local vendors nationwide. Of enterprises interviewed, 61% sell directly in local markets, 34% to cooperatives, 16% to retailers from neighbouring counties and just 7% to processors. The dominance of informal sales channels affects producer margins- these markets offer between KShs. 28- 32 per litre compared to KShs. 35-40 per litre if sold through the cooperatives or processors. Producers prefer to sell in cash as opposed to a two to one month waiting period if sold through formal channels. This constraint presents opportunity to financiers to extend working capital to cooperatives/ emerging processors.

*Figure 2: Milk market offtake channels*




### 2.2.2.3. Support functions

The cooperative hub model is widely used in the high potential dairy locations and has improved farmer access to inputs, extension services, veterinary care, breeding programmes and milk offtake. Technology providers, many of them employing young people, are active in the dairy sector. Artificial insemination (AI) centres run by private actors and by the Kenya Animal Genetic Resources Centre have facilitated distribution of quality semen while providing employment to AI and animal health professionals. Several counties have prioritised dairy as a key value chain, investing in breed improvement, fodder production and extension.

Green technology demand: Out of the surveyed dairy enterprises, 38% expressed demand for solar milk chilling and processing facilities, 30% for solar chuff cutters, 22% for biogas systems, 19% for electric bikes

17 Kenya Dairy Board
18 Primary field data (2026)
19 Kenya Dairy Board Annual Sector Report (2024)

or tri-wheelers (Tuk tuk) for milk transport and 16% for energy saving technologies. Dairy actors expressed demand for green technologies, which gives GFYE an opportunity to partner with financiers and providers so that young small and medium enterprises, cooperatives and large dairy companies can acquire these assets.

### 2.2.2.4. Rules, norms and policies

The regulatory framework includes Kenya Dairy Regulations on hygiene, handling and processing; oversight by the Kenya Dairy Board and Kenya Veterinary Boards on licensing and compliance; Animal Disease Laws on livestock health; and Cooperative Laws governing dairy cooperative formation and management. National policy targets 11 billion litres of annual production and a 200 million litre increase in exports through value addition. The Kenya Dairy Industry Act 2021 advocates youth inclusion to promote generational renewal.[20]

*Table 8: Constraints and opportunities in the dairy market system*

| Constraint | Opportunity |
|---|---|
| • Limited access to green technology financing: many young farmers and small and medium enterprises cannot secure commercial financing for solar chillers, biogas and solar powered equipment because of asset and operating capital constraints.<br>• Commercial lenders, particularly banks lack unified classification protocols for green financing, which subsequently contribute to rejections of green loan applications | Strong engagement and entrepreneurship by young people: with 60 to 70% of dairy employment held by young people according to Kenya Dairy Board, there is a real opportunity to foster startups led by young people in solar chillers, biogas and energy efficient processing.<br>This also presents opportunities to lenders to streamline green finance classification. |
| High initial green technology cost: solar milk chilling (KSHS 400,000), biogas (KSHS 105,000) and solar chuff cutters (KSHS 55,000) remain a barrier for many young people and small cooperatives. | High demand for green technologies: 38% of dairy enterprises want solar chilling, 30% solar chuff cutters and 22% biogas. Young entrepreneurs can supply and install these technologies, creating jobs and accelerating uptake. |
| Inadequate technical and financial support for green innovation: there is a gap in targeted programmes that combine finance, training and mentorship for green dairy enterprises led by young people. | Supportive policy environment: the Kenya Dairy Industry Act 2021 and county level prioritisation open avenues for youth focused green technology initiatives and capacity to enhance performance of youth-led enterprises. |
| Limited youth asset ownership and control: young farmers and entrepreneurs typically lack collateral, restricting investment in productivity enhancing green technologies. | Green job creation potential: renewable and energy efficient technologies create employment in manufacturing, installation, maintenance and training, helping young people become self-employed. |

*Table 9: Intervention for the dairy market system*

| Timeframe | Key Activities | Possible implementing partners |
|---|---|---|
| **1. Value chain coordination and market access** | | |
| **Short-term (0–12 months)** | • Partner with solar technology providers to train and certify youth as chiller installers and maintenance technicians serving cooperative clusters.<br>• Facilitate high performing cooperatives to procure solar chillers through PFI lending backed by the RK-FINFA de-risking facility.<br>• Enhance capacity of cooperatives and motorcycle collector networks to roll out digital systems for milk collection and for daily volume, quality, and payment recording. | Registered dairy cooperatives<br>Youth motorcycle collectors<br>Kenya Dairy Board |

20 Republic of Kenya (2021). Kenya Dairy Industry Act, 2021

| Timeframe | Key Activities | Possible implementing partners |
|---|---|---|
| **Medium-term (1–3 years)** | • Facilitate supply arrangements between organised producer groups and major processors such as Brookside, New KCC, Githunguri, Sameer/Daima, and Meru Central DFCU on agreed prices, volumes, and payment cycles.<br>• Engage county governments on integrating dairy investment plans into CIDP budgets. | Brookside Dairy<br>New KCC<br>Githunguri<br>Sameer/Daima<br>Meru Central DFCU<br>County governments |
| **2. Green technology adoption** | | |
| **Short-term (0–12 months)** | • Facilitate e-bike distributors such as Rhingo, Roam Bike companies, and other green technology suppliers to extend asset-finance offers to youth, cooperatives, biogas systems, and e-bikes/tuk-tuks.<br>• Partner with MFIs and SACCOs to design financial solutions for green dairy equipment with cycle-aligned repayment. | Green technology suppliers (Rhingo, Roam Bikes)<br>Solar equipment providers |
| **Medium-term (1–3 years)** | • Build capacity of youth green technology businesses to expand from single-unit installation into networked service contracts with multiple cooperatives.<br>• Enhance access to capital by brokering relationships between cooperatives and lenders so that cooperatives can invest in solar chiller networks across farm gate, collection points, and bulking centres, and in solar mini-dairy processing facilities.<br>• Facilitate biogas-to-energy systems at cooperative collection points, with revenue from energy sales contributing to loan repayment.<br>• Engage commercial banks on opening ring-fenced green lending windows aligned with project financed taxonomy<br>• Strengthen capacity of cooperatives to expand climate-smart feed systems such as silage making, adoption of solar chuff cutters and fodder conservation to reduce feed costs. | Green technology suppliers<br>Youth installation enterprises<br>Cooperatives |
| **3. Access to finance** | | |
| **Short-term (0–12 months)** | • Facilitate MFIs and SACCOs to offer asset leasing for solar chillers, chuff cutters, biogas systems, and e-bikes, with repayment aligned to milk sales revenue.<br>• Engage dairy asset-finance lenders on lower collateral thresholds for the 18–35 age group.<br>• Support mobile money providers and lenders to develop working capital products for milk procurement, transport, and trade, scored on digital collection records.<br>• Connect women savings groups to MFI products and facilitate supplier credit arrangements between technology providers and cooperative purchasing groups. | MFIs<br>SACCOs<br>Mobile money providers<br>Technology suppliers |
| **Medium-term (1–3 years)** | • Support lenders to roll out receivables-backed lending against confirmed processor offtake, with automated repayment through processor payment systems.<br>• Enhance capacity of chiller financiers to offer pay-per-litre leasing repaid from milk sale deductions.<br>• Work with insurers to underwrite bundled livestock mortality and milk spoilage cover triggered by verified power outage or disease events.<br>• Link women dairy cooperatives to WEF, AFC Women's Window, and gender-lens funds.<br>• Engage commercial banks on opening ring-fenced green lending windows for solar mini-processing units. | Commercial banks<br>Women Enterprise Fund<br>AFC Women's Window<br>Insurance providers<br>Green finance facilities |

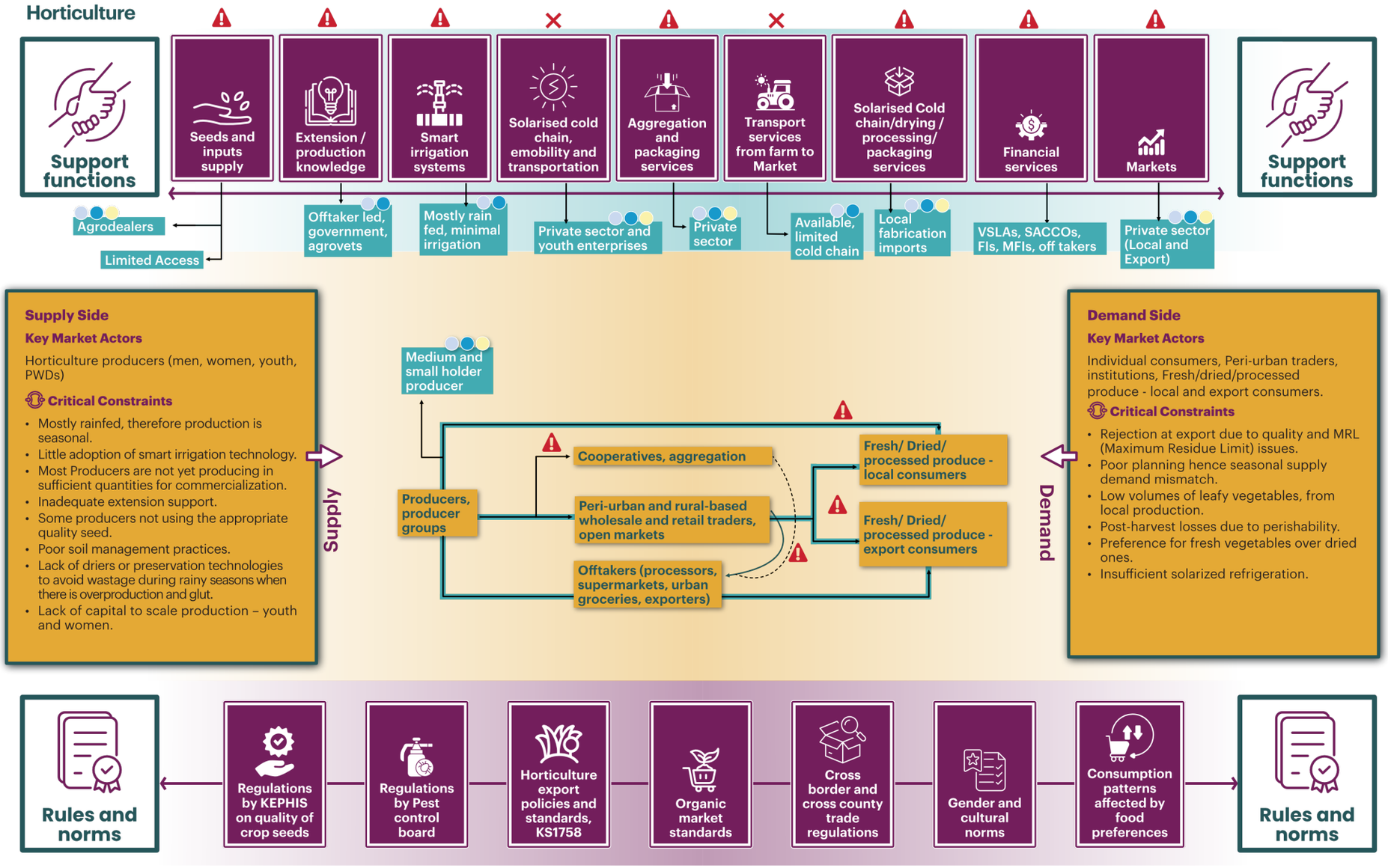
| Timeframe | Key Activities | Possible implementing partners |
|---|---|---|
| **4. Business development services** | | |
| **Short-term (0–12 months)** | • Connect Kenya Dairy Board extension officers, technology providers, and private trainers with cooperative clusters.<br>• Broker partnerships between green technology suppliers, financial institutions, and development agencies to bundle supply-and-finance packages. | Kenya Dairy Board<br>Technology providers<br>Private sector trainers |
| **Medium-term (1–3 years)** | • Enhance capacity of technology providers to bundle training with equipment sales as a commercially sustainable BDS model.<br>• Enhance capacity of youth green tech enterprises to embed training and maintenance advisory within service contracts. | Technology providers<br>Digital platforms<br>Youth enterprises |
| **5. Digital platforms and information systems** | | |
| **Short-term (0–12 months)** | • Partner with digital platform developers to deploy accessible milk collection tools for real-time volume, quality, payment, and logistics tracking at cooperative level.<br>• Incentivise developers to incorporate USSD short codes, voice prompts, and screen-reader support for PwD users. | Digital platform developers<br>Mobile money providers |
| **Medium-term (1–3 years)** | • Incentivise digital platforms and lenders through co-financing to integrate collection records into credit scoring methods for automated lending.<br>• Enhance capacity of platform-processor integration for automated repayment and contract management. | Mobile money providers<br>Processors<br>PFIs |
| **6. Social inclusion (cross-cutting)** | | |
| **Short-term (0–12 months)** | • Enhance capacity through co-financing of green technology enterprise streams: solar chiller installers, e-bike transport operators, digital collection agents to expand solutions offer to youth led enterprises in the rural areas<br>• Strengthen capacity of women groups to venture into value addition of milk products borrowing on successful models piloted by USTADI under the IFAD funded Boosting Youth Employment in Agribusiness (reference to Wazo Jema women group in Kilifi[21])<br>• Work with cooperatives on PwD-accessible roles in record keeping, quality grading, and market coordination. | Technology providers<br>All partners above<br>County governments |
| **Medium-term (1–3 years)** | • Support youth green tech businesses to scale into networked multi-cooperative service contracts.<br>• Connect youth-led cooperative processing hubs to processors and to WEF/AFC financing linkages.<br>• Enhance capacity of cooperatives to formalise PwD-specific roles and link savings group members to standard microcredit. | Women Enterprise Fund<br>AFC Women's Window<br>MFIs |

### 2.2.3. Horticulture market system

Horticulture contributes over KShs. 150 to 200 billion annually and more than 30% of agricultural GDP, making it one of Kenya's most important sectors. Kenya National Bureau of Statistics (KNBS) and the Ministry of Agriculture report primary horticultural crop production valued at KShs. 271 billion in 2024, covering 476,672 hectares with output of approximately 7,769,586 tonnes[22]. Exports from January to September 2025 reached 353,834 metric tonnes valued at KShs. 107.04 billion, a 12% rise in volume but a 5.5% fall in value year on year, driven by global headwinds.[23] Horticulture sustains over 5 million livelihoods, with young people prominent in aggregation, packaging, cold chain logistics and digital marketing[24].

21 https://ustadi.org/2022/03/17/wazo-jema-youth-group/
22 Horticultural Crops Directorate and KNBS (2025). Horticulture Exports Performance, January to September 2025.
23 Horticultural Crops Directorate and KNBS (2025). Horticulture Exports Performance, January to September 2025.
24 Kenya Horticultural Exporters Association of Kenya

*Graphic 3: Structure of the horticulture market system*




Mobility challenge was the primary characteristic of differently abled persons encountered in this research. This legend relies on that for positioning within market systems

### 2.2.3.1. Structure of the horticulture market system

The horticulture market system is a well organised network connecting farmers to local and export markets, offering dependable employment for women and young people at multiple nodes of the value chain. Apex bodies in the horticulture sector include the Fresh Produce Exporters Association of Kenya, the Kenya Flower Council, the Avocado Society of Kenya, the Association of Kenya Mango Traders, the Fresh Produce Consortium among others. These work with government and destination countries to secure favourable trade agreements, and with Kenya Plant Health Inspectorate Service (KEPHIS) and exporters to ensure export quality produce.

Farmers access seeds, fertilizers, irrigation equipment and greenhouses through private companies, cooperatives and government programmes. Financial services support investment; training enhances capabilities to operate modern equipment; cold storage and transport reduce post-harvest loss; market data platforms like MFarm inform pricing; and research from KALRO and ICIPE introduces climate resilient and disease resistant varieties. The system operates under quality, safety and sustainability standards, with informal community level practices (collective buying and selling groups, traditional knowledge and cultural preferences) further shaping demand.

### 2.2.3.2. Core functions

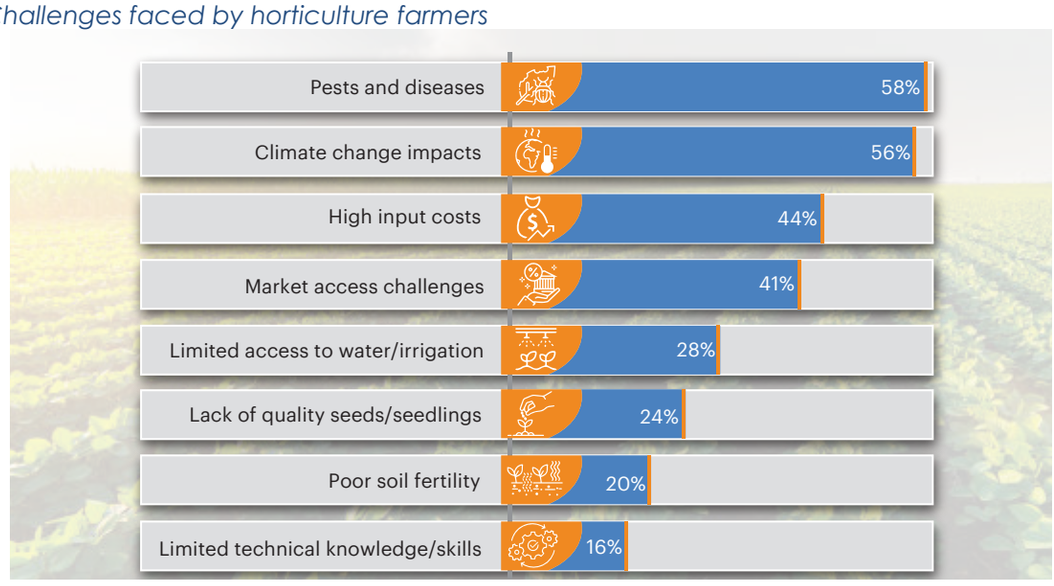
**Production**

Kenya's horticulture supply chain is relatively advanced catalysed by adoption of modern farming technology, skilled labour, increased per capita income and urbanisation. About 96% of horticultural crops are produced under rain fed conditions with low investment in irrigation infrastructure. Agriculture production data from 2024 and 2025 indicates a shift from open field cultivation toward drip irrigation, greenhouse farming and precision agriculture.

From the analysis, advanced techniques now support outputs of 10 to 20 tonnes per hectare for crops such as French beans and tomatoes, a substantial improvement and a vital factor in meeting domestic demand and restoring supply growth. Young people and women participate across most nodes of the value chain, including export. However, about 30% to 40% of produce is wasted; 20% to 25% during export (due to strict standards) and 15 to 20% locally (because of spoilage and poor handling). The agriculture production report (KNBS,2024) show that export wastage stands at 25% of total exports and local wastage up to 20%.

In addition to these constraints, horticulture producers reported pests and diseases (58%), impacts of climate change (56%), high cost of inputs among others. These challenges present opportunities to pilot integrated pest management solutions using green technologies and scaling solar powered irrigation to sustain production even with limited water availability..

*Figure 3: Challenges faced by horticulture farmers*




**Profitability analysis:**

Profitability analysis from the surveyed actors confirms the sector is profitable despite market volatility. A typical one-hectare operation generates KShs. 30,000 to 80,000 in net profit per cycle (annual revenues of KShs. 250,000 to KShs. 300,000), indicating strong performance driven by advanced management techniques (effective pest control, crop rotation, fertigation systems) and favourable conditions in counties such as Nakuru and Nyeri. Inputs (seeds, fertilizers) account for 60 to 70% of costs, which makes access to financing essential for profitability and scale. Investing KShs. 130,000 in a 5HP solar powered irrigation pump increases profitability by almost 50% by enabling an extra production cycle, a payback period of 2 to 3 harvests.[25]

25 GFYE Food Systems primary data (2026).

*Table 10: Comparative analysis of profitability of conventional vs solar powered irrigation of 1 ha of tomato production*

| Metric | Rainfed (1 cycle) | Solar irrigation (2 cycles) | Change |
|---|---|---|---|
| Production cycles per year | 1 | 2 | plus 1 |
| Annual production (tonnes) | 10 to 15 | 20 to 30 | plus 100% |
| Annual gross revenue (KShs.) | 250,000 to 300,000 | 500,000 to 600,000 | plus 100% |
| Equipment and inputs (KShs.) | 150,000 to 180,000 per cycle | 150,000 to 180,000 per cycle | |
| Total annual expenses (KShs.) | 220,000 to 280,000 | 440,000 to 560,000 | plus 100% |
| Annual net profit (KShs.) | 30,000 to 80,000 | 60,000 to 160,000 | approximately plus 50% |
| Solar pump capital expenditure (KShs.) | | 130,000 | Payback: 2 to 3 harvests |

### 2.2.3.3. Support functions

The sector is supported by varied support functions depending on the commodity. Across counties, government support extension services with technology providers extending distributorship of green technologies such as solar powered pumps, greenhouses through agent network. On produce aggregation, established exporters operate private pack-houses for packaging and grading.

### 2.2.3.4. Rules and policies

The regulatory backbone is the Agriculture Act and the Horticulture Crops Authority Act (mandatory commercial farm registration, approved growing methods and pest measures), the Food, Drugs and Chemical Substances Act (food safety) and KEBS specifications, notably KS 1758 (pesticide residues, grading, packaging and traceability). Agricultural officers monitor crops, enforce quarantines and run plant health programmes. Informal community practices, including collective equipment sharing, bulk purchasing and collective selling, yield tangible benefits, opening doors to certifications such as Global GAP, encouraging sound agronomic practices. Kenya has aligned with international Sanitary and Phytosanitary measures, EU carbon requirements and trade pacts such as Africa Growth and Opportunity Act (AGOA), strengthening its export position while supporting national goals for women, young people and climate resilient crops.

*Table 11: Constraints and opportunities in the horticulture market system*

| Constraint | Opportunity |
|---|---|
| Pest and disease outbreaks and limited modern equipment: yield losses of 20 to 30% in key crops | Modern equipment financing and training; input supply and pest management services led by young people, including drone-based monitoring |
| Climate impacts (drought, floods, high temperatures): affecting up to 50% of smallholder farms and reducing yields by 15 to 25% | Climate smart variety planting and solar powered irrigation pumps; innovation by young people in resilient farms, water efficient systems and digital monitoring apps |
| High equipment and input costs: inputs are 60% of expenses, limiting technology adoption | Collateral based input acquisition and piloting vendor financing models with leading technology providers |
| Limited value addition and market linkages: low revenue from raw produce only; post-harvest loss 30 to 40% | Processing and branding (juices, dried fruits); value addition enterprises led by young people and cold storage hubs/ fresh juice parlours |
| Access to finance and training: only 35% borrow; gaps in skills for export compliance | Youth friendly financing and extension; tailored SACCOs and mobile training apps on end market quality compliance |

*Table 12: Intervention for the Horticulture Market System*

| Timeframe | Key Activities | Possible implementing partners |
|---|---|---|
| **1. Value chain coordination and market access** | | |
| **Short-term (0–12 months)** | • Facilitate through co-financing cold room technology suppliers, MFIs, and anchor buyers (supermarkets, hotel chains, institutional caterers) to set up youth-run solar cold room aggregation hubs in high-density tomato and cabbage clusters.<br>• Engage certified seedling nurseries to enter bulk supply arrangements with cooperative clusters for improved seed/ varietal quality and lower per-seedling costs.<br>• Establish partnerships with youth e-bike logistics operators to run same-day harvest-to-hub delivery on fixed daily routes serving local farmer clusters. | Cold room technology suppliers<br>Certified seedling nurseries<br>Supermarkets, hotel chains<br>Institutional caterers |
| **Medium-term (1–3 years)** | • Facilitate medium-term supply arrangements between youth pack-and-grade enterprises and major retailers and institutions such as Naivas and county school feeding programmes.<br>• Engage digital platform operators in the agri-food system space such as M-Farm to establish digital buyer-matching platforms to scale on the back of Phase 1 transaction data (daily volumes, buyer preferences, seasonal price patterns).<br>• Strengthen capacity and co-finance women cooperatives to invest in dried vegetable and juice processing solar dryers, paste mills, juice extractors for shelf-stable, higher-margin products.<br>• Engage KEBS and women cooperatives on certification pathways and connect certified processors to retail buyers. | Naivas<br>County school feeding programmes<br>Hotels, QSR chains<br>KEBS |
| **Long-term (3–5+ years) Beyond GFYE Implementation Window** | • Strengthen capacity and co-finance lead firms/ anchor buyers to support the establishment Youth-owned aggregation, logistics, and pack-and-grade firms operating commercially at multi-county scale. | Multi-stakeholder platforms<br>National and county governments<br>Export agencies |
| **2. Green technology adoption** | | |
| **Short-term (0–12 months)** | • Facilitate solar cold room suppliers, drip irrigation providers, and e-bike companies to extend asset-finance offers to youth, women, and cooperative clusters.<br>• Support women-led bio-pesticide micro-enterprises to supply neem-based sprays, Trichoderma, and Bacillus thuringiensis products to nearby producers. | Solar cold room suppliers<br>Bio-pesticide input suppliers<br>E-bike providers |
| **Medium-term (1–3 years)** | • Incentivise through co-financing of cold room operators to expand into networks across additional production clusters.<br>• Facilitate access to finance for women cooperatives to invest in solar dryers, paste mills, and juice extractors for surplus produce.<br>• Facilitate expansion of solar drip irrigation into new cooperative clusters, bundled with agronomic advisory. | Solar technology suppliers<br>Processing equipment providers<br>Cooperatives |

| Timeframe | Key Activities | Possible implementing partners |
|---|---|---|
| **3. Access to finance** | | |
| **Short-term (0–12 months)** | • Facilitate MFIs and SACCOs to offer asset leasing for solar cold rooms and pumps, with repayment from per-kg service fee revenue.<br>• Support mobile money providers and lenders to develop trade credit for aggregators and e-bike operators, scored on digital transaction records.<br>• Connect women table banking groups to MFI products for certified seeds, bio-pesticides, and irrigation inputs.<br>• Engage KEBS and lenders on revolving fund arrangements for GlobalGAP certification, repaid from premium pricing on certified produce | MFIs<br>SACCOs<br>Mobile money providers<br>DFIs |
| **Medium-term (1–3 years)** | • Support lenders to pilot and deploy receivables-backed lending against supermarket and hotel purchase orders, with automated repayment.<br>• Enhance capacity of equipment financiers to offer pay-per-crate leasing repaid per crate processed.<br>• Identify, screen and connect youth and women processing cooperatives to WEF, AFC Women's Window, Youth Fund and Uwezo Fund credit windows. | Commercial banks<br>Women Enterprise Fund<br>AFC Women's Window<br>Youth Fund<br>Uwezo Fund<br>Insurance providers<br>DFIs |
| **4. Business development services** | | |
| **Short-term (0–12 months)** | • Incentivise through co-financing of cold room technology suppliers to bundle installation training and maintenance advisory with equipment. | Cold room technology providers |
| **Medium-term (1–3 years)** | • Explore partnerships with Digital platform providers to deploy financial solutions leveraging atypical financial behavioural patterns that farmers and MSEs exhibit.<br>• Engage private compliance consultants to scale KEBS certification support.<br>• Incentivise processing equipment providers through matching grants to bundle training with women cooperative equipment leasing. | Digital platforms<br>Private compliance consultants<br>Equipment providers |
| **5. Digital platforms and information systems** | | |
| **Short-term (0–12 months)** | • Partner with digital platform developers and aggregators to extend buyer-matching tools for hotels, school caterers, and supermarkets.<br>• Incentivise upstream buyers to adopt digital platforms to coordinate orders, e-bike pickups, and M-PESA payments while generating transaction data for credit scoring.<br>• Establish partnerships with developers to incorporate USSD and voice prompts for PwD users in the digital applications | Digital platform developers<br>Mobile money providers |
| **Medium-term (1–3 years)** | • Support digital buyer-matching platforms to scale on aggregated transaction data across multiple clusters.<br>• Enhance capacity of platforms and lenders to integrate transaction records into credit scoring for automated lending. | Mobile money providers<br>Supermarket chains<br>PFIs |

| Timeframe | Key Activities | Possible implementing partners |
|---|---|---|
| **6. Social inclusion (cross-cutting)** | | |
| **Short-term (0–12 months)** | • Engage youth across enterprise streams: aggregation hub operators, e-bike logistics, pack-and-grade entrepreneurs, and digital commerce coordinators.<br>• Work with aggregation hubs on accessible grading stations (adjustable tables, screen-reader-compatible recording) and digital platform roles for PwDs. | County governments |
| **Medium-term (1–3 years)** | • Support youth pack-and-grade enterprises to transition to supply contracts with supermarkets and institutional buyers.<br>• Connect youth/women-led processing cooperatives to WEF, AFC Women's Window, and Uwezo Fund. | Women Enterprise Fund<br>AFC Women's Window<br>Youth Fund<br>Uwezo Fund<br>MFIs |

### 2.2.4. Apiculture market system

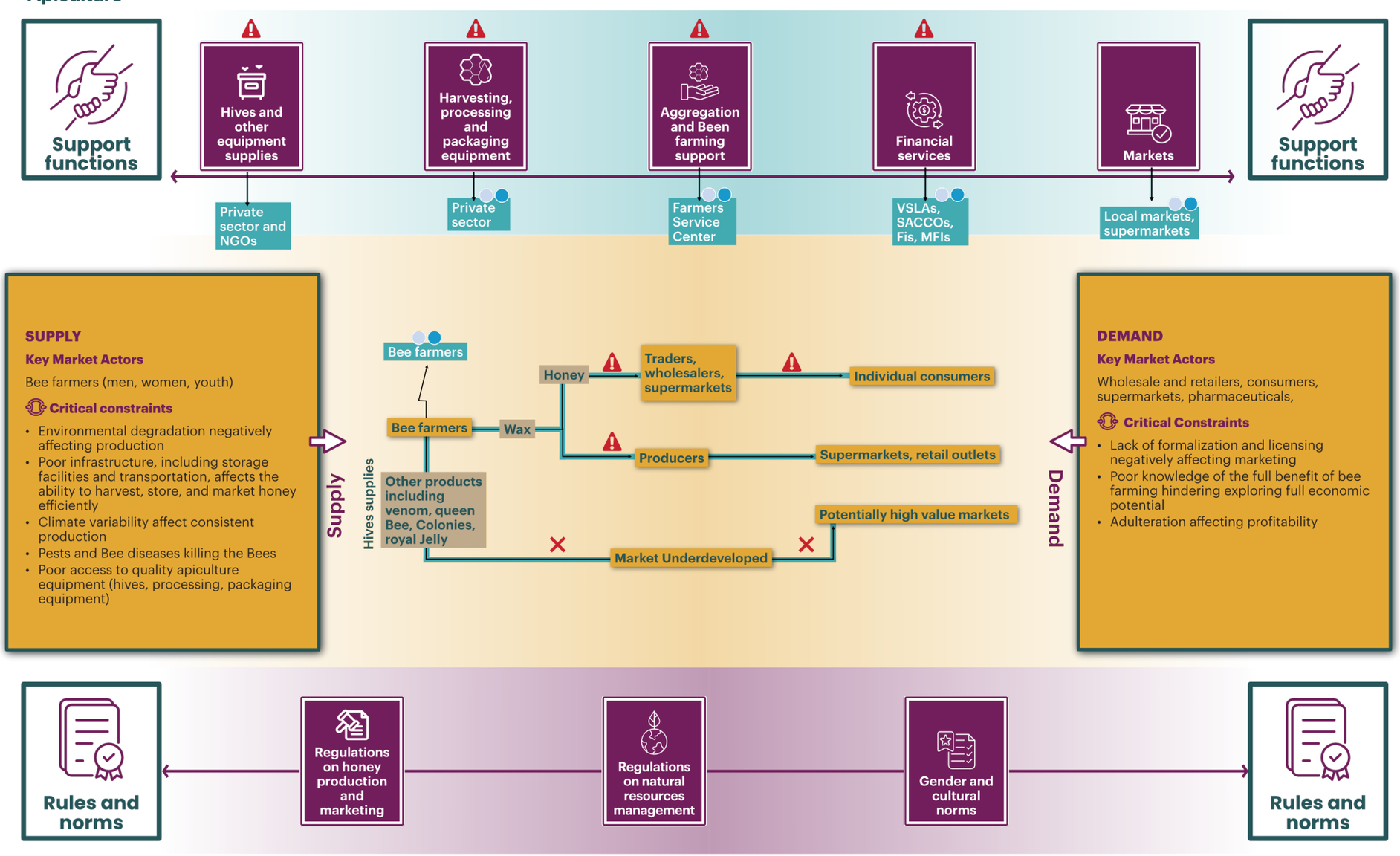
The potential for Kenyan beekeeping is significant, yet the sector remains constrained by an inability to scale production to meet demand. This gap represents opportunity for entrepreneurship and innovation by young people. The national demand for honey is estimated to approximately 25,000 metric tonnes annually while local production sits at around 19,500 metric tonnes, a shortfall bridged through imports[26].

The deficit is driven by rising urban consumption, a growing health-conscious consumer base and untapped honey export markets. Beyond honey, the sector offers diverse high value by-products such as beeswax and propolis, increasingly sought after in cosmetics, pharmaceuticals and food. Minimal land requirements and startup costs make beekeeping accessible, positioning it as an ideal sustainable venture for young people and women.

#### 2.2.4.1. Structure of the apiculture market system

The apiculture system operates through connected core functions: hive management and maintenance, strategic harvesting, product aggregation and bulking, processing and value addition, and distribution to consumers. This value chain handles the flow of honey, beeswax and other high value apiary products throughout the country. Supporting services include modern hives, quality queen bees and protective gear, finance, specialised training and extension, transport and logistics, market information and product development. The system is governed by formal regulations (quality standards, licensing, biosecurity) and informal models, including cooperative agreements, traditional harvesting practices passed down through generations, and strong cultural preferences for raw, natural honey.

*Graphic 4: Structure of apiculture market system*




Mobility challenge was the primary characteristic of differently abled persons encountered in this research. This legend relies on that for positioning within market systems

### 2.2.4.2. Core Functions

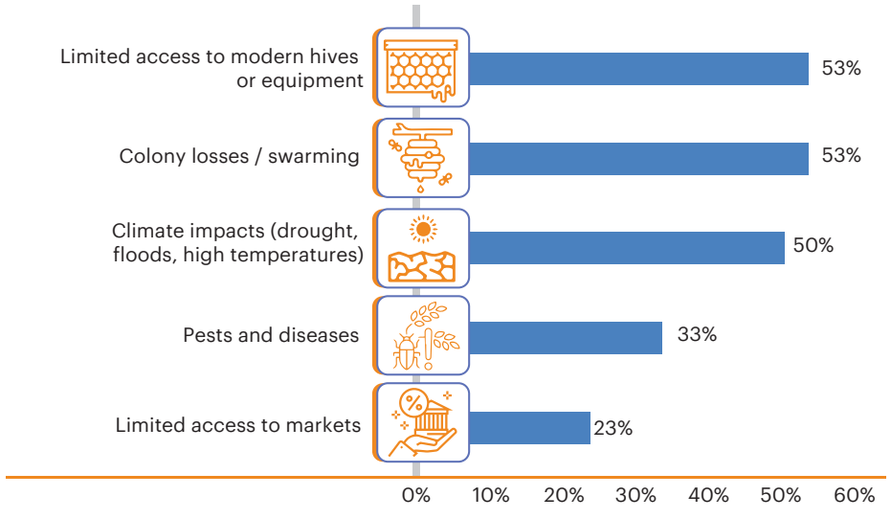
**Production** - Kenya's honey production is increasingly shifting to modern apiculture technology in order to address the supply deficit. Among the beekeepers surveyed, modern hive adoption has reached 73%, directly linked to improved output. These systems deliver a median yield of 10 kg per hive per season due to high colony capacity, a significant improvement over older methods that yield between 4-6kgs of honey per hive. This upgrade creates a clear entry point for young entrepreneurs: with improved management, semi commercial apiaries can be established on as little as 0.45 acres, with quality honey fetching up to KShs. 1,000 per kg.

**Profitability Analysis -** Analysis of apiculture producers confirms honey production is financially viable and profitable. A median operation of 20 hives generates seasonal net profit of KShs. 159,900 from median gross revenue of KShs. 200,000. Strong performance reflects effective modern hive management, good colony health and favourable environmental conditions in key producing counties. The average investment of KShs. 7,995 per modern hive over a season provides a strong return on investment. Hives and equipment represent 71% of total costs, the single largest expense, which makes access to capital essential for profitability.[27]

**Production challenges -** The common challenges cited by more than half of respondents, are colony losses and swarming, coupled with limited access to modern hives and equipment (53%). Environmental pressures also weigh heavily: 53% of producers report significant climate impacts. Additional constraints include pests and diseases (33%) and limited market access (23%). High colony loss emphasises the need for improved management techniques; equipment shortages signal demand for local manufacturing or hive supply enterprises; and climate change creates an opening for climate smart apiculture, including drought resistant floral resources for consistent feed and water conservation systems to provide safe hydration.

Income generating opportunities also lie in value addition: processing beeswax and propolis into higher value products for cosmetics and pharmaceuticals creates new business models and diversified revenue streams, ultimately fostering a more resilient, sustainable and profitable industry that attracts youth and women.

*Figure 4: Challenges faced by honey producers*




### 2.2.4.3. Support functions and policies

Inputs, extension and information. Modern Langstroth hives and protective gear are delivered through private companies, cooperatives and county programmes, directly enabling the 73% modern hive adoption rates. Training and extension reach 64.5% of beekeepers through KALRO climate smart Training of Trainers manuals, the M-kulima digital platform, county agricultural officers and development institutions such as Practical Action, covering colony management, disease control and value addition. Transport and logistics support aggregation and delivery, mainly to local markets and consumers. Producers also benefit from digital weather alerts, market price updates and research from KALRO and ICIPE on pollination and resilient forage.

### 2.2.4.4. Rules and norms

Formal regulation rests on the Livestock (Bee Industry) Regulations 2023 and the Beekeeping Act 2002 (apiary registration for commercial operations and biosecurity), the Food, Drugs and Chemical Substances Act (food safety) and KEBS standards, notably Kenya Standard and East African Standard KS EAS 36:2020, which specifies honey standards by bee species, intended use and additives, alongside beeswax standards and

26 https://repository.kippra.or.ke/items/e272ec45-37dd-4c3b-9f6a-af3a8c7d7194

comprehensive labelling rules supporting domestic and export compliance.[28][29] Veterinary services under the State Department for Livestock Development oversee disease control and colony health. Informal models continue to shape day to day practice, including cooperative shared harvesting and collective marketing, traditional practices prevalent in Western Kenya (especially Kakamega and Bungoma) and community-based stewardship ensuring sustainable forage access. The regulatory framework aligns with international Sanitary and Phytosanitary standards, supporting export access and advancing national goals for inclusion of young people and women and for climate adaptation.

*Table 13: Constraints and opportunities in the apiculture market system*

| Constraint | Opportunity |
|---|---|
| Colony losses and swarming and limited modern hives: major constraints on yield stability | Modern hive financing and training; equipment supply and colony management services led by young people |
| Climate impacts (drought, floods, high temperatures): increasing vulnerability | Climate smart forage planting and solar powered tools; innovation by young people in resilient apiaries and digital monitoring |
| High equipment and input costs: barrier to scaling for small producers | Affordable hive kits and cooperatives; group purchasing and input supply chains led by young people |
| Limited value addition and market linkages: low revenue from raw honey only | Processing and branding (beeswax, propolis); value addition enterprises led by youth and women |
| Access to finance and training: slow adoption of best practices | Youth friendly financing and extension; tailored SACCOs, grants and mobile training apps |

*Table 14: Intervention for the Apiculture Market System*

| Timeframe | Key Activities | Possible implementing partners |
|---|---|---|
| **1. Value chain coordination and market access** | | |
| **Short-term (0–12 months)** | • Facilitate scale of aggregation networks that work, drawing in youth-run centres to bulk honey from registered beekeepers with extraction, filtering, and branded packaging.<br>• Support hive manufacturers to expand their distribution networks through youth Langstroth retail shops in beekeeping counties to close the equipment access gap.<br>• Facilitate buyer linkages with lead offtakers such as Naivas, health food retailers, honey exporters, and pharmaceutical buyers sourcing propolis.<br>• Map out and enter into partnership with established honey/ biproducts value addition enterprises to mentor women-led cosmetics enterprises producing candles, lip balms, skin creams, wood polish, and propolis tinctures and facilitate market linkages. | Savannah Honey<br>Honey Care Africa<br>African Beekeepers Limited<br>Hive manufacturers<br>Supermarket chains<br>Pharmaceutical buyers |
| **Medium-term (1–3 years)** | • Support youth aggregation centres to scale beekeeper coverage and add extraction, bottling, and labelling capacity.<br>• Broker medium-term supply arrangements with lead off takers such as Naivas and other supermarkets, with receivables underpinning working capital.<br>• Engage KEBS and women cosmetics enterprises on certification, standardised product lines, and supply arrangements with cosmetics distributors, pharmacy chains, and hotel amenity suppliers.<br>• Facilitate quality certification KEBS honey standards, organic and fair-trade for premium upstream market positioning | Naivas<br>Cosmetics distributors<br>Pharmacy chains<br>Hotel amenity suppliers<br>KEBS |
| **2. Green technology and climate alignment** | | |
| **Short-term (0–12 months)** | • Engage KIRDI and KALRO to enhance capacity of women micro-enterprises to pilot and roll out low-energy, home-based by-product processing kits wax melters, moulds, and bottling kits. | KIRDI<br>KALRO apiculture division<br>County governments |

27 GFYE Food Systems Analysis primary data (2026)

| Timeframe | Key Activities | Possible implementing partners |
|---|---|---|
| **Medium-term (1–3 years)** | • Working through TSPs, support beekeepers and apiary managers to adopt climate-smart practices seasonal calendars, pest-resistant colony genetics, shade and windbreak infrastructure. | Processing equipment suppliers<br>County governments |
| **3. Access to finance** | | |
| **Short-term (0–12 months)** | • Facilitate MFIs and SACCOs to offer hive leasing for Langstroth starter kits, with repayment aligned to seasonal honey revenue.<br>• Work with mobile money operators and lenders to develop working capital solutions for aggregators purchasing honey before selling to formal buyers, scored on digital transaction records.<br>• Connect women savings groups to MFI products for processing equipment.<br>• Support 30–60-day trade credit arrangements between hive manufacturers and youth input retailers, with cooperatives co-signing.<br>• Engage DFIs on a first-loss facility on apiculture MSE portfolios to generate default and repayment data for commercial pricing. | MFIs<br>SACCOs<br>Hive manufacturers<br>Mobile money providers<br>DFIs |
| **Medium-term (1–3 years)** | • Support lenders to roll out value chain finance against confirmed supermarket and exporter purchase orders, with automated repayment through buyer systems.<br>• Encourage equipment financiers to offer lease-to-own contracts for processing equipment.<br>• Work with insurers to underwrite colony loss insurance bundled with credit, triggered by county veterinary or agricultural officer reports.<br>• Connect women by-product cooperatives to WEF, AFC Women's Window, and Uwezo Fund to them access funding for business expansion<br>• Engage DFIs on partial credit guarantees declining over time at commercial fees. | Commercial banks<br>Women Enterprise Fund<br>AFC Women's Window<br>Uwezo Fund<br>Insurance providers<br>AFC/DFIs |
| **4. Business development services** | | |
| **Short-term (0–12 months)** | • Establish partnership with KALRO apiculture division, and experienced commercial beekeepers to offer hive management as a paid technical service to youth and cooperatives.<br>• Support youth input supply shops to act as BDS nodes; market information, service provider referrals, and buyer linkages.<br>• Broker quality standard alignment between aggregation enterprises and formal buyers. | KALRO apiculture division<br>Commercial beekeepers<br>Hive manufacturers |
| **Medium-term (1–3 years)** | • Facilitate youth hive management enterprises to expand across more clients per technician.<br>• Contract private compliance consultants to offer KEBS, organic, and fair-trade certification navigation. | Private compliance consultants<br>Marketing/branding firms<br>KEBS |
| **5. Digital platforms and information systems** | | |
| **Short-term (0–12 months)** | • Partner with digital platform developers to roll out transaction recording tools for aggregation enterprises volumes purchased, beekeepers served, buyer sales, M-PESA payments.<br>• Enhance capacity of partner MFIs to use transaction data for working capital credit scoring on aggregators. | Digital platform developers<br>Mobile money providers |

28 Republic of Kenya (2023). Livestock (Bee Industry) Regulations, 2023; Beekeeping Act, 2002.
29 Kenya Bureau of Standards. KS EAS 36:2020, Honey Specification (East African Standard).

| Timeframe | Key Activities | Possible implementing partners |
|---|---|---|
| **6. Social inclusion (cross-cutting)** | | |
| **Short-term (0–12 months)** | • Working through TSPs, strengthen capacity of youth to deliver demand-driven services provision across enterprise streams-these include; hive management technicians, honey aggregators, input supply retailers, and e-bike logistics operators.<br>• Strengthen capacity of youth groups and home-based beeswax and propolis micro-enterprises to formalise business operations and upgrade quality of the products<br>• Work with aggregation centres to expand access to honey grading stations (moisture meters with audio readouts, colour charts with tactile markers) and PwD digital platform roles. | All partners above<br>County governments |
| **Medium-term (1–3 years)** | • Engage KEBS and youth-led cosmetics enterprises on formalisation, with WEF, AFC, and Uwezo Fund linkages.<br>• Provide technical assistance to aggregation enterprises to formalise PwD digital marketplace roles as paid positions. | Women Enterprise Fund<br>AFC Women's Window<br>Uwezo Fund<br>MFIs |

### 2.2.5. Fisheries & Aquaculture market system

Kenya's Fisheries & Aquaculture sector present untapped opportunities for youth employment and food system transformation. Annual Fisheries & Aquaculture demand is approximately 500,000 MT against domestic production of around 160,000 MT, leaving a deficit of about 340,000 metric tonnes that is currently bridged by imports. Lake Victoria cage aquaculture contributes 76.4% of national farmed Fisheries & Aquaculture output, with Kisumu as the commercial hub[30]. The sector's diverse green technology portfolio, combined with strong demand and well documented profitability presents attractive business case for GFYE investment.

#### 2.2.5.1. Structure of Aquaculture Market System

Kenya's aquaculture and fisheries sector operate through an interconnected system linking input supply, production, processing, and distribution to local and export markets. The sector is supported by access to fingerlings, feeds, financial services, training, cold chain infrastructure, digital market platforms, and research institutions such as Kenya Marine and Fisheries Research Institute and Kenya Agricultural and Livestock Research Organization, which promote improved and climate-smart technologies. The industry is guided by key policy frameworks including the Fisheries Development and Management Act 2016, National Aquaculture Policy 2025, and the National Blue Economy Strategy 2025–2030, alongside cooperative and community-based market systems.

#### 2.2.5.2. Core functions

**Production**

Kenya's fisheries and aquaculture sector is largely dominated by smallholder producers engaged in pond-based aquaculture, cage fish production, and artisanal fisheries, all of which contribute significantly to rural livelihoods, employment, and food security. The sector supports approximately 2.5 million people for their livelihoods in Kenya[31]. This includes fishers, traders, processors, smallholder farmers, and their dependents. Primary data shows that aquaculture farmers own between 1-2 ponds whereas cage producers operate an average of two cages. Production cycles range between 7-12 months depending on the feeding cycles- availability of quality floating feeds can shorten the production cycle by a month.

**Profitability Analysis Land-Based Pond Aquaculture**

The land-based aquaculture and caged production are both profitable. From the primary data, pond aquaculture generates a return on investment of 127%, cage aquaculture 135% . Feed costs are the single biggest constraint, cited by 87% of producers, and represent 52 to 57% of total costs. A typical pond-based operation harvests 1,000 kg per 7-month cycle, generating gross revenue of KShs. 200,000. With total production costs of KShs. 88,000, the enterprise realizes a net profit of KShs. 112,000, yielding a Return on Investment (ROI) of 127%.

Substituting conventional feeds with alternative home-based formulated feeds such as Black Soldier Fly (BSF) protein reduces feed costs by 40%, from KShs. 50,000 to KShs. 30,000 per cycle. This single intervention lowers total production costs from KShs. 88,000 to KShs. 68,000 (–23%), increasing net profit from KShs. 112,000 to KShs. 132,000 (+18%). The ROI improves dramatically from 127% to 194% (+67% points), making BSF feed substitution viable.

*Table 15: Profitability analysis of pond/cage-based production systems*

| Metric | Pond (7 mo) | Pond + BSF | Cage (8–12 mo) | Cage + BSF |
|---|---|---|---|---|
| | Conventional | With BSF Feeds | Conventional | With BSF Feeds |
| **Production & Revenue** | | | | |
| Harvest / cycle | 1,000 kg | 1,000 kg | 1,250 kg | 1,250 kg |
| Selling price (KSHS/kg) | 200 | 200 | 200 | 200 |
| **Gross revenue** | **200,000** | **200,000** | **250,000** | **250,000** |
| **Production Costs (KShs.)** | | | | |
| Feeds | 50,000 (57%) | **30,000 (44%)** | 55,500 (52%) | **33,300 (40%)** |
| - BSF feed saving | — | **–20,000 (–40%)** | — | **–22,200 (–40%)** |
| Labour | 20,000 (23%) | 20,000 (29%) | 20,000 (19%) | 20,000 (24%) |
| Fingerlings | 15,000 (17%) | 15,000 (22%) | 28,500 (27%) | 28,500 (34%) |
| Other | 3,000 (3%) | 3,000 (4%) | 2,200 (2%) | 2,200 (3%) |
| **Total costs** | **88,000** | **68,000** | **106,200** | **84,000** |
| **Profitability** | | | | |
| **Net profit** | **112,000** | **132,000** | **143,800** | **166,000** |
| **ROI** | **127%** | **194%** | **135%** | **198%** |

**Key Insight:** BSF (Black Soldier Fly) feed substitution reduces feed costs by 40%, cutting total production costs from KShs. 88,000 to KShs. 68,000 (–23%). Net profit rises from KShs. 112,000 to KShs. 132,000, and ROI improves from 127% to 194% (+67%age points).
BSF alternatives, bulk sourcing & working capital for 7-month cycles are critical for sustained profitability.

### Cage-Based Aquaculture Production

Cage culture has emerged as the dominant driver of aquaculture expansion in Kenya since the mid-2010s, with rapid growth in Lake Victoria counties. A survey of 30 cage farmers reveals that a typical operation runs with an average of one cage at an optimal stocking capacity of 4,500 fish, producing approximately 1,250 kilograms per harvest cycle across an 8–12-month production period. Fish are sold at an average price of KShs. 200 per kilogram, generating gross revenue of KShs. 250,000 per cycle. Feed accounts for 52% of total production costs at KShs. 55,500, followed by fingerlings at 27% (KSHS 28,500) and labour at 19% (KSHS 20,000), bringing total production costs to KShs. 106,200. This yields a net profit of KShs. 143,800 and an ROI of 135%, reflecting the high profitability potential of cage systems.

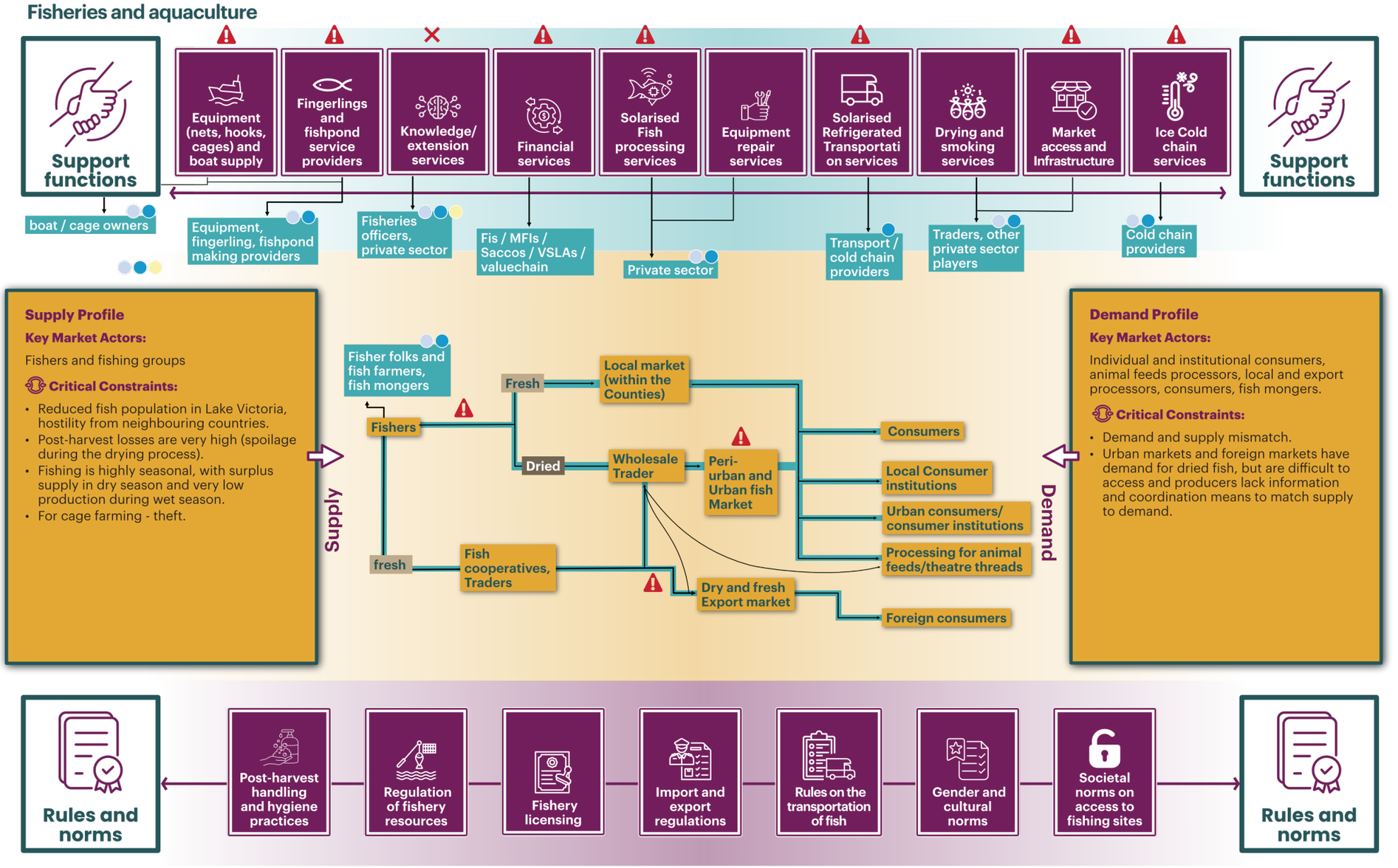
The data confirms that feed is the dominant expense across both production systems, signalling clear opportunities for feed optimization, bulk procurement, or sourcing locally manufactured alternatives to improve margins. The relatively long harvest period of 8–12 months in cage culture underscores the importance of working capital planning to manage ongoing costs before revenue is realized. With strong ROI, cage farming represents a lucrative avenue for youth and smallholder farmers seeking sustainable income, particularly if investment is made in increasing cage numbers, improving fingerling quality, and enhancing water management practices.

### Production Challenges

Despite its promise, Kenya's aquaculture sector faces a combination of input, technical, and market-related challenges that constrain profitability and scalability. The most significant constraint is high feed costs,

30 Kenya National Bureau of Statistics (2024); Kenya Marine Fisheries Research Institute (2025)

*Graphic 5: Structure Fisheries and aquaculture market system*

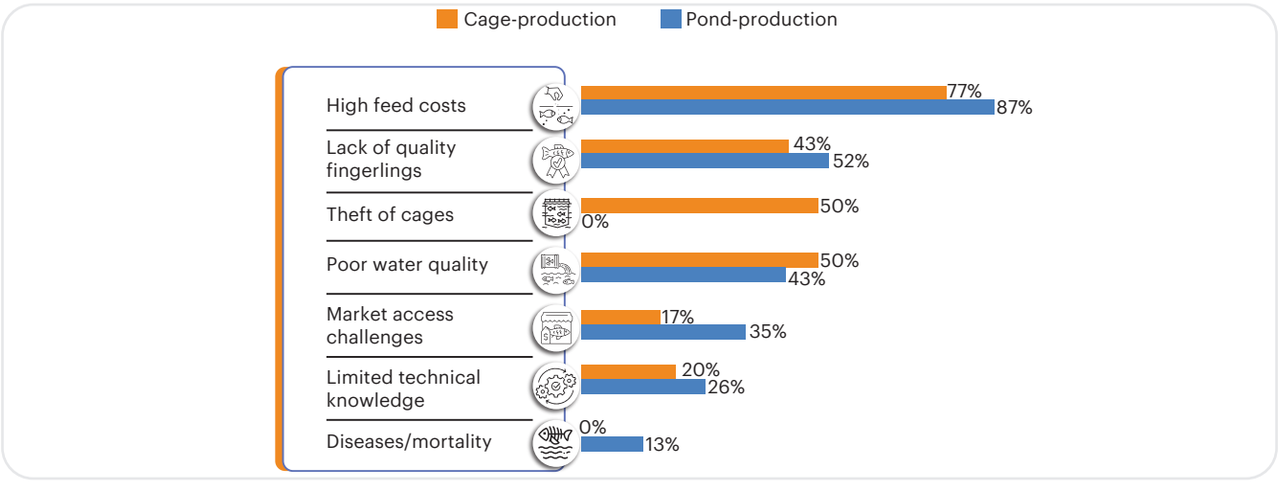



Mobility challenge was the primary characteristic of differently abled persons encountered in this research. This legend relies on that for positioning within market systems

cited by 87% of land-based producers and 77% of cage farmers. Feed dominates production expenses across all enterprise types, limiting both profit margins and the capacity to expand. County governments could address this by implementing feed subsidy programmes modelled on the Kakamega initiative, where feeds are procured in bulk and retailed to farmers at reduced rates, complemented by promotion of on-farm feed formulation using Black Soldier Fly larvae and Azolla, and by establishing youth-run feed milling cooperatives.

Lack of quality fingerlings affects 52% of land-based producers and 43% of cage farmers, directly undermining fish survival rates and growth performance. Poor water quality, cited by 43% of land-based producers, further exacerbates disease susceptibility and reduces yields. On the market side, limited access to buyers affects 35% of producers, creating post-harvest losses and income instability. These market gaps highlight deficiencies in aggregation infrastructure, cold chain logistics, and market linkages. Limited technical knowledge constrains the adoption of modern practices for 26% of producers, while disease and mortality events (13% of cases) undermine consistent harvests across both production systems.

*Figure 5: Constraints faced by fish producers*




Collectively, these challenges demonstrate that sustainable aquaculture enterprises require not only financial support but targeted interventions spanning feed management, hatchery improvement, water quality monitoring, technical training, and market facilitation. Addressing these interlinked constraints can enhance production efficiency, stabilize incomes, and build a more resilient sector capable of supporting youth employment and broader food security.

### Fish Trading

Interviews conducted with 53 fish traders reveal a highly profitable trading enterprise. The fish business generates gross revenue of KShs. 100,000 per month, with total expenses of KShs. 28,000 covering transport (KSHS 9,000), labour (KSHS 9,000), packaging and processing (KSHS 5,000), and other miscellaneous costs (KSHS 5,000). This yields a net profit of KShs. 72,000 per month, a profit margin of 72%. With monthly expenses as the investment base, the ROI reaches approximately 257%, meaning that for every KShs. 1 spent, the trader earns approximately KShs. 2.57 in profit. Sustained over a full year, the business generates an estimated annual net profit of KShs. 864,000, highlighting significant profitability and scaling potential. The major cost drivers are transport and labour, each constituting roughly a third of total expenses, suggesting that cost optimization in logistics, such as aggregation models and route consolidation, could further improve returns.

## 2.2.5.3. Support Functions

**Input Supply & Extension services:** The performance of Kenya's aquaculture supply chain depends on a network of support services addressing producers' needs at every production stage. Input provision, encompassing quality fingerlings, commercial feeds, aeration systems, and pond construction materials, is delivered through private agro-dealers, KMFRI research stations, and county government programs. This setup, however, remains inadequate: the current supply of 50 million fingerlings leaves an annual deficit of 100 million, while the feed deficit stands at 50,000 metric tonnes.

### Hatchery Operators

A typical fingerling hatchery produces approximately 12,000 fingerlings per five-month production cycle, sold at an average price of KShs. 10 per fingerling, generating gross revenue of KShs. 120,000 per cycle. Feed is the primary cost driver at 77% of total production costs (KSHS 40,000), followed by labour at KShs. 10,000 (19%) and other miscellaneous expenses at KShs. 2,000 (4%), bringing total production costs to KShs. 52,000. This yields a net profit of KShs. 68,000 per cycle and an ROI of 130%, demonstrating that hatcheries are highly profitable even at modest scales. Hatcheries also benefit from shorter production cycles compared to grow-out operations, enabling faster cash turnover and reinvestment.

31 https://kefs.go.ke/sites/default/files/National%20Aquaculture%20Development%20Plan%20and%20Strategy%202025.pdf

*Table 16: Profitability analysis of hatchery operators*

| Number of fingerlings raised per 5-month cycle | 12,000 | |
|---|---|---|
| Average selling price per fingerling (KShs.) | 10 | |
| Gross revenue from fingerlings per cycle | 120,000 | |
| Costs of production | | **Cost contribution** |
| • Feeds (KShs.) | 40,000 | 77% |
| • Labour (KShs.) | 10,000 | 19% |
| • Other (KShs.) | 2,000 | 4% |
| Total Hatchery Cost | 52,000 | |
| Net Profit | 68,000 | |

Feed efficiency is the key determinant of hatchery profitability, with strong opportunities to further reduce costs through improved feed management or use of lower-cost alternative inputs. Overall, fingerling production offers a high-margin, scalable entry point into aquaculture for youth and smallholder entrepreneurs, while simultaneously supporting the wider sector by supplying quality stock to grow-out ponds and cage operations.

**Green technology priorities.** Solar freezers are the most demanded technology (40% of respondents) and polyvinyl cages that drive cage culture expansion. Other technologies include Biofloc systems to recycle water and reduce discharge and solar aeration for stabilising dissolved oxygen. Cooler trucks are best deployed as cooperative shared fleets[32]. The 7-to-12-month cash flow gap between input investment and harvest is the longest of any priority sector, making conventional monthly repayment products unsuitable. Patient capital with grace periods, structured around harvest cycles, is required.

Available digital aquaculture platforms in Kenya, such as AquaRech, integrate mobile apps, data analytics, and financing to support farmers. They enable farmers to order inputs, access credit, monitor production, and link to markets. Such systems provide opportunities for lenders to access useful data for alternative credit scoring in place of traditional physical collaterals.

### 2.2.5.4. Rules, Norms, and Policies

Kenya's aquaculture and fisheries sector operate within a combination of formal regulatory frameworks and community-based practices that shape production, trade, and resource management. Key policies including the Fisheries Management and Development Act 2016, National Aquaculture Policy 2025, and the National Blue Economy Strategy 2025–2030 provide guidelines on licensing, fish health, environmental management, and food safety, while also promoting youth inclusion and green jobs. However, implementation challenges persist due to uneven enforcement, high compliance costs, expensive imported feeds, and weak sector coordination. At the same time, informal systems such as collective pond management, group feed procurement, and traditional fish processing continue to play an important role in supporting smallholder producers and local fish trade.

*Table 17: Constraints and opportunities in Fisheries & Aquaculture*

| Constraint | Opportunity |
|---|---|
| High feed costs (87% of land-based producers; 57% of expenses) | On farm feed production via youth led milling cooperatives; BSF larvae and Azolla farming up to 40% cost reduction |
| Poor fingerling quality and supply gaps (52% of producers; 100 million annual deficit) | Hatchery entrepreneurship: hatcheries run by young people (130% ROI); |
| Poor water quality and disease (43% land based, 50% cage) | Solar aeration, dissolved oxygen sensors and biofloc systems to stabilise water quality and reduce mortality |
| Limited market access and cold chain gaps (only 35% with reliable buyers) | Cold chain (solar freezers KShs. 87,500), mobile Fisheries & Aquaculture trading platforms and aggregation centres connecting to premium markets |
| Limited technical knowledge and financing (26% knowledge gaps; only 4% of TVETs offer aquaculture) | Youth friendly financing and tailored trainings offered by TVETS; digital training applications and sector specific credit design |

*Table 18: Intervention for Aquaculture/Fisheries Market System*

| Timeframe | Key Activities | Possible implementing partners |
|---|---|---|
| **1. Value chain coordination and market access** | | |
| **Short-term (0–12 months)** | • Facilitate digital platform providers such as Aquarech Ltd to expand its digital platform reach into additional counties and onboard more producers.<br>• Support hatchery operators in partnership with Kenya Marine Fisheries Research Institute (KEMFRI) to expand fingerling production through youth-run hatcheries, easing the national fingerling deficit.<br>• Partner with alternative feed production enterprises such as Hydrovictoria to scale BSF and Azolla feed enterprises supplying nearby producers below commercial prices.<br>• Support women fish trading groups to transition to clean-energy kilns, to replace firewood usage in fish frying. | Aquarech Ltd<br>Hatchery technical partners<br>KEMFRI<br>Hydrovictoria (BSF model)<br>Kiln suppliers |
| **Medium-term (1–3 years)** | • Strengthen capacity of youth feed milling to expand feeds production, with pooled BSF/Azolla production feed hubs<br>• Establish formal medium-term supply arrangements with upstream buyers including supermarkets, hotels; receivables underpin value chain finance. | Supermarket chains<br>Hotels, export buyers<br>TVET authorities<br>Feed cooperatives |
| **2. Green technology adoption** | | |
| **Short-term (0–12 months)** | • Facilitate solar equipment suppliers to extend asset-finance offers for solar aeration systems, solar freezers, and clean-energy smoking kilns to pond, cage, and processing operators.<br>• Partner with feed producers such as Hydrovictoria to expand BSF larvae production as an organic feed alternative replacing imported commercial feed. | Solar equipment suppliers<br>BSF/Azolla input suppliers<br>Kiln manufacturers |
| **Medium-term (1–3 years)** | • Support youth cold chain operators to expand interconnected solar networks of freezers and cooling boxes from pond to market.<br>• Partner with solar cooling box suppliers to expand access and uptake among mobile traders and temporary market storage operators on flexible payment plans such as rent to own models<br>• Facilitate cage manufacturers to extend asset finance for modern cage systems supporting Lake Victoria expansion. | Solar technology suppliers<br>Cage manufacturers<br>Youth installation enterprises |
| **3. Access to finance** | | |
| **Short-term (0–12 months)** | • Facilitate MFIs and SACCOs to offer asset leasing for cages, pond construction, and aeration equipment with repayment aligned to 7–12-month harvest cycles.<br>• Partner with mobile money providers and lenders to develop 7–12-month revolving credit for feed, fingerlings, and operations, scored on transaction data such as Aquarech<br>• Broker 30–60-day trade credit arrangements between feed manufacturers, fingerling hatcheries, and cooperative purchasing groups. | MFIs<br>SACCOs<br>Mobile money providers<br>Aquarech Ltd<br>AFC/DFIs |

32 Kenya Marine and Fisheries Research Institute (KMFRI). Aquaculture research and hatchery support documentation.

| Timeframe | Key Activities | Possible implementing partners |
|---|---|---|
| **Medium-term (1–3 years)** | • Support lenders to roll out value chain finance against confirmed supermarket and exporter purchase orders, with alternative data e.g Aquarech as transaction verification.<br>• Strengthen capacity of financiers to offer pay-per-harvest leasing repaid per kg harvested at aggregation centre settlement.<br>• Work with insurers to underwrite fish mortality cover for disease, water quality events, and extreme weather, bundled with credit.<br>• Connect youth/women fish processing cooperatives to WEF, AFC Women's Window, and Youth/ Uwezo Fund. | Commercial banks<br>Women Enterprise Fund<br>AFC Women's Window<br>Uwezo Fund<br>Youth Fund<br>Insurance providers<br>AFC/DFIs |
| **4. Business development services** | | |
| **Short-term (0–12 months)** | • Connect youth feed enterprises with BSF/Azolla cultivation protocols from KALRO research in partnership with existing feed producers such as Hydrovictoria.<br>• Broker quality standard alignment between aggregation enterprises and formal buyers. | KALRO<br>Hydrovictoria<br>Aquaculture technical partners<br>Equipment suppliers |
| **Medium-term (1–3 years)** | • Strengthen capacity of equipment suppliers to bundle installation training and maintenance advisory with leasing. | TVET authorities<br>Private compliance consultants<br>Equipment suppliers |
| **5. Digital platforms and information systems** | | |
| **Short-term (0–12 months)** | • Partner with technology providers such as Aquarech Ltd to expand mobile-based input supply, harvest aggregation, and market linkage tools to producers in additional counties.<br>• Strengthen capacity of partner MFIs to use alternative transaction data (e.g Aquarech production volumes, sales records, M-PESA payments) for producer and aggregator credit scoring.<br>• Incentivise digital platform providers such as Aquarech to incorporate USSD short codes and voice prompts for PwD users entering fish grading data. | Aquarech Ltd<br>Mobile money providers<br>Digital platform developers |
| **6. Social inclusion (cross-cutting)** | | |
| **Short-term (0–12 months)** | • Engage youth across enterprise streams: hatchery operators, BSF and Azolla feed entrepreneurs, cold chain operators, technical service providers, and digital platform agents.<br>• Support youth groups, clean-energy fish smoking enterprises, and BSF bulking on the working models such as Hydrovictoria model.<br>• Work with aggregation enterprises and market actors such as Aquarech on accessible fish grading stations and digital platform roles for PwDs. | All partners above<br>County governments |
| **Medium-term (1–3 years)** | • Support youth feed cooperatives, aggregation enterprises, and technical service businesses to scale to county level, working with youth and women as last mile distributors and service providers. | Women Enterprise Fund<br>AFC Women's Window<br>Uwezo Fund<br>MFIs |

## 2.3. Skills and Labor Demand in Green Value Chains

Skills development for young people in Kenya's agri-food systems faces a range of structural barriers that limit both participation and employment outcomes. The analysis assessed skills requirements across three dimensions: (1) training offered by higher learning institutions, government programmes, and other initiatives; (2) skills demanded by employers; and (3) the aspirations of youth, women, and persons with disabilities to meaningfully engage in the agri-food systems.

### 2.3.1. Gaps in Training Coverage

Available formal training focuses mainly on production related aspects and agribusiness skills, while marketing, aggregation, logistics, processing, and digital services receive limited attention. A particularly important gap exists in green technology training, where TVETs offer general trainings, such as electrical installations without specialisation in the installation and maintenance of renewable energy appliances such as solar powered pumps, milk chillers, solar incubators, deep freezers which are increasingly important across modern agricultural value chains.

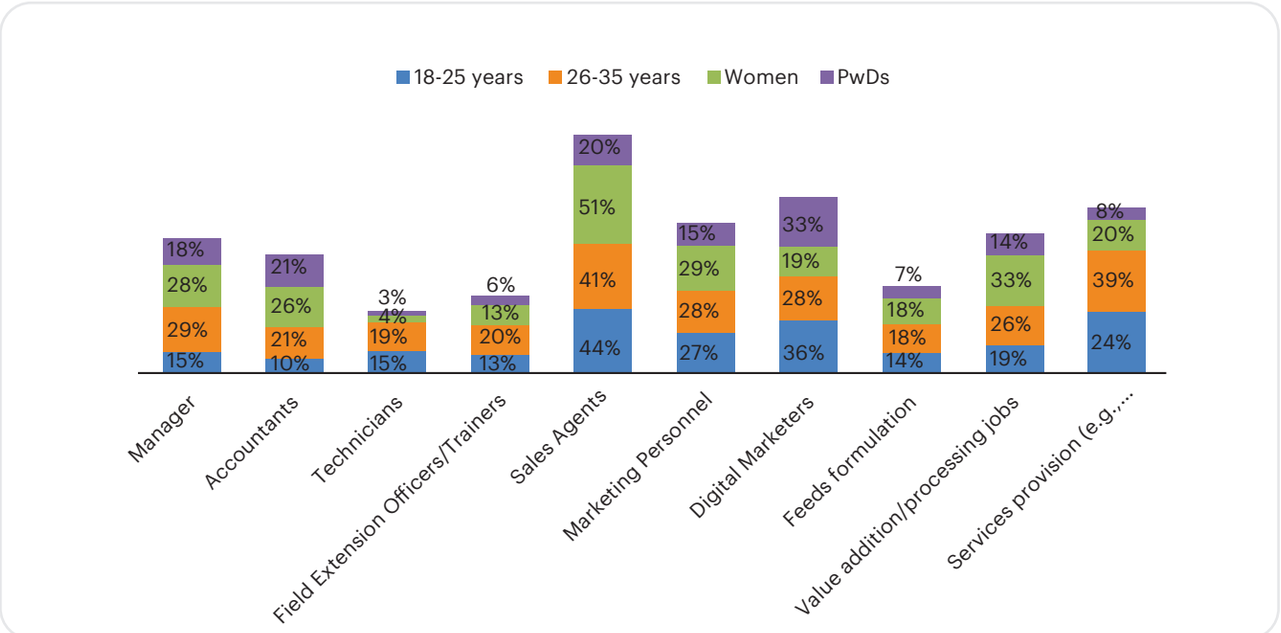
Interviews with the management of 28 training facilities, particularly TVETS showed reliance on outdated equipment, weak digital infrastructure, insufficient investment in trainer development, and weak connections to industry. As a result, many young people who complete training enter the workforce without adequate preparation, with dropout rates running at between 30 and 40%, driven by financial barriers, gender specific challenges, and poor accessibility for persons with disabilities. Across all sectors, persons with disabilities were absent from core functions entirely. While the industry is making some progress on gender inclusion, the structural and accessibility changes needed for a more inclusive workforce have not yet been put in place.

### 2.3.2. Skills Mismatch

The gap between what agri-employers' need and what training produces is most visible in job demand patterns. Employer demand is highest for sales agent roles, particularly in inputs supply for horticulture at 60%, poultry at 55%, and aquaculture at 54%, pointing to the importance of distribution and marketing across these value chains. Value addition and processing roles are mostly demanded in aquaculture at 67% and fisheries at 62%, showing considerable opportunity in post-harvest handling. Feeds formulation is concentrated in poultry at 33%, reflecting that sector's reliance on feed production, while managerial roles are most sought after in dairy at 35%, a sector with more formalised markets and active producer cooperatives.

The career preferences of young people do not always match these demands. Among those aged 18 to 25, the most preferred roles are sales agents at 44%, services provision at 42%, and digital marketing at 36%, showing a preference for entry level and client facing work. Among those aged 26 to 35, preferences shift toward roles with greater responsibility, including managerial positions at 29%, sales agents at 41%, and value addition and processing at 26%. Women showed a clear preference for sales agent roles at 51% and value addition and processing at 33%, though participation in technical roles was just 4%. For persons with disabilities, preferences concentrate around less physically demanding roles such as digital marketing at 33%, accountancy at 21%, and sales agents at 20%, while low interest in technical and hands on service roles, with technicians at 3% and services provision at 8%, reflected the accessibility and inclusion gaps in both training design and the workplace.

*Figure 6: Skills demanded by agri-enterprises*

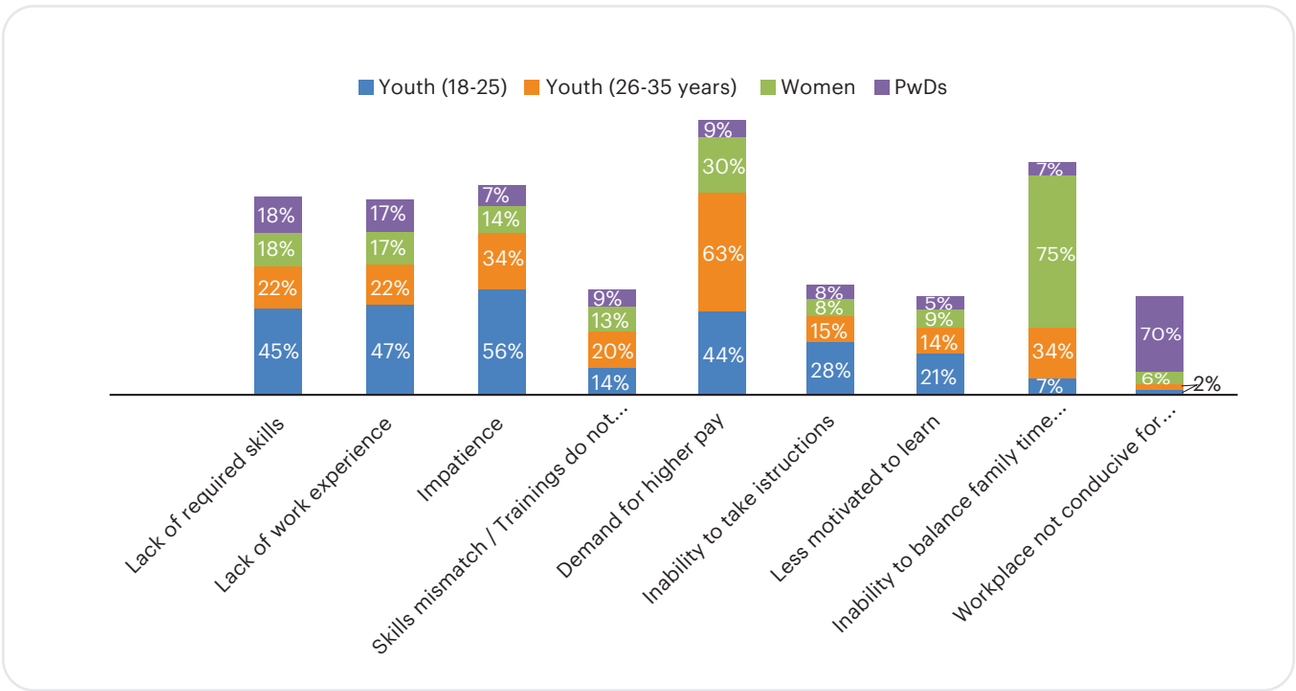


### 2.3.3. Employment Barriers faced by agri-employers in attracting youth, women and PwDs

Employment barriers vary considerably across groups and compound the skills mismatch further. For those aged 18 to 25, the main challenges were lack of experience, affecting 47%, and perceived impatience, which employers flag for 56% of this group. For those aged 26 to 35, the concern were low salaries/pay, with 63% identifying demand for higher wages as their main obstacle.

Women and persons with disabilities face barriers that go beyond skills. Among women, 75% pointed to the difficulty of balancing family and work responsibilities as their primary challenge, while 70% of persons with disabilities report working in environments that do not accommodate their needs. Across all groups, lack of motivation to learn was consistently the lowest barrier, suggesting that the workforce is willing to develop but is held back by misaligned systems, inflexible workplace cultures, and too few entry level opportunities.

*Figure 7: Challenges faced by agri-employers in absorbing youth, women, PwDs*




### 2.3.4. Existing Capacity Building Models

Capacity building plays a key role in supporting bankability and investment attraction. The analysis identified two main training models currently in use:

i. The Technical Service Provider (TSP) approach trains selected youth farmers and enterprises in cohorts, with activities compensated directly by AGRA and Cordaid and
ii. Mentor-Mentee model in which established youth enterprises support early-stage youth agri enterprises.

Such models are equally being implemented by USTADI under the IFAD funded Boosting Youth Employment in Agribusiness. These programmes have also incorporated exchange visits, peer to peer learning, digital marketing training, and support for accessing markets and inputs relevant to selected value chains. These approaches offer useful models that can be built on and scaled, but they need stronger sector-wise coordination and broader reach to address the full scale of the skills gap.

### 2.3.5. Proposed Capacity Enhancement Strategies

***Green Module Development.*** At least one sector-specific green agribusiness module should be co-developed per value chain with KALRO (aquaculture, horticulture), and the Kenya Dairy Board (dairy). Modules should be co-created with technology providers like Agsol, Hydrovictoria, Eco-Incubators and Sun Culture bundling training with equipment sales so that delivery costs are recovered through margins rather than donor subsidies. Priority content for capacity enhancement include BSF feed formulation and solar incubator operation (poultry); hatchery management and alternative data such as Aquarech data reporting (aquaculture); solar chiller installation and cooperative governance (dairy); drip irrigation and Langstroth hive management and colony health monitoring targeting the documented 53% colony loss rate (apiculture).

***Structured Apprenticeships.*** Poultry and aquaculture offer the clearest structured apprenticeship pathways.

In poultry, the brooder agent networks of hatchery operators such as Uzima Poultry, Silver land, and Engoho Chicken already provide the institutional framework: youth entering as day-old chick distributors can be onboarded with bundled training in chick-rearing, vaccination, and record-keeping, with M-PESA-tracked commission earnings. In aquaculture, existing platforms such as Aquarech's covering 5,000+ producers across 10 countries provides the data infrastructure to track apprentice performance.

***Circular Feed Production as Capacity Multiplier.*** Feed dominates production costs across all animal-based chains, accounting for 58% in poultry, 57% in pond aquaculture, 52% in cage systems, and 77% in hatcheries. The Hydrovictoria Fisheries Farm in Busia has demonstrated that BSF circular bioreactors cut feed costs by 40% and more than double poultry ROI from 108% to 260%.[33] Scaling this model through partnerships between KALRO, and feed formulators such as Hydrovictoria, and community-based women-led backyard units simultaneously reduces production costs and creates enterprise opportunities.

Replication should prioritise the Western and Lakeside cluster (Busia, Siaya, Bungoma), where fish-processing waste provides abundant BSF feedstock and both poultry and aquaculture are highly ranked value chains. The Kakamega County Cooperative Feed Milling Model provides the proven template for scaling youth-led feed production.

***Alignment of TVET offered courses.*** Long term formal agreements should be established between TVET institutions and green technology provider companies to co-deliver technical training through apprenticeships and internships to ensure a higher youth transition into the job market. GFYE could leverage similar initiatives championed by GIZ with funding from Finland that promotes close cooperation with the private sector and the development of practical training programmes.

Beyond these partnerships, TVET institutions should reconsider calibrating their training curricula to move beyond general training, especially for electrical courses and introduce specialised practical modules in the installation, repair, and maintenance of renewable energy appliances used in agricultural settings, such as solar powered pumps, solar incubators and milk chillers.

***Gender and Disability-Responsive Design.*** Women's exclusion from technical roles (4% participation) and the complete absence of PwDs across all sampled enterprises are design failures, not pipeline problems. The project should consider; setting a minimum of 40% women enrolment in training programmes; work with developers to incorporate USSD-compatible and voice-enabled interfaces across Agriflock 360, Aquarech, and MFarm as a condition of GFYE partnership; and accessible workstation infrastructure.

*Table 19: Capacity Enhancement Framework*

| Strategy | Primary Value Chains | Possible Partners | Target Outcome |
|---|---|---|---|
| Co-develop green agri-food BDS/ TVET modules | All five | KALRO, BDS providers, TVETs | 1 module per sector within 12 months; commercial BDS model |
| Structured dual training/ apprenticeships | Poultry, Aquaculture | Uzima, Silverland, Aquarech, AGRA | TVET graduates placed within 6 months; M-PESA tracked earnings |
| Scale BSF circular feed production | Poultry, Aquaculture | KALRO, Hydrovictoria, county cooperatives | 40% feed cost reduction; replication of Kakamega model |
| Embed training in digital platforms & supply chains | All five | Agsol, Sun Culture, Agriflock 360, MFarm | Self-sustaining BDS markets by year 3 |
| Expand TVET aquaculture & horticulture | Aquaculture, Horticulture | KALRO, USTADI Hubs, IFAD | 10 TVETs offering aquaculture by year 2 |
| Gender & disability-responsive capacity design | All five | County governments, KDB, technology providers | 40% women enrolment; USSD/ voice platform interfaces; accessible workstations |

33 Analysis of primary field data

## 2.4. Financial access landscape in agri food systems

### 2.4.1. Demand for finance: sector specific patterns

**Poultry.** Poultry presents the highest and most consistent demand that can easily be linked to a financing model. The monthly operations costs are estimated to KShs. 25,000 against gross revenues of KShs. 37,800, creating frequent liquidity shortfalls. Working capital needs range between KShs. 20,000 and 30,000; asset finance requires between KShs. 30,000 and 70,000, generate revenue ranging between KShs. 50,000 and 140,000. Despite a 108% return on investment, 51% of producers cite lack of finance as their main constraint. Innovative financial products that will appeal to poultry value chain include - short tenor revolving facilities, lease to own products and digital credit aligned to 6-to-12-month production cycles are most suitable.

*Table 20: Patterns of finance demand for poultry*

| Dimension | Detail | Purpose |
|---|---|---|
| **Working Capital** | KSHS 20,000–30,000/month | Feed procurement, vaccines, flock replacement, day-to-day operational costs |
| **Asset Finance** | KSHS 30,000–70,000 | Cages, solar heaters, deep freezers, brooding equipment |
| **Total Financing Requirement** | KSHS 50,000–140,000 | Full operational setup and productivity-enhancing asset acquisition |
| **ROI/Viability Signal** | 108% ROI; gross revenue KShs. 37,800/month | — |
| **Cash Flow Profile** | Monthly; short cycle (6–12 months) | — |
| **Main Finance Barrier** | 51% cite lack of finance despite high profitability | — |
| **Green Technology** | Cost | Provider |
| **Solar-powered heaters** | KSHS 50,000 | Kilimo, Eco-Incubators, local fabricators |
| **Solar incubators/ hatcheries** | KSHS 67,500 (500 egg capacity) | Kilimo, Eco-Incubators |
| **BSF larvae production unit** | Low CAPEX (variable) | Hydrovictoria (Busia), KALRO |
| **Agsol solar feed formulation machine** | KSHS 179,000 (5HP motor) | Agsol |
| **Climate-smart housing** | KSHS 60,000–80,000 (500 bird capacity) | Local contractors, county government programmes |
| **Key Sector Partners** | Uzima Poultry · Engoko Chicken · Silverland Agsol · Hydrovictoria · Kilimo · Eco-Incubators · EAMDA · Fineline Systems | — |
| **Recommended Instruments** | Revolving working capital · Lease-to-own Digital credit · Supplier credit · First-loss facility · Short-tenor loans (6–12 months) | — |
| **Finance Readiness** | Innovation-Stage | — |

**Dairy.** The dairy sector presents a stable daily cash flows (median monthly gross revenue KShs. 63,900 and operating costs KShs. 20,000) but persistent liquidity gaps around feed and animal health. Financing needs range from KShs. 75,000 to over KShs. 500,000, driven by green technology adoption (38% want solar milk chillers, critical since over 80% of cooperative chillers run on grid power). Blended approaches combining cooperative linked credit, receivables finance and pay per litre leasing are appropriate.

*Table 21: Patterns of finance demand for dairy*

| Dimension | Detail | Purpose |
|---|---|---|
| **Working Capital** | KSHS 20,000–30,000/month | Animal feed, veterinary services, milk collection operations |
| **Asset Finance** | KSHS 55,000–400,000 | Solar chillers, chaff cutters, biogas systems, e-transport |
| **Total Financing Requirement** | KSHS 75,000–500,000+ | Operational continuity and green technology adoption across the cold chain |
| **ROI/Viability Signal** | Gross revenue KShs. 63,900/month; stable daily cash flows | — |
| **Cash Flow Profile** | Stable; daily milk sales | — |
| **Main Finance Barrier** | Green tech costs exceed self-financing capacity; 80%+ chillers grid-dependent | — |
| **Green Technology** | Cost | Provider |
| **Solar milk chilling & processing** | KSHS 400,000 (500 litre capacity after KShs 400,000) | Davis & Shirtliff, solar equipment distributors |
| **Solar-powered chaff cutter** | KSHS 55,000 (1.3 KW) | Local agro-equipment dealers, county government programmes |
| **Biogas system** | KSHS 105,000 (20$m^3$) | Sistema Bio, Biogas Technology Africa, county programmes |
| **Electric bike /tuk-tuks** | KSHS 110,000 (3 to 4.5KW) | Roam Electric, BasiGo, local EV dealers |
| **Key Sector Partners** | Brookside Dairy · New KCC · Githunguri · Sameer/Daima · Meru Central DFCU · KAGRC · Kenya Dairy Board | — |
| **Recommended Instruments** | Cooperative-linked credit · Receivables finance · Concessional loans · Blended finance · Pay-per-litre leasing · Partial guarantees | — |
| **Finance Readiness** | Finance-Ready | — |

**Horticulture.** Horticulture is characterised by tight seasonal cycles with production costs per cycle averaging KShs. 35,700 against gross revenues of KShs. 90,000. Total financing needs range between KShs. 180,000 and 290,000. Short term seasonal finance is required for inputs (60 to 70% of costs) and medium-term capital for solar drip irrigation (96% of crops are currently rain fed). Climate variability affects 40 to 50% of growers, which drives demand for insurance linked products. Only 35% of enterprises currently borrow. Seasonal input loans, medium term asset finance and certification revolving funds are recommended.

*Table 22: Patterns of finance demand for horticulture*

| Dimension | Detail | Purpose |
|---|---|---|
| **Working Capital** | KSHS 30,000–40,000/cycle | Seeds, fertilizers, pesticides, seasonal labour during harvest peaks |
| **Asset Finance** | KSHS 150,000–250,000 | Solar drip irrigation, cold rooms, post-harvest handling equipment |
| **Total Financing Requirement** | KSHS 180,000–290,000 | Full seasonal input coverage and climate-resilient infrastructure investment |
| **ROI/Viability Signal** | Net profit KShs. 30,000–80,000/ha/cycle; export-grade produce KShs. 50–100/kg | — |
| **Cash Flow Profile** | Seasonal; 30–90-day crop cycles | — |
| **Main Finance Barrier** | Only 35% borrow; post-harvest losses 30–40%; climate variability affects 40–50% of growers | — |
| **Green Technology** | **Cost** | **Provider** |
| **Solar drip irrigation systems** | KSHS 150,000–250,000 (5 to 7 HP pump) | Davis & Shirtliff, Mazingira Green, Netafim Kenya |
| **Solar cold rooms (aggregation hubs)** | Variable | Davis & Shirtliff, local solar fabricators |
| **Biological pest controls (neem, Trichoderma, Bt)** | Low CAPEX | ICIPE, private agro-input dealers, KALRO |

| | | |
|---|---|---|
| **Rainwater harvesting systems** | Variable | County government programmes, NGOs |
| **Solar dryers** | Variable | Local fabricators, KIRDI, county programmes |
| **E-biKShs/tuk-tuks (harvest-to-hub)** | Variable | Roam Electric, BasiGo, local EV dealers |
| **Key Sector Partners** | KALRO · ICIPE · Mkulima platform, MFarm, Kenya Climate Smart Agriculture Project, KEBS (GlobalGAP, KS 1758) · Private agro-dealers | — |
| **Recommended Instruments** | Seasonal input loans, Medium-term asset finance Insurance-linked climate-smart loans · Certification revolving fund · First-loss risk sharing | — |

**Aquaculture and Fisheries & Aquaculture.** The highest capital requirements of any sector. Median production costs per cycle of KShs. 92,000 to 106,200 against revenues of KShs. 200,000 to 250,000, with 7-to-12-month harvest cycles that create extended cash flow gaps. Total financing needs are KShs. 214,500 to 386,200, excluding cold chain. The green tech portfolio is the most diverse: solar freezers are most demanded (40%), polyvinyl cages drive cage culture expansion (76.4% of farmed Fisheries & Aquaculture output), Black Soldier Fly and Azolla reduce feed costs by up to 40%, and clean energy smoking kilns and cooler trucks are best deployed as cooperative shared fleets. Feed costs (cited by 87% of producers) and a 100 million fingerling annual deficit are the most binding constraints. Structured finance with grace periods and harvest-aligned repayment, patient capital, TA-linked loans, pay-per-harvest cage leasing and Fisheries and Aquaculture mortality insurance are recommended.

*Table 23: Patterns of Finance Demand for Aquaculture and Fisheries*

| Dimension | Detail | Purpose |
|---|---|---|
| **Working Capital** | KSHS 52,000–106,200/cycle | Feed, fingerlings, labour, pond/ cage operating costs across 7–12-month fish production |
| **Asset Finance** | KSHS 162,500–280,000 | Fish cages, aeration systems, cold chain infrastructure |
| **Total Financing Requirement** | KSHS 214,500–386,200 | Full production setup, input supply, and post-harvest market access |
| **ROI / Viability Signal** | Pond 127% Cage 135% Fish trading 257% · Hatchery 130% ROI | — |
| **Cash Flow Profile** | Delayed; 7–12-month harvest cycles | — |
| **Main Finance Barrier** | Feed costs cited by 87% of producers; 100M fingerling annual deficit; longest cash-flow gap of any sector | — |
| **Green Technology** | **Cost** | **Provider** |
| **Solar-powered freezers** | KSHS 87,500 | Davis & Shirtliff, Chloride Exide, SunCulture |
| **PVC fish cages** | KSHS 280,000 | KMFRI, private cage fabricators, county aquaculture programmes |
| **Solar-powered cooling boxes** | KSHS 100,000 | Local solar fabricators, Davis & Shirtliff |
| **Solar aeration systems** | KSHS 50,000–100,000 | Davis & Shirtliff, private suppliers, KMFRI |
| **BSF larvae/Azolla production units** | KSHS 30,000–80,000 startup | Hydrovictoria (Busia), KALRO, private BSF enterprises |
| **Clean-energy fish smoking kilns** | KSHS 20,000–50,000 | Local fabricators, NGO-supported programmes |
| **Solar dryers** | KSHS 50,000 | Local fabricators, KIRDI, county programmes |
| **Cooler trucks (shared fleet)** | KSHS 2,000,000 | Private logistics firms, cooperative procurement |
| **Key Sector Partners** | KMFRI · KALRO · Hydrovictoria (BSF, Busia) · Aquarech Ltd (10 counties, 5,000+ producers) . Kenya Fisheries Service · Kakamega county bulk feed model | — |
| **Recommended Instruments** | Structured finance with grace periods · Patient capital TA-linked loans · Harvest-aligned repayment · Pay-per-harvest cage leasing · Fish mortality insurance | — |
| **Finance Readiness** | Innovation-Stage | — |

**Apiculture.** Apiculture exhibits strong profitability (a 0-hive operation yields KShs. 159,900 in seasonal net profit on KShs. 200,000 gross) yet significantly under financed. Total financing needs range from KShs. 15,000 entry to KShs. 200,000 for aggregation scale up. Hives and equipment account for 71% of costs. Modern Langstroth hives sit at the centre of a technology transition, with 73% adoption among surveyed producers. Current borrowing is just 35%. Hive leasing packages, seasonal working capital for aggregators, women savings groups, supplier credit from hive manufacturers and colony loss insurance are most appropriate.

*Table 24: Patterns of Finance Demand for Apiculture*

| Dimension | Detail | Purpose |
|---|---|---|
| **Working Capital** | Variable; seasonal | Honey aggregation, labour, transport, working stock for by-product processing |
| **Asset Finance** | KSHS 15,000–30,000 starter; higher for scale-up | Modern hives, protective gear, extraction and bottling equipment |
| **Total Financing Requirement** | KSHS 15,000–200,000 depending on scale | Entry-level hive establishment through to commercial aggregation and value addition |
| **ROI / Viability Signal** | Net profit KShs. 159,900/season (20 hives); KShs. 7,995/hive/season | — |
| **Cash Flow Profile** | Seasonal; biannual harvests | — |
| **Main Finance Barrier** | Only 35% borrow; hives & equipment = 71% of costs; colony losses affect 53% of producers | — |
| **Green Technology** | **Cost** | **Provider** |
| **Langstroth modern hives & gear** | 71% of total production costs | Private hive manufacturers, cooperative supply networks, county programmes |
| **Drought-resistant forage planting (Calliandra, Croton, Acacia)** | Low CAPEX | KALRO, KEFRI, county agroforestry programmes |
| **Solar-pumped colony water systems** | Low CAPEX | Local fabricators, NGO-supported programmes |
| **Wax melters, moulds & bottling kits** | KSHS 15,000–30,000 | Local equipment suppliers, NGO enterprise support programmes |
| **Honey extractors & bottling lines** | Variable | Private equipment dealers, cooperative procurement |
| **Key Sector Partners** | KALRO (apiculture division) · ICIPE · International Bee Research Association affiliates · Practical Action · County agricultural officers · KEBS (KS EAS 36:2020) | — |
| **Recommended Instruments** | Hive leasing (20-unit starter) · Seasonal working capital · Women savings groups · First-loss facility · Supplier credit from hive manufacturers · Colony loss insurance | — |
| **Finance Readiness** | Emerging Potential | — |

*Table 25: Demand of finance patterns for surveyed enterprises in priority value chains*

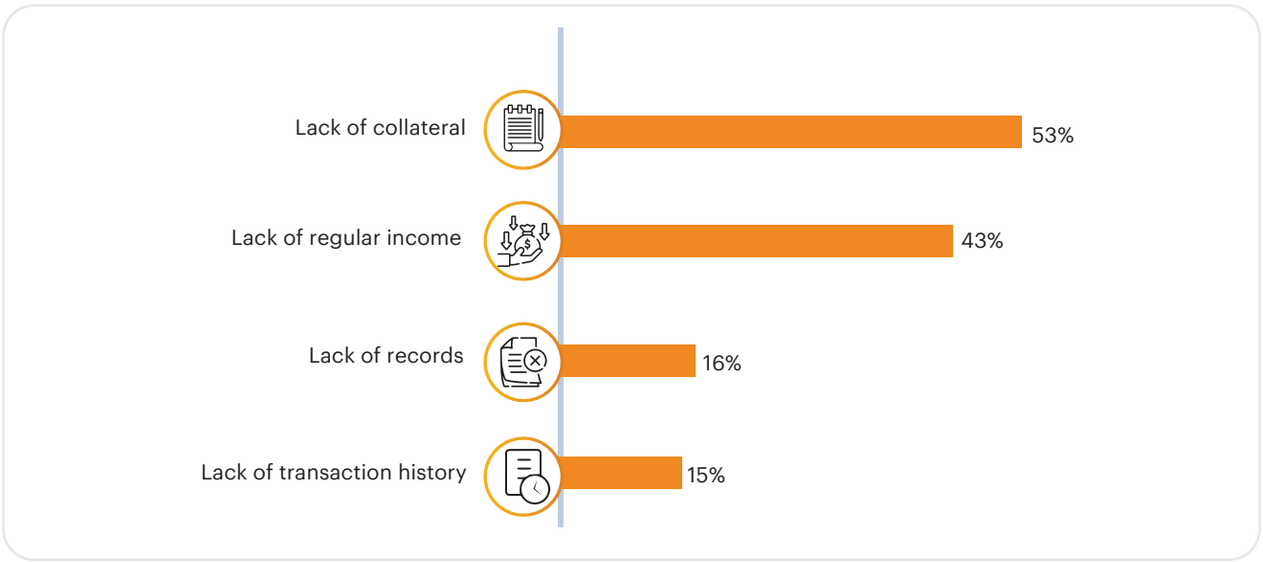
| Sector | Working capital | Asset finance | Total need (KShs.) | Cash flow | Main finance barrier | Recommended instruments |
|---|---|---|---|---|---|---|
| **Poultry** | KShs 20,000 to KShs. 30,000 per month | KShs 30,000 to KShs. 70,000 | KShs 50,000 to KShs. 140,000 | Monthly; 6 to 12 months | 51% cite lack of finance despite 108% ROI | Revolving working capital, lease to own, digital credit. |
| **Dairy** | KShs 20,000 to KShs. 30,000 per month | KShs 55,000 to KShs. 400,000 | KShs 75,000 to KShs. 500,000 plus | Daily; stable | Green tech costs above self-finance capacity; over 80% of chillers grid dependent | Coop linked credit, receivables, pay per litre lease. |

| Sector | Working capital | Asset finance | Total need (KShs.) | Cash flow | Main finance barrier | Recommended instruments |
|---|---|---|---|---|---|---|
| **Horticulture** | KShs 30,000 to KShs. 40,000 per cycle | KShs 150,000 to KShs. 250,000 | KShs 180,000 to KShs. 290,000 | Seasonal; 30-to-90-day cycles | Only 35% borrow; 30 to 40% post-harvest loss; climate affects 40 to 50% | Seasonal input loans, medium term asset, insurance linked, certification fund |
| **Aquaculture** | KShs 52,000 to KShs. 106,000 per cycle | KShs 162,000 to KShs. 280,000 | KShs 215,000 to KShs. 386,000 | Delayed; 7-to-12-month cycles | Feed costs 87%; 100M fingerling deficit; longest cash flow gap | Structured with grace periods, patient capital, TA linked, pay per harvest lease, insurance |
| **Apiculture** | Seasonal, variable | KShs 15,000 starter plus | KShs 15,000 to KShs. 200,000 | Seasonal; biannual | Only 35% borrow; hives 71% of costs; 53% colony loss | Hive leasing, seasonal working capital, supplier credit, colony insurance |

### 2.4.2. Cross cutting constraints shaping demand for finance

All sectors report a persistent financing gap. Most of the enterprises led by young people and women lack collateral, credit histories or formal registration that conventional products require. Across the 1,210 enterprises surveyed, the most commonly cited barriers are lack of collateral (53%), irregular or seasonal income (43%), weak financial records (16%) and insufficient transaction history (15%). These barriers are most severe for enterprises led by young people (40% of the sample) and by women (44%), yet GFYE seeks to serve the youth. As a result, enterprises rely predominantly on informal finance, including retained business proceeds, personal savings, chamas, rotating credit associations and mobile digital loans, while formal institutions remain underutilised.

*Figure 8: Constraints faced by youth in accessing finance*




**Collateral and (in)formality remain the main structural barrier.** All provider categories rely on land titles, logbooks, savings multiples or guarantor capacity as part of primary credit underwriting requirements. In many cases, the young people are systematically excluded regardless of commercial potential. In poultry, 51% of the young people cited lack of finance even as the sector delivers a 108% return on investment within the production period, illustrating that the barrier is product design and access rather than enterprise viability. Women face a compounding constraint; land and asset ownership remain disproportionately male, limiting their ability to offer collateral even where they operate profitable enterprises.

**Informality and weak records.** Many enterprises led by young men and women operate without formal business registration, structured bookkeeping or documented transaction histories. Formal borrowing reaches only 35% for enterprises in apiculture, horticulture and agroforestry despite demonstrated profitability. Commercial banks require documentation rigor that most smallholders simply do not have, effectively disqualifying a large share before an application is even assessed.

**Cash flow misalignment.** Financial solutions across all providers assume predictable monthly repayment, yet agriculture generates income in seasonal cycles (e.g. 7 to 12 months for aquaculture) that misalign with financial products. Short term tenures and the near universal absence of grace periods mean obligations begin before revenue is realised, forcing arrears or deterring borrowing. SACCOs and public lenders, with the longest tenures and most concessional pricing, nonetheless report elevated non-performance in agricultural portfolios (portfolio at risk up to 15% during climate shocks), not because agriculture is unprofitable, but because repayment is misaligned.

**Perceived risk and lender reluctancy.** Financial institutions consistently characterise enterprises led by young people and agricultural enterprises as high risk and respond by shortening tenures , pricing and grace periods, pricing expensively, down-sizing loans and requiring additional security. While these measures protect portfolios in the short term, they undermine investment at the scale required, particularly in green technologies and post-harvest infrastructure. When lending is better aligned to enterprise cash flows and supported by risk sharing instruments, portfolio performance remains within acceptable ranges, indicating that risk perception significantly exceeds the actual risk of well-structured agricultural lending.

**Identity and digital exclusion.** FinAccess 2024 reports that 9.9% of Kenyan adults remain financially excluded, with rural youth nearly half of this group (45.5%). Key barriers include inability to afford a phone (64.1%) and lack of a national identity card (51.5%), preventing access to mobile enabled credit, digital savings and formal registration, channels increasingly central to financial inclusion.

The cumulative effect is a persistent under financing cycle. Commercially viable enterprises in high demand markets cannot access finance at the scale or structure required, while institutions that could serve them continue to apply product designs calibrated to formal, salaried, urban borrowers. Closing this gap requires shifting from collateral-based exclusion to cash flow aligned structuring; from short rigid tenures to harvest cycle repayment; and from individual credit assessments to group based, value chain and alternative data driven underwriting.

*Table 26: Summary of cross cutting constraints*

| Constraint | Evidence | Most affected | Implication for GFYE |
|---|---|---|---|
| Lack of collateral | 53% cite lack of collateral as primary barrier | Youth led; women (lower asset ownership) | Asset backed leasing, group guarantees, first loss facilities as collateral substitutes |
| Irregular or seasonal income | 43%; monthly norms misaligned with biological cycles | All agricultural enterprises; most acute aquaculture and agroforestry | Harvest aligned and step up repayment; grace periods for longer cycles |
| Weak financial records | 16%; most lack formal bookkeeping or registration | Informal and early stage; startups led by young people | Digital transaction records and value chain data (E.g Aquarech, M-PESA) as alternative scoring inputs |
| Insufficient transaction history | 15%; formal scoring requires history first timers lack | New entrants; young people 18 to 25 | Graduated lending models; group-based entry products to build credit history |
| Informality and lack of registration | Prevalent across all sectors | Young people and women in apiculture, horticulture, agroforestry | Support formalisation as part of BDS; link registration to finance access pathways |
| Lender risk perception | Shorter tenures, no grace, downsized loans; PAR up to 15% in climate shocks | All agri food enterprises regardless of actual ROI | Capacity building to derisk enterprises, credit guarantees and concessional capital to shift perception; demonstrate via pilot portfolio data |
| Identity and digital exclusion | 45.5% of financially excluded are rural young people; 64.1% cannot afford phone; 51.5% lack national ID | Rural young people 18 to 25; women in remote areas; persons with disabilities | USSD compatible and voice enabled interfaces; support national ID acquisition during onboarding |

### 2.4.3. Cross cutting constraints shaping supply of finance

Meaningful engagement of youth in the priority agri-food systems presents commercial opportunity due to the profitability of the enterprises and minimal barriers to entry. However, despite the availability of financial products, effective access remains limited due to collateral requirements, weak credit histories, informality, climate-related risks, and digital exclusion among rural youth and women. Commercial banks, MFIs, SACCOs, and public lenders offer diverse financing products, but most are designed around predictable monthly incomes and established collateral systems that do not align with the seasonal and cyclical realities of agri-food enterprises. As a result, youth-led enterprises are often restricted to small, short-term, or group-based loans despite demand for larger and longer-term investment. The key challenge is therefore not lack of capital, but misalignment between financial product design and the realities of youth-led agri-food and green enterprises.

**SACCOs and microfinance institutions**

The GFYE project identifies SACCOs and MFIs as key financial intermediaries that enable rural youth to access loans for green, climate-smart investments. These institutions are targeted because they already serve millions of rural low-income households and MSMEs. This analysis confirms the significant contribution of SACCOs and MFIs, demonstrating that these institutions account for a considerable share of both initial and subsequent borrowing among young individuals, especially within agri-food value chains and rural areas.

*Table 27: Overview of Financial Supply, Risk Management Practices and Portfolio Performance Signals for SACCOs and MFIs*

| Metric | SACCOs | MFIs/MFBs |
|---|---|---|
| Total Institutions Analysed | 10 | 2 |
| Institutions with Agri Focus | 5 | 2 |
| Average Youth Client Share | 25-35% | 30% |
| Average Women Client Share | 30-60% | 98% (MFB) |
| Institutions with Formal Inclusion Policy | 1 | 1 |
| Interest Rate Range (p.a.) | 12-21% | 16-27% |
| Max Loan Tenor | Up to 8 years | Up to 2 years |
| Group Lending Offered | 9 of 10 | 2 of 2 |
| Digital Services | 9 of 10 | 2 of 2 |
| Green Finance Products | 4 of 10 | 2 of 2 |
| Scale / Portfolio Signals | Not indicated | 40% Agric; 40% Business development; 20% Consumers |
| Typical Ticket Size (KShs.) | Micro-agri loans ~KShs 70,000–100,000; member loans from <KShs 50,000 up to KShs. 2–3M. | Entry loans commonly KShs. 10,000–30,000; higher limits for repeat borrowers. |
| Repayment Structure | Limited grace period observed | immediate repayment; no formal grace periods reported. |
| Dominant Risk Assessment Practices | Savings history and discipline; guarantor capacity; production-based underwriting in structured value chains (where present). | Group vetting, character assessments, and graduated lending progression based on repayment performance. |
| Security/Collateral Norms | Savings multiples (e.g. 3×–5× deposits) and guarantors are central; collateral required for higher ticket sizes (e.g. >KShs. 500,000). | Group guarantees plus one collateral item (household or productive asset) commonly required; additional guarantees may apply for youth. |
| Reported NPL/ PAR Signals (Ranges) | Reported non-performance signals include ~5% (agriculture) and ~11% (enterprise) in one DT-SACCO; PAR up to ~15% during drought in one case. | Quantitative NPL ratios not consistently reported; qualitative evidence suggests asset-backed lending performs better than non-asset lending. |

**Microfinance Institutions and Microfinance Banks**

The data for MFIs indicates a strong orientation toward productive lending, with agriculture and business development together comprising most observed loan portfolios. Entry-level loan sizes are typically small, commonly ranging between KShs. 10,000 and 30,000, with higher limits available to repeat borrowers through graduated lending models. Loan tenures are generally short, spanning two years and repayment typically begins immediately, with few formal grace periods reported. These features make MFIs well suited to supporting short-cycle activities, such as trading, poultry, or small-scale processing, which align with quick cash-flow turnover and align with activities that are attractive to youth.

**Case Study of Juhudi Kilimo:** Juhudi is an asset/productivity-focused lender, making them relevant for youth enterprises needing capital for productive investment, however, their collateral/documentation approach shapes who can access what. Below is a summary of the lender's product offerings and implications to lending to the GFYE target group.

*Table 28: Case Study of Juhudi Kilimo*

| Features | Juhudi Kilimo |
|---|---|
| Core Lending Products | Working capital<br>Asset Financing - income-generating assets, including:<br>✓ Dairy cows<br>✓ Motorcycles (notably for boda-boda transport enterprises) (electric 110,000)<br>✓ Tractors<br>✓ Farm machinery<br>Consumer/retail loans<br>Group (Chama) loans<br>Micro housing loans<br>Asset-backed loans (logbook) |
| Agricultural Loans | **Production Loan**- dairy, poultry, horticulture, cereals, coffee – are insurance backed<br>✓ Inputs (seeds, feed, fertilizer)<br>✓ Animal loan - Livestock acquisition<br>**Agricultural assets loan** – (Generators, Water Tanks, Water pumps, Milking cans, Biogas digesters, Motorcycles, Posho Mill, Chaff Cutters, Green Houses, Irrigation Equipment (if solar powered KShs 150,000 to 250,000), Milk Freezer (if solar powered 87.5k), Milking Machines, ATM milk dispensers, ploughing tools/ equipment, Animal Housing structures) – are insurance backed<br>**Agribusiness working capital** |
| Green Financing | **Green energy loans** – LPG gas, solar TVs, solar water pumps (KShs 10,000 to 300000), solar home systems, modern cookstoves, and biogas system (KShs 105000)<br>Supplier partnership - Sun King and biolite. |
| Loan Terms | **Ticket Size**: First time borrowers – KShs. 10,000 to 30,000 – higher amounts for repeat borrowers<br>**Tenure:** 1-9months<br>**Grace periods:** No<br>**Seasonal repayment:** not indicates<br>**Interest rate:** 2.25% per month<br>**Processing fees:** May apply<br>**Penalty for delayed repayment:** Higher interest cost<br>**Collateral:** Household or productive asset<br>**Group guarantee:** Youth & groups<br>**Additional guarantee for youth**: Guardian/parental guarantee/stringent background check |
| Tailored Youth Products | No |
| Tailored Women Products | No |
| Digital Lending | No – Digital loan application and payment enablement but not a product |
| Supporting services | ✓ Business mentorship<br>✓ Training, Financial literacy, and credit management<br>✓ Technical assistance on assets<br>✓ Market linkages<br>✓ Input linkages |

| Features | Juhudi Kilimo | |
|---|---|---|
| **GFYE IMPLICATIONS** | | |
| Financing green technology assets recommended | Juhudi has agricultural assets loans and green energy loans that use the acquired asset as collateral and can finance acquisition of the recommended green technologies in poultry, dairy and horticulture. It, however, will need to expand its product offering to cover apiculture, aquaculture and fisheries technologies. Since, the financial products are generic, do not have grace periods, and are not aligned to the production cycles, they will need further refinement to make them more suitable to the youth and general climate and agricultural enterprises.<br><br>The cost of the recommended green assets range from KShs. 50,000 to as high as KShs. 400,000, way above the ticket size limit (KShs. 10,000 to 30,000) for first time Juhudi borrowers. Even for repeat borrowers building one's credit profile to access higher loan ticket sizes may take a while. Majority of the youth enterprises analysed are start-ups or in very early stages of their business growth and are small in size. Moreover Youth/women/PWD primarily access credit through group loans, not individual loans capping enterprise scale and individual asset-building.<br><br>Juhudi provides training to youth and women led enterprises, but these are not product linked. | |
| Alignment with Green Finance for Youth Employment Youth Incentive Fund (GFYE-YIF) asset financing model | **GFYE MODEL** | **JUHUDI** |
| | 10% asset value own contribution | 15% refundable deposit (refunded after loan fully paid) |
| | Collateral – co guarantee and financed asset serves as collateral | Loan terms align |
| | Ticket sizes: Min KShs. 5000 and Max Ksh 5m range depending on whether Individual, youth led or SME employing youth | Youth access loans through groups and not individual loans and ticket size are capped at KShs. 30000 for first time borrowers |
| | Loan repayment: Grace period of 3-6 months | Juhudi does not offer grace periods on its loans |
| | Loan repayment period: Range of 12 to 36 months depending on borrower category | Maximum repayment period for Juhudi loans is 9 months. |
| | Direct payment to the vetted supplier by PFI | Aligns with Juhudi's terms. Already in existing patronship with suppliers e.g., Sun King and biolite |
| **GFYE- aligned recommendations for Juhudi Kilimo** | | |
| Product structuring | Introduce embedded grace periods (1–3 months) for agricultural and green technology loans, especially poultry and dairy. | |
| | Differentiate tenures by value chain, for example: Poultry: shorter tenure with delayed first repayment; Dairy cows / solar irrigation: longer tenures (12–36months) | |
| | Allow step up repayment schedules, where instalments increase as enterprises stabilize. | |
| Risk modelling & portfolio segmentation | Introduce cash flow based micro enterprise loans for youth below a certain threshold e.g., starter loans | |
| | Formalise graduation ladders for youth, with clear, pre communicated milestones instead of discretionary progression. | |
| Youth group incubation Fund early-stage facilitation | Create youth only group products, rather than mixed age groups where youth are disadvantaged. | |
| | Introduce group linked savings buffers, where a small%age of repayments builds a collective risk reserve. | |
| | Allow flexible group sizes for youth enterprises (smaller, more cohesive groups). | |

| Features | Juhudi Kilimo |
|---|---|
| Co-finance affordability gaps | Develop youth, specific green asset loans with: Lower upfront contributions; Longer repayment horizons |
| Product design | Bundle pay as you earn models, where repayments are explicitly tied to income generated by the green asset. |
| | Separate productive green assets (solar irrigation, cold storage) from household solar in product design and pricing. |
| Product structuring | Introduce alternative credit scoring (Mobile money transaction histories, Group savings behaviour, Consistency of digital repayments) |
| Product structuring | Pilot digital first youth loan products with simplified appraisal for small ticket sizes. |
| Capacity building | Make basic financial literacy and enterprise coaching a built-in condition for youth loan access. |

**SACCOs (Deposit-Taking and Non-Deposit-Taking)**

SACCOs occupy an intermediate position between MFIs and commercial banks in the finance landscape, offering relatively longer tenures and more competitive loan terms are typically longer than those of MFIs, ranging from one year to as much as six or eight years. Despite these strengths, access to SACCO finance is structurally constrained for youth. Lending capacity is closely tied to savings multiples, commonly three to five times a member's deposits, and to the availability of guarantors. Youth members, especially those early in their savings history, therefore, face binding constraints on loan size even when there is clear demand for larger productive investments. Collateral requirements become more pronounced for higher ticket sized loans higher ticket sizes, further limiting access.

Risk exposure in SACCO portfolios is strongly influenced by climate shocks, with reported portfolio-at-risk levels rising significantly during drought periods. Where repayment schedules remain fixed and monthly, without grace periods, this exposure is amplified.

**Case Study of Wevarsity SACCO:** Wevarsity SACCO is primarily salary-backed in its traditional model (employee membership), which shapes its risk appetite, underwriting approach, and portfolio performance. At the same time, it is expanding outward to serve smallholder farmers, groups, and MSMEs through group arrangements and partnerships. Below is a summary of the lender's product offerings and implications for lending to the GFYE target group.

*Table 29: Case Study of Wevarsity Sacco*

| Features | Wevarsity SACCO |
|---|---|
| Core Lending Products | Generic purpose short- and long-term loans – demand and repayment-capacity-driven |
| Agricultural Loans | No dedicated products |
| Green Financing | No dedicated products |
| Loan Terms | **No standardization:** Case-by-case basis (loan size, tenor, interest negotiated based on profile, purpose, repayment capacity)<br>**Collateral:** Savings deposit + guarantee<br>**Additional collateral for larger loans:** Title deeds, formal pay slips from employers, or logbooks<br>**Eligibility requirements:** payslip, guarantors, ID, clean CRB, KRA PIN |
| Tailored Youth Products | No |
| Tailored Women Products | No |
| Digital Lending | No – Digital payment enablement but not a product |
| Supporting services | Group based financial literacy training |

| GFYE IMPLICATIONS | |
|---|---|
| Financing green technology assets recommended & Alignment with GFYE-YIF asset financing | **What works but needs improvement in some cases:**<br>✓ Financial literacy training tied to group lending cycles. This is a strong complementary supply feature because it supports repayment capacity and could be formalized into "bundled finance + capability building."<br>✓ Has established SACCO savings-and-guarantee model that supports lending without hard collateral.<br>✓ Offers extended loan terms of up to 72 months, making it easier to acquire high-value assets that have returns stretched over long periods.<br>✓ Has M-banking services largely via Safaricom M-PESA, but not a fully youth-tailored digital proposition. Youth savings behaviour described as irregular and low, with preference for liquidity in M-Pesa wallets rather than SACCO deposits<br><br>**What does not work:**<br>✓ Does not have specialised agriculture/green/ asset-based loan products.<br>✓ Its lending is generic and, on a case, -by-case basis.<br>✓ It is not youth-centered and remains skewed toward older, salary-linked borrowers.<br>✓ Its lending works best where income is verifiable (salary) or social collateral is strong (Groups)<br>✓ Youth and informal agricultural actors face structural barriers because they often lack savings base, collateral substitutes, formal records, and clean CRB records.<br>✓ Gender data is captured but not used for targeting, reporting, or product development - Without segment performance data, they cannot refine risk models or tailor products to suit youth/women/PWD<br><br>In summary scaling individual youth agriculture and green assets loans will be a challenge for Wevarsity without restructuring its generic loans. It needs to build standardized agriculture/green, asset-based and cashflow-matched products. |
| | **Key GFYE aligned recommendations for Wevarsity:** |
| Product Design | **Standardise a lease-to-own / asset-backed facility:** finance the asset (motorbike, solar kit, irrigation kit, processing equipment) and retain a clear security interest in the asset until completion. Price and tenor should match the asset's income cycle (e.g. harvest-aligned for crop farming).W |
| | **Convert asset financing into 'Asset + installation + after-sales' bundles:** disburse directly to vetted suppliers (not cash to borrower) and include warranty/maintenance in the financed amount. |
| | **Create a "Chama/Group Guarantee Ladder":** (i) starter group loans with low ticket sizes; (ii) graduation to individual asset finance based on repayment history; (iii) larger repeat loans for performing members—building on SACCO guarantor culture. |
| | **Introduce cashflow-aligned repayment calendars:** seasonal/balloon structures for agriculture (e.g., smaller instalments during production, larger payment at harvest) to reduce distress and delinquency. |
| | **Build 'input/working-capital' top-ups tied to performance:** a revolving working-capital limit for repeat borrowers, sized off transaction records (repayments, deposits) rather than collateral alone. |
| | **Embed micro-insurance into asset finance:** mandatory comprehensive cover for motorbikes and insured asset cover where relevant, priced transparently and bundled into repayments. |
| Delivery model & partnerships | **Build preferred-supplier partnerships:** create a vetted supplier roster for priority assets (motorbikes, solar/clean energy, farm equipment, small processing machinery) with agreed pricing, warranty terms, and after-sales service. Use direct-to-supplier disbursement and asset registration/verification at delivery. |
| | **Use 'merchant payments' to enforce discipline:** for asset loans, pay the supplier; for ag-input loans, pay agro-dealers; This reduces diversion and improves outcomes. |
| | **Ecosystem check-off:** Where members are in organised groups, use group leaders as first-line monitors of asset use and repayment follow-up). |
| | **Create offtaker/aggregator linkages for productive loans:** for members in dairy/ horticulture/poultry, partner with cooperatives/aggregators and structure repayment via receipts/collections where feasible (receivables-based discipline). |
| | **Field verification 'light touch':** use a simple verification playbook for asset confirmation (photo + serial number + GPS pin + supplier confirmation), supported by periodic portfolio spot-checks. |

| | |
|---|---|
| Risk management & inclusion | **Adopt "ability-to-pay + asset security" scoring:** for youth and informal members, base approval on (i) cashflow proxies (mobile money statements, deposit consistency), (ii) group history, and (iii) supplier verification—rather than land/title collateral as the default. |
| | **Formalise a 'graduation' pathway for CRB-constrained members:** start with small, short-tenor, fully-digital repayment products; after 2–3 successful cycles, allow larger ticket sizes and longer tenures. |
| | **Ring-fence a pilot risk buffer:** start with a small internal risk reserve for new segments/ products, with clear stop-loss rules. |
| | **Design for inclusion by default:** support USSD where needed; allow group-based borrowing and flexible repayment schedules for members with irregular incomes and persons with disabilities. |
| | **Strengthen guarantor quality controls:** cap total guarantees per member, require minimum savings/transaction behaviour for guarantors, and automate guarantor notifications when instalments are missed. |
| Operations, governance & KPIs | **Define product templates:** eligibility, documentation, verification steps, pricing/tenor bands, and collections workflow—so branches/loan officers don't price "case-by-case" for the same segment. |
| | **Track KPIs by product and segment (monthly):** approval turnaround time, on-time repayment, PAR/NPL by product, repeat-borrower rate, average ticket size, and loan purpose adherence (supplier-paid vs cash). |
| | **Supplier performance dashboard:** delivery timelines, defect/return rates, after-sales responsiveness, and customer complaints—remove suppliers that increase credit risk through poor service. |
| | **Inclusion reporting:** tag youth/women/PWD participation at onboarding and monitor uptake, approval rates, and PAR by group to ensure inclusion is real (not only policy). |

**Commercial banks and other lenders**

*Table 30: Overview of financial supply by provider commercial banks and public lenders (observed ranges)*

| Provider Type | Observed Scale / Portfolio Signals | Typical Ticket Size (KShs.) | Tenor / Repayment Structure | Pricing (Observed Ranges) | Product Offer & GFYE Fit |
|---|---|---|---|---|---|
| Commercial Banks | Branch outreach signals of ~100,000 customers in a single branch catchment (where reported). | Mobile/digital loans up to ~1,000,000; production-linked limits observed (e.g. KShs./kg advances). | Predominantly 6–36 months; some digital loans 3–6 months; commodity-linked facilities aligned to ~12-month seasons. | Market-based pricing; concessional agriculture ~10% p.a.; MSME lending ~17–18% p.a. | Working capital, overdrafts, asset finance, LPO/ contract finance, agriculture finance. GFYE fit: Low–moderate without redesign. |
| Public / Affirmative Action Lenders | Portfolio exposure (one case): ~30% agriculture; ~10% green/sustainability. | Loan sizes range KShs. 100,000–5,000,000. | Repayment periods 12 months–6 years; group lending common. | Group loans at 0%; expansion loans ~8% p.a.; other agri-lending ~7–12% p.a. | Business expansion, group and LPO finance. GFYE fit: Moderate but constrained by collateral and CRB requirements. |

*Note: Ranges reflect values observed across KIIs in the GFYE finance synthesis; not all providers reported all metrics.*

*Table 31: Risk management practices and portfolio performance signals- commercial banks and public lenders (observed ranges)*

| Provider Type | Dominant Risk Assessment Practices | Security / Collateral Norms | Reported NPL / PAR Signals (Ranges) | Operational Risk Treatment | Implications for Youth Access |
|---|---|---|---|---|---|
| Commercial Banks | Formal credit scoring; CRB checks, cash-flow and transaction history analysis; emphasis on business formality and stability. | Hard collateral (titles, logbooks) and guarantees remain common; group structures used as an inclusion pathway. | Quantitative ratios not consistently disclosed at branch level; performance described as broadly comparable across sectors where noted. | Risk managed through conservative approval (downsizing), limited grace periods, and strict eligibility thresholds; limited use of alternative data reported. | Youth access largely mediated through group products and graduation pathways; start-ups and informal enterprises face binding access constraints. |
| Public/ Affirmative Action Lenders | Committee-based appraisal, documentation verification, CRB checks, and sector preference for fast-turnover activities. | Collateral applied especially for larger loans (titles, logbooks, chattels, stock); group registration and certification requirements apply. | Portfolio performance reported in one case as ~80% performing and ~20% NPL. | Cautious risk posture reinforced by material NPLs and perceived youth risk; digitization often under development rather than fully deployed. | Concessional pricing improves affordability, but collateral, CRB, and formality requirements continue to ration access for higher-potential youth enterprises. |

Commercial banks rank highly as capital providers for these segments and offer the widest range of products, including working capital, asset finance, and contract-based lending. Cooperative Bank for instance has dedicated green finance products (solar irrigation, biogas, water tanks, tree planting). Family Bank has emerging green finance (climate-smart agriculture, sustainable practices) scaling via partnerships. Other banks offer implicit green finance through standard agricultural loans. However, their risk frameworks prioritise formality, collateral, and stable repayment capacity, limiting direct access for most youth-led enterprises. Inclusion is therefore frequently mediated through group structures or tightly controlled lending pathways, which constrain flexibility. Public and affirmative action lenders offer concessional pricing and longer repayment periods, aligning in principle with GFYE objectives. In practice, access remains constrained by collateral, documentation, and credit history requirements, limiting outreach to higher potential but less formal youth enterprises identified in the demand analysis.

Chapter 3

# Conclusions and Recommendations

Photo/Sunculture

> **High feed costs remain one of the biggest constraints affecting profitability within poultry and aquaculture value chains. At the same time, limited access to green technologies continues to reduce productivity, increase operating costs, and constrain climate resilience across agri-food systems.**

## 3.1. Key conclusions

Kenya's agri-food systems present a significant opportunity for inclusive economic growth, employment creation, and green transition, particularly for young people. The assessment demonstrates that enterprises across poultry, dairy, horticulture, apiculture, and aquaculture are commercially viable and capable of generating strong returns. However, the full potential of these sectors remains constrained by systemic barriers that limit enterprise growth, financial inclusion, green technology adoption, and market integration. The core challenge is not lack of opportunity or enterprise viability, but weak alignment between agricultural production systems and the financial, market, policy, and institutional ecosystems intended to support them. Unlocking this opportunity will therefore, require coordinated interventions that redesign financial products around agricultural cash flows, strengthen market linkages, expand green asset financing, invest in inclusive enterprise support systems, and reform enabling policies that currently exclude youth, women, and persons with disabilities from participating effectively in agri-food markets. The study has clearly demonstrated that;

- **Agri-food enterprises are profitable but lack access to value adding finance:** Across all five priority value chains, enterprises demonstrate strong commercial viability, including poultry (108% return on investment), pond aquaculture (127%), cage aquaculture (135%), fisheries and aquaculture trading (257%), and apiculture enterprises generating up to KShs. 159,900 per season. Despite this, lack of access to finance remains the most significant barrier limiting enterprise growth. Existing lending models remain heavily dependent on collateral requirements, formal business records, and rigid monthly repayment schedules that are poorly suited to agricultural production systems

characterised by seasonal, cyclical, and irregular cash flows. As a result, viable youth- and women-led enterprises continue to be excluded from formal financial services.

- **Green technologies have strong market demand but remain inaccessible to most enterprises due to financing gaps:** Demand for green technologies is consistently high across all assessed sectors. Technologies such as solar milk chillers, solar freezers, aquaculture cages, Langstroth hives, solar irrigation systems, and Black Soldier Fly (BSF) feed systems demonstrate clear productivity, climate resilience, and profitability benefits. However, adoption remains low because enterprises are unable to meet upfront investment costs and existing financial products are not structured around productive asset financing or agricultural cash flows. Without deliberate green financing interventions, enterprises will continue operating below optimal productivity levels while relying on expensive and carbon-intensive production systems.
- **Young people, particularly women, and persons with disabilities face overlapping barriers that limit participation in agri-food systems:** Youth, particularly women, remain disproportionately excluded from formal finance due to low asset ownership, limited land access, and irregular income patterns. Weak business records and high informality further restrict access to commercial lending. People with disabilities face additional physical, workplace, and digital accessibility barriers, contributing to extremely low participation across the target value chains. These barriers are systemic rather than individual and therefore require integrated responses that combine inclusive finance, targeted enterprise support, accessible technologies, and policy reforms.
- **Agricultural finance solutions are available but are mis-aligned with agricultural production cycles:** Kenya's agricultural finance ecosystem includes commercial banks, SACCOs, microfinance institutions, cooperatives, and public lenders. Most of the financial products from these banking institutions are not designed around agricultural production realities. Short repayment periods, immediate loan servicing requirements, savings multiple conditions, and conventional collateral requirements make many products inaccessible to enterprises operating in long-cycle sectors such as aquaculture and apiculture. Consequently, loan default challenges are often linked to poor product design rather than enterprise failure or lack of profitability.
- **Market systems show strong growth potential but require stronger coordination and market integration mechanisms:** large supply deficits in eggs, milk, fish, honey, and horticulture products demonstrate significant market opportunities for youth-led enterprises. Support infrastructure such as hatcheries, cooperatives, digital platforms, green technology suppliers, and business development service providers already exists. However, stronger coordination mechanisms are needed to connect enterprises to formal buyers, strengthen aggregation systems, expand receivables-backed financing, and reduce market inefficiencies caused by fragmented value chain coordination and cross-county cess regimes.

## 3.2. Recommendations

### Recommendation 1: Create and structure market linkages that can support agri-enterprise lending

Stringent collateral requirements imposed by financial service providers continue to exclude many youth- and women-led agri-enterprises from accessing formal finance. To address this challenge, GFYE should support the development of structured produce offtake arrangements that connect enterprises to reliable buyers while enabling receivables-based lending models.

Formal supply agreements with processors, supermarkets, exporters, and institutional buyers would provide enterprises with predictable revenue streams and create alternative forms of collateral based on signed contracts and future cash flows rather than land ownership. Potential anchor buyers include Brookside Dairy, New Kenya Cooperative Creameries, supermarket supply chains, hotels, institutional feeding programmes, poultry processors, and honey exporters. Strengthening these market linkages would also improve enterprise planning, aggregation, quality compliance, and access to working capital.

At the policy level, GFYE should work with sector associations such as Agricultural Sector Network and Kenya National Chamber of Commerce and Industry to advocate for harmonisation of cross-county cess regimes and produce levies that currently reduce producer margins and increase transaction costs. To implement these, the project should;

- Identify and engage at least five anchor buyers per priority value chain within the first 12 months.
- Facilitate negotiation and signing of formal offtake agreements between youth-led enterprises and buyers.
- Pilot receivables-backed financing models using signed supply contracts as collateral substitutes.
- Strengthen capacity of enterprises to meet buyer quality standards through certification, aggregation, and traceability systems.
- Convene multi-stakeholder policy dialogues involving county governments, producer organisations, KNNCI and private sector actors to review cross-county cess systems.
- Commission an economic analysis on the impact of multiple cess charges on producer profitability and market competitiveness.

**Recommendation 2: Develop and deploy credit models that Leverage on alternative data as collateral.**

Conventional collateral-based lending models continue to exclude viable agri-enterprises that lack land titles and formal financial records. GFYE should therefore support financial service providers to develop and adopt alternative credit assessment models that utilise agricultural transaction and digital payment data to assess borrower reliability and enterprise performance.

Alternative data sources such as mobile money transaction histories, cooperative delivery records, aggregation centre data, digital platform records, and input purchase histories provide a more accurate reflection of enterprise activity and cash flows within informal agricultural markets. This approach would significantly improve financial inclusion for youth, women, and first-time borrowers operating within agri-food systems. To achieve these, the project should;

- Partner with SACCOs, microfinance institutions, and commercial banks to pilot alternative credit scoring systems in aquaculture, poultry, dairy, and horticulture sectors.
- Integrate mobile money records, cooperative milk delivery data, and digital producer platform records into underwriting frameworks.
- Develop data-sharing agreements between financial institutions, cooperatives, digital platforms, and aggregation hubs.
- Train financial service providers on agricultural cash flow analysis and alternative credit assessment methodologies.
- Use pilot evidence to advocate for wider adoption of alternative data lending approaches within the financial sector.

**Recommendation 3: Redesign agricultural loan products around agri-production cycles and risk management needs**

Most existing agricultural loan products are poorly aligned with production cycles and seasonal income flows. Fixed monthly repayment structures are unsuitable for enterprises such as aquaculture, apiculture, and poultry that generate income after relatively long production periods. As a result, many viable enterprises experience repayment distress despite being commercially profitable.

GFYE should support financial institutions to redesign agricultural loan products around enterprise cash flows and sector production cycles. Flexible repayment structures, seasonal grace periods, and step-up repayment systems would significantly improve enterprise sustainability and reduce default risks. In parallel, insurance providers should be supported to develop bundled agricultural insurance products tailored to sector-specific production risks. To achieve these, the project should;

- Design and pilot harvest-aligned loan products across poultry, aquaculture, apiculture, dairy, and horticulture sectors.
- Introduce grace periods linked to production cycles, including 6–12 months for poultry and 7–12 months for aquaculture enterprises.
- Develop biannual repayment structures for apiculture enterprises and seasonal repayment schedules for horticulture producers.
- Pilot step-up repayment systems for first-time youth borrowers.
- Partner with insurance companies to develop index-based insurance products covering poultry mortality, fish mortality, colony loss, milk spoilage, and climate-related crop risks.
- Bundle insurance products with agricultural credit facilities to reduce lender exposure and enterprise vulnerability.
- Generate and document repayment performance data to support scaling of successful financial products.

**Recommendation 4: Invest in alternative feed systems and green technologies for profit optimisation**

High feed costs remain one of the biggest constraints affecting profitability within poultry and aquaculture value chains. At the same time, limited access to green technologies continues to reduce productivity, increase operating costs, and constrain climate resilience across agri-food systems. GFYE should support youth- and women-led enterprises to establish hub-based Black Soldier Fly (BSF) feed production systems designed as circular business models producing both larvae and organic fertiliser (frass). Partnerships with Kenya Agricultural and Livestock Research Organization, cooperatives, and private sector market actors should be leveraged to strengthen technical capacity, standardisation, and aggregation systems. In parallel, the project should promote adoption of green technologies including solar milk chillers, solar freezers, aquaculture cages, solar incubators, solar irrigation systems, and Langstroth hives through tailored asset financing and financial literacy support targeting youth- and women-led enterprises. The project should undertake the following.

- Develop county-specific BSF production manuals and operational guidelines in collaboration with KALRO.
- Establish pilot BSF production hubs within poultry and aquaculture clusters and support formation of feed aggregation systems linking BSF producers, cooperatives, and farmer groups.
- Promote circular feed systems linking organic waste recycling, BSF production, and feed manufacturing.
- Establish a green asset financing facility targeting productive technologies across priority value chains and introduce asset-leasing models using productive assets as collateral.

- Deliver financial literacy and enterprise management training targeting youth and women project participants/ enterprises.
- Facilitate partnerships between green technology suppliers, financial institutions, and producer groups.

**Recommendation 5: Scale proven working TSP and Mentor-Mentee training models for skills and capacity enhancement.**

Skills development systems remain poorly aligned with emerging green economy opportunities and market demands within agri-food systems. Existing TVET curricula provide limited coverage of renewable energy technologies, climate-smart agriculture, aquaculture systems, and green enterprise management. In addition, many young people lack access to practical work-based learning opportunities linked to real market demand.

GFYE should therefore support reform of skills development systems by adapting proven Technical Service Provider and Mentor–Mentee delivery models, including those implemented under the Mastercard Foundation RAY programme. These approaches should be combined with stronger partnerships between TVET institutions, renewable energy companies, private sector firms, and value chain actors. In the long run, TVET curricula should also be reviewed in consultation with employers, value chain actors, and the National Industrial Training Authority to incorporate dedicated modules on renewable energy installation, repair, and maintenance. Drawing on the GIZ dual-training approach supported by Finland, formal partnerships should be established between TVET institutions and renewable energy companies to provide co-designed apprenticeships and internships focused on solar equipment installation, maintenance, and repair. To achieve these, the project should;

- Scale Mentor–Mentee, hub model and Technical Service Provider approaches targeting youth and women entrepreneurs.
- Partner with local BDS providers such as Fineline Systems and East Africa Market Development Associates and extension agents to deliver targeted trainings on green technologies and climate-smart enterprise development.

**Long term actions targeting TVETs (beyond GFYE)**

- Engage a skills development expert working in partnership with TVET CDACC and the National Industrial Training Authority to review and update TVET curricula to incorporate green agriculture and renewable energy modules.
- Co-develop competency-based training modules with selected green technology providers covering key skills such as; solar equipment installation, repair, maintenance, aquaculture systems, and BSF production.
- Working with the private sector, establish apprenticeship and internship partnerships between TVET institutions and renewable energy companies; Also, pilot dual-training models combining classroom learning with workplace-based practical training.

**Recommendation 6: Ecosystem level recommendations beyond GFYE project**

Broader ecosystem reforms are necessary to create an enabling environment for inclusive green finance and sustainable growth of youth and in particular, women-led agri-enterprises, although some of these reforms may extend beyond the immediate GFYE implementation period. These interventions are important for addressing systemic barriers that continue to constrain financial inclusion, enterprise competitiveness, and investment in green technologies across agri-food systems.

- **Revision of prudential guidelines to support inclusive green finance**

Support policy advocacy targeting the National Treasury and Central Bank of Kenya to review prudential regulations governing agricultural and green lending. Currently, financial institutions apply a uniform 100% capital charge to agricultural loans regardless of borrower profile or environmental impact. This increases the cost of lending to sectors perceived as risky, particularly youth (women, and PWD-led) enterprises that often lack conventional collateral and formal financial records.

Introducing differentiated risk weightings for green finance and inclusive lending would lower the cost of capital for financial institutions and incentivise expansion of lending to underserved borrower segments. Green investments such as solar-powered cold chains, irrigation systems, Black Soldier Fly feed production, solar freezers, and climate-smart aquaculture technologies could therefore become more commercially attractive to lenders.
To support this process, future programmes should facilitate evidence generation through pilot lending programmes, documenting repayment performance, portfolio quality, and risk profiles of youth-led green enterprises. This evidence can inform regulatory reforms and strengthen the case for differentiated prudential treatment of inclusive and climate-smart lending portfolios.

- **Harmonise cross-county taxation and cess regimes**

Multiple taxation and cess charges imposed across counties continue to increase transaction costs and reduce producer profitability within agricultural value chains. In many cases, agricultural commodities are subjected to repeated cess charges as they move across county borders, significantly eroding margins for producers, traders, aggregators, and processors. These

costs are ultimately passed on to consumers and reduce competitiveness of local agricultural enterprises.

Future projects should therefore support coordinated advocacy for harmonisation of county taxation frameworks affecting agri-food systems. This would require engagement with sector associations and intergovernmental platforms including the Agricultural Sector Network, Council of Governors, and Kenya National Chamber of Commerce and Industry.

The objective should be to develop a more predictable and harmonised cess framework that minimises double taxation while protecting county revenue interests. Improved policy coordination would reduce market inefficiencies, strengthen regional trade, improve enterprise profitability, and encourage private sector investment across value chains.

- **Centralise green finance credit appraisal systems at local branches**

Financial service providers should establish credit appraisals within their branches to improve originations and improve consistency and strengthen confidence in green lending. While appraisal of green finance solutions is undertaken at branch level final approvals are escalated to national/headquarters. This results in rejection of viable investments due to perceived risks.

Future projects should support financial institutions to develop unified underwriting frameworks, sector-specific appraisal tools, and standard operating procedures for green technologies commonly used within agri-food systems. This includes technologies such as solar milk chillers, solar irrigation systems, aquaculture cages, solar freezers, Black Soldier Fly feed systems, and renewable-energy powered agro-processing equipment.

Centralised systems would improve quality control, reduce operational inconsistencies, accelerate approval processes, and build institutional capacity to finance green enterprises at scale. Standardised appraisal systems would also reduce perceived risk among branch-level credit officers and improve access to finance for youth, particularly women-led enterprises seeking productive green assets.

Chapter 4

# List of Annexes

### Annex 1: Priority regional interventions

County cluster prioritisation distils the cross-cutting implications from Section 4.1 into a concise action set. Detailed county by county context and value chain rankings are in Tables 5 to 8.

| County cluster | Priority sectors | Recommended green technologies | Proposed employment models |
|---|---|---|---|
| Nyeri, Kirinyaga, Murang'a and Meru | Dairy, Horticulture | Solar milk chillers (KShs 400,000); solar drip irrigation; solar cold rooms; biogas (KShs 105,000); solar chaff cutters (KShs 55,000); climate smart poultry housing | Women led cooperative mini dairy processing hubs; solar chiller installation and maintenance enterprises run by young people; aggregation hub operators for tomatoes and cabbages; e bike harvest to hub logistics; women biopesticide micro enterprises; cooperative cold chain services |
| Busia, Siaya, Kisumu, Kakamega and Bungoma | Aquaculture, Poultry, Fisheries & Aquaculture | Solar incubators (KShs 67,500); solar aerators (KShs 50,000 to 100,000); BSF feed units (KSHS 30,000 to 80,000); clean energy smoking kilns (KSHS 20,000 to 50,000); solar freezers (KShs 87,500); PVC cages (KShs 280,000); biofloc systems | Fingerling hatcheries led by young people (130% ROI); women led BSF backyard production (Hydrovictoria model); feed milling cooperatives run by young people (Kakamega model); women Fisheries & Aquaculture smoking and trading groups; solar incubator hatchery operators run by young people (KSHS 57,500 profit per cycle); digital market coordination via Aquarech; PWD Fisheries & Aquaculture grading stations |
| Machakos, Tharaka Nithi and Embu | Horticulture, Apiculture | Modern Langstroth hive kits; solar grain dryers; rainwater harvesting; biological pest controls; colony water systems | Hive management as a service operated by young people (KSHS 500 to 1,000 per hive per season); honey aggregation and processing run by young people (500 to 1,000 kg per season); women beeswax and propolis micro enterprises (KSHS 15,000 to 30,000 startup); Langstroth input supply retail run by young people; PWD honey grading (audio moisture meters); certified seedling nursery partnerships; solar cold room operators run by young people |
| Nandi, Trans Nzoia and Nakuru | Dairy, Poultry | Solar chaff cutters (KSHS 55,000); solar powered milling equipment (Agsol, KShs. 179,000); hermetic storage; e bike and tuk tuks (KSHS 110,000); solar heaters (KSHS 50,000); biogas (KSHS 105,000) | Green transport enterprises run by young people (e bikes, tuk tuks); cooperative dairy processing hubs; feed milling cooperatives run by young people; poultry hatchery and brooder agent networks within Uzima, Silverland and Engoho chains run by young people; women dairy cooperative cold chain upgrading; women BSF micro production for poultry feed |

| County cluster | Priority sectors | Recommended green technologies | Proposed employment models |
|---|---|---|---|
| Kiambu and Nyeri | Horticulture, Dairy | Solar cold rooms; e bikes for last mile harvest logistics; solar processing equipment; solar milk chillers (KSHS 400,000); solar drip irrigation | Pack and grade enterprises run by young people (KEBS KS 1758 and GlobalGAP compliant); digital produce marketing and buyer matching platforms run by young people; e bike logistics operators; women dairy cooperative upgrading; women dried vegetable and juice processing; PWD leafy vegetable grading stations (adjustable tables, screen reader quality recording) |

## Annex 2: Implementation Plan

The implementation plan covers five agri-food value chains; poultry, dairy, horticulture, apiculture, and aquaculture with activities spread across three GFYE components and targets project implementation partners - FSD Kenya, AGRA and Cordaid Kenya with potential interventions targeting young men, women as well as persons with disabilities.

### Component 1: Scalable green business models and products for youth

**Facilitator: FSD Kenya**

| Timeframe | Activities | Potential Market actors and partners |
|---|---|---|
| **Short-term (0–12 months)** | • Undertake a scoping analysis that identifies and assesses commercially viable, green and sustainable business models and associated employment opportunities—outside the food value chains—for youth, women, and persons with disabilities in the 14 target counties.<br>• Synthesise and consolidate the capacity needs of rural youth entrepreneurs and rural financial institutions identified by the food systems analysis report and scoping study on green business models to guide Component 2 of the GFYE Project.<br>• Support refinement and finalisation of a practical green finance taxonomy for youth-focused rural investments in Kenya by integrating findings from the food systems analysis and the green business model scoping and ensuring alignment with the Kenya Green Finance Taxonomy (KGFT). | The Agricultural Finance Corporation<br>The National Treasury<br>Cordaid Kenya<br>AGRA<br>14 county governments<br>PFIs |

### Component 2: Capacity Building on Green Investment for Youth Employment

### Facilitator: AGRA/ Cordaid

| Timeframe | Activities | Potential Market actors and partners |
|---|---|---|
| **Short-term (0–12 months)** | • Partner with at least four TVETs and 2 BDS providers to co-develop modular agribusiness curricula covering solar technology operation, BSF production, cooperative governance, and financial literacy, with industry partners absorbing trained graduates into commercial roles.<br>• Co-finance pilots of BSF larvae production demonstrations in Busia using applicable models such as Hydrovictoria model and two additional aquaculture-priority counties, with KALRO supporting county-specific protocols and a commercial replication pathway agreed up front.<br>• Partner with Savanah honey (Honey Company) and pilot youth hive-management-as-a-service trainings in 5–8 high-colony-loss apiculture zones<br>• Through co-investment, facilitate Savannha honey company to mobilise women into commercial micro-enterprises in propolis and beeswax (KShs. 15,000–30,000 start-up), bio-pesticides (neem, Trichoderma), and clean-energy fish smoking groups, with starter packs and training bundled at entry.<br>• Partner with MFIs (e.g. Juhudi Kilimo) and DT-SACCOs with appetite for agri-youth product redesign to embed advisory in their loan products.<br>• Pilot youth solar cold room operations at 3–5 tomato and cabbage clusters; youth-led hatcheries with monosex fingerling technology; and e-bike logistics operators serving harvest-to-hub delivery.<br>• Co-design accessible grading stations for PwD operators: audio moisture meters for honey, adjustable-height sorting tables for leafy vegetables, fish grading at aggregation hubs.<br>• Broker structured apprenticeships between agribusiness firms and TVET graduates across the five sectors, with firms cost-sharing the apprenticeship investment. | TVETs<br>KALRO, IBRA<br>Hydrovictoria<br>Juhudi Kilimo, DT-SACCOs<br>Anchor firms in five sectors |
| **Medium-term (1–3 years)** | • Crowd in BSF and Azolla feed enterprises into KEBS-certified cooperative feed milling and replicate the Kakamega county feed bulk procurement model through commercial uptake in additional counties.<br>• Partner with private market actors and implementers (e.g. USTADI borrowing lessons from IFAD Boosting Youth in Agribusiness Programme) to strengthen women-led cooperative processing: mini-dairies (500–1,000 litres per day), county-scale honey aggregation (2,000–5,000 kg per season), fish fileting, drying, and packaging, and dried vegetable and juice processing.<br>• Help launch youth-led Farmer Service Centres as commercial aggregation hubs in poultry and dairy, alongside youth-led digital buyer-matching platforms in horticulture.<br>• Build women's leadership and governance pathways within the registered dairy cooperatives and the aquaculture and apiculture cooperatives, with structured pipeline programmes feeding board and committee positions. | KEBS, USTADI<br>Dairy cooperatives, aquaculture and apiculture cooperatives<br>Women cooperatives<br>TVETs<br>Logistics SMEs<br>MFIs |

| Timeframe | Activities | Potential Market actors and partners |
|---|---|---|
| | • Embed TVET aquaculture modules across institutions, with enterprise incubation pathways integrated into graduation requirements and industry co-investment in equipment and placements.<br>• Crowd in e-bike and tuk-tuk logistics enterprises (E.g. Roam and Rhingo) for same-day harvest-to-hub delivery in horticulture, and youth green-tech service contracts in dairy.<br>• Pilot a matched savings programme for PwD producers (1:1 top-up), with graduation to standard microcredit as the sustainability mechanism; formalise PwD digital coordinator roles within cooperatives. | |

### Component 3 — De-risking for Increased Green Financing

**Lead facilitator: RK – FINFA/ AFC**

| Timeframe | Activities | Market actors and partners |
|---|---|---|
| **Short-term (0–12 months)** | • Partner with 3–5 MFI and DT-SACCO partners to design and pilot harvest-aligned loan products with grace periods matched to sector cash-flow cycles: 21-day poultry, 7–12-month aquaculture, biannual apiculture, seasonal horticulture, fortnightly dairy.<br>• Pilot green asset leasing across the five sectors: solar incubators (KShs 67,500), Langstroth hive kits, solar cold rooms, solar freezers (KShs 87,500), clean-energy kilns (KShs 20,000–50,000), and e-bikes (KShs 110,000).<br>• Establish a time-bound 20% first-loss facility (18-month limit) on youth agri-food portfolios, with repayment data generated to support commercial pricing thereafter.<br>• Pilot alternative credit scoring with PFIs using M-PESA histories, Aquarech records, Agriflock 360 data, and cooperative delivery volumes to address information asymmetry on borrower performance.<br>• Co-design sector-specific index-based insurance products with insurers; poultry mortality, colony loss, fish mortality, weather-index crop cover, milk spoilage each triggered by verified events. | AFC, Juhudi Kilimo and other MFIs<br>DT-SACCOs<br>Insurance providers<br>Aquarech, Agriflock 360<br>Mobile money providers |
| **Medium/ Long term (1–3 years+)** | • Scale green asset leasing into higher-value equipment: solar milk chillers (KShs 400,000), PVC fish cages (KShs 280,000), solar drip irrigation (KShs 150,000–250,000), solar feed machines (KShs 179,000), biogas (KSHS 105,000), and biofloc systems (KShs 80,000–150,000).<br>• Crowd in commercial uptake of bundled index-based insurance products across the five sectors.<br>• Broker contract farming arrangements between commercial buyers and organised youth, particularly women producer groups across the five sectors. | 5+ PFIs<br>Leasing companies<br>Insurance providers<br>Commercial buyers<br>WEF, AFC Women's Window, Uwezo Fund |

| Timeframe | Activities | Market actors and partners |
|---|---|---|
| | • Broker formal linkages between women cooperatives and the Women Enterprise Fund, AFC Women's Window, and Uwezo Fund.<br>• Pilot sector-aligned cash-flow leasing models: pay-per-litre (dairy), pay-per-harvest (aquaculture), pay-as-you-hatch (poultry), pay-per-crate (horticulture), with repayment indexed to verified production events. | |

## Annex 3: Example of Green Technology Providers

The examples of technology providers, costs and sectors served, grouped by technology category. Costs are in KShs..

### A3.1 Green energy and solar technologies

| Provider | Technology or product | Indicative Cost (KShs.) | Sectors |
|---|---|---|---|
| Davis and Shirtliff | 500 L capacity | 400,000 | Dairy |
| Davis and Shirtliff; Mazingira Green; Netafim Kenya | 5 to 7HP | 150,000 to 250,000 | Horticulture |
| Davis and Shirtliff; SunCulture; Chloride Exide | 500l capacity | 87,500 | Aquaculture and Fisheries |
| Davis and Shirtliff; local solar fabricators | 50l capacity | 100,000 | Aquaculture and Fisheries |
| Davis and Shirtliff; private suppliers; KMFRI | 300 to 400 W | 50,000 to 100,000 | Aquaculture and Fisheries |
| Kilimo; Eco Incubators | 500 bird capacity | 67,500 | Poultry |
| Kilimo; Eco Incubators; local fabricators | 500 bird capacity | 50,000 | Poultry |
| Local fabricators; county programmes | 5HP | 55,000 | Dairy |
| Local fabricators | 400W to 500 W | 100,000 to 200,000 | Cereals |

### A3.2 Biogas, circular economy and feed technologies

| Provider | Technology or product | Indicative Cost (KShs.) | Sectors |
|---|---|---|---|
| Sistema Bio; Biogas Technology Africa | 20 m3 | 105,000 | Dairy |
| Local fabricators | Waste to energy and compost systems | Project specific | Poultry, Aquaculture |
| Hydrovictoria (Busia); KALRO; private BSF enterprises | Black Soldier Fly larvae production units; protocols and technical support | 30,000 to 80,000 startups | Aquaculture, Poultry |
| Agsol | 5HP | 179,000 | Poultry |
| Kakamega County | Bulk feed procurement and retail model | County programme | Aquaculture, Poultry |

### A3.3 Electric transport, aquaculture and apiculture equipment

| Provider | Technology or product | Indicative Cost (KShs.) | Sectors |
|---|---|---|---|
| Roam Electric; Rhingo; BasiGo | 3 to 4.5 KW | 110,000 | Dairy, Horticulture |
| Private logistics firms; cooperative procurement | Cooler trucks (3MT) | 2,000,000 | Aquaculture, Fisheries & Aquaculture |
| KMFRI; private cage fabricators; county aquaculture programmes | PVC Fisheries & Aquaculture cages; cage and pond construction $15m^3$ | 280,000 (cages); variable | Aquaculture |

| Provider | Technology or product | Indicative Cost (KShs.) | Sectors |
|---|---|---|---|
| Private hive manufacturers; cooperative supply networks; county programmes | Langstroth modern hives, protective gear, smokers, queen excluders, foundation sheets | Variable (around 71% of production costs) | Apiculture |
| Local equipment suppliers; private equipment dealers | Wax melters, moulds, bottling kits; honey extractors and bottling lines | 15,000 to 30,000 (kits); variable | Apiculture |

### A3.4 Horticulture inputs and digital platforms

| Provider | Service or product | Sectors |
|---|---|---|
| ICIPE; private agro input dealers; KALRO | Biological pest controls (neem, Trichoderma, Bacillus thuringiensis); IPM products | Horticulture |
| KALRO; KEFRI; private certified nurseries | Certified seedlings, improved germplasm, disease resistant varieties | Agroforestry, Horticulture |
| KIRDI | Processing equipment (solar dryers, paste mills, juice extractors) | Horticulture |
| Aquarech Ltd | Digital aquaculture platform covering input supply, harvest aggregation and market linkage; 10 counties, more than 5,000 producers | Aquaculture, Fisheries & Aquaculture |
| Agriflock 360 | Digital platform for poultry production records, disease alerts, buyer demand and market prices | Poultry |
| MFarm | Real time market price information and buyer connections | Horticulture |
| Mkulima Sharp | Digital advisory services for crop and livestock management | Dairy, Horticulture |
| KALRO FarmSmart | Climate smart advisory app for tree and crop management | Agroforestry |

### A3.5 Poultry value chain actors and BDS or training providers

| Provider | Service or product | Sectors |
|---|---|---|
| Uzima Poultry | Day old chicks (DOCs), hatchery and distribution networks (around 220,000 chicks per 21-day cycle) | Poultry |
| Engoho Chicken | Day old chicks and hatchery operations with youth agent distribution networks | Poultry |
| Silverland | Day old chicks and broiler input supply | Poultry |
| Kenya Animal Genetic Resources Centre (KAGRC) | Quality semen distribution and artificial insemination services | Dairy, Poultry |
| EAMDA | Agribusiness training bundled with product sales | Cross cutting |
| Fineline Systems | Technical and enterprise training for poultry producers | Cross cutting |
| Practical Action | Hands on training in apiculture, colony management and value addition | Multi sector |
| KALRO | Technical training, research and climate smart advisory across sectors | All sectors |
| ICIPE | Pollinator research, pest management training, biological controls | Horticulture, Apiculture |

| Provider | Service or product | Sectors |
|---|---|---|
| KMFRI | Aquaculture research, hatchery support and extension | Aquaculture, Fisheries & Aquaculture |
| International Bee Research Association affiliates | Apiculture technical training and colony management | Apiculture |
| Kenya Dairy Board (KDB) | Regulatory oversight, extension services and licensing | Dairy |

## Annex 4: Glossary

| Term | Definition |
|---|---|
| Agri Value Chain | The full range of activities and actors involved in moving agricultural products from farm to consumer. |
| Bankability | The degree to which a project meets the criteria financial institutions use for investment or lending. |
| Blended Finance | The strategic use of public or philanthropic funds to mobilise private investment for sustainable development. |
| Circular Economy | An economic model that aims to minimise waste and maximise resource efficiency through reuse and recycling. |
| Climate Resilience | The capacity of communities and ecosystems to anticipate, absorb and recover from climate shocks. |
| Food Systems | The interconnected network of all activities, people, resources, and institutions involved in producing, processing, distributing, preparing, and consuming food. It highlights the drivers (such as policies, markets, and technology), stressors (like climate change, conflict, and economic shocks), and outcomes (including food security, nutrition, health, and environmental sustainability) that shape how food is accessed and utilized within a community or region (WFP food systems wheel) |
| Gender Responsive Approach | Strategies that address the distinct needs and contributions of women and men in development processes. |
| Green Finance | Structured financial activity with desired environmental outcome. Examples include green concessional loans, bonds, blended finance, and credit guarantees |
| Green Technologies | Tools, equipment and systems that reduce environmental impact while improving productivity and resilience, such as solar irrigation, biogas digesters and energy efficient cold storage. |
| Impact Investment | Investments made to generate measurable social and environmental impact alongside financial returns. |
| Inclusive Market Systems | Market structures that enable active participation by marginalised groups, including youth, and in particular, women and persons with disabilities. |
| Systems Transformation Lens | A holistic framework that views food systems as connected socio cultural and economic networks, focused on shifting entire systems toward resilience, inclusivity and sustainability. |
| Youth Employment | Decent economic opportunities for young people, often linked to entrepreneurship and skills development. |
| Youth Financing Models | Financial structures tailored to young entrepreneurs, including revolving funds, microcredit, digital platforms and results-based grants. |
| Inclusive, sustainable and green financing models | Financing approaches that promote equal participation, protect the environment, and can be maintained long-term. |