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Practical ACTION

Agroecological enterprises in Kenya

End-market demand and market systems analysis in selected value chains

2nd, revised edition

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DISCLAIMER

This report was developed by the Biovision Foundation in collaboration with Practical Action (PA). The first version of this report was published in 2024 and was primarily intended for internal use within Biovision.

The present publication constitutes the second, revised version of the report and is intended for an external audience. Compared to the first edition, several sections have been revised and clarified, particularly the methodological explanations, including an updated definition of Agroecological Enterprises (AEEs), to improve the overall understanding of the analysis. In addition, a general conclusion has been included. The underlying data and analysis remain unchanged and are based on field research and desk review conducted in 2022 and 2023.

The views and interpretations presented in this report are those of the authors and do not necessarily reflect the official positions of all partner organizations involved.

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Acronyms

AE	Agroecology
AEE	Agroecological Enterprise
B-ACT	Business Agroecology Criteria Tool
BVAT	Biovision Africa Trust
CIAT	International Center for Tropical Agriculture
FI	Financial Institution
GDP	Gross Domestic Product
IDH	Sustainable Trade Initiative
ISFAA	Intersectoral Forum on Agrobiodiversity and Agroecology
KEBS	Kenya Bureau of Standards
KEPHIS	Kenya Plant Health Inspectorate Service
KOAN	Kenya Organic Agriculture Network
KSh	Kenyan Shillings
MSD	Market Systems systems Developmentdevelopment
MSME	MSME Micro, small, and medium enterprises
MT	Metric tons
PELUM Kenya	Participatory Ecological Land Use Management Kenya
PGS	Participatory guarantee scheme
SME	Small and medium enterprises
TOR	Terms of reference
TIFS	Transformational Investing in Food Systems
USAID	United States Agency for International Development

Contents

Executive summary

Agroecology is increasingly recognised as an approach to promoting more sustainable and resilient food systems. Within this context, agroecological enterprises (AEEs) are considered important catalysts for scaling agroecological production and supporting the broader transformation of food systems. An AEE is a business operating in one or more value chains in the agrifood sector, whose business model, strategy, operations, and products or services align with the principles of agroecology. AEEs contribute to food systems that regenerate ecosystems, support human and animal health and wellbeing, ensure fairness, inclusion, and respect for community rights, and foster resilience and wealth creation in local economies. Their development depends not only on their business models, but also on the market systems in which they function. This report therefore combines an assessment of consumer demand with an analysis of market systems in two strategic value chains, mango and tomato in Kenya, alongside enabling services such as organic inputs and access to finance.

Urban consumers in Kenya express strong and widespread preferences for food that is chemical free, healthy, locally sourced, and linked to small scale farmers' attributes that are strikingly aligned with food produced from agroecology. This preference holds across income groups, though willingness to pay a price premium is concentrated in higher-income groups. Two domestic markets emerge: a large mass market for fresh produce, driven by perceptions rather than certification and offering limited or no premiums; and a smaller urban niche market where certification and branding enable modest premiums for fresh or processed products. Despite these favorable attitudes, actual consumption of agroecological and organic products remains below potential due to limited availability, weak differentiation, lack of traceability, and price sensitivity. The core demand challenge is therefore not consumer willingness, but the absence of reliable supply and credible differentiation in the places where most Kenyans shop.

The market systems analysis of mango and tomato reveals that systemic bottlenecks, rather than demand, are the primary constraints to the growth of AEEs. Mango presents stronger near-term enterprise opportunities, including for processing, but suffers from inconsistent agroecological production, weak aggregation and limited formality of marketing, post-harvest losses, limited embedded technical and financial services, and gaps in seedling and organic input systems. Tomato, while in high demand nationally, has a weaker production base: pest and disease pressure and poor access to suitable organic inputs that contribute to low agroecological production volumes and limited organization of aggregation and marketing. Both value chains share constraints such as weak producer organization, insufficient aggregation, fragmented technical support, poor input systems, and limited differentiation. The main difference lies in sequencing: mango already offers enterprise opportunities, while tomato requires foundational strengthening before AEEs can emerge and scale.

Organic input markets, specifically fertilizers and biopesticides, play a critical enabling role, yet face challenges including weak demand, limited know how of farmers, distribution bottlenecks, and regulatory hurdles. Addressing these challenges requires improvements not only in product availability for farmers but also in technical support provision by input providers, distribution models, and farmer competence in correct application.

A key cross cutting factor is the policy and enabling environment. Kenya's national policy framework continues to prioritize commercial, input intensive agricultural models. Limited coordination between national and county levels, under resourced extension services, and the dominance of export oriented actors in key policy forums constrain the scaling of agroecology and the emergence of AEEs. Nevertheless, openings are emerging, most notably the 2024 National Agroecology Strategy, which has the potential to improve coherence across actors and levels of government. Realizing this potential will require alignment between national and county policy frameworks, increased county-level commitment, and reforms that incentivize the development, certification, and distribution of bio-based inputs. Without these shifts, the enabling environment will remain a structural constraint.

Access to finance is another systemic barrier. AEEs frequently fall between financing categories: they are too small or not investment-ready for many commercial lenders, while also perceived as risky and seasonal for conventional financial products. Strengthening the pipeline of investable enterprises will require improving business development support, enhancing investment readiness, and developing better fit financial instruments and de-risking mechanisms. Crucially, improvements in finance must be connected to improvements in market functioning, finance alone cannot compensate for weak market incentives.

Overall, the analysis concludes that the primary constraint to scaling agroecological enterprises

in Kenya is not consumer demand, but the underdevelopment of market functions that organize, support, and incentivize agroecological production. Significant near-term opportunities exist in the fresh produce mass market, where more reliable supply and credible differentiation could unlock growth without relying on consumer premiums. Realizing this potential will require coordinated progress across producer organization, aggregation and marketing models, technical support, organic input delivery, and access to suitable finance—supported by a more coherent policy framework that recognizes and invests in agroecological market development.

The report is structured to reflect this integrated analysis. It begins with the **methodological approach (Section 1)**, followed by an assessment of **consumer demand for agroecological produce (Section 2)**. It then examines the **market systems of the mango and tomato value chains (Section 3)**, before analysing two critical enabling functions, **organic inputs (Section 4)** and **access to finance (Section 5)**. The report concludes with **key findings and recommendations (Section 6)**, highlighting systemic bottlenecks, leverage points, and priority areas for strengthening the agroecological enterprise ecosystem. Each chapter concludes with a brief summary to highlight its key findings.

Section 1
Introduction

1.1 Background and rationale

Agroecology is increasingly recognised as an approach to promoting more sustainable and resilient food systems. Within this context, **agroecological enterprises (AEEs) are considered important catalysts for scaling agroecological production and supporting the broader transformation of food systems.** These businesses operate at different points along agricultural value chains, for example by supplying inputs for agroecological production, aggregating and marketing farm produce, or processing agroecological products. However, the development and growth of such enterprises depend not only on their individual business models but also on the market systems in which they operate, including consumer demand, value chain structures, access to inputs, and availability of finance. Understanding these dynamics is therefore essential for assessing the opportunities and constraints for agroecological enterprises in Kenya.

1.2 Aims and specific objectives of the report

The **aim of this report** is to provide evidence on demand for agroecological products and to identify entry points for market systems development in Kenya that can inform organisations engaged in agroecological market development. By analysing consumer demand and market dynamics, the report seeks to generate actionable insights and recommendations that can guide interventions supporting growth-oriented agroecological enterprises within the targeted market systems. Ultimately, these interventions are expected to strengthen market opportunities for agroecological primary producers while improving consumers' access to agroecological products.

The **specific research objectives** that guided the strategic analysis were:

- to understand levels of end-demand for products from AEEs in Kenya;
- to understand levels of demand from agroecological producers for services and inputs in Kenya;
- to understand how to use a market system development (MSD) approach to influence the growth of AEEs;
- to understand the business-enabling environment for AEEs.

1.3 Key concepts and analytical approach

1.3.1 Agroecological enterprises (AEEs)

An **Agroecological Enterprise (AEE)** is a business whose activities are commercially oriented and embedded within agri-food systems. An **AEE aligns the way it creates, delivers, and distributes value in agri-food systems with the principles of agroecology**. AEEs may do so by supporting diversified farming systems, reducing dependence on synthetic inputs, strengthening local value chains and local economic activity, or ensuring fair economic relationships with producers.

AEEs operate across different segments of the agri-food value chain, including input and service provision, agricultural production, post-harvest handling, transport and logistic, trading and sale, and food services. AEEs contribute to the broader transformation of food systems toward environmental sustainability, resilience, and equity.

Through their activities, AEEs contribute to **positive ecological, economic, and social outcomes** while avoiding practices that fundamentally contradict agroecological principles (Agroecology Red Flags, Table 1). AEEs align with agroecological principles[1]. In many cases this alignment is intentional; in other cases, enterprises may operate in ways that are consistent with agroecological principles even without explicitly identifying their activities as agroecological. Agroecological transformation is understood as a process, and enterprises may operate at different stages along a continuum toward agroecology rather than fully embodying all agroecological principles from the outset. Importantly, no single enterprise is expected to align to all principles of agroecology. Instead, AEEs **contribute to agroecological food systems as part of broader networks of actors**, value chains, and territories.

1 High Level Panel of Experts (HLPE), 2019

AEEs go beyond implementing individual sustainable practices. Rather, agroecological principles are embedded across the enterprise, shaping its business model and strategy, as well as its governance, management, operations, and partnerships. This may be reflected, for example, in production methods, resource and energy use, labor practices, waste management, and the products and services the enterprise provides. **AEEs can take diverse legal and organizational forms**, including private companies, state-owned enterprises, cooperatives, or informal businesses. They may combine commercial and non-commercial activities but maintain a clear commercial orientation.

AEEs are therefore designed to be:

- **Ecologically sound**, through strengthening biodiversity, ecosystem functions, and resource cycles (incl. healthy soils)
- **Economically viable**, by linking long-term value creation with contributions to positive food system outcomes
- **Socially responsible**, by ensuring fairness, inclusion, and respect for community rights

Table 1. Agroecology Red Flags

Agroecology Red Flags
Introduces GMOs and associated genome-editing technologies
Promotes use of synthetic fertilizers and pesticides
Promotes extensive single cash crop production (monocultures) at the expense of diversified strategies
Focuses exclusively on productivity resulting in avoidable destruction of vital ecosystems and services.
Actively promotes regulations/actions that hamper/destroy local and farmer-managed seed systems (e.g. promoting intellectual property rights of natural resources such as e.g. patenting of seeds, traits)
Focuses on the large-scale intensification of animal production (factory farming)
Excludes or discriminates against women and other marginalized groups
Focuses exclusively on promoting highly processed, industrially produced foods (with low nutrient value)
Promotes extractive raw material production without some local value addition
Promotes approaches that violate rights, including customary rights, ignores prior informed consent, or results in population displacement and/or land grabbing

1.3.2 Market systems perspective

Market Systems Development (MSD) is an approach that seeks to improve the functioning of markets by addressing systemic constraints and strengthening relationships between market actors. Rather than focusing on individual enterprises, MSD analyses entire market systems, including value chains, supporting services, and the enabling environment, to identify bottlenecks and opportunities for growth. In this report, the MSD perspective is used to assess consumer demand for agroecological products and to identify entry points for strengthening the market participation of growth-oriented agroecological enterprises. Applying a market systems lens to agroecological enterprises represents a relatively novel approach, as agroecology has traditionally focused more strongly on production systems than on market development. Combining agroecological principles with MSD therefore provides a useful framework for analysing how markets can support the scaling of agroecological production and food system transformation.

Analysis of the market systems in which AEEs are found is important to identify the key bottlenecks and opportunities for this sort of enterprise. Only in this way can valid market systems and policy recommendations be formulated that can be used to advocate for an enabling environment for AEEs. A central theory to the market systems assessment is the interdependence between consumer demand and market systems that enable AEEs. If high demand exists, it can only be met if market systems enable the development of AEEs. Likewise, AEEs can only develop if there is consumer demand for their produce (Figure 1).

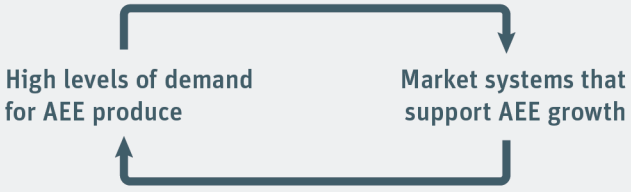

Figure 1. Consumer demand and AEE development

1.3.3 Products as proxies for value chains

In this analysis, individual agroecological products are used as proxies for the broader sectors in which growth-oriented AEEs operate. By analysing demand for specific products, particularly within the fruit and vegetable sectors, the analysis generates insights that can be contextualised to assess the broader viability of sectoral market development. This approach allows the analysis to identify where the findings can be generalised to agroecological enterprise sectors as a whole and where conclusions remain product-specific.

1.4 Methodology

The methodology can be broken down into three main activities.

1.4.1 Identification of priority sectors and products

A comprehensive market systems analysis covering all agricultural sectors was beyond the scope of this study. Therefore, a selection process was undertaken to identify the sectors and, subsequently, the products within these with the greatest potential for AEE development. This process consisted of three exercises:

- **National demand assessment:** drawing mainly on secondary data, complemented by some key informant interviews, to identify general demand trends that indicate the sectors in which there was the most potential for AEEs. As data were only available for organic produce, these were used as a proxy for agroecological production.
- **AEE mapping:** it was assumed that the presence of AEEs was an indication of a vibrant sector with potential for growth. The mapping of AEEs was done as part of the development of the Biovision-supported SHONA accelerator[2]. Notably, this mapping identified AEEs from across a large range of sectors. However, it proved difficult to identify a large number of AEEs within individual domestic sectors, which had implications for the implementation of the analysis.
- **Further secondary research:** additional desk-based research was undertaken to narrow the focus to specific subsectors and products. This process deliberately excluded certain sectors that, while meeting other selection criteria, were already receiving substantial attention from government and other agencies (e.g., African leafy vegetables).

1.4.2 Consumer demand assessment

A comprehensive consumer demand assessment was carried out to better understand attitudes to and purchase patterns associated with agroecologically and organically produced food. The assessment also included specific questions on the four focus products. **Consumer exit interviews** were conducted using a questionnaire in July 2023. The key characteristics of this methodology were as follows:

- Three urban locations were selected: two cities, Nairobi and Mombasa, and major towns in Kirinyaga County, Kagio, Kerugoya, Mwea and Kutus.
- Fully rural locations were not included due to logistical challenges in obtaining a sufficiently large sample. The findings therefore reflect urban populations.
- Customers were selected at random in and around specific retail outlets, including open-air markets, grocery stores, and supermarkets.

In total, 300 consumers were interviewed. Details of the sample group are provided in Figure 2 below.

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Scope of consumer research
Agroecological vs. Organic

Although agroecological and organic production are conceptually distinct, the two terms were used interchangeably for the purposes of the consumer demand assessments. This approach was necessary because most stakeholders are unfamiliar with the concept of agroecology, whereas "organic" provides a recognizable frame of reference that facilitates data collection. Where possible, explicit links to agroecology have been made.

The analysis examines agroecological products that are sold in Kenya and regional markets. Products destined exclusively for established global markets (such as tea and coffee) are intentionally excluded from the analysis.

Following this process, two value chains and associated products were selected for the market system analysis (Table 2).

Table 2. Selected Value chains and associated products

Value chain	Product 1	Product 2
Mango	Fresh mangoes	Dried mango
Tomato	Fresh tomatoes	Tomato puree

A detailed description of how and why these two products were selected is provided in Annex 1.

2 "A Market Study of Agroecology Enterprises in Uganda and Kenya_FINAL REPORT": https://drive.google.com/file/d/1LNiagSMiYaGOapKYw3k34y-BksSHrdYg/view (accessed from the news and updates box here: https://www.fao.org/agroecology/in-action/detail/a-market-study-of-agroecology-enterprises-in-kenya-and-uganda/en)

Gender composition

Gender	%
Male	44%
Female	56%

Age of respondents

Age range	%
18-24 yrs	10%
25-31 yrs	27%
32-38 yrs	39.3%
39-45 yrs	18.3%
46 +	6.3%

Income groups
Income per month, % of respondents

Income group, KSh	USD	%
Below 20,000	below 140	11%
20,001–50,000	140–350	42%
50,001–100,000	351–700	31%
100,001–200,000	701–1,400	14%
200,001+	1,401+	2%

Respondents per urban area

Urban area	Respondents
Kirinyaga	100
Mombasa	100
Nairobi	100
Total	300

Figure 2. Profile of respondents in consumer demand survey (n=300)

The survey initially aimed to focus on lower-middle, middle, upper-middle, and high income groups as it was assumed that the market for AEE products would be concentrated within these groups. The sample therefore shows a bias towards these groups. It has not been possible to get data that compares the actual distribution of incomes in Kenya with the distribution in the sample, but a number of data points can be used to draw some conclusions:

- A 2023 Kenya National Bureau of Statistics report suggested a figure for overall poverty in urban areas of KSh 7,193.[3] This is thought to represent about 34 per cent of the urban population. This group is assumed to be excluded from our sample.
- Average minimum gazetted monthly wage in Nairobi and Mombassa was KSh 21,310 in 2021. This just fits into the second income bracket in our sample, suggesting that people in formal employment on low wages are captured, although the degree of representation is not possible to ascertain.
- Data from the Kenya National Bureau of Statistics from 2020 indicates that middle-incomes in Kenya can be considered to fall in the 23,671 KSh to 119,999 KSh range. This covers the majority of participants in the survey.[4]

The conclusion from this is that the dataset is biased towards people in the formal economy and in the lower middle-income group.

1.4.3 Market systems assessment

The market systems assessment analysed previously identified value chains (tomato and mango) from a market systems perspective to assess their potential for growth-oriented agroecological enterprises (AEEs).

The specific outputs anticipated were:

- identification of market systems bottlenecks, including core market blockages, access to inputs and services, and enabling environment issues, which may constrain the emergence, growth, and profitability of AEEs;
- identification of MSD interventions and outputs that would improve the enabling environment for growth-oriented AEEs.

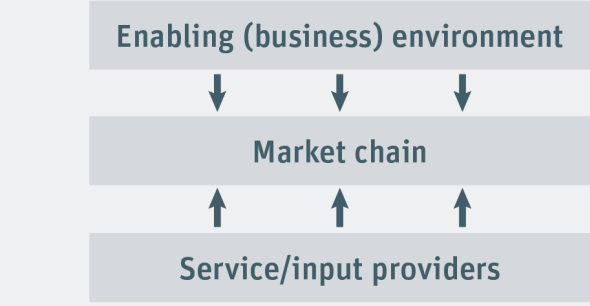

Figure 3. Market systems framework

- **enabling environment:** factors including policy, regulations, consumer demand, and social norms that influence how the market system operates and who benefits;

3 Kenya Bureau of Statistics (2023) Kenya poverty report 2021, https://www.knbs.or.ke/wp-content/uploads/2023/09/The-Kenya-Poverty-Report-2021.pdf.
4 Kenya Bureau of Statistics (2020) Inequality trends and diagnostics in Kenya 2020, https://www.knbs.or.ke/wp-content/uploads/2021/07/Inequality-Trends-and-Diagnostics-in-Kenya-Report.pdf.

- **core market chain:** the 'value chain' in which trade and value addition of the product takes place;
- **inputs and services:** the market for inputs and services that support all actors in the core market.

Thus, market systems and value chains are related and value chain analysis needs to be understood as a specific "lens" applied within the assessment of a market system to the object of inquiry. Key to such a market systemic analysis using a value chain lens is the aim to go beyond the symptoms of a problem to get to the underlying systemic issues that cause it. Based on the rationale for the market systems assessment described above, the analysis followed the sequence presented in Figure 4.

Mapping of market- description of market system: market channels, key actors and functions, inclusiveness

↓

Identification of **constraints** holding back the competitiveness and inclusiveness of the sector and the **opportunities** providing potential growth

↓

Identification of the **systemic issues**, the underlying issues causing this, which affect specific actors and market functions

↓

Identification of market-based **solutions** that address the systemic issues

↓

Identification of **facilitative actions** that will lead to the **solutions**

Figure 4. Market systems analysis stages

The market system analysis applied in the this report attempted to focus as much as possible on systemic issues that affected the potential of AEEs to emerge and grow, with a specific focus on 'growth-oriented' AEEs – those with ambition and potential to grow and be investable. However, the lack of AEEs in some locations led to the inclusion of non-AEEs that presented opportunities to highlight issues that would affect AEEs.

Information was collected through a combination of primary and secondary research.

- **Primary field research** in the regions included interviews and focus group discussions with key informants. These included producers, traders, processors, retailers, finance institutions, service organizations, and government bodies (Table 3). Details of these interviews are provided below in the tomato and mango market systems analyses in Section 3.

Table 3. Consultation groups*

Stakeholder group	Value chain actors
Producer groups/farms	9
Traders	3
Processors	4
Retail	2
Government	2
Finance	6
Input providers	18
Sector-wide service organizations[5]	8

*see Annex 2 for the full consultation list.

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The analysis focuses on Kirinyaga for tomatoes and Makueni for mangoes, given their importance in the production and trade of these crops (Table 4). It also captures market linkages beyond these counties, including outlets such as Nairobi. Due to the limited presence of AEEs within the target areas, additional enterprises operating outside these geographies were included to provide a more comprehensive understanding of the challenges and opportunities affecting AEEs.

Table 4. Significance of Kirinyaga and Makueni counties for tomato and mango production and trade[6]

	Kirinyaga tomatoes	Makueni mangoes
Area (Ha)	2,935	20,414
Value (KSh)	3,169,070,000	4,163,470,000
Value (USD)	21,654,000	28,500,000
% of national production value	….13.4	34

5 KOAN, BVAT, Enviu, CIAT, Slow Food Kenya, World Vegetable Centre, ISFAA, Biovision Foundation Kenya, IDH, TechnoServe.
6 Government of Kenya (2022) Agriculture and Food Authority yearbook of statistics 2022, https://de.scribd.com/document/674326754/AFA-Year-Book-of-Statistics-2022.

1.5 Limitations of the report

It is important to understand the nature of the consumer demand data. The results cannot be used to draw definitively conclusions about national demand, as the sample was skewed toward lower middle-income groups in urban areas. Rural populations and the urban poor were not included in the analysis.

The sample broadly represents the middle-income group. However, it was not possible to obtain a sample that exactly matched the actual proportions of each income group. Achieving this would have required a separate preliminary survey to determine these proportions, which was well beyond the scope of this analysis. Nevertheless, the observed trends provide useful insights into demand patterns.

The analysis focused on agroecological products, however, this concept is not widely understood by consumers. Consequently, much of the consumer analysis examined attitudes towards organic products as a proxy for agroecology. While the use of these two terms may at times create some ambiguity, efforts were made to address this by assessing consumer attitudes toward specific characteristics associated with agroecology.

The market systems research was initially based on the assumption that a large number of AEEs existed, around which an analysis of the market system could be built. This assumption proved incorrect for both value chains – tomato and mango. This presented challenges for conducting a standard market systems analysis and required the integration of conventional market systems with organic markets systems, while seeking to identify issues relevant to AEEs. Methodically, this created some challenges, and, at times, required a degree of interpretation in assessing the relevance of certain issues to AEEs.

Section 2

Consumer demand for agroecological products

2.1 The Kenyan Horticulture Market Context

2.1.1 General trends in Kenya's horticulture sector

The horticulture sector in Kenya, which comprises vegetables, flowers, fruits and medicinal aromatic plants, has been growing in significance since the 1970s. In 2019, the sector was considered the second best-performing agricultural subsector, after dairy and ahead of tea, contributing 26 per cent to Gross Domestic Product (GDP).[7] In 2021, it was estimated that horticulture employs 6.5 million Kenyans, directly and indirectly. In the same year, 496,062 ha were under horticulture production, yielding 7.9 million metric tons (MT) of produce.[8]

In 2024, data from Statista suggests that the fresh vegetable market in Kenya is worth $5.48 bn or about €5 bn (export and domestic), with projected annual growth of 11.13 per cent a year. Projections for the future growth of the sector are provided in Figure 5.[9]

Similarly, the fresh fruit market in Kenya is valued at about $4.39 bn (about €3 bn) by Statista[10], with a projected annual growth of 10.63 per cent (Figure 6).

Exports have driven much of the growth of the horticulture sector over the last 20 years. In 2021, horticulture exports were valued at €1.25 bn, and of this, 72 per cent came from floriculture, 18 per cent from vegetables, and 10 per cent from fruits.[11] In 2020, despite the Covid pandemic, exports of vegetables and fruits earned over €0.25 bn.[12]

Accompanying this has been a steady rise in domestic demand for horticulture produce. Local fruit and vegetable consumption accounted for 96 per cent of total production in 2020,[13] and in 2019 it was estimated to represent KSh 68.5 bn or approximately €0.5 bn[14] in total value. The trends being seen in Kenya are not uncommon and follow those seen across developing countries, which are experiencing increasing urbanization and increasing incomes. As incomes rise, so diets shift and demand for fresh

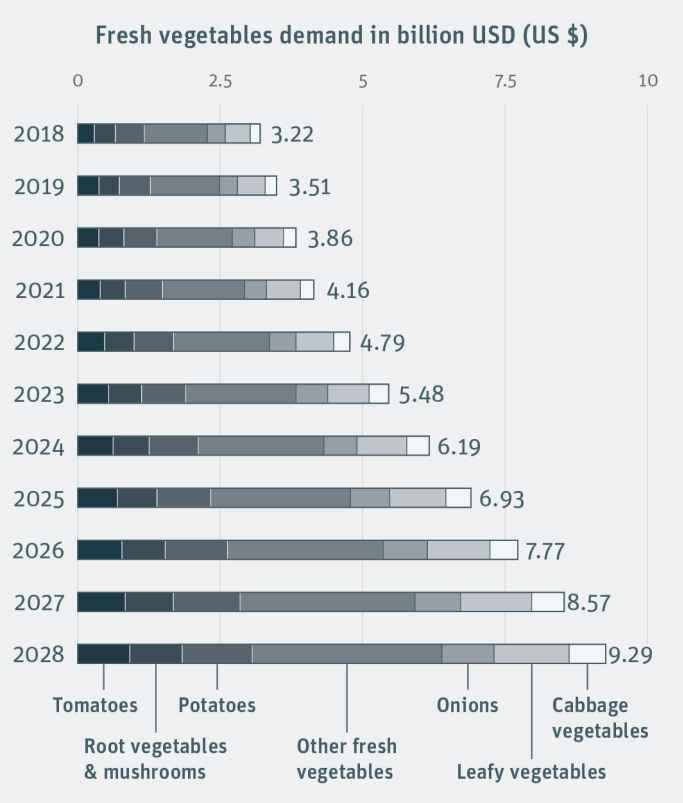

Figure 5. Projected demand for vegetables, Kenya[9]

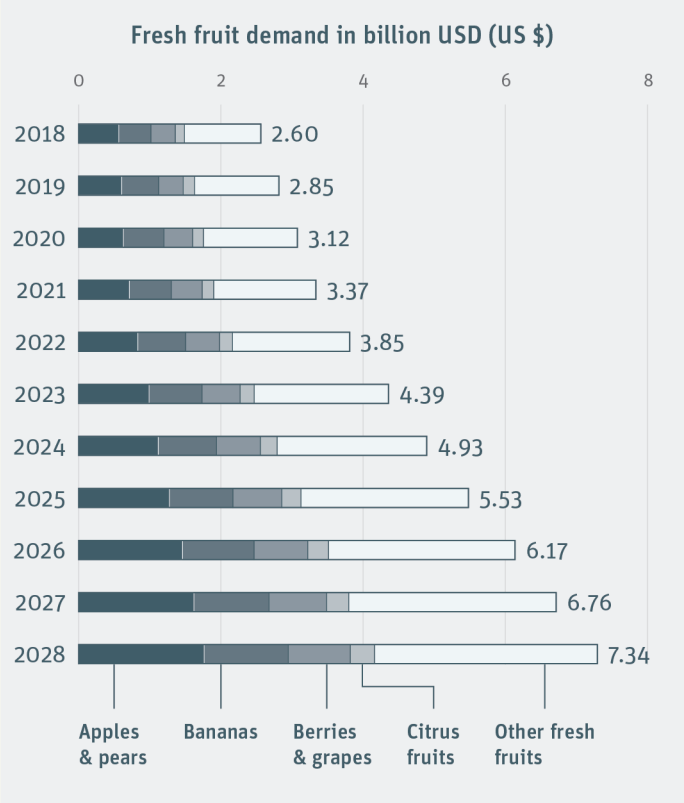

Figure 6. Projected demand for fresh fruit, Kenya

7 Horticulture Kenya, *Our portfolio*, https://horticulturekenya.co.ke/our-portfolio/ (last accessed 16 November 2024).
8 Kilimo News (2021) *State of the horticulture industry in Kenya*, https://kilimonews.co.ke/general-news/state-of-the-horticulture-industry-in-kenya/, 13 July (last accessed 6 November 2024).
9 Statista (n.d.) *Fresh vegetables – Kenya*, https://www.statista.com/outlook/cmo/food/vegetables/fresh-vegetables/kenya.
10 https://www.statista.com/outlook/cmo/food/fruits-nuts/fresh-fruits/kenya
11 Horticulture Kenya, *Our portfolio*.
12 Fresh Producer Exporters Association of Kenya (2021) *Update on the state of the horticulture industry in Kenya 2020*, https://fpeak.org/2021/01/07/update-on-the-state-of-the-horticulture-industry-in-kenya-2021/.
13 ibid.
14 Kilimo News (2021) *State of the horticulture industry in Kenya*.
15 Ibid.

horticultural produce increases. Also associated with this is an increased concern over food safety.[16]

Despite this promising performance, domestically and in export markets, the horticulture sector is beset by challenges. The Horticultural Crops Directorate, the government agency that oversees the sector, reports export concerns, such as an over-reliance on the European Union (EU) for exports, and challenges with meeting the safe pesticide requirements of foreign buyers. General concerns that also affect the domestic sector include the competitiveness of value chains, caused by the high cost of marketing, inputs, and processing, and the complexity of many value chains with intermediaries exploiting farmers.

2.1.2 Growth of the organic market in Kenya

While specific data on organic horticulture are scarce, overall organic market trends offer useful insights into the growth and dynamics of this sector. Statistics on the overall organic sector suggest that the sector has been steadily growing over the past 20 years. The amount of farmland under organic agriculture has increased from 4,535 ha in 2006 to 172,000 ha in 2022, an increase of nearly fortyfold.[17] This growth has been accompanied by an increase in the number of organic operators. In 2022, there were 64,156 producers[18], 22 processors[19], and 100 exporters.[20] Most of the formally certified organic production is destined for export markets.

Several factors are driving this growth:

- Concerns about food safety have become widespread. Research by the Consumer Grassroots Association in 2021 found that, in Kirinyaga and Kajiado, over 55 per cent of the population expressed concerns about food safety, with pesticides use / misuse being the major worry.[21] This concern was frequently observed during the field research conducted for this analysis.
- Rising incomes and the expansion of the middle class are contributing to increased demand for horticultural products (in line with trends observed in other countries going through similar phases of development). It has been estimated that in Kenya, fresh fruit production will increase by 6.5 per cent per year and fresh vegetables by 7 per cent a year to meet this new demand.[22] Horticultural produce is the backbone of the organic sector. Research from the Research Institute of Organic Agriculture (FiBL)[23] estimated that, in 2018, the most demanded organic products were (in descending order) fresh vegetables, fresh fruits, tea, and honey.

Together, these trends suggest favourable demand prospects for agroecological production.

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16 Farmers Review Africa (2023) *Industry leaders express great hope in the performance of the horticulture sector in Kenya*, 15 February.
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18 ibid
19 FiBL & IFOAM (2022) *The world of organic agriculture: statistics and emerging trends 2022*, IFOAM, Bonn, and FiBL, Frick.
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22 Kamer, L. (2022) *Consumer insights on organic exports from Kenya to the EU in 2020 and market forecast*.
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2.2 General consumer purchasing patterns for agroecological products

Assessing and understanding general purchasing patterns is essential for assessing the realistic market potential of agroecological products. Where consumers typically buy their food determines the retail environments in which such products must compete, while perceptions of agroecology and interpretations of "organic" influence trust, willingness to pay, and purchasing decisions. Examining these aspects helps clarify the conditions under which demand for agroecological products can translate into viable market opportunities for AEEs.

2.2.1 Main shopping point for farm produce

A wide range of market outlets exists for horticulture produce. For the purposes of this analysis, these outlets are grouped into three main categories: (i) open-air markets, also called 'mass markets' are characterized by the domination of fresh, unprocessed produce, a combination of formal and informal elements, and a high turnover of produce, (ii) grocery stores, which are smaller, formal or semi-formal retail outlets mainly for food items, such as Zucchini and Beyond Fruits, and (iii) supermarkets, like Carrefour, which are formal, large-scale retail outlets selling a wide range of foods and household goods and often operate as part of national or international chains.

Overall, 60% of consumers interviewed said that open-air markets are their main shopping point for food (Table 5). This preference is particularly pronounced among lower-income households. In contrast, higher-income groups are more likely to purchase horticultural produce from formal retail outlets, including supermarkets and grocery stores.

Table 5. Main shopping point for farm produce per income group (% of income group identifying outlets as their main shopping point)

	Income group (KSh/month)					
	Total	Under 20K	20K-50K	50K-100K	100K-200K	200K+
Open-air market	60	72	78	56	12	17
Grocery store	13	6	5	13	40	33
Supermarket	23	13	11	30	48	50
Other	4	9	6	1	0	0

2.2.2 Consumer perceptions of agroecological attributes

Most consumers in Kenya do not have an understanding of what is meant by 'agroecology'. Therefore, a variety of different methods were used in the consumer survey to assess consumer attitudes to agroecological practices, without reference to the term itself.

To start, respondents were asked to score a series of statements to indicate how important different agroecological attributes are to them (Figure 7).

The results are interesting for their order of ranking, rather than the actual scores given.

- Environmental considerations and being free from chemicals are the most important aspects, tying in with other secondary research (see Section 2.2.1.).
- Of the people in the survey, 76 per cent indicated a preference for food from local sources. This is particularly high for the lower income groups, with 87 per cent of people earning under $140/month having this preference.

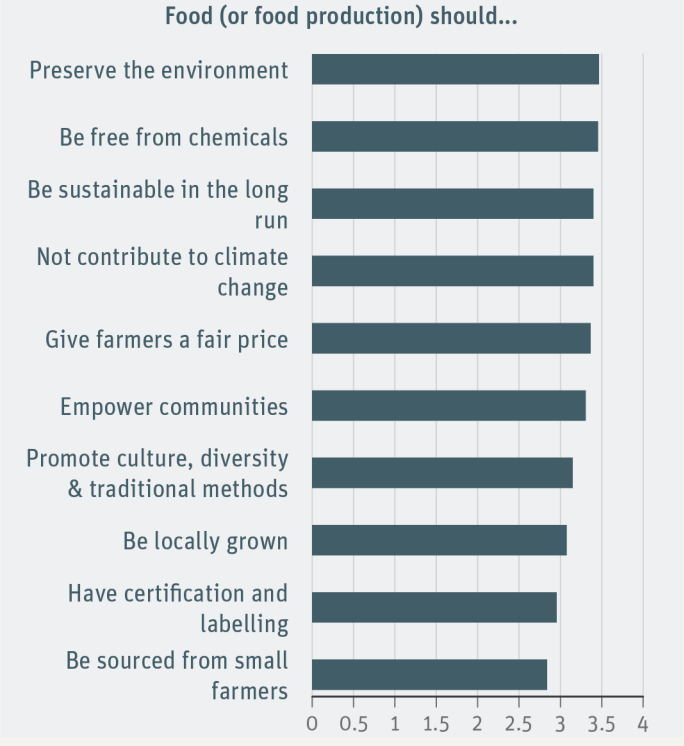

Figure 7. Scoring of agroecological attributes (scoring 1–4, where 4 is very important (% of score out of 4))

- Of the respondents, 66 per cent stated a preference for food produced by small farmers. Again, the numbers were higher from people earning less than $140/month – 78 per cent.

The meaning of the term 'local food' as food produced in the local economy is self-evident for respondents from the towns in Kirinyaga. One hypothesis for what this means in Nairobi and Mombasa is the regularly observed phenomenon of people buying food from traders who collect food from their home area. This also suggests that consumers have more trust in how such food has been produced. However, the reality is that most of this food has no traceability associated with it. As a result, this trust could be misplaced. The preference also resonates with the trend seen in the last decade of increasing interest in 'traditional' food that embodies local culture: for instance, the increasing popularity of African Leafy Vegetables.

2.2.3 Consumer's understanding of organic produce

Understanding how respondents interpret the term "organic" food was essential, as subsequent survey questions relied on this term to assess demand. Since consumers may attach different meanings to "organic," it cannot be assumed that the concept is understood consistently. Respondents were asked how much they associated specific attributes with organic produce by giving a score of between 1 and 4 (Figure 8). The results are similar to those in Section 2.2.2.

The results are interesting for a number of reasons:

- High quality, free from chemicals, health aspects and better taste are key attributes associated with organic produce.
- Environmental and social considerations are often attributed to organic produce, suggesting that consumers associate organic products with broader sustainability values.
- The lower score for certification suggests that consumers associate organic products more with perceived attributes (e.g. health, chemical-free) than with formal labelling or verification, indicating that products considered "organic" may reflect consumer perceptions rather than certified standards.

The data becomes even more interesting when broken down by income group. This reveals the following:

- Of the lower two income groups, 75 per cent and 67 per cent, respectively, said that they know where their 'organic' food is sourced from.
- This compares to only 42 per cent and 33 per cent of the highest two income groups.

Figure 8. Characteristics associated with organic food (where 4 is the highest association).

2.2.4 Willingness to buy and pay for agroecological products

Of the 300 consumers interviewed, 269 claimed to buy some 'organic produce'. Even if this might not actually mean food that is 100 per cent organic; as stated above, this may nevertheless provide some useful indications about food preferences.

The survey further examined whether consumers value characteristics aligned with broader agroecological principles beyond organic production. Respondents were asked how important additional environmental benefits and fairness to farmers would be in their purchasing decisions, and whether they would be willing to pay more for such products.

Based on the fact that most people do not seem to be referring to certified organic food in their answers, it is assumed that they are not paying premium prices. With this in mind, the answers to this question are assumed to represent the willingness to pay for agroecologically produced food, over and above the prices of conventional food. The responses are presented as a percentage of the total numbers in each income group (Table 6).

The results show that a majority of consumers across all income groups would be more inclined to buy produce with the positive environmental and social characteristics associated with agroecological produce. However, the data clearly shows that price remains a key determinant of purchasing decisions. Only in the two highest income groups does a majority indicate a willingness to pay a premium price for such produce, while the majority of the lowest income group are not prepared to pay more. This suggests that premium prices for organic or agroecological produce are only viable within higher income groups.

Table 6. Willingness to buy and pay for agroecological produce (% in each income group)

	Income group (KSH/month)**				
Willingness to buy food with agroecological characteristics (%)	Under 20,000	20,000–50,000	50,001–100,000	100,001–200,000	200,000+
It would not make a difference	19%	11%	13%	3%	1%
Less willing to buy	9%	19%	13%	7%	0%
Increased willingness to buy	62%	64%	61%	76%	83%
Willingness to pay more	28%	43%	40%	79%*	76%

*This figure is assumed to also include those that answered 'it would not make a difference' to the previous question, explaining why it is higher than the increased willingness to buy figure. **The willingness-to-buy columns do not add up to 100 per cent per income group because of the percentage that did not answer positively to buying any organic food in the first place.

2.2.5 Gender differences in organic purchases

An analysis of the differences between men and women shows little difference between the purchase patterns. 33 per cent of men and 35 per cent of women interviewed claim to buy organic produce. As other research we have seen suggests that women are more concerned about the issue of chemicals, we would be cautious about drawing conclusions from this data. It is an area that could use some more research.

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2.3 Purchasing patterns for priority products – tomatoes and mangoes

2.3.1 Overall purchasing patterns

To better understand the purchasing patterns within the identified priority value chains, respondents were asked specific questions about the selected products (fresh tomato and mango, tomato puree and dried mango). Table 7 presents overall purchasing patterns for these four products, overall and disaggregated by income group.

Table 7. Percentage of consumers buying priority products by income group

		Income group (KSh/month)					
		Total	Under 20K	20K– 50K	50K– 100K	100K– 200K	200K+
% buying	Tomato	**99**	100	100	98	100	100
	Tomato puree	**16**	6	14	15	31	17
	Mango	**73**	56	70	77	88	83
	Dried mango	**12**	3	7	12	31	17

The data shows a marked difference between raw and processed products, with significantly higher consumption of fresh produce than processed alternatives. As expected, tomato consumption is high across all groups. Mango consumption is also widespread, with more than three-quarters of respondents in all but the lowest income group reporting that they purchase it. The processed products, not surprisingly, generally see higher consumption as income grows, although it does not exceed 30 per cent in any groups. A noteworthy pattern in the data is that processed products peak in the second highest, not the highest, income group. The small size of the highest income group, however, makes it difficult to draw conclusions from this.

2.3.2 Purchasing patterns for organic products

Participants were asked to comment on the usual type of produce they bought (Figure 9). They were given four options.

- It is always organic.
- It is a mixture of organic and non-organic.
- It is non-organic.
- Don't know.

As mentioned earlier, when people say that they 'buy organic', they often seem to be referring to food that they believe has characteristics that they believe are associated with 'organic', rather than certified organic food. Nevertheless, the data indicates that most consumers purchase either a combination of organic and non-organic products, or exclusively organic products.

The data was also disaggregated by income group and product. The data in Table 8 shows the percentage of consumers within each income group that claim to buy organic products, or a combination of organic and non-organic products.

The data on raw produce is as expected, with consumption of organic produce increasing with income. However, there are still significant percentages

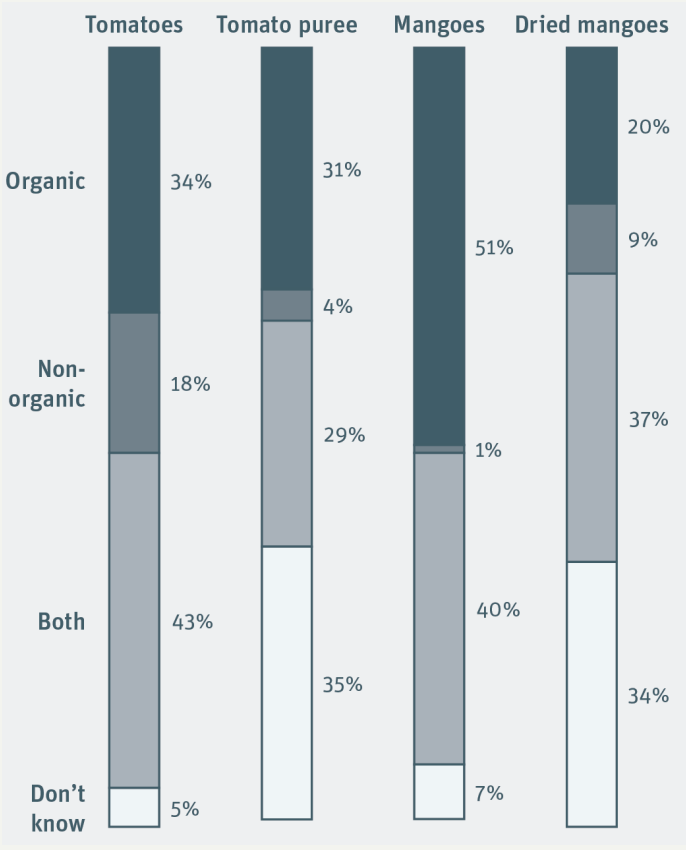

Figure 9. Percentage of consumers buying organic priority products

of lower income groups who claim to be purchasing organic tomatoes and mangoes, indicating that interest in organic cuts across all segments of society.

The low numbers claiming to buy organic processed products is probably a function of two variables: first, the lower numbers of people buying the generic product in the first place (Table 7 and Figure 9); and, second, the low availability of organic processed products (see Section 2.4).

Table 8. Percentage of consumers buying organic priority products by income group (% of income group)

		Income group (KSh)				
		Under 20K	20K– 50K	50K– 100K	100K– 200K	200K+
Tomatoes	Organic	19	29	39	48	33
	Organic & non-organic	50	42	47	33	50
Mangoes	Organic	19	32	40	62	17
	Organic & non-organic	28	27	32	26	66
Tomato puree	Organic	3	4	3	12	0
	Organic & non-organic	0	4	5	10	0
Dried mango	Organic	3	9	2	1	0
	Organic & non-organic	0	9	4	5	0

2.3.3 Purchasing patterns of organic products by region

The data were disaggregated by region for each product. Table 9 presents, for each product, the purchasing preferences reported by consumers who actually buy that product. The percentages therefore refer only to consumers of the respective product and indicate whether they purchase organic, non-organic, both, or do not know. The number of respondents in each category is shown in brackets.

Consumption of organic produce is highest in Nairobi for all products except dried mango. However, over 50 per cent of buyers in all locations answered 'organic' or 'both'.

The reasons for the higher figures for Nairobi are difficult to disentangle but, as Figure 10 indicates, the Nairobi sample did include a higher percentage in the higher three income groups. 54 per cent of the Nairobi sample were from these groups, compared to 47 per cent and 40 per cent in the Mombasa and Kirinyaga samples, respectively.

The significantly higher number of people saying that they buy non-organic tomatoes in Kirinyaga and non-organic mangoes in Mombasa is very interesting because these are areas of high tomato and mango production, respectively. One possible explanation of these figures is thus that people living in close proximity to where the products they were interviewed about are produced, have more accurate information on how they are produced than those living further away. While the populations in towns of Kirinyaga very likely have first-hand insight into the fact that farmers use chemical inputs in their tomato production process

Table 9. Purchasing preferences of the priority products, by region. Number representing percentage within group

		Income group (KSh)		
		Mombasa	Nairobi	Kirinyaga
Tomatoes (298 consumers)*	Organic	10	67	23
	Non-organic	6	2	41
	Both	83	30	24
	Don't know	1	1	12
Mangoes (220 consumers)	Organic	24	64	53
	Non-organic	0	1	2
	Both	71	35	30
	Don't know	5	0	15
Tomato puree (48 consumers)	Organic	0	21	44
	Non-organic	14	0	4
	Both	86	43	7
	Don't know	0	36	44
Dried mango (35 consumers)	Organic	38	16	13
	Non-organic	0	11	13
	Both	63	37	13
	Don't know	0	37	63

*n in brackets represent consumer having indicated that they buy the respective product).

of tomatoes, and inhabitants of Mombasa likewise for the production of mangoes, the inhabitants of Nairobi do not have this proximity and most of them will not have a differentiated understanding of the standard production processes of mangoes and tomatoes and how much chemical inputs are involved. They are more likely to base their decisions on wrong assumptions about the production of these crops and this may explain the consistently higher figures for purchase of organic produce there.

The relatively high share (albeit from a small sample size) of low-income respondents reporting that they buy organic tomato puree and dried mango is also interesting One possible explanation is that these consumers are buying locally produced or informal products and assume they are organic based on trust or familiarity with local production practices. This seems particularly likely in the case of tomato puree because no organic brand was encountered in the research.

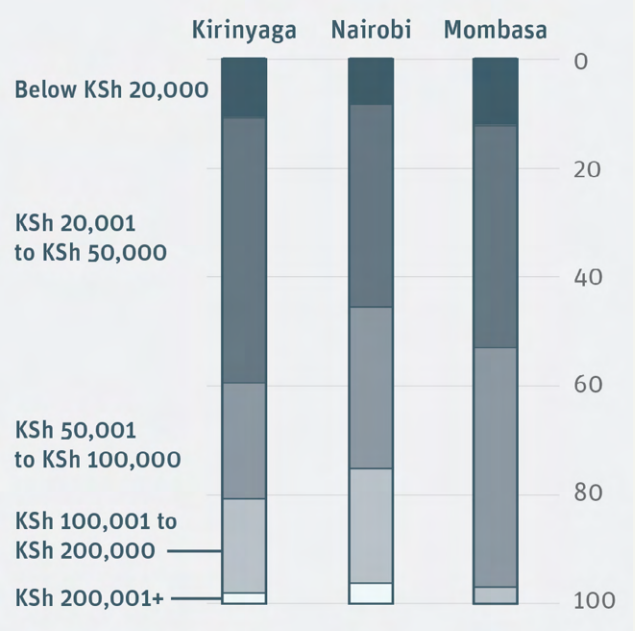

Figure 10. Distribution of survey respondents by income group and region in per cent of income group

2.3.4 Estimation of national urban demand for organic products

Drawing on the observed purchasing patterns, national urban demand for organic products was estimated in terms of both the number of purchasing households and the potential volumes sold. The estimation was done on the basis of the following assumptions:

- The data excludes the 34 per cent of the urban population living under the poverty level.
- The data is representative of the income groups above the poverty level.
- The urban population in Kenya in 2019 was 15,370,000 people[24], suggesting that 10,144,200 people are above the poverty line. This equates to 2,601,076 households.

The results suggest that **over 2 million urban households in Kenya buy organic tomatoes at some point** and **1.7 million households buy organic mangoes.**

Together with other evidence on consumer preferences, these findings reinforce the conclusion that there is a significant level of demand for organic products in urban areas. However, the specific quantitative estimates should be interpreted with caution.

Table 10. Estimate of total numbers of urban households who say they buy organic produce in Kenya

	Tomato	Tomato puree	Mango	Dried mango
Organic	884,366	130,054	962,398	52,022
Both	1,118,463	130,054	754,312	104,043
Non-organic	468,194	26,011	126,011	36,011
Don't know	130,054	26,011	130,054	104,043

Survey participants were also asked to indicate the quantities of organic produce they purchase. By combining these responses with data on the number of urban households that report purchasing organic products (Table 10), an estimate of total urban demand for organic products in Kenya was derived, as presented in Table 11.

Table 11. Estimated total demand for organic produce in urban areas

	Monthly kgs, per 300 people (all produce)	Monthly kgs, per person/ household	Number of households demanding organic*	Organic monthly national demand (kgs)	Organic annual demand (tons)
Tomatoes	2,359	7.86	884,366	69,514,118	93,413
Tomato puree	67	0.22	130,054	28,612	3,433
Mangoes	1,060	3.43	962,398	3,301,027	39,612
Dried mango	108	0.36	52,022	18,728	225

24 2019 *Kenya Population and Housing Census Reports* - Kenya National Bureau of Statistics.

2.4 Barriers to the purchase of organic produce

There is a significant difference between the number of people saying that they want to eat food without chemicals and those that buy organic produce. This is illustrated in Table 12, which includes the data for those that say they 'only' buy organic tomatoes.

Table 12. Difference between food preference and actual purchase patterns

Income group (KSh/ month)	Want food that is free from chemicals	Buy organic tomatoes
Below 20,000	75%	19%
20,001-50,000	92.9%	29%
50,001-100,000	98%	39%
100,001-200,000	98%	48%
200,001+	83%	33%

This difference is likely to be greater if we assume that consumers are not always correct in their assumption that the food they buy is organic.

To assess barriers to purchasing organic products, secondary research was first conducted to identify potential obstacles. Participants were then asked to indicate which of these applied to them. The barriers identified were:

- **availability:** limited availability of organic produce in market outlets;
- **knowledge of outlets:** limited awareness of which market outlets stock organic produce and where they are located;
- **cost:** the actual cost of organic produce;
- **certification/labelling:** limited availability or clarity of certified and labelled organic products;
- **information on farming:** limited information available to consumers about farming methods employed (organic vs. others).

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To simplify the results, they are shown as rankings, indicating the priority given by each income group to each barrier (Table 13).

Table 13. Priority barriers to purchase of organic tomatoes (where 1 is the most commonly cited barrier with a given group and 5 is the least commonly cited)

	Income group (in thousands of Ksh per month)				
Constraint	Under 20K	20K–50K	50K–100K	100K–200K	200K+
Availability	4	1	2	2	=2
Awareness of outlets	1	3	1	1	=2
Cost	2	2	4	4	=2
Lack of certification	5	5	3	3	1
Lack of farming information	3	4	5	5	=2

- The data shows that constraints with the supply of produce – either availability and/or knowledge of outlets – are the most significant constraint for all income groups.
- Cost is a noticeable constraint for lower income groups and much less so for higher income groups.
- Likewise, a lack of certification is not prioritized by lower income groups but is important for higher income groups, reinforcing previous analysis.

The data for mango is less distinct (Table 14). The most consistent variable across all income groups is the supply constraint (availability and knowledge of outlets). Cost is a constraint for most groups, although there is an anomaly with the middle group.

Table 14. Priority barriers to the purchase of organic mango (where 1 is the most commonly cited barrier with a given group and 5 is the least commonly cited)

	Income group (in thousands of Ksh per month)				
Constraint	Under 20K	20K–50K	50K–100K	100K–200K	200K+
Availability	=3	1	2	=1	=1
Awareness of outlets	=2	3	1	3	=1
Cost	1	2	5	=1	=2
Lack of certification	=3	4	4	=2	=1
Lack of farming information	=2	5	3	=2	=2

The data on tomato puree (Table 15) indicates that supply is the major constraint – either availability or knowledge of outlets is the number one constraint for all groups. Higher cost is not such an issue for lower income groups, which may reflect the way puree is purchased (in small, low-cost sachets).

Table 15. Priority constraints to the purchase of organic tomato puree

	Income group (in thousands of Ksh per month)				
Constraint	Under 20K	20K–50K	50K–100K	100K–200K	200K+
Availability	=4	2	1	4	–
Awareness of outlets	1	1	=3	1	=1
Cost	=4	3	2	2	–
Lack of certification	2	5	=3	5	=2
Lack of farming information	3	4	4	3	–

It is difficult to derive too many conclusions from the data for dried mango (Table 16). However, problems with supply do dominate.

Table 16. Priority constraints to the purchase of organic dried mango

	Income group (in thousands of Ksh per month)				
Constraint	Under 20K	20K–50K	50K–100K	100K–200K	200K+
Availability	=1	=1	=2	=4	1
Awareness of outlets	=1	=2	=2	2	–
Cost	–	=1	=2	=4	–
Lack of certification	–	=2	1	3	–
Lack of farming information	–	3	3	1	–

To summarize the findings from all tables, they seem to indicate that:

- **Cost** is a significant barrier for the lowest income groups for all products.
- **Availability** is a constraint across all products, particularly processed items, reflecting limited local processing of organic or agroecological food in Kenya. It is also a barrier for fresh organic produce, though to a lesser extent. This aligns with the data in Section 2.1, which show that while organic horticultural production is increasing, overall volumes remain low and are largely export-oriented.
- The importance of **certification/labelling and information on production** methods increases with income, although these factors are less frequently cited as barriers than expected. It should be noted, however, that this reflects consumer perceptions; without certification, consumers cannot be certain that products are genuinely organic.
- There also may be a hierarchical effect at play here. If supply of organic produce is a problem, then challenges with a lack of information about produce or certification will not apply. These only become issues when availability is no longer a challenge.

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2.5 Summary consumer demand

The analysis focused on agroecological products, using attitudes toward organic products as a proxy, because agroecology is not widely understood by consumers. The findings point to a **strong and widespread consumer interest in food with agroecological characteristics**, particularly food that is perceived as chemical-free, healthy, locally sourced, and linked to small-scale farmers. This preference cuts across all income groups and is closely linked to broader concerns about food safety in Kenya. It is especially pronounced for fresh produce such as fruits and vegetables, while demand for processed products remains more limited. This is illustrated by numerous data points highlighted above and includes, but is not limited to the following:

- The preference for food grown without chemicals is never lower than 83 per cent of all people across income groups.
- The preference for food grown by small farmers varies between 73 per cent and 87 per cent across income groups but is highest in the lowest income group.
- 98 per cent of all people believe that 'organic' food tastes better.

At the same time, **these preferences do not consistently translate into actual consumption**. Affordability and availability remain key constraints, particularly for lower-income consumers, who can only purchase such products when prices are comparable to conventional alternatives. In addition, most food is purchased in informal, open-air markets where certified products are largely absent, and consumers often rely on assumptions about production practices. This highlights the **importance of improving information, traceability, and trust in agroecological products.**

The analysis suggests the existence of **two domestic market segments**. A larger mass market, especially for fresh produce, is driven by perceived chemical-free characteristics, with little or no price premium. Alongside this, a **smaller niche market**, mainly in urban areas such as Nairobi, supports certified and branded products that can command modest premiums. While Nairobi remains a key demand centre, interest is also evident in other regions, indicating broader potential for market development.

Nairobi remains a focal point for demand for organic products, and it is assumed that this is linked to the higher incomes and greater access to markets and information available in Nairobi. However, demand in other parts of the country is also reasonably high – for instance, over 50 per cent of consumers in Kirinyaga demand organic mangoes. In many respects, the level of demand is not a surprise in a country with a growing middle-class and in which concerns over food safety are prominent. Thus, **the central challenge is not a lack of demand, but the need to strengthen supply, improve product differentiation, and ensure that agroecological products are available in the market channels where most consumers purchase food.** In this context, scaling is more likely to be achieved through mass markets, while niche markets offer opportunities for more specialised enterprises.

The consumer demand data generated through this research also informed the policy brief "Agroecology in Mass Markets: Opportunities for Expanding Access to Agroecological Products in Kenya."[25] The brief further explores the implications of the findings for market development, with particular attention to the role of mass markets and Participatory Guarantee Systems (PGS) in expanding access to agroecological products.

25 https://www.biovision.ch/wp-content/uploads/2025/01/Infopool_Mass_markets_brief_online.pdf

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Section 3

Market systems analysis of two selected value chains – mango and tomato

3.1 Introduction

This section presents the market systems analysis for tomatoes and mangoes, two value chains identified as having potential for growth-oriented agroecological enterprises. Building on the demand analysis of section 2, this section examines the structure and functioning of these market systems to identify key bottlenecks, opportunities, and potential entry points for strengthening agroecological market development.

3.2 Mango market systems analysis

3.2.1 Mango market systems analysis

The mango sector is associated with high domestic demand (see Section 2), an increasing export demand, and productivity challenges amongst the smallholder farmers who dominate the sector. The mango sector in Kenya has seen significant growth over the past two decades. Since 2000, it has seen a 300 per cent increase in production, and Kenya is now Africa's third-largest mango producer.[26] It has also seen a 400 per cent increase in the value of exports over the same period.

In 2021, mangoes contributed 15 per cent of the total value of fruits in Kenya. However, the land under mango cultivation decreased from 62,234 ha in 2020 to 56,668 ha in 2021, a 9 per cent drop. Over the same period, production dropped from 793,280 to 54,959 MT, leading to a decrease in the value of mango production of KSh 2.7 bn.[27] This reduction has been attributed to the decrease in production and a decline in average farm gate prices.

Although significant mango production is documented in 19 counties, Makueni dominates, with 34 per cent of the total production value of the country. The next closest county is Machakos, which produces 23.2 per cent of the value.[28]

The structure of mango production is dominated by small- and medium-sized producers. Fifty-five per cent of mango farmers are small scale with no more than 10 trees. Forty-four per cent are considered 'medium' scale, although this ranges from 11–500 trees.[29] Only a small minority are large scale, with more than 500 trees. Productivity on most small- and medium-scale farms is considered low due to low awareness of good practice and challenges with fruit flies. Other challenges are mango weevil, rust, and poor-quality planting material. The other challenge affecting the whole sector is a high rate of post-harvest loss – up to 36 per cent of all production.[30]

It is estimated that approximately 57 per cent of mangoes produced in Kenya are consumed domestically as fresh fruit. Five per cent of the mangoes are processed for the domestic and regional market, and 2 per cent are exported as fresh product. The remaining 36 per cent are assumed to be lost before they reach the consumer.[31]

3.2.2 AEEs in the mango value chain

This analysis was designed as a market systems assessment centred on agroecological enterprises (AEEs), with a focus on understanding how market system constraints affect their development. It was initially assumed that a significant number of AEEs would be operating within the mango value chain. In practice, however, a fully developed and vibrant AEE sector in the mango value chain was not identified. Instead, the sector consists of a diverse mix of businesses, some of which meet many of the AEE criteria, while others meet only a few.

To better understand this diversity, consulted enterprises were assessed against a set of AEE-related criteria by asking how important each criterion was to their business[32]. It is assumed that businesses actively

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28 KALRO (n.d.) *Mango*, https://www.kalro.org/divisions/crops/mango/ (last accessed 20 January 2024).
29 Bien, J., and Soehn, I. (2022) *Unlocking the Kenyan mango value chain*, John F Kennedy School of Government, Harvard University, March.
30 Snel, H. et al. (2021) *A food system analysis of Kenya's mango, avocado and poultry sectors: assessing opportunities to reduce food losses*, Wageningen University.
31 ibid.
32 The criteria used to assess agroecological enterprises (AEEs) were developed specifically for the purposes of this analysis by the consulting team. They are intended as a practical, context-specific framework to guide the assessment and should not be interpreted as a definitive or universally established set of criteria for defining AEEs.

encourage those criteria critical for their business, are less likely to actively encourage criteria only considered as 'preferred but not critical', and will not do anything to encourage criteria "not important or critical for the business".

The results (Table 17) suggest that most of the businesses promote reductions in chemical use and restricted use of GMOs. Other AEE characteristics are not so explicitly promoted, although circularity, water conservation, and organic soil improvement are all preferred. Importantly, even partial alignment may contribute to positive changes in upstream production systems.

Table 17. Alignment of consulted mango businesses with AEE criteria

	% of business responding		
AEE Criteria	Not important or critical for the business	Preferred but not critical	Critical for the business
Supply mostly comes from small farmers	11	22	67
Farms that supply you are reducing the use of or are not using any chemical fertilizer	11	22	67
Farms are reducing or are not using any chemical pesticides	11	22	67
Farms are using organic matter to improve the structure of soils	11	67	22
Farms are using cover crops to protect soils	22	44	33
Farms are not using genetically modified seed		22	78
Farms have management systems that conserve water	11	67	22
Farms are recycling resources in circular systems	11	56	33
Farms are using diversified cropping systems	33	44	22
Local knowledge is respected in the farming system used	33	33	33

Note: Based on information obtained from consultations with Manjaro Ltd, Kilele Farms, Paka Ltd, Fruit Processors, Martha's Enterprises, Kilima Horticulture Group, Azaavi Foods, Lucas's Self-Help Group, and Umoja ni Nguvu Self-Help Group.

In a next step, growth orientation of the enterprises was assessed using three simple criteria:

- The business has an employee base of at least five people from which it can expand. In this definition, cooperatives – which did not have any workers apart from farmer members – did not meet the criteria.
- The business has distinct plans to expand, either increasing market share, expanding geographically, or diversifying its products.
- The business is in a position to utilize formal finance (based on its experience with finance to date).

The analysis shows that the only growth-oriented enterprises in the production stage are larger, private entities. A summary of the analysis is displayed in Table 18.

Table 18. Growth orientation – mango businesses

Meets criteria | Does not meet criteria

Business	Employees	Plans to expand	Finance
Lucas's Self-Help Group			
Kilima Horticulture Group			
Umoja ni Nguvu Self-Help Group			
Fruit Processors			
Marandu Exporters			
Martha's Enterprises			
Kilele Farms			
Miti Food			
Manjaro Ltd			
Paka Ltd			

Table 19, groups the consulted AEEs into categories based on their position in the value chain and presents their responses to three selected AEE criteria, alongside an assessment of their growth orientation. This combined view helps to understand both the extent to which enterprises align with agroecological principles and their potential to scale.

The data shows that no enterprise meets all AEE criteria and is growth oriented. However, there are promising examples—such as Manjaro Ltd—that combine a commitment to social and environmental outcomes with potential for growth.

Growth orientation tends to increase further along the value chain, from production to processing. Producer groups at the production level generally lack both the capacity and the intention to expand, focusing instead on consolidating farmer membership, production, and existing market linkages.

This pattern is consistent with the experience of Aceli Africa, a market incentive facility (see Section 5), which has had to reduce the 'ticket size' in order to be able to identify businesses that meet environmental and climate criteria to qualify for loans.

Table 19. Alignment of consulted mango businesses with selected AEE criteria and growth orientation

		AEE criteria (sample)			
Enterprise category	Name	Supply from small farmers	Reduction in pesticide	Local knowledge respected	Growth oriented?
Producer groups	Lucas's Self-Help Group	Critical	Critical	Critical	No
	Kilima Horticulture Group	Critical	Critical	Preferred	No
	Umoja ni Nguvu Self-Help Group.	Critical	Critical	Critical	No
	Fruit Processors	Critical	Critical	Preferred	No
Large-scale farmer	Samuel Kizito	Not relevant	Critical	Not relevant	Yes
Traders	Marandu Exporters	Not important	Preferred	Not important	Yes
Small-scale processors	Martha's Enterprises	Critical	Critical	Critical	No
	Kilele Farms	Not important	Preferred	Not important	No
Medium-/large-scale processors	Azaavi Food	Critical	Critical	Not important	Yes
	Manjaro Ltd	Critical	Critical	Preferred	Yes
Large-scale processors	Paka Ltd	Preferred	Preferred	Preferred	Yes
Retailer	Peter's Health Food	Critical	Critical	Critical	Yes

3.2.3 Market channels

To ensure clarity, the market mapping distinguishes between conventional and organic segments. Conventional segments are included to provide a more complete understanding of market dynamics and to highlight constraints and opportunities that may also be relevant to AEEs.

Figure 11 outlines the mango value chain in Kenya. The majority of mangoes in the county are produced and sold by individual small-scale farmers. Organized production, aggregation, and marketing is rare. However, it is not absent, and some producer cooperatives successfully aggregate and organize collective marketing. But most 'conventional' (non-organic) mangoes are sold by small-scale farmers at the farm gate to small, informal or larger, formal traders and aggregators.

It is estimated that 80–95 per cent of their production (conventional (non-organic) mangoes sold by small-scale farmers) goes through intermediaries.[33] Larger-scale producers are more likely to have contracts, either with specific traders or directly with exporters. Some exporters have collection centres in the county where produce is aggregated.

Conventional mangoes are sold directly to local markets by small-scale informal traders. A large quantity of mangoes goes to wholesale markets within and outside the county, including in Nairobi. There are typically three destinations for mangoes

33 Bien and Soehn (2022) *Unlocking the Kenyan mango value chain*.

from wholesale markets. The majority go to the 'mass market', which includes kiosks and large open-air markets. Good-quality produce goes to higher-end supermarkets and grocery stores. A small amount goes to processors to manufacture pulp, juices, and dried products. This includes the Makueni County processing facility as well as processors outside of the county. Processed products are either sold to other processors (e.g. pulp to juice makers), or they are sold as branded products in supermarkets (e.g. dried mango).

The market channels in the small organic sector are different. They tend to be much shorter with fewer intermediaries involved – a sign partly of the nascent state of the sector.

Organic production is almost exclusively carried out by producer groups because most are supported to get established by NGOs and similar agencies who work with this modality, although some larger-scale organic farmers do exist. Some groups have in the past sold directly to organic exporters, with whom they have had contracts. Export companies have provided embedded support to enable them to meet the required standards. However, there are indications that producers in Makueni have struggled to maintain international standards and the numbers involved have declined. However, the general trend nationally indicates an increasing production for export.

There is a market for organic mangoes within Kenya, and producer groups sell directly to retailers, including

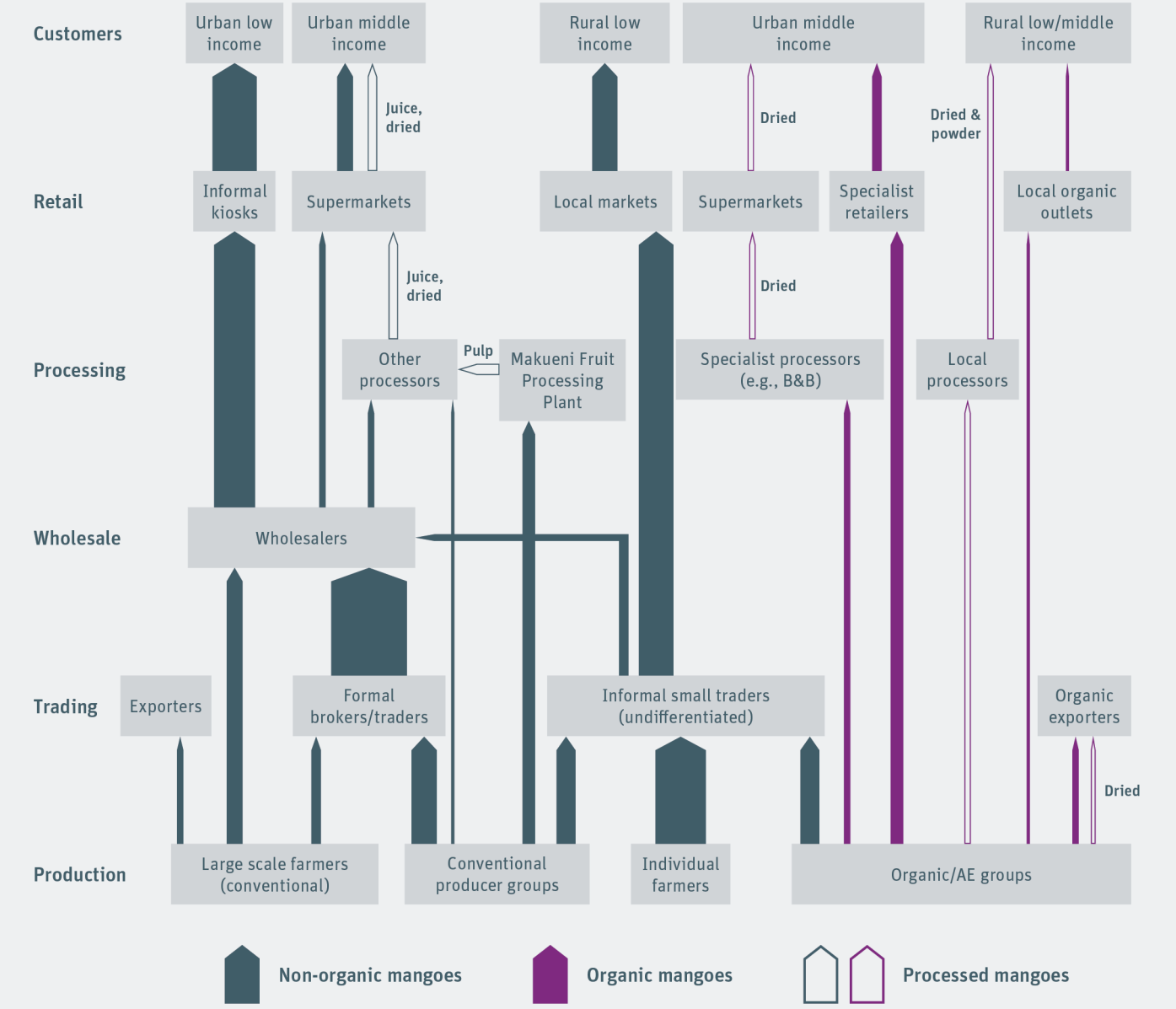

Figure 11. Mango value chain (Makueni into local and urban markets)

Note: The width of the arrows is designed to indicate relative volumes in each channel based on the information provided in the narrative. It is not based on actual data for volumes. The interrelationships have been simplified somewhat to aid understanding of the key channels. The size of the boxes does not represent anything – they are different sizes to make the diagram work.

specialist shops both locally and further afield in Nairobi. It is assumed that, in some cases, marketing is done directly by the producer groups themselves, allowing more margins to go directly back to the producers. However, some organic produce is sold to conventional traders because of a lack of organic markets.

There is a market for socially and environmentally responsible dried mango, as seen with the example of Manjaro Ltd. While the product is not 100 per cent organic, this meets some of the AEE criteria. In this instance, producer groups sell directly to the processor and receive technical support to meet Global G.A.P. production standards. Manjaro Ltd is exploring the sourcing of products from Kilimohai (organic) groups. The products are then sold directly to higher-end supermarkets in urban centres.

3.2.4 Main functions and actors

Producers

Mango production in Makueni is dominated by smallholder producers, most of whom grow rain-fed mangoes on farms of less than 5 ha. The majority of these fall in the medium-sized category and have between 20 and 300 trees (Table 20).

Table 20. National categories of mango producers[34]

Producer category	Characteristics
Smallholder farmers (0–10 trees)	Approximately 55% of farmers. Mangoes grown as a supplementary crop to main crops. Local varieties, no irrigation, minimal use of inputs. Use of brokers to buy mangoes at farm gate.
Medium- to large-scale farmers (11–500 trees)	Approximately 44% of farmers. Combination of farmers growing mangoes as primary and supplementary crop.[35] Larger-scale producers often tied to processors or exporters. Irrigation and use of inputs more common than for smallholders. Cooperatives and links to local processors more common. Organic certifications more common.
Private business orchards	Approximately 1% of farmers. Growing mangoes exclusively for processing or for export. In addition to own farms, may contract local farmers. Often own packhouse and may have own processing facility or use county-level one.

According to CIAT,[36] generally, mango farming practices in the county use limited amounts of fertilizer and incorporate a range of agroecological approaches, including the integration of livestock, the use of local composts and manure, the growth of complementary crops (including legumes), and water harvesting, including through the use of sand and earth dams. CIAT also suggest that producers are 'active in preserving indigenous food and social traditions and maintaining culture'. Own field research suggested that, although farmers used chemical inputs, particularly pesticides to combat fruit flies, there was interest in reducing this and even trying organic production. Although part of the motivation for this includes the perception of a market opportunity, it is also driven by health-related concerns over chemical use. For one of the women's organic farm groups consulted, this is a prime motivation rather than a market opportunity. Together, these characteristics indicate potential for an increase in the numbers of farmers practising agroecological production.

Productivity in the county is perceived to be low, with most farms achieving less than 50 per cent of potential yields.[37] Interestingly, organic producers interviewed, including an organic women's group and an individual large-scale organic farmer, both claim that productivity improved after converting to organic production. The potential reasons for this need to be explored in more detail. Production is lower on women-owned farms, assumed to be a result of less access to grafted seedlings and fertilizer.

The peak season for mangoes is between January and February, and during this time, produce floods the market, with high levels of spoilage as a result. It is estimated that, nationally, 36 per cent of mango production is spoiled before it reaches the consumer.[38] The only exceptions to this are the small quantities of irrigated mangoes around the Athi River that allow harvests early in September.

The county includes a mixture of local and exotic varieties of mango. The preferred variety for conventional and organic production is Apple because

34 ibid.
35 Owuor (2020) estimates that revenues from mango production contribute to approximately 40 per cent of household income in Makueni and Machakos; Owuor, T. (2020) Mango value chain road map, Makueni County, Republic of Kenya, quoted in Snel et al. (2021) A food system analysis of Kenya's mango, avocado and poultry sectors).
36 Onyango, Kevin, Peter Bolo, Aurillia Ndiwa, Rosina Wanyama, and Christine GK Chege . *A rapid agroecological mango value chain analysis in Kenya.* (2023). (report) https://cgspace.cgiar.org/items/52cf0c60-ef37-4e3c-ac69-0deb77f50698
37 ibid.
38 Snel et al. (2021) *A food system analysis of Kenya's mango, avocado and poultry sectors*.

of the higher price it obtains locally and in export markets. Other important varieties are Ngowe (local) and Kent (exotic).

Currently, organic producers can be broken into the following categories:

- farmers who are organically certified (relatively low number, linked to exporters);
- farmers who are part of PGSs;
- farmers who produce organically or near organically but have no certification of any sort. Motivations identified for this category through the research include:
  - perceptions that productivity can actually be higher with organic production;
  - recognition of the health benefits for the farmers when avoiding chemicals;
  - evidence that local customers prefer products they know have been produced without chemicals, even without certification.

Agricultural production AEEs

Agricultural production AEEs tend to be small-scale producer groups that concentrate on local, informal markets. They do not qualify as growth-oriented businesses. Profiles of two producer group-type AEEs and two conventional producer groups are provided in Table A4.

Traders and aggregators

Traders and aggregators can be broken down into a number of categories.

- Cooperatives: Fruit Processors is an example of an organization that buys mangoes from its members and sells to the county processing facility. The cooperative has also recently obtained an export licence and is seeking to sell directly into these markets. However, although it has a membership of over 12,000 farmers, recent consultations with the cooperative suggested that, currently, only 3,600 actively supply it with produce. The reasons for this are not fully known, but it is assumed that the remaining producers are selling to other channels. Last year, the cooperative aggregated 450 MT of mangoes. Other examples exist, such as the Kwiminia community based organisation, a women's group that owns a locally made cold storage unit, with a capacity of 40–50 MT a year and sells to wholesalers and retailers. None of these groups are purposefully organic or agroecological, but they may represent opportunities to develop AEEs.
- Informal small-scale traders: local small-scale traders visit farmers during peak periods. As a result of low levels of capital, limited transport capacity, and the perishability of mangoes, these traders sell the produce quickly in local markets.
- Larger private-sector aggregators: large traders purchase produce from small, medium, and large farmers and sell to wholesalers in the county and further afield.
- Brokers: brokers often act on behalf of larger traders or exporters, sometimes using their own cash flow to buy produce to the standard and quantity required. Therefore, they are not necessarily like agents – they are entrepreneurial and take risks with their own cash.

Many traders and brokers will pick the mangoes from the tree for the farmer. This practice results in a lower margin for the farmer.

Although organic mango producers will sell some of their produce to these categories of traders, the actual organic supply chains they are part of are much simpler and involve direct trading with processors and end markets, without traders or aggregators involved.

Processors

Processors can be broken down into informal processors, small (formal) processors, medium-sized processors, and large-scale processors. Profiles of processer AEEs are provided in Table A5.

Informal processors include household enterprises that dry or juice mangoes for sale in local markets. These are not covered in this analysis.

Martha's Enterprises is an example of a small-scale processor, producing organic mango powder and selling to local customers who use it as a sweetener. Like many similar small-scale processors, it lacks sufficient working capital to purchase sufficient product. Kilele Farms is a small company based in Makueni that buys mangoes from producers, dries it, and exports it.

It is currently unable to meet the demand for export despite reaching its maximum capacity.

Makueni includes one large-scale processor, the Makueni Fruit Processing Plant, set up by the government in 2017. The plant produces pulp that is sold to juice-making companies. It only operates during the mango harvest season due to a lack of storage facilities. It can process approximately 3,000 MT of mangoes each year, approximately 10 per cent of the production in the county. However, in reality the figures are lower than this – in 2021, it only processed 1,180 MT of mangoes.

A number of other medium and larger juice and pulp

processors are in operation outside of the county, many of which obtain some of their produce from Makueni. Most of these are conventional processors, but a small number of organic processors exist. These include Azaavi Foods, Sunny Mango (which sources from the lower Eastern region of Kenya), Kevian, and Paka Ltd, none of which are organic. As with the Makueni Fruit Processing Plant, most of these operate at about 40 per cent capacity because of the seasonality of production, post-harvest losses (estimated at 10–31 per cent),[39] difficulties in storage, and competition with other markets (local fresh and export). Manjaro Ltd, also located outside of the county, is an example of a processor focusing on dried product.

Wholesalers

The wholesale market does not exist for organic or agroecological mangoes. Their value chains are too short, and quantities are too low to warrant wholesaling – although a lot of organic mangoes end up in undifferentiated wholesale markets.

The conventional wholesale market offers little potential to support AEE development. However, a few points are worth noting. Mango wholesalers are based in locations like Nairobi and Machakos. They either buy directly from farmers or they source from aggregators. Wholesalers sell either to retailers, to agents for retailers, or to exporters. Since 2017, the Association of Kenya Mango Traders has represented the interests of mango wholesalers.

Retailers

Most mangoes are sold in large semi-formal and formal open-air markets.

Peter's Health Food[40] is a specialist organic retailer that sells products online and from a shop in Nairobi. It collects organic produce from PGS groups in a number of counties, including Makueni. It also trains farmers on organic production.

Input providers

Key inputs required by mango producers are seedlings, pesticides, and fertilizers.

Seedlings are provided by individual farmers, farmer groups, and NGOs, but not all of these are certified. A lack of good-quality seedlings, attributed to only a limited number of certified nurseries, is often cited as one of the problems underpinning low productivity.

Pesticides and fertilizers are provided by agro-dealers, such as Magos and New Dawn Agrovets. They are found in large towns, with some small outlets in minor towns. Most agro-dealers are not totally independent, relying on the producers of inputs to promote the products and generate demand. Pesticides are the most in demand produce from mango farmers, and some will travel long distances to obtain suitable quantities. Producers of agrochemicals have developed smart marketing strategies and include products in small sizes, allowing farmers with low incomes to afford them.

The quantities of organic products held by agro-dealers in Makueni is low, and the demand from mango farmers is low. Statistics are difficult to work out exactly, but informants suggested that between 1 and 5 per cent of stock is organic. Some organic farmers consulted with during the research were not always aware of the type of organic inputs available. However, one user of both organic fertilizer and pesticide reported that it was common for agro-dealers to run out of stock.

Training services

Technical support for mango farmers is available from a number of organizations, including the county government, the Dryland Natural Resource Center, and the larger cooperatives (e.g. Makueni County Fruit Processing Cooperative). However, the reality is that training services are limited and most farmers lack access.

Most current organic or agroecological farmers received training from externally funded programmes such as a previous USAID initiative and the MESPT. Other programmes providing similar support include those from Enviu and CIAT.

Technical support for marketing and for the development of small businesses is very limited. Organizations that provide these services, such as formal financial institutions, struggle to engage with small and medium enterprises in the agricultural sector. AEEs are particularly disadvantaged (see [CH] Section 5: Market systems analysis of the finance below).

Finance

Financial institutions in Makueni include the usual mix of community self-help groups, Savings and Credit Cooperatives (SACCOs), and conventional financial institutions. In terms of their engagement with mango farmers and mango businesses, it would appear to be limited. Research in 2015 from Financial

39 Fintrac Inc (2015) *USAID-KAVES mango value chain analysis*.

40 For a profile of a similar enterprise, see the Sylvia's Basket website https://www.sylviasbasket.co.ke/. It has received support from a number of donors and accelerators, helping it expand, including the WYLDE Scalerizer. For more information, see https://www.argidius.com/en/learning/sylvias-basket-kenya. The business has in the meantime started to focus on aggregating for a wholesaler (October 2024).

Sector Deepening (FSD) Kenya found that 85 per cent of mango farmers in Makueni, Kitui, and Machakos financed operations through savings. A further 10.6 per cent obtained finance through informal sources, such as friends and community groups, and only 4.4 per cent obtained finance through formal means; the majority of these were larger farmers with over 300 trees.[41]

There are limited financial services suitable for larger businesses, including AEEs, and most do not utilize formal finance.

Insurance

Crop insurance is in a nascent state in the county; one initiative facilitated by Pula[42] was established in the last couple of years. This focuses on maize farmers and bundles insurance with inputs and advisory services. The significance of crop insurance in the context of climate change in the region is growing. The climate risk profile for the county indicates that the area will experience a significant increase in extreme heat events, increased flood and erosion risk, and shifting rainfall patterns. Climate advisory services and insurance could play an increasingly important role in the viability of all forms of agriculture in the county.

3.2.5 Market segments

Results of the consumer demand survey coupled with the market systems analysis suggest the following main market segments for organic or agroecological mangoes beyond export market:

1. **Urban/peri-urban niche market for certified organic fresh mangoes:** Small market segment. Sold through formal supermarkets as certified produce, typically with a price premium to middle-class consumers in urban areas. Expansion potential will depend on certification requirements and the associated transaction costs.
2. **Urban/peri-urban mass market for organic fresh mangoes:** Fresh produce sold mainly through informal outlets in urban and peri-urban areas. Customers include all income groups, though predominantly middle-income consumers. Price premiums are low or absent, but there is a clear preference for chemical-free or near chemical-free produce. Participatory Guarantee Systems (PGSs) could play an important role if implemented at scale, making improvements in their efficiency and cost-effectiveness important.
3. **Urban/peri-urban niche market for dried organic mango:** Medium-sized market supplied at production scale. Products are certified and sold mainly through formal supermarkets to lower- and upper-middle-class consumers. Expansion potential exists but is linked to the relatively small number of producers and processors.
4. **Rural mass markets for organic fresh mangoes:** Characterised by short value chains and large sales volumes through specialist outlets and mass markets. Mangoes are typically sold with little or no price premium. PGSs are expected to become increasingly important in this segment.
5. **Rural/peri-urban informal market for fresh mangoes.** Small, localised market based on informal and small-scale production. Sales take place mainly in local markets, typically without certification.

Table 21. Gross margins in the mango value chain (conventional)[43]

	Producer	Aggregator/ trader	Wholesaler	Retailer	Processor	Exporter
Purchase price (KSh/kg)	0	18	23	42	13	36
Additional costs (KSh/kg)	2.30	1	12	15	4	76
Total cost (KSh/kg)	2.30	19	32	57	17	112
Selling price (KSh/kg)	18	24	42	75	36	151
Gross margin (KSh/kg)	16	5	10	18	18	39
Gross margin (%)	**87%**	**22%**	**22%**	**24%**	**51%**	**26%**

41 FSD Kenya (2015) *Opportunities for financing the mango value chain: a case study of lower Eastern Kenya*, FSD Kenya, June.
42 Business Daily Africa (2021) *Insurance startup Pula to pay Kirinyaga farmers for March–May losses*, https://www.businessdailyafrica.com/bd/corporate/companies/insurance-startup-pula-sh9mn-deal-for-kirinyaga-farmers-3580838 (last accessed 6 November 2023).
43 BCG, KCDMS (2021) Industry growth strategic plan and analysis of binding constraints, USAID Kenya Crops and Dairy Market Systems Activity (KCDMS).

3.2.6 AEE profitability

For the mango sector, detailed analysis from USAID[44] for the conventional sector was used to illustrate profitability (Table 21). Although not specifically focused on AEEs, his data is considered relevant and more comprehensive than what could be generated through this analysis, given the difficulties of obtaining financial information directly from businesses. The margins reported in the USAID analysis for individual farmers or producer groups are relatively high. Additional data from FSD Kenya[45] suggests producer margins ranging from 49 to 92 per cent, illustrating the difference between small and large farmers. It is assumed that producer groups aggregating production at a reasonable scale would fall somewhere within the middle of this range.

Whichever figures are used, margins in the mango value chain are relatively high compared to the tomato sector. Lower costs of production result in high margins for producers, although this is countered by relatively low production levels (as documented in other parts of the report), so it does not automatically lead to high incomes. The relatively high value for processing enterprises illustrates the potential provided to agroecological entrepreneurs by increasing demand for organic dried and other processed mango.

3.2.7 Policy and regulatory framework

National level

At a national level, the Agricultural Sector Transformation and Growth Strategy 2019–2029 (ASTGS) is the main driver of the activities supported by the Ministry of Agriculture and Livestock Development (MoALD). The ASTGS recognizes sustainable and climate-smart natural resource management as an enabler of agricultural transformation. It also recognizes a range of issues that are relevant to the mango and tomato sectors and AEEs, including improving road infrastructure, developing farmer-facing SMEs to help provide inputs, investment in irrigation, reducing post-harvest losses, investing in new agro-processing projects, assisting in tax incentives, and increasing fruit crop production. **However, the strategy puts emphasis on commercial, large-scale, and 'modern' agriculture, and as a result, does not directly encourage investment in agroecology or AEEs.**

This strategy is taken forward in the horticulture sector by the National Horticulture Taskforce, a private-public body. Private-sector members of the taskforce are drawn from various organizations, including the Fresh Produce Exporters Association of Kenya, the Fresh Produce Consortium of Kenya, the Kenya Flower Council, and the Agrochemicals Association of Kenya. Government members include representation from the MoALD, the Ministry of Health (Public Health — Food Safety Unit), the State Department for Trade, and the National Treasury. Government agencies include the Horticultural Crops Directorate, Kenya Plant Health Inspectorate Service (KEPHIS), the Pest Control Products Board (PCPB), the Kenya Agricultural & Livestock Research Organization (KALRO), and the Kenya Export Promotion and Branding Agency. The Council of Governors (i.e. Council of County Governors) is also represented.

The taskforce in its current composition reinforces the supremacy of export markets and intensive agriculture and provides little encouragement for agroecological approaches or local markets.

Other policies that act against the interest of agroecology include the Fertilizer Subsidy Programme, which provides subsidized inorganic (only) fertilizer to registered farmers. In 2022, this led to 71,000 MT of inorganic fertilizer being provided to a minority of farmers. In 2023, it is thought that just over 2 million farmers will benefit from the subsidy.[46]

Other national policies and strategies that may provide an opening to stimulate agroecology and AEEs include:[47]

- **National Climate Smart Agriculture Strategy (2017–2026)**: this recognizes sustainable agriculture as a key approach to climate-smart agriculture and includes initiatives to promote sustainable farming.
- ***The Government of Kenya Agriculture Act (Cap. 318)* 2012**: this provides a legal framework for the regulation and promotion of agricultural activities, including agroecology, which emphasizes sustainable and ecological farming practices that harmonize with natural ecosystems.
- **Green Economy Strategy and Implementation Plan 2016–2030**: this strategy promotes developing and enhancing agriculture infrastructure

44 Fintrac Inc (2015) USAID-KAVES mango value chain analysis.
45 FSD Kenya (2015) Opportunities for financing the mango value chain.
46 The Kenyan Wall Street (2023) *Kenya's fertiliser subsidy programme hit by challenges*, 16 August, https://kenyanwallstreet.com/kenyas-fertiliser-subsidy-program-hit-by-challenges/#:~:text=According%20to%20the%20Central%20Bank%20of%20Kenya%20%28CBK%29%2C,29%25%20reported%20in%20May%20and%20March%202023%2C%20respectively
47 See Section 5: Organic inputs and Section 4: AEEs and access to finance for further relevant policies.

(enhanced irrigation and reduced post-harvest losses), developing a natural resource-accounting system, pursuing measures such as Payment for Ecosystem Services and benefit-sharing, promoting sustainable land management, developing water footprint sustainability assessment guidelines, managing waste as a resource, and strengthening consumer protection.

However, these are disparate and uncoordinated and have little impact as a result. **A National Agroecology Strategy for Food System Transformation was launched in 2024.** This strategy brings some coherence and enhanced synergies amongst the different policies and actors in the sector.

The Pest Control Products Act (2012) empowers the Pest Control Products Board (PCPB) to regulate the importation, exportation, manufacture, distribution, and use of products used for the control of pests. However, farmers are known to still use banned pesticides, and organic pesticides face challenges in getting registered. This is largely due to capacity constraints within the PCPB (see Section 4). As noted in Section 5, this is a significant area for engagement.

County level

Makueni county government is prioritizing the mango sector for growth. In 2023, it held the first national mango conference, which saw 1,250 delegates from 22 counties attend. Following the conference, the county developed a mango value chain strategy and implementation plan, which focuses on exports and includes the establishment of a low pest zone and a mango (export) packhouse.[48] As CIAT acknowledges,[49] there is a lack of coordination between county and national policy, which creates inefficiencies.

However, there are also significant challenges at the county level. As seen, agriculture extension is a key need in the county. The National Agricultural Extension Policy (2022) articulates the importance of clientele participation and a demand-driven extension system, recognizing the role of the private sector in pluralistic extension, and setting out modalities for commercialization and privatization of extension services. The need for such an approach is emphasized by the fact that Makueni had an extension officer to farmer ratio of 1:1,357 by the end of 2021, against the Food and Agriculture Organization (FAO) recommended ratio of 1:400.[50] While this reinforces the need for a more pluralistic approach to extension, there is a risk that conventional commercial interests, encouraged by the weighting given to intensive agriculture in the policy noted above, push away from agroecology, and farmers are sent conflicting extension messages and resources are wasted.[51] **This emphasizes the need for effective coordination at the county level.**

Such coordination could potentially be provided by a county agroecology policy. In neighbouring Murang'a, a county agroecology policy presents opportunities for greater alignment of policies that support agroecology and AEEs. The policy focuses on specific initiatives, such as crop diversification, use of organic fertilizers, and the development of markets for agroecological products (County Government of Murang'a, 2022). This is promising because it gives the county the opportunity to allocate resources for agroecology in the county development plan. Such an initiative in Makueni could do the same.

3.2.8 Other organizations in the mango value chain in Makueni

The Alliance Bioversity - CIAT aim to improve food systems through the widespread adoption of agroecology, and in Kenya they have recently started a programme of support in the mango value chain in Makueni. They are conducting research on business models that could provide support to a transition to agroecology, with likely **areas of focus centred around support to production and the organization of farmers.** There is less of a focus on AEEs higher up the value chain. CIAT would be a key partner for any work in Makueni. A coordinated approach to evidence generation, advocacy, and programming would lead to efficiencies and greater impact.

Enviu is a venture builder, aiming to trigger value chain development by supporting vital functions, including the provision of finance, training support, regenerative agricultural certification, and marketing. The programme aims to achieve this by developing new businesses, owned partly by Enviu, which provide these services. This includes bringing in external finance, for instance to support a revolving transition fund for farmers. Enviu will be exploring the role of carbon finance to support these ventures. The Enviu programme will provide some useful learning but fewer opportunities for direct collaboration, given its focus on developing its own businesses.

48 Government of Makueni County Department of Agriculture, Irrigation, Livestock, Fisheries, and Coop-erative Development, Projects Delivery FY 2022/2023.
49 Onyango et al. (2023) *CGIAR agroecology initiative*.
50 Government of Makueni County (2023) Makueni County integrated development plan 2023–2027.
51 Makueni County Agriculture and Livestock Policy, 2020.

The Drylands Natural Resource Center[52] is an NGO, set up in 2008, which amongst other things supports the development of nurseries for the mango sector. It is motivated by agroecological principles and promotes local species and knowledge. It could be an important knowledge partner in terms of supporting an agroecological transition at farmer level.

3.2.9 Constraints and opportunities

The following analysis aims to isolate constraints and opportunities in the market system that specifically hold back or encourage AEE development. Inevitably, many of the constraints will be generic constraints that affect all businesses, but their relevance to AEEs is explained in Section 3.2.10. The analysis shows that AEEs of all types are fundamentally held back by a lack of agroecological or organic production. Other constraints in the market system also play a significant role.

Production

Mango production in Kenya is currently constrained by **low supply and suboptimal production practices**, driven by limited awareness of good agricultural practices and a relatively small number of farmers engaged in agroecological production. These challenges are further exacerbated by increasing incidences of drought. At the same time, there is a strong foundation to build on, as many farmers already apply elements of **agroecological practices**, even if not systematically. In addition, production shows **high profitability**, with rates of return significantly exceeding prevailing lending rates, indicating that investments in this segment could be viable if financial products are adapted to seasonal realities.

Marketing

Marketing systems are characterized by **limited aggregation capacity and low levels of formality**, which hinder farmers' integration into structured markets and make it difficult for processors to source produce efficiently. High **post-harvest losses**, driven by poor handling practices, weak transport infrastructure, and insufficient storage and aggregation facilities, further reduce margins and increase risks across the value chain. In addition, **limited market information systems** create inefficiencies, including market saturation and unequal value distribution, while **limited possibilities to differentiate organic produce** reduce incentives for agroecological production. Despite these constraints, there are clear opportunities linked to **strong and growing consumer demand**, with mangoes being one of the most consumed fruits in Kenya and widespread interest in organic products across income groups. Expanding **Participatory Guarantee Systems (PGS)** also offers a pathway to improve product differentiation and build consumer trust in domestic markets.

Processing

Processing is constrained by **high capital and operational costs**, particularly due to energy-intensive drying processes and high electricity prices, compounded by unreliable supply. These challenges are even more pronounced for agroecological enterprises, which often face additional transaction costs when sourcing from dispersed smallholders. Nevertheless, the combination of **high margins and increasing demand for processed mango products** suggests that processing remains a promising area for agroecological enterprise development, provided that cost and efficiency challenges can be addressed.

Inputs and Services

The input system is weakened by **limited availability of high-quality seedlings**, due to a lack of certified nurseries, and by **low uptake of organic fertilizers and biopesticides**, which constrains agroecological production. While these challenges limit productivity and the transition toward agroecological practices, the gradual emergence of organic input markets presents an opportunity to strengthen this segment, particularly if accompanied by improved distribution, quality assurance, and farmer awareness.

Access to Finance

Access to finance remains a cross-cutting constraint, affecting all actors in the value chain. Producers face difficulties in financing productivity improvements and transitions to agroecological practices, while aggregators and processors struggle with **limited working capital**, restricting their ability to operate and scale. At the same time, the **high profitability of mango production** suggests that there is potential for tailored financial products, particularly those that account for seasonality and risk, to unlock investment across the value chain.

Policy and Enabling Environment

The policy environment presents both constraints and emerging opportunities. While broader structural challenges remain, increasing **consumer concern about food safety and chemical use** creates a strong entry point for advocacy and policy engagement. Several county governments are already taking steps to support the sector, with **Makueni County** providing

52 Kenyan Drylands Natural Resource Center (2007) *Factsheet*, https://www.worldfuturecouncil.org/wp-content/uploads/2019/01/Kenya_Drylands-Natural-Resource-Center-DNRC-2007-Factsheet-OPA-2019.pdf (last accessed 6 November 2023).

a notable example through investments in seedling distribution, farmer training, and extension services. In addition, a range of **national and international organizations** are actively supporting the mango sector, including efforts to strengthen producer groups and improve sector formalisation. These initiatives provide important momentum that can be leveraged to address systemic bottlenecks and support the scaling of agroecological enterprises.

3.2.10 Systemic issues

Each of the constraints identified in the mango value chain is linked to a number of underlying systemic issues, which themselves may present opportunities for market-based interventions. The following analysis outlines these systemic issues and their implications for the development and scaling of agroecological enterprises.

Production

Limited aggregation and low levels of formality increase transaction costs for agroecological enterprises and constrain their growth. These challenges are rooted in the **lack of effective business models for establishing and strengthening farmer marketing groups**, as well as the absence of efficient systems for aggregation and quality control of produce sourced from individual farmers. In parallel, insufficient training provision for farmers limits both the supply and quality of agroecological produce, thereby constraining the development of processors and other AEEs. This reflects broader systemic issues, including the **lack of business models to embed producer training**, declining government support for extension services, limited agroecological knowledge within extension systems, and weak coordination among actors, which leads to duplication, inconsistency, and higher transaction costs.

Transport and Post-Harvest Handling

Poor transport infrastructure, combined with a lack of aggregation and storage facilities, results in **high post-harvest losses**, increasing costs and risks across the value chain and ultimately undermining the viability of AEEs. These challenges are linked to **weak government investment in rural road infrastructure**, limited private investment in safe storage solutions, and insufficient coordination between public and private actors in developing aggregation structures. While the lack of coordination is not yet a major constraint for AEEs due to their current small scale, it is likely to become increasingly relevant as the sector grows. High post-harvest losses also reduce incentives for farmers and limit the availability of consistent supply for processors.

Access to Finance

Limited access to finance affects both producers and enterprises across the value chain. For farmers, the **lack of suitable financial services to support the transition to agroecological production** constrains supply and, in turn, limits opportunities for AEEs downstream. This reflects the misalignment between formal financial institution requirements and the realities of small-scale farming. At the enterprise level, the **limited availability of appropriate finance for AEEs** hinders both start-up and expansion, reducing their capacity to provide services that support agroecological production. Underlying systemic issues include the lack of financial products tailored to small-scale enterprises, low levels of investment readiness among AEEs, and insufficient technical support to help enterprises become investment-ready.

Inputs and Services

Constraints in input supply, particularly the **limited availability of high-quality seedlings**, contribute to low levels of agroecological production and restrict the development of AEEs across the value chain. This is largely due to the **lack of certified nurseries**. In addition, the **low use of organic inputs, especially biopesticides**, limits productivity and further constrains enterprise growth. These challenges are reinforced by negative perceptions and low awareness of organic inputs among farmers, as well as limited local availability of such products. Deeper systemic issues within the organic input sector are explored further in Section 4.

Market Access

Limited market access, particularly the **slow expansion of local organic market outlets**, reduces incentives for producers and constrains the growth of AEEs. This is closely linked to the **slow rollout of Participatory Guarantee Systems (PGS)** and limited political support at county level for scaling such initiatives. As a result, producers often lack reliable and differentiated market channels, which discourages investment in agroecological production.

The analysis highlights that these constraints are **interconnected rather than isolated**. For example, production challenges are closely linked to weaknesses in input supply and access to finance, while limited market access reduces farmers' incentives to invest in agroecological practices. These interdependencies reinforce systemic bottlenecks and underline the need for coordinated, market systems-based interventions.

3.2.11 Market-based solutions

Market-based solutions address systemic constraints by strengthening market functions, relationships, and incentives among market actors. Market based solutions are geared at engaging the private sector to spearhead them and consider them as avenues for improving their business and the business model that will make that solution available in the market in the long run. Table 22 outlines different market-based solutions for each systemic issue identified for the mango value chain in chapter 3.2.10. These solutions thus outline what would be required to enable positive change for AEEs.

The presence of other organizations working on mangoes and the attention given to the sector by the county government are strengths that can help enable systemic change. This presents opportunities for joint learning and a coordinated effort, which allows organizations to specialize, rather than spreading themselves too thinly.

The state of the development of the mango market presents **opportunities to develop both the markets for fresh produce and processed produce** at the same time. However, the development of both of these markets is dependent on **simultaneously improving the production base and addressing the current disconnect between production and buyers**. The former needs to involve both increasing the number of farmers producing agroecologically and improving productivity through good practice. The latter can include a variety of options, including the development of PGSs, developing local organic outlets, and improving sales to processors.

The balance of attention given to farmer groups – which can support collective marketing, for instance through **PGSs** – and **individual farmers** is an important consideration. Much of the evidence points to the need for collective marketing to help in the formalization of the sector, enabling the delivery of services, contracting, and guarantees. However, PGSs require the presence of well-functioning farmer groups. The initial focus for this needs to be existing groups with established governance structures and with proven ability to work together. Strategies that involve the development of new groups need to be conscious of learning from many externally driven initiatives that have led to poorly functioning groups, dependency on the 'host' NGO, and a lack of longevity. Because of their focus on strengthening internal governance and their direct links to markets, PGS groups may find it easier to stimulate collective marketing. Certainly, organizations supporting the development of new PGS groups need to prioritize this as an area for joint learning.

Given the degree of market activity, there could be potential for **small agribusiness clusters** to play a role in achieving these objectives. Clusters could include AEEs involved in production, marketing, and input and service providers. This would be on a small scale to start with but could provide opportunities for expansion, especially if processors from outside of the county can be drawn in. **PGS groups** could be a means to attract market actors to the cluster, giving them confidence in the production and the market. Within the clusters, there could be opportunities to develop **lead firm** models, particularly from larger processors, in which buyers provide services to contracted farmers.

Clusters could make access to finance easier. Although commercial banks struggle to finance agriculture, there is potential to work with commercial banks that partner with Aceli and that receive incentives to provide finance to high-risk AEEs (see Section 5). This can support small-scale AEEs in aggregation, processing, or retail, and can be used to extend support to farmers – i.e. businesses providing financial services to contracted farmers.

Improved training on the effective use of organic inputs would result in **reduced agroecological production costs**, mitigating the concerns of some farmers. More research is required on the economics of agroecological production to work out the exact nature of this. However, some evidence from PGSs shows that local organic produce can be competitive with conventional produce, as seen in Kirinyaga and Murang'a counties.[53]

53 Market price data for January/February 2024 for 15 markets in Nairobi and urban locations in central Kenya outside of Nairobi collected by KOAN and Slow Food Kenya. Data shows competitive prices for a range of crops that includes a variety of staples (fruit, leafy vegetables, and exotic vegetables). Prices in organic markets were competitive in the urban locations in central Kenya across the board, the exception being tomatoes, which were cheaper in conventional markets. At the same time, different varieties of banana were cheaper in the organic markets. The data was more mixed for the comparison of organic and conventional markets in Nairobi. The limitation in this data is that there is no comparison over time, which would provide additional information about price variations. In addition, the price data does not provide information about the factors causing price variations.

Table 22. Market-based solutions in the mango value chain

Systems issue	Market-based solution	Actors involved
Lack of business models to aid and sustain farmer group development	Establishment of PGS groups – first focusing on existing farmer groups and, second, on new groups	PGS service providers (Slow Food Kenya, KOAN, BVAT)
	Development of **agroecological market clusters** (producers, buyers, input and service providers) – linked to PGS groups	PGS service providers, organic input manufacturers, local agents, processors, financial institutions
Lack of efficient models for aggregation and quality control of produce from individual farmers	Development of **agroecological market clusters** (producers, buyers, input and service providers) – linked to individual farmers	Organic input manufacturers, local agents, processors, financial institutions
Lack of business models to embed producer training	Development of **training models** within individual AEEs or within cluster model	AEE processors, input providers, agroecological producer groups, individual farmers, PGS service providers
Lack of political will from county government to support more organic outlets	Advocacy to Makueni county government and collaboration to establish organic/ agroecological outlets	KOAN, Slow Food Kenya, county government
Formal financial institution (FI) requirements not suited to small-scale farmers*	Testing by FIs of products that support farmers within cluster model or with individual AEEs	FIs, actors within clusters
Lack of suitable financial products for small-scale enterprises*	Support AEEs to develop business models for embedded financial services for farmers	AEEs, incubators, Business Development Services (BDS) providers
	Strengthening of capacity and investment worthiness of AEEs	Local BDS providers, AEEs/potential AEEs, incubators
	Support to commercial banks partnering with Aceli to develop their pipeline of investable enterprises	Commercial banks, Aceli, local partners
	Support to impact investors to engage with mango sector AEEs	Impact investment funds
Reducing support from government for extension services/limited knowledge in extension services of AE	Development of network of **lead agroecological farmers** to work with government extension workers. Capacity of government extension workers on agroecology strengthened	Makueni county government extension service, agroecology training body (e.g. Slow Food Kenya, BVAT)
Lack of coordination of extension provision and training	Establishment of a **coordination mechanism** involving county government, private sector, and civil society advocacy to county government for the development of an **agroecology policy**	Makueni county government, private-sector actors providing embedded services, civil society groups supporting farmer training
Weak government investment in road infrastructure	Advocacy to county governments, demonstrating potential impact on improving agricultural markets	County government, NGOs involved in agricultural sector
Lack of business investment in safe storage	Incentives provided to AEEs by donors and government to develop improved transport/ storage options	AEE processors and buyers, agroecological producer groups
Lack of certified nurseries	Government 'smart' subsidy for the startup and expansion of organic nurseries	Existing and new nurseries, Makueni county government
Low levels of awareness/ negative attitudes to organic inputs by farmers*	Sensitization and training of farmers on farm trials, and dissemination of information	Organic input producers, local agro-dealers
Low quantities of organic inputs available locally*	Development of improved last-mile distribution models	Organic input producers, local agro-dealers

***The finance and organic inputs constraints are both looked at in more detail in Sections 4 and 5, respectively.**

3.2.12 Facilitation activities

Table 23 provides a list of market facilitation activities that would support the achievement of the market-based solutions identified above. The activities identified are designed to give actors interested in the development of the sector an idea of what an MSD programme in Makueni to support AEE and agroecological markets in the mango sector could look like. It is assumed that some activities provide a foundation for others. This is reflected in the prioritization provided.

Table 23. Facilitation activities (mango)

Initial priorities | Second-stage priorities | Further facilitation activities

Market-based solution	Facilitation activities
Establishment of PGS groups	Working with KOAN and other PGS service providers to first support existing farmer groups become PGS groups and, second, support the development of new groups
Advocacy to Makueni county government for establishment of PGS outlets in conventional markets	Working with KOAN, Slow Food Kenya, and other actors in the county, present evidence of the value to farmers and consumers of PGS markets
Development of **agroecological market clusters** (PGS groups, buyers, input and service providers)	Working with CIAT, Enviu, and other local partners, identify suitable cluster members and facilitate a participatory process to assess viability and design a pilot
Development of **training models** within individual AEEs or within cluster model	Identify suitable private-sector partners, collaboratively develop package of smart incentives that support testing of training models. Potential partners: CIAT, Enviu, input providers
Development of AEE business models that provide embedded financial services for farmers	Identify potential mango AEEs suitable for incubator support, such as Neycha. Provide capacity support through Neycha or local BDS providers
Strengthening of capacity and investment worthiness of AEEs	
Support to commercial banks partnering with Aceli to develop their pipeline of investable enterprises (smaller businesses)	Provide training to relevant banks on AEEs and agroecology, in line with Aceli incentive criteria Support AEEs to develop embedded financial services for farmers Strengthen AEEs and present them to commercial banks as part of their Aceli pipeline[54]
Support to impact investors to engage with mango sector AEEs (larger businesses)	Provide market intelligence to relevant impact investment funds, including information on potential AEEs for investment
Development of network of **lead agroecological farmers** to work with government extension workers. Capacity of government extension workers on agroecology strengthened	Advocacy to county government, training of county extension workers, support to county to identify lead farmers, development of smart incentives to enable testing of model. Potential partners: CIAT
Incentives provided to AEEs by donors and government to develop improved transport/storage options	Research into transport needs and available storage solutions. Development of subsidized pilots to test appropriate technology and develop business models. Potential partners: other food sector agencies.
Establishment of a **coordination mechanism** involving county government, private sector, and civil society	Mobilization of other civil society organizations, validation of approach, advocacy to county government, provision of evidence supporting the development of an agroecology policy. Participatory process involving county government, private sector, and civil society to determine strategy for coordination
Government support and incentives for the startup and expansion of organic nurseries	Support Makueni county government to develop a nursery improvement plan and capacity to provide technical support to nurseries. Provide smart subsidies to individual nurseries to expand organic production
Sensitization and training of farmers, on farm trials and dissemination (inputs)*	Partner with input producers to research and test model
Development of improved last-mile distribution models (inputs)*	Partner with input producers to research and test model

***Not prioritized here because these would need to be part of a general support programme for the inputs sector, rather than a Makueni-specific programme (see Section 5: Organic inputs).**

54 See Section 4: AEEs and access to finance for details of the rationale behind this and how it might work.

3.3 Tomato market systems analysis

3.3.1 Tomato value chain context

The tomato sector is associated with very high domestic demand, production challenges, and fluctuating prices, partly as a result of imports.

Tomato is the leading vegetable sector in Kenya, according to the Kenya Agriculture and Food Authority. It accounts for 32.5 per cent of the value of exotic vegetables and 12 per cent of the total value of horticulture grown in Kenya.[55] This is rooted in domestic demand, where tomatoes are the most demanded vegetable in the country, demand that cuts across all segments of society and all regions. A report from 2015 indicates the relative importance of different fruits and vegetables in the domestic horticulture market.[56] Figure 12 indicates the most consumed vegetables amongst urban dwellers in Nakuru, Nairobi, and Mombasa.

Demand for tomatoes exceeds the potential supply, and as a result, imports from neighbouring countries are also important. In 2021, Kenya imported $121,000 worth of tomatoes, with Mozambique and the Netherlands (assumed to be processed tomato products) being the most significant contributors.[57] This can lead to reductions in the value of Kenyan tomatoes from time to time, potentially negatively impacting on farmers.[58]

Despite the high domestic demand, the area under production actually decreased from 31,486 ha in 2020 to 30,882 ha in 2021, while production decreased from 973,304 MT into 686,667 MT, a 29 per cent drop.[59] However, the value of the sector increased by 14 per cent from KSh 20.69 bn in 2020 to KSh 23.61 bn in 2021, as a result of improved farm gate prices.

The leading counties for production were Kirinyaga, Taita Taveta, and Narok, accounting for 13.4 per cent, 12.6 per cent, and 8.0 per cent of the value of total national production, respectively. The majority of production comes from small-scale farmers and 90 per cent of tomatoes are produced on rain-fed farms.[60] However, despite increasing demand and increasing production over the last two decades, productivity on farms has not seen much improvement. The Centre for Agriculture and Bioscience International (CABI) suggests that this is due to poor soil health, climate change, and plant pests and diseases (e.g. *Tuta absoluta*). The sector is associated with an over-reliance on pesticide and a lack of access to improved seed.[61] The limited use of greenhouse technology, which some reports indicate can increase productivity tenfold, is a further contributing factor.[62]

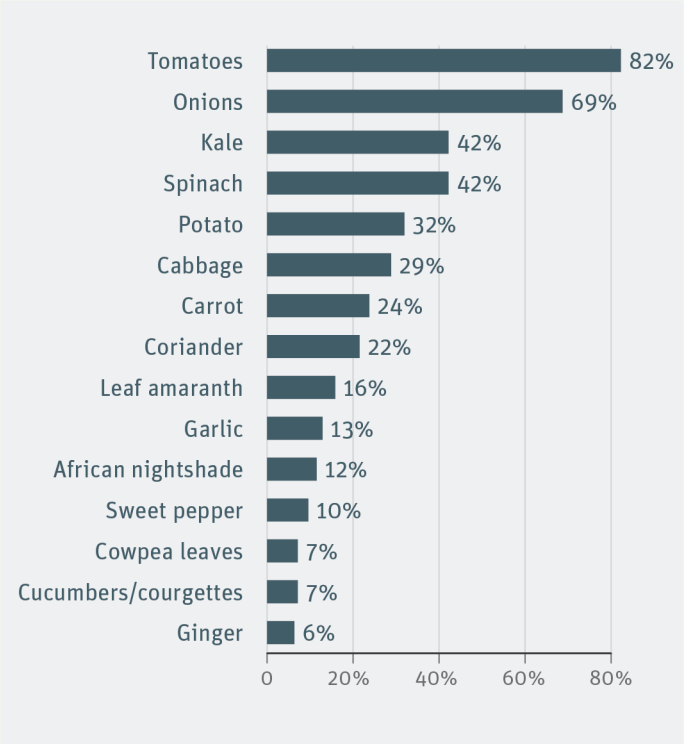

Figure 12. Percentage of Kenya population consuming different fruits and vegetables, 2015

55 Government of Kenya (2022) *Agriculture and Food Authority yearbook of statistics 2022*.
56 Research Solutions Africa Ltd (2015) *Report of a study on fresh vegetables market in Kenya*. Supported by the Kingdom of the Netherlands Ministry of Economic Affairs, Agriculture, and Innovation, https://www.agroberichtenbuitenland.nl/site/binaries/site-content/collections/documents/2015/12/part-1---report-of-a-study-on-fresh-vegetables-market-in-kenya/part-1--report-of-a-study-on-fresh-vegetables-market-in-kenya/Fresh+Vegetables+Market+in+Kenya+-+Part+1+-+Desk+Review.pdf.
57 The Observatory of Economic Complexity, *Tomatoes in Kenya,* https://oec.world/en/profile/bilateral-product/tomatoes/reporter/ken#:~:text=Imports%20In%202021%2C%20Kenya%20imported,%2C%20and%200man%20(%24437).
58 Soko Directory (2022) *Kenya tomato market drops by 40% due to influx of Ethiopian produce*, 27 May, https://sokodirectory.com/2022/05/kenyas-tomato-market-drops-40-due-to-influx-of-ethiopian-tomatoes/#google_vignette (last accessed 6 November 2023).
59 The Observatory of Economic Complexity, *Tomatoes in Kenya*.
60 Tenisi, C.M.G. and Kitonga, L.M. (2023) 'The competitiveness of the tomato value chain in Kenya', *International Journal of Science and Technology* 11:7, July.
61 CABI, *How can tomato farming be improved in Kenya*, CABI Plantwise Plus blog, https://blog.plantwise.org/2019/05/21/how-can-tomato-farming-be-improved-in-kenya-study-finds-producers-face-a-myriad-of-constraints/.
62 Tenisi and Kitonga (2023) 'The competitiveness of the tomato value chain in Kenya'.

3.3.2 AEEs in the tomato value chain

This analysis was intended to be a market systems analysis centred on AEEs, exploring how market system constraints affected their potential. As such, it was predicated on the existence of a significant number of AEEs. In this case, it proved more difficult to find AEEs in the tomato sector than in the mango sector. In general, the value chain for organic or agroecological produce is very poorly developed.

To better understand this diversity, consulted enterprises were assessed against a set of AEE-related criteria by asking how important each criterion was to their business[63]. It is assumed businesses actively encouraging those criteria critical for their business are less likely to actively encourage criteria only considered as 'preferred but not critical', and will not do anything to encourage criteria "not important or critical for the business".

The results (Table 24) suggest that reductions in chemical use and restricted use of GMOs are the principles most likely to be promoted, similar to the mango sector. The only business indicating that any of the principles were 'not important' was the large processor TruFoods (a conventional enterprise).

In the next step, growth orientation of the enterprises was assessed using three simple criteria:

- The business has an employee base of at least five people from which it can expand. In this definition, cooperatives which did not have any workers apart from farmer members did not meet the criteria.
- The business has distinct plans to expand, either by increasing its market share, expanding geographically, or diversifying its products.
- The business is in a position to utilize formal finance (based on its experience with finance to date).

Similar to mangoes, most production-focused AEEs are non-growth-oriented producer groups. Conventional growth-oriented tomato processors exist but no organic or agroecological processors. A summary of the analysis is displayed in Table 25.

As for the mango sector, the same approach was applied to the tomato sector, combining an assessment of AEE criteria with an analysis of growth orientation across different categories of enterprises. The results (Table 26) shows that there is wide support for the core values of agroecology. However, the sample is very limited, is heavily weighted towards organic production groups, and draws in enterprises from other locations – so, at the most, it is possible to say that a small number of enterprises in the tomato sector present opportunities to promote agroecology. It remains a very niche, small sector.

Table 24. Alignment of enterprises (tomato) against AEE criteria

Question: How important are these factors, about the farms that supply you, for your business?*			
AEE criteria	Percentages of business responding		
	Not important or critical for the business	Preferred but not critical	Critical for the business
Supply mostly comes from small farmers	17**		83
Farms that supply you are reducing the use of or are not using any chemical fertilizer	17**		83
Farms are reducing or are not using any chemical pesticides		17**	83
Farms are using organic matter to improve the structure of soils		17**	83
Farms are using cover crops to protect soils		50	50
Farms are not using genetically modified seed			100
Farms have management systems that conserve water		83	17
Farms are recycling resources in circular systems		50	50
Farms are using diversified cropping systems		50	50
Local knowledge is respected in the farming system used		33	67

***Based on responses from TruFoods, Peter's Health Food, Chui Organic Farm, Duma Organic Farmers Group, Simba farmers (Kirinyaga organic cooperative), and Wanjiku Muthiri'. ** TruFoods.**

63 The criteria used to assess agroecological enterprises (AEEs) were developed specifically for the purposes of this analysis by the consulting team. They are intended as a practical, context-specific framework to guide the assessment and should not be interpreted as a definitive or universally established set of criteria for defining AEEs.

Table 25. Growth orientation – tomato businesses[64]

Meets criteria Does not meet criteria

Business	Employees	Growth plans	Finance
Chui Organic Farm			
Duma Organic Farmers Group			
Simba farmers fruits and vegetables group (Kirinyaga organic cooperative)			
Kitonga village farmers			
Wanjiku Muthiri – farmer and trader (aggregator)			
Fresh Sauce			
Peter's Health Food			

Table 26. Enterprises consulted in field research

		AEE criteria (sample)			
Enterprise category	Name	Small farmers	Reduction in pesticide	Local knowledge respected	Growth oriented?
Agricultural Production	Chui Organic Farm	Critical	Critical	Critical	No
	Duma Organic Farmers Group	Critical	Critical	Critical	No
	Simba farmers fruits and vegetables group (Kirinyaga organic cooperative)	Critical	Critical	Critical	No
	Kitonga village farmers				No
	Moon Organic Farm (not Kirinyaga)	Critical	Critical	Critical	N/A
Traders	Wanjiku Muthiri – farmer and trader (aggregator – not Kirinyaga)	Critical	Critical	Critical	No
Tomato processor	Fresh Sauce	Not important	Critical	Critical*	Yes
Retail outlets	Peter's Health Food	Critical	Critical	Critical	Yes

*This data point is an outlier and is believed to represent a misunderstanding of the question.

3.3.3 Market channels

As with the mango value chain, both organic and conventional enterprises were analysed, due to the limited number of organic enterprises and the need to get a full picture of market dynamics (Figure 13). In the conventional (non-organic) tomato market, it is a common strategy for farmers to sell to at least three different channels (this helps manage the problem of high perishability). The most common channels are brokers, local traders, and retailers, and are informal relationships. Marketing is rarely organized. Less common, although not absent, are formal contract sales, sales direct to customers, and sales to wholesalers.

Small traders who buy non-organic tomatoes sell predominantly in local markets. A new dedicated tomato market, Makueto, has just opened in Kirinyaga, which will house 500 traders[65] and will deal with wholesale and retail markets. Brokers or larger-scale traders sell mostly in wholesale markets, either major outlets such as those in Nairobi or to smaller ones in Kirinyaga. Wholesalers also buy tomatoes from traders

Tomato puree brands found in a Nairobi supermarket, August 2023

- Aryuva – China
- Cirio – Italy
- Clopvers – China
- Gilda – Kenya
- Kenylon – Kenya
- Kenzy – Egypt
- KOL – Kenya
- La am – Kenya
- Laziza – Egypt
- Peptang – Kenya
- Rico Tomato – Egypt
- Santa Maria – Egypt

64 No response from Moon Organic Farm

65 County Government of Kirinyaga (2023) *Governor Waiguru opens first exclusive tomato market as county sup-ports farmers to upscale tomato farming*, https://kirinyaga.go.ke/governor-waiguru-opens-first-exclusive-tomato-market-as-county-supports-farmers-to-upscale-tomato-farming/.

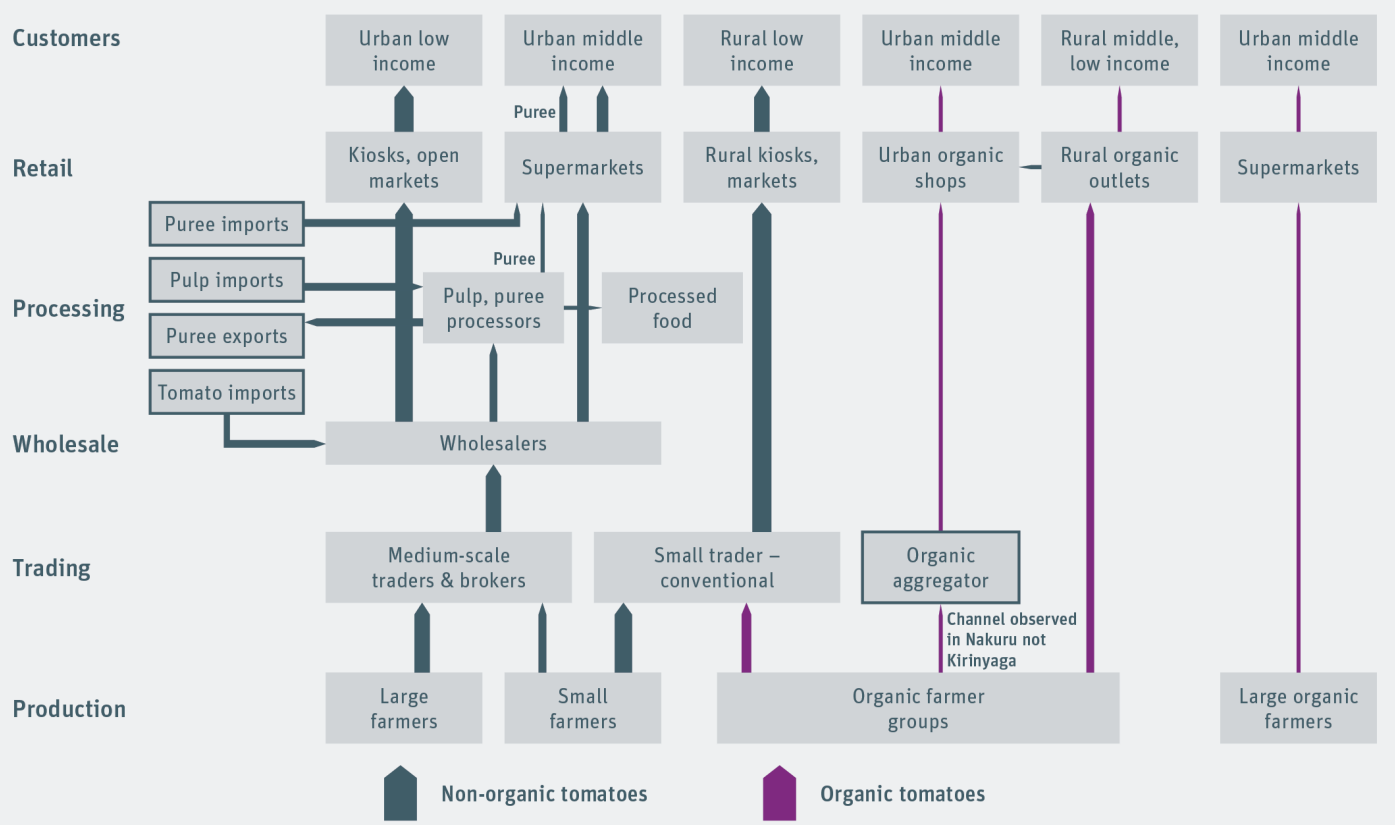

Figure 13. Tomato market map, Kirinyaga/ Kenya

from neighbouring countries, especially Tanzania and Uganda. Most of the produce bought by wholesalers is sold to traders who sell in large informal markets and to supermarkets or grocery stores.

A relatively small, but not insignificant, quantity of tomatoes are sold by wholesalers to tomato processors who produce products ready for consumption (e.g. puree) and ingredients to be used in the processed food sector (e.g. to go into soups and ready meals).

Processors combine Kenyan tomatoes with imported tomato products because of a difficulty in getting the right quantity of the right type and quality of tomatoes in Kenya. The tomato puree produced is sold in two markets:

- Kenyan markets, where it is sold to all income groups (low-income groups purchase tomato puree in small sachets, often in informal markets);
- export markets – 80 per cent of Kenya's tomato puree exports go to Uganda.[66]

Imported tomato puree makes up about 50 per cent of the supply and Kenya remains a net importer of puree (taking into account export and imports).

The **organic tomato market** in Kirinyaga is small. In Kirinyaga, organic tomato farmers sell most organic produce direct to customers through the Kagio Earth Market (some direct selling to individual customers results from this). The number of farmers who currently supply this market are relatively low and largely limited to members of Slow Food Kenya. An expansion of this number is planned but is dependent on the application of processes to ensure product quality and consistency. A PGS will be an important part of this process. Produce in the Earth Market is sold at prices that are the same or are less than conventional products. No intermediaries are involved: farmers sell the produce themselves. Some organic retailers from further afield, such as Peter's Health Food, travel to Kirinyaga to buy organic tomatoes from Kagio Earth Market.

Organic produce is also sold in other local markets, to traders and local informal processors, where it is sold without being branded as organic. This is largely due to the lack of organic outlets in which to sell produce and the perishability of tomatoes. It is also assumed that there are examples of small-scale informal processing of organic tomatoes – e.g. dried and paste – that are then sold in local markets. This has not been observed but was mentioned by some informants. The organic traders who buy produce in rural areas sell to specialized retail shops in urban areas.

66 IndexBox, *Tomato puree market in Kenya*, https://app.indexbox.io/report/200290h1/404/?_gl=1*jc9hr7*_ga*MTYONDQ3MDM4Ni4xNjk1MjI3OTEO*_ga_6KCVGEDSJE*MTY5ODIyOTcONC4yLjAuMTY5ODIyOTcONC4wLjAuMA (last accessed 1 November 2023).

3.3.4 Main functions and actors

Agricultural Production

Eight per cent of farmers in Kirinyaga farm tomatoes. Of these, 55 per cent are small-scale farmers and 30 per cent are medium farmers.[67] Most tomato production in Kirinyaga and across Kenya is carried out by small-scale farmers and most of this is rain fed. Although we do not have data specific to Kirinyaga, 95 per cent of tomatoes grown in Kenya are grown in open fields. Kirinyaga county government has recently been supporting the introduction of greenhouse technology for tomato farming to shift this ratio, although its overall effect is not yet known. Although not confirmed, it is assumed that this is exclusively being offered to conventional farmers.

Yields in Kenya are generally considered to be low as a result of unreliable rainfall, poor soils and soil erosion, and biotic factors such as pests and diseases. Tomato leaf miners and Fusarium wilt-root nematode complex present a significant threat to production. In the past, these have led to crop losses of 80–100 per cent among small farmers.[68] This has encouraged many farmers to use chemical inputs intensively, which according to some informants has contributed to acidification of the soil. Agro-dealers note that farmers are now being encouraged by some extension agents to use more organic fertilizer to address this problem.

Immediate post-harvest losses are also high as a result of poor handling and a lack of storage and aggregation at farm level. As a result, farmers are encouraged to sell produce quickly and are often 'price takers', selling on disadvantageous terms.

These production risks partly explain the low numbers practising organic tomato production. Even in the consulted organic groups, the numbers growing organic tomatoes has dropped. Some of this may be linked to a lack of understanding of how to use organic inputs correctly – a challenge that was raised by numerous informants during the analysis.

Farmers tend to be poorly organized, with the majority farming and marketing produce as individuals. A survey of four counties in Kenya revealed that 88 per cent of tomato farmers operate as individual producers.[69] Organic production is an exception, as it rarely takes place on an individual basis. Profiles of the producer AEEs consulted with in this analysis are provided in Table A6.

Tomato farming has high capital and labour requirements. It is also a risky crop as a result of the high pest and disease burden and its vulnerability to excessive dry periods. As a result, production is dominated by older men, with one survey reporting that 70 per cent of farmers are aged between 36–60 years.[70]

Traders, brokers and aggregation

Traders and brokers are very active in the growing season, moving from farm to farm. There are few examples of formal contracts. Small-scale traders – e.g. on motorbikes – visit farms and sell in local markets. Traders with larger vehicles also visit farms directly and sell in larger towns, including Kirinyaga. There are no aggregation points in rural areas that act as a node for traders.

The equipment used by traders is generally of poor standard and does not guarantee preservation of the produce. Cold storage, either static or vehicular, is absent.

As a result of being so small, there is no wholesale trading in the organic sector. Produce is sold in local organic outlets (e.g. Kagio Earth Market) or through direct links between producer groups and the market. The only trading for more distant markets that takes place is an organic retailer in Nairobi that comes to Kagio Earth Market to buy produce. No examples of traders acting as intermediaries were found in the organic sector in Kirinyaga. An example of a dedicated organic trader was found in Nakuru. In this instance, the trader purchased organic produce from cooperatives and then transported it and sold it to a specialist organic shop in Nairobi. This may provide a model that is of value in Kirinyaga as the sector develops and a role for commercial aggregators becomes necessary. A profile of this aggregator enterprise is provided in Table A7.

Wholesalers

Important wholesale markets exist in Nairobi and in Kirinyaga itself. The new wholesale market in Kirinyaga may influence the current structure of trading by creating an important node for wholesalers supplying more distant markets. However, given the low volumes of organic production, this development currently has little relevance for the organic sector.

Wholesalers do not just buy produce from Kenya. As a result of the very high demand for tomatoes in Kenya

67 Biodiversity International/CIAT (2021), *Kenya county climate risk profile: Kirinyaga County*. https://alliancebioversityciattest.org/publications-data/kenya-county-climate-risk-profile-kirinyaga-county
68 https://knowledge4food.net/research-project/arf2-tomato-production-kenya/.
69 Odhiambo, H. (2022) 'Characteristics of Smallscale Tomato Production across Four Counties of Kenya', *Journal of Horticulture*.
70 Ochilo, W.N. et al (2019) 'Characteristics and production constraints of smallholder tomato production in Kenya', *Scientific African*. https://doi.org/10.1016/j.sciaf.2018.e00014.

and the difficulty in meeting this solely from local production, tomatoes are also bought from traders from Uganda and Tanzania.

Processors

There are no significant processors currently in Kirinyaga, although the government has plans to establish a plant in Kangai that will initially focus on tomatoes. This aims to provide value addition opportunities and reduce post-harvest losses. There are currently no plans for it to have an organic product line, although this could be an advocacy opportunity.

Tomatoes from Kirinyaga may find their way to private-sector processors based outside of the county. Companies such as Premier Foods and TruFoods process large quantities of tomato puree and other products and export them (principally to Rwanda). Currently, all Kenya-made tomato puree is conventional.

Retailers

There are two types of consumer market for organic tomatoes in the county. They include semi-formal mass markets (Kagio Earth Market) and specialist retailers (e.g. Peter's Health Food) who buy direct from groups or from the Earth Market, and sell elsewhere (e.g. Nairobi).

Specialist retailers like Peter's Health Food source from specialist traders, directly from cooperatives, and from farmer markets such as Kagio Earth Market. They buy produce that is certified through a PGS – Kilimohai – allowing them to brand it as organic. A profile of the enterprise is provided in Table A8.

Input providers

The key inputs involved for tomato farmers are seeds, pesticides, and fertilizer. The majority of farmers in the survey areas buy inputs from local agro-dealers. Isolated rural agro-dealers tend to only stock non-organic products. It is only agro-dealers in larger centres in the county that stock both non-organic and organic products, although with a huge bias to non-organic. Exact statistics are difficult to determine, but informants suggested that between 1 and 5 per cent of the stock is organic.

Farmers mostly grow tomato from seeds, which are bought from agro-dealers. In a survey in other counties, 89 per cent of farmers bought seeds from agro-dealers and only 5 per cent recycled seeds.[71] For an acre of tomatoes, approximately 10,000 seeds are required, at an estimated cost of KSh 27,000 to 30,000 (up to $200). The county government in Kirinyaga, through the Wezesha programme, provided 1.1 million seedlings to 2,000 farmers. No information was found on providers of tomato seedlings, and so the impact of this temporary subsidy on seedling suppliers is not known.

Extension services

Extension services for all farmers are very limited. County government extension services are in decline, like in the rest of Kenya. However, the county is prioritizing the tomato sector, and as part of this it has provided additional training to tomato farmers, along with irrigation and greenhouse technology. It remains to be seen if this is a short-term subsidy or if training services will continue to be provided. None of this has included organic or agroecological farming, and capacity in this regard in government extension services is low.

The only organic or agroecological training services provided have come from producers of organic inputs and/or NGOs. Service providers include the International Centre of Insect Physiology and Ecology (ICIPE) and Safi Organics, a producer of organic fertilizer. Although organic input manufacturers such as these provide an opportunity, they do not have the same level of resources as non-organic input producers and thus cannot provide the same level of farmer support without collaborations with NGOs or the government.

One characteristic of this piecemeal and uncoordinated approach, noted by farmers, is that training on one topic may be provided by an NGO in one year and on a different topic by another NGO the following year. As a result, a critical mass of farmers with agroecological production skills that could be shared with others rarely develops. In the past, the lack of a clear government commitment to a specific approach to organic or agroecological production has contributed to this fragmented situation.

Finance

Financial services for farmers and other market actors in the tomato value chain are provided by a mixture of informal village-based saving schemes, credit cooperatives, Savings and Credit Co-operatives (SACCOs), and conventional finance institutions. In reality, few actors access any form of formal finance. It is common for enterprises including AEEs to be self-financed for their start-up phases and often beyond. Improved access to finance could increase organic production and improve other market functions.

71 Odhiambo, H. (2021) 'Characteristics of small-scale tomato production across four counties of Kenya'.

3.3.5 Market segments

Results of the consumer demand survey coupled with the market systems analysis suggest the following main customer segments for organic or agroecological produce.

Existing segments:

1. **Urban/peri-urban niche market for certified organic fresh tomatoes**: Small market segment. Produce is certified and sold through formal supermarkets and specialist shops, typically at a premium to middle-class consumers in urban areas. Expansion of supply to this segment will depend on certification requirements and the associated transaction costs.
2. **Urban/peri-urban mass market for organic fresh tomatoes**: Fresh produce is sold through a variety of outlets in urban and peri-urban areas, predominantly informal. Consumers come from all income groups. Price premiums are generally low or non-existent, but there is a preference for chemical-free or near chemical-free produce. Participatory Guarantee Systems (PGSs) could play a role if their rollout becomes more efficient and less costly.

Potential segments (these two segments require more investigation)

1. **Rural mass market for organic tomatoes**: this segment may represent an extension of Segment 2, although there is currently insufficient data to confirm this. Its development would depend on the emergence of local informal organic stalls.
2. **Organic tomato purée segment**: Consumer demand indicates interest in such products, but none are currently commercially available. This therefore represents a potential future market segment.

3.3.6 Tomato AEE profitability

The analysis sought to understand levels of profitability in specific types of AEE or enterprise that could represent opportunities for AEEs. This provides an indication of the viability of AEEs in this sector. It proved challenging to obtain financial data from organizations in Kirinyaga, with many businesses cautious about sharing such information due to concerns related to Kenyan tax regulations.

Margins are generally considered to be much lower for tomato farmers than mango farmers. This is partly due to the high capital cost and the costs of managing pests and disease and partly due to low prices as aggregators attempt to offset the risks associated with high levels of crop waste. This highlights the value of direct relationships with buyers in the tomato value chain – assuming transport and preservation issues can be addressed. In the early stages of the development of the organic or agroecological market, these sorts of relationships may be easier to develop. As supply of agroecological produce increases, the role of aggregators may become more important, presenting an opportunity for production AEEs that can take on this responsibility but a challenge to the margins of those that cannot.

3.3.7 Policy and institutional framework

A review of relevant general national policy issues is presented in Section 3.2.7. In addition to these, the tomato sector is affected by import policies for processed food. As noted, imports are such that, in supermarkets, imported puree sometimes exceeds local puree in quantity. However, tomato puree is not favoured compared to other food products in import policy. It has a 35 per cent import tax rate, the rate used for most foodstuffs, and in the annual adjustment of rates in 2023, this did not change.[72] The only other regulation affecting imports is the need to meet Kenya Bureau of Standards (KEBS) standards. These two regulations are clearly not sufficient to limit puree imports because of, it is assumed, the high standards and low costs of production in countries of origin.

At a county level, Kirinyaga county government has identified tomato as one of four agricultural sectors targeted by an economic stimulus programme, 'Wezesha'. In practice, this translates into direct investment by the government (into a market, greenhouses, and a forthcoming processing plant) rather than attempts to address underlying systemic issues affecting the sector. Whether or not the county government can create a more general enabling environment for agroecological production and AEEs in the sector remains to be seen.

72 East Africa tariff rates are available here: https://www.ey.com/en_gl/technical/tax-alerts/east-african-community-implements-tariff-changes-for-the-financi.

3.3.8 Other organizations in the tomato sector in Kirinyaga

ICIPE has been working with Real IPM and Safi Organics on the Integrated Sustainable Production of Tomatoes (ISPOT) project in Kirinyaga. This project supports tomato farmers and extension workers to support the adoptions of organic approaches to pesticide and fertilizer use in tomato production. Phase 2 started this year.

Slow Food Kenya is actively supporting the development of producer groups in the PGSs and local organic markets. Although not focused on tomatoes, the large quantity of tomato production taking place across the county creates a lot of crossover.

3.3.9 Constraints and opportunities

The constraints and opportunities identified for the tomato market are similar to the ones identified for the mango market. This is not totally surprising – the issues associated with perishable horticultural products are expected to have a lot of overlap. However, there are also notable differences owing to the different structures of the markets and the differences in the state of development of agroecological production. For tomatoes, improving agroecological production is a necessary prerequisite for development of AEEs, and so this is the focus below.

Production

Tomato production is constrained by **low agroecological production levels**. The number of organic or agroecological tomato farmers and production-focused AEEs remains small, due to dependence on rain-fed agriculture, pest and disease pressure, limited confidence in organic treatments, and the lack of market outlets. Compared to mango, tomato is a more difficult crop for agroecology. Production is also affected by **high post-harvest loss**, caused by poor handling, packaging, and transport, lack of cold storage and aggregation centres, and spoilage due to exposure and pests.

Inputs and services

The sector is further constrained by **limited ongoing training and extension**. Extension services are limited and uncoordinated, although organic groups connected to a buyer are more likely to receive some support. The low number of producer groups makes embedded extension from AEEs or other enterprises more difficult to organise. In addition, **limited use of organic inputs** contributes to low levels of agroecological production, as demand for such inputs remains low and availability in local agro-dealers is limited. **Poor access to finance for farmers** is another key barrier. Although some financing instruments exist for the horticultural sector, access to finance remains a challenge for most actors in the market system, and given the low level of agroecological production, farmer finance is the main initial constraint.

Marketing

Marketing is constrained by **lack of aggregation and informal marketing**. In the study area, farmer organisation remains weak, both in organic and conventional systems, with few examples of groups supporting production or marketing and no real alternatives for aggregating produce from individual farmers. While most organic farmers are organised in groups, these are very few and there is little support for their expansion and replication. The market is also constrained by **lack of differentiation of organic produce**, since the dispersed and unorganized nature of production makes certification difficult, including through PGS. As a result, only a few producers in the region have certification. This is closely linked to **limited market structures for agroecological produce**. Although some progress is being made, a critical mass of formal market outlets for agroecological produce has not yet developed, meaning that organic or agroecological produce is largely sold into conventional markets. In the processed segment, **cheap imports** of tomato paste remain a challenge, as imported products are widely available, including in local markets, and maintain stable prices throughout the year, making them attractive to retailers.

Demand

There are, however, clear opportunities on the demand side. **Rising consumer demand for fresh tomatoes** is a major opportunity, as tomatoes are the most consumed vegetable in Kenya and demand for horticultural products continues to grow. Demand for organic tomatoes is driven by concerns over food safety, but there is also interest in other characteristics of agroecological production. The evidence suggests that 77 per cent of the population with purchasing power is interested in buying organic tomatoes. A second opportunity lies in the **development of local market outlets**. The Kagio Earth Market, established by Slow Food Kenya, demonstrates the potential of local organic outlets to increase the value returning to farmers and reduce losses from transport. In addition, KOAN has been developing a network of PGS assessors around the country, which could reduce the cost of certification and make PGS more accessible to local producer groups.

Policy and Enabling Environment

The policy environment currently provides limited support, reflected in the **lack of policy and governance support** for agroecological production and marketing. For example, Kirinyaga county government has no intelligence on organic or agroecological production in the county and has no plans to investigate this, while no support is currently provided to organic production or the marketing of agroecological produce.

At the same time, there is an opportunity linked to **health concerns and demand**. Growing concern over the harmful effects of agricultural chemicals, including investigations by national authorities into pesticide use and possible links to rising cancer cases in the Mount Kenya region[73], creates an entry point for advocacy. This provides a basis for encouraging greater county-level support to agroecological production and to the development of AEEs.

3.3.10 Systemic issues

Each of the constraints identified in the tomato value chain is linked to a number of underlying systemic issues, which themselves may present opportunities for market-based interventions. These issues are identified below. The impact of the specific constraint on the potential of AEEs is also identified.

Production

At the production level, lack of aggregation and formal marketing increases transaction costs for agroecological enterprises and constrains their growth. This reflects **lack of business models to support and sustain producer group development**, as well as **lack of efficient models for aggregation and quality control for produce from individual farmers**.

In addition, lack of training provision for farmers limits both the supply and quality of agroecological produce, thereby constraining the development of processors and other AEEs. This is linked to **lack of business models to embed producer training**, as well as **reducing support from government for extension services and limited knowledge in extension services of agroecology**.

Further constraints arise from dependence on rain-fed production, which limits supply and reduces reliability. This reflects **lack of models allowing investment in organic greenhouse technology**. The high disease burden of organic tomato production also constrains supply, linked to **limited use of and confidence in organic pesticide for tomatoes** and **lack of local supply of organic pesticide in agro-dealers**.

Transport and storage

Poor transport, lack of aggregation and storage lead to high post-harvest losses, increasing costs across the value chain and reducing incentives for both farmers and enterprises. These challenges are rooted in **weak government investment in road infrastructure** and **lack of business and government investment in safe storage**.

Finance

Limited availability of financial services to enable farmers to transition to agroecological production constrains supply and inhibits the development of processors and other AEEs. This reflects **formal financial institution requirements not suited to small-scale farmers**.

Inputs and Services

Low levels of use of organic inputs contribute directly to low levels of agroecological production. This is driven by **negative attitudes and low awareness of organic inputs amongst farmers** and **low quantities of organic inputs available locally**, which together limit uptake and productivity.

Market access

Limited local organic market outlets disincentivize agroecological producers, as they take time to expand capacity. This is linked to **slow rate of rollout of PGSs and lack of political will from county government to support more outlets**.

In addition, lack of differentiation of organic produce removes any market advantage associated with agroecological production. This reflects **high costs of organic certification and nascent development of PGSs**.

Processing

Cheap imports make it difficult for agroecological enterprises to be competitive, even though local processing capacity remains underdeveloped. This is reinforced by **import policy that enables cheap imports**.

Policy

The enabling environment is constrained by lack of policy and governance support to the agroecological sector and AEEs, making it difficult for these enterprises to compete with conventional actors. This

73 Kenya News Agency (2023), *State probing possible link between pesticides & rising cancer case*, 7 February. https://www.kenyanews.go.ke/state-probing-possible-link-between-pesticides-rising-cancer-cases/#:~:text=A%202022%20Report%20by%20the,followed%20by%20Kirinyaga%20at%202%2C033 (last accessed 20 January 2024).

reflects lack of knowledge and commitment from the county government for agroecology and AEEs.

3.3.11 Market-based solutions

Market-based solutions address systemic constraints by strengthening market functions, relationships, and incentives among market actors. market based solutions are geared at engaging the private sector to spearhead them and consider them as avenues for improving their business and the business model that will make that solution available in the market in the long run. Table 27 outlines different market-based solutions for each systemic issue identified for the mango value chain in chapter 3.3.10. These solutions thus outline what would be required to enable positive change for AEEs.

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Table 27. Market-based solutions – tomato sector

Systems issue	Market based solution	Actors involved
Lack of business models to aid and sustain producer group development	Development of PGS groups linked to Kagio Earth Market and other relevant organic markets	Slow Food Kenya and other PGS service providers
	Development of agroecological market clusters, linked to PGS groups, that support longer supply chains outside of the county	Slow Food Kenya and other PGS service providers, organic input companies, FIs, processors
Lack of efficient models for aggregation and quality control of produce from individual farmers	Development of agroecological market clusters linked to individual producers, which support longer supply chains outside of the county	Organic input companies, FIs, processors
Lack of business models to embed producer training	Development of training models with organic input producers	Organic input providers, producer groups
Reducing support from government for extension services/limited knowledge in extension services of AE	Development of network of lead farmers. Capacity of government extension workers on agroecology strengthened	Kirinyaga county government, producer groups
Lack of models allowing investment in organic greenhouse technology	County government integrates agroecological producers into greenhouse support	Kirinyaga county government
Limited use of and confidence in organic pesticide	Sensitization and training of farmers on good organic input use	Organic input providers, producer groups
	Development of 'champions' and influencers within the farming community.	Organic input providers, producer groups
Lack of local supply of organic pesticide in agro-dealers	Development of last-mile distribution models	Organic input providers, producer groups
Weak government investment in road infrastructure	Advocacy to relevant government institutions on the potential impact of road network improvements	(Organized) farmers and entrepreneurs, local organizations working in the agricultural sector
Lack of business investment in safe storage	Incentives provided to develop improved transport/storage options	Buyers of agroecological tomatoes, traders in local organic outlets
	Collaboration between government and private sector on development of safe storage and aggregation facilities	Buyers from tomato and other sectors and county government
Formal FI requirements not suited to small-scale tomato farmers due to high risk and lower returns of tomato farming	Development of innovative financial products	Testing by FIs of products that support farmers within cluster model or with individual AEEs
Lack of political will from county government to support more outlets	Kirinyaga county government invests in local organic market outlets	KOAN, Slow Food Kenya, Kirinyaga county government
Import policy that enables cheap imports	Policy that provides more protection for local processing sector	Processors

These solutions differ slightly from the mango value chain because of the differences in the configuration of the market system. To start with, market solutions are more likely to be based around the development of local wet markets, relationships between input providers and producers, and a limited number of relationships between producers and organic retailers.

The issues relating to the development of PGS groups and support to individual farmers are similar. However, the pest and disease problems of the agroecological production of tomatoes are such that peer support and learning from peers will be more important in this subsector – suggesting a greater role for some form of group.

3.3.12 Facilitation activities

The development of AEEs in the tomato sector is strongly constrained by the low levels of agroecological production currently taking place. The processing of organic products, including tomato puree, may present some potential, but for the time being, the combination of the constraints affecting processing with the production challenge indicate that this is not a priority.

A more logical market development approach would be to first focus on developing the local wet market for tomatoes and use that to address some of the production challenges. Once production is improved and local markets are more active, it may be possible to consider further market developments (Figure 14).

As a result of the lack of development of the agroecological tomato market and the lack of actors involved, the role of the county government in catalysing action will be more important than in the mango sector. The role of input providers will also be more important initially than in the mango sector, for two reasons: first, the importance of tackling pests and diseases in tomato production; and second, as a conduit for the provision of extension support to farmers. The training of farmers on good practice for the use of organic inputs can be adapted so it also covers other aspects of the broader agroecological production. In the absence of other market actors, the role of input providers to do this will be more important. The previous experience of the ICIPE ISPOT programme, provides something to build on.

The lack of actors in the sector presents particular challenges for the provision of finance. Farmer finance is important in the tomato sector, but the limited number of agroecological actors may present a challenge for a cluster approach to financing. Likewise, the relative lack of development of AEEs means that the potential of developing a pipeline of enterprises for impact investors is not feasible. There may be some opportunities to support small-scale enterprises

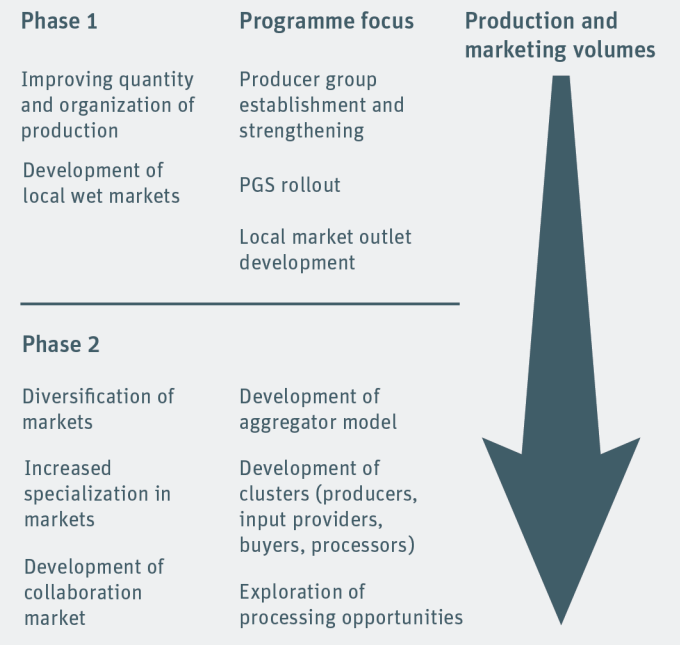

Figure 14. Sequencing of facilitation activities - tomato sector

to access finance from commercial banks that are receiving de-risking support from Aceli. However, those enterprises will require investment readiness support.

Only when agroecological production has significantly improved, is consistent, and is well organized might organic processing become a viable option to look at. It will then still have to contend with a number of issues, including demand creation, challenges from cheap imports (although none are organic), and other factors driving high costs for processing. It will be worth exploring the practicalities of integrating an organic/agroecological element to the forthcoming government-supported processing plant.

The development of local wet markets would not initially involve the development of growth-oriented AEEs. AEEs that support production would be critical, but they would mostly be producer groups, focused on supporting production and enabling market access for their members. Small opportunities for value addition may develop, but this would not meet the criteria for a 'growth orientation'.

However, as agroecological production increases, a potential role for aggregator AEEs will develop. A critical issue will be the value that they add compared to the value that they take away from producers. The development of more sophisticated producer groups, which can manage aggregation and marketing on a larger scale, will be one strategy to manage this tension.

The facilitation activities (Table 28) identified for the tomato sector are prioritized with the sequencing described above in mind.

Table 28. Facilitation activities – tomato sector

Initial priorities | Second-stage priorities | Further facilitation activities

Market-based solution	Facilitation activities
Development of existing and new PGS groups linked to Kagio Earth Market and other new PGS outlets	Provision of support to the expansion of local markets by Slow Food Kenya, including support to PGS rollout
Kirinyaga county government invests in local organic market outlets	Documentation of lessons from Kagio Earth Market, advocacy to county government, cost-sharing for new outlet creation (partner: Slow Food Kenya)
Development of training models with organic input producers	Design pilot to test models, provision of smart subsidies to reduce risk to input companies
Development of last-mile input distribution models	Design pilot to test models, provision of smart subsidies
Sensitization and training of farmers on good organic input use, including development of 'champions' and influencers	Build on ISPOT. Design pilot to test training models, provision of smart subsidies integrated into collaboration with input producers and distributors
Development of market clusters based on PGS groups and individual farmers	Facilitate a participatory process with market actors, including PGS groups, buyers, and FIs, to explore potential value and mechanisms for a cluster model
Development of a network of lead farmers. Capacity of government extension workers on agroecology strengthened	Advocacy to county government, training of county extension workers, support to county to identify lead farmers, development of smart incentives to enable testing of model
County government integrates agroecological producers into greenhouse support	Advocacy to county government for pilot with focus on agroecological producers
Policy that provides more protection for local processing sector	Deeper investigation into viability of change. Advocacy to national government if appropriate
Development of innovative financial products for processing and trading enterprises	Explore potential of connecting with Aceli-supported commercial banks
Development of innovative financial products for farmers	More investigation required into how to do this
Incentives provided to AEEs to develop improved transport/storage options	Pilot with producer groups to test options for improved storage/marketing

3.4 Summary market systems development

Mango value chain

The market systems analysis of the mango value chain indicates that the central issue is not the absence of market opportunity, but the weak functioning of the market system needed to translate that opportunity into more reliable agroecological enterprise growth. The main bottlenecks are inconsistent agroecological production, weak aggregation and formal marketing structures, limited technical support, poor access to finance, and weak input systems, particularly for quality seedlings and organic inputs. These constraints increase transaction costs, reduce coordination, undermine supply reliability, and make it difficult for agroecological enterprises to emerge in a more organised and scalable way.

A key finding is the lack of effective business models linking dispersed producers to markets, services, and incentives in a sustained way. This is visible in the limited development of farmer marketing groups, the absence of strong embedded training models, and weak last-mile distribution of appropriate inputs. As a result, many producers continue to operate through short and informal channels, while processors and other potential agroecological enterprises struggle to source reliable volumes and consistent quality. The evidence suggests that business-model development should therefore be treated as a central conclusion of the mango value-chain analysis.

These systemic issues point toward **market-based solutions that strengthen collective organisation, improve coordination, and lower the commercial barriers to agroecological production and trade**. The most relevant solutions include the strengthening of Participatory Guarantee System (PGS) groups, the development of broader agroecological market clusters, improved aggregation and quality-control models, stronger embedded training functions within

enterprises or clusters, improved last-mile distribution of organic inputs, and more suitable financial pathways for producer groups and agroecological enterprises. Initial facilitation should focus on working with existing groups and market actors that already show some governance capacity or commercial orientation. It should support the strengthening of PGS groups, the testing of agroecological market cluster models, and the development of embedded training and input-delivery arrangements. A second stage of facilitation would focus more explicitly on enterprise business models, investment readiness, and appropriate finance pathways for enterprises able to take on stronger aggregation, processing, or service roles.

Tomato value chain

The tomato value-chain analysis points to a more foundational challenge. The core issue is the weakness of the production and market base on which agroecological enterprise development would need to build. This is the case despite clear consumer interest in agroecological tomatoes. Compared with mango, the tomato value chain is more heavily constrained by pest and disease pressure, low agroecological production levels, weak farmer organisation, poor aggregation, high post-harvest losses, fragmented extension support, and weak access to appropriate organic inputs. Together, these factors produce irregular volumes, uncertain quality, and very limited differentiation of agroecological tomatoes in the market. As a result, the value chain currently provides only a narrow base from which more specialised agroecological enterprises (e.g. growth-oriented processors) can emerge.

The analysis indicates that the tomato value chain is constrained not only by technical production problems, but also by the **absence of workable business models and market structures capable of reducing production risk and organising supply**. The main gaps are in producer group development, aggregation, embedded training, input distribution, and reliable local market channels. In this sense, the tomato value chain lacks the organisational and commercial arrangements that would allow agroecological production to become viable at greater scale. The **most relevant market-based solutions are therefore those that first stabilise and organise the lower end of the chain** before expecting stronger downstream enterprise development. These include the strengthening of local wet-market outlets linked to PGS, the development of producer groups and local market clusters, improved last-mile distribution of organic inputs, and training models more closely embedded in market relationships.

The **facilitation implications are correspondingly more stepwise** than in mango. Initial facilitation should focus on strengthening producer organisation, supporting local organic market outlets, testing training and input-distribution models, and improving the immediate conditions for agroecological production and sale. This includes working with actors that can support local market expansion, supporting participatory processes for the development of cluster-type models, and piloting input-distribution and training arrangements in contexts where input providers may play a particularly important role. Policy engagement remains relevant, but mainly where it can support organic outlets, input access, or more enabling local market structures. More advanced downstream enterprise functions (e.g. growth-oriented processing) are likely to depend on prior strengthening of these earlier-stage market conditions.

Comparison of mango and tomato value chain

The two market systems analyses reveal substantial overlap in the systemic constraints affecting agroecological enterprise development. In both value chains, weak producer organisation, limited aggregation, fragmented technical support, weak access to finance, poor input systems, and insufficient market differentiation constrain enterprise growth. These shared constraints create similar market-function gaps, especially in producer–buyer coordination, embedded service provision, last-mile input delivery, and the development of business models linking producers to markets, services, and incentives. **The analyses therefore converge in identifying business-model development as a central priority**, particularly in aggregation, embedded training, input distribution, and PGS or cluster-based market organisation.

The main differences lie less in the type of systemic constraints than in their extent and in the sequencing of responses. In the mango value chain, the system base is stronger, and the main challenge is to improve weak but already visible enterprise and coordination functions so that market opportunities can be translated into more reliable agroecological enterprise growth. In the tomato value chain, by contrast, the production and market base remains weaker, requiring earlier-stage strengthening of producer organisation, local outlets, and input access before stronger downstream enterprise functions can emerge (i.e. for processing and a stronger aggregation function). The two value chains therefore justify both a common MSD lens and differentiated intervention sequencing.

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Section 4

Market systems analysis of the organic input services sector

4.1 Why organic inputs?

Organic input services are a critical component in the development of agroecological enterprises (AEEs) and the broader transformation of food systems. Enterprises that provide inputs such as organic fertilisers and bio-based crop protection products play a key enabling role by supporting agroecological production practices. Their growth can help reduce dependence on synthetic, non-organic inputs and facilitate a gradual transition toward more sustainable, regenerative agricultural systems.

This part of the analysis thus aimed to assess the significance and future potential of the AEE input sector in Kenya and the challenges that need to be addressed to meet that potential.

Specifically, it set out to:

- map the AEE input sector, including the identification of priority subsectors it serves;
- assess current and potential future levels of demand for inputs and services from AEEs, including identification of inputs and services that may provide a focus for future development;
- assess the constraints that exist within existing market systems for inputs that support agroecology and interventions that might address these.

Information was obtained through two approaches:

- **Desk review**: a large part of the results presented come from secondary research on both the organic fertilizer sector and the organic pesticide sector.
- **Interviews**: interviews were carried out with the stakeholders listed in Table 29 to validate and build up the secondary data.

Table 29. Organic input stakeholders interviewed

Category	Number
Farmer groups	4
Local agro-dealers	8
Organic input manufacturers (Safi Organics, Sanergy, Juanco)	3
Cross-sectoral organizations (KOAN, IDH, BVAT, Integrated Biopesticides Manufacturers Association (IBMA) of Kenya)	4

4.2 Current state of the AEE input sector

AEEs in this sector provide three types of organically derived inputs (Table 30).

Organic fertilizer (including soil amendments) is the most advanced of these markets. Pioneer companies started operations from about 2010. Early followers started entering the market from about 2014 as companies started stabilizing operations and exploring strategies for scale. It is now considered to be in a 'gold rush' stage, with a lot of companies rushing in to take advantage of a perceived significant market opportunity created by a combination of growing awareness of the deterioration of soils in Kenya and the rising price of inorganic fertilizer. However, significant constraints exist within the market system, including limitations to demand. Interest from donors and other funders in addressing these is significant. The FCDO has recently funded an assessment of the sector, GIZ and the EU are supporting other research. These donors seem committed to ensuring that they coordinate in their efforts to support the sector.

The organic pesticide sector receives comparatively less attention; however, it is relatively well established. Several companies have been operating for decades, and the number of registered organic pesticide products is notably high. In 2021, the Pest Control Products Board (PCPB) announced that it had registered 109 biopesticides. However, it is also impeded by relatively low levels of demand and market system constraints.

Table 30. Categories of organic inputs

	Organic fertilizer	Soil amendments	Organic pesticides
Definition	Plant/animal origin, applied to soil in original or decomposed form to improve nutrients and/or soil structure	Products that stimulate natural nutrition uptake and improve stress tolerance	Naturally occurring biochemical, microbial, botanical, or mineral chemicals that disrupt or eliminate pests
Products	Frass, vermicompost, farmyard manure, biochar, human and industrial waste	Seaweed, other naturally occurring stimulants	Biopesticides, fungicides, traps

4.3 Organic fertilizers market system

Organic fertilisers encompass both fertilisers and soil amendments. This section draws in part on analysis from a forthcoming TechnoServe report prepared for the FCDO[74].

4.3.1 AEEs in the organic fertilizer sector

There are currently two critical types of business in the organic fertilizer sector:

- **Producers of organic fertilizer**: most are 100 per cent involved in the production and sale of organic fertilizer. However, some inorganic fertilizer companies are now starting to explore the potential of organic fertilizer as well.
- **Distributors of organic fertilizer**: these include agrovets and input traders. They include local stand-alone businesses and larger chains such as Magos. Currently, there are no examples of businesses that only sell organic inputs. Although there is evidence that sales are increasing in local shops, the field research included dealers in Makueni, whose sales of organic inputs in general are still only about 1 per cent of total income.


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As the sector matures, it may become more differentiated and complex, with businesses adopting higher levels of specialization and the number and types of business increasing. For now, the structure remains relatively simple. TechnoServe predicts that the development of the sector will be driven by the larger players, capable of innovation, specialization, and economies of scale, such as Sanergy. If this is correct, it does not preclude a role for smaller, localized producers of organic fertilizer, such as Safi Organics, who could potentially develop a competitive edge through reduced transport and storage costs and the use of locally available waste.

4.3.2 Demand for organic fertilizer

TechnoServe analysis suggests that organic fertilizer could achieve between a 12.5 per cent and 17.5 per cent share of the fertilizer market by 2030, equating to a value of at least $200 m a year. This growth potential was reflected to a degree in the field research, with Makueni input providers noting increases in demand from small farmers. They attribute this to the promotion of organic inputs by development organizations and the sensitization by the government of the dangers of overuse of chemicals in farming. The most demanded organic inputs are foliar feeds, which are perceived to give quick results.

However, despite this trend, a lack of sufficient demand is one of the major constraints holding back development of the sector, as indicated by all of the companies spoken to in this research and by the TechnoServe report. Demand for organic fertilizer is a complex issue with numerous elements to it:

Farmer mindsets: inorganic fertilizers have created an expectation amongst farmers of 'immediate impact' on productivity. In contrast, most organic fertilizers take time to bear fruit, and the full benefits may take several years to be seen. Organic foliar fertilizers are the most rapidly working organic product. They are also easy to transport and relatively cheap – all of which explains their popularity. This issue indicates that training alone is not enough: farmer mindsets need to adapt.

Lack of technical knowledge: farmers have a lack of knowledge on integrated soil management – the combination of organic and inorganic inputs in a way that maintains soil health. This can be a stepping stone to fully organic or agroecological production, which is more palpable to farmers than immediately halting use of non-organic inputs. However, a lack of awareness of this option limits this.

Lack of differentiated products: inorganic inputs have been developed to deal with different types of soil conditions, different stages of growth, and different crops. In comparison, organic fertilizer has much less variety and is more generic. Farmers note this, and it raises questions for them as to the effectiveness of organic fertilizers. This may not always be an accurate conclusion, but it is how farmers perceive the situation.

Lack of consistency in standards: as a result of a production process that often includes the use of an inconsistent supply of inputs, some organic fertilizers vary in their composition from batch to batch. This makes it difficult for farmers to predict how best to use them and erodes confidence.

74 CASA (in press) *Scalable alternatives to inorganic fertiliser: final report, April 2023*, FCDO/TechnoServe.

Perception from farmers that organic inputs are more expensive: this is a common perception, but, as noted by one cooperative, this may be due to a lack of knowledge on the part of farmers on how to use organic inputs effectively. If the TechnoServe research is seen to be accurate, the reality is that organic fertilizer is cheaper than subsidized inorganic products. Average costs are equivalent to $300–400/MT, but as the market matures, this price should come down, potentially to the $200–250/MT level seen in more mature markets.[75]

4.3.3 Constraints and opportunities

The **demand issues** identified above are some of the most significant constraints on the development of the market system. However, there are other significant issues.

Limited sector coordination: It is noted that the type of market segment that is the most well developed is black soldier fly, the segment that has had the most collaboration (for instance between companies in support of research and development (R&D)) to date. However, coordination across the sector has been absent. To address this, a new cross-sectoral association has just been established – the Organic Farm Input Manufacturers Association of Kenya (OFIMAK).

Sector governance challenges: A number of challenges for the governance and policy framework of the sector are noted in the TechnoServe analysis. Many of the institutions needed to develop the sector have limited awareness and commitment to organic fertilizer at the moment and are difficult and costly to work with. This results in increased costs for companies and delays in the establishment of operations. Some noted issues are summarized in Table 31.

Relevant policies that affect organic fertilizer include:

- ***Sustainable Waste Management Act* 2022**:[76] this Act aims to support sustainable waste management in a way that also supports employment in waste recovery and reuse and in the circular economy. It covers a number of issues relevant for organic fertilizer companies using waste, including standards, land use, and the roles of public and private actors.
- **Kenya Standard: Organic Fertilizer Specification** (KS2290: 2023): this standard issued by Kenya Bureau of Standards (KEBS) sets the requirements for the composition, hygiene, and labelling of organic fertilizer products.

Bulkier product: many organic fertilizers are bulkier than their chemical counterparts. This makes them more difficult for farmers to store and use.

Marketing by inorganic input providers: inorganic input providers have much more financial muscle than organic providers and have deep relationships with many agro-dealers. They are able to skew the provision of information, training, and sales incentives towards inorganic products.

Table 31. Institution and governance challenge

Institutions	Role	Challenges recorded
MoALD	Produces bills and implementation frameworks for the sector	Stakeholders believe it is slow to develop the necessary standards and regulations
KEPHIS	Trains extension workers, tests soil and organic products	Difficult and expensive to work with, resulting in delays in the launch of products
KEBS	Manages standards for organic fertilizer	Very slow certification process, which slows down business growth. Often this is because there is confusion in KEBS on who is responsible
KALRO	Agricultural research, dissemination of agricultural information	Stakeholders suggest that KALRO is not doing enough to promote information on fertilizer and soil that would help uptake of organic products

Lack of evidence: Other actors who are essential to the promotion of organic fertilizer at scale, such as the government and agro-dealers, need good evidence on its cost-effectiveness and practicality to justify investments and to enable them to convince farmers. However, evidence like this is time-consuming and costly and is difficult for all but the largest companies to invest in.

Last-mile distribution challenges: All agricultural inputs face a challenge in how to reach rural communities in a cost-effective way, requiring innovative business models. Organic fertilizer is more bulky than chemical fertilizer – especially when it is not pelletized. This makes it difficult for agro-dealers, who have limited storage facilities to stock it. There is also a danger of contamination: some organic fertilizer

75 The comparison in prices to inorganic fertilizer is not totally clear. TechnoServe makes the point that organic fertilizer can be cheaper but only provide the costs of organic.

76 See the FAO database: https://www.fao.org/faolex/results/details/en/c/LEX-FAOC212545/#:~:text=The%20Act%20identifies%20the%20following,environment%20for%20employment%20in%20the (last accessed 20 January 2024).

uses packaging that is breathable but that lets in water and other substances. These factors discourage agro-dealers from stocking organic fertilizer.

Low awareness of distribution agents: Extension workers and agro-dealers have very limited knowledge on organic inputs, what is available, and, crucially, how to use them effectively. As a result, they are unable to promote them, and when they do, there is a risk they encourage ineffective use, further eroding farmer confidence.

Research and development needs: Organic fertilizer is at a relatively early stage in development, and practical problems with the product remain. Areas for R&D include the development of formulations suited to the needs of specific crops in specific circumstances, and practical and logistical improvements, such as pelleting and packaging that would aid distribution. Fertilizer companies often have connections to centres of learning that can support such research, but R&D can be very costly and time consuming.

4.3.4 Market system development priorities[77]

The analysis provided by TechnoServe suggests a tiered approach to developing the market system. Immediate priorities focus on building the capacity and knowledge of decision makers, improving cross-sectoral collaboration, and strengthening quality standards. Secondary priorities include supporting catalytic business models that can be scaled up, creating market incentives to encourage adoption by reducing costs, improving farmer awareness—particularly in relation to integrated soil management—and developing holistic, pluralistic extension and advisory services.

This represents one of several recent analyses of the market system. Additional studies by different stakeholders further contribute to an evolving evidence base, highlighting the need for coordination and alignment across initiatives. As this body of research continues to develop, future market systems development (MSD) interventions should build on the latest available insights and seek to complement ongoing efforts. Based on the findings of this report, a number of priority areas for intervention can be identified, as outlined in Table 32.

Table 32. Market system development priorities and facilitation activities

Market system development priority	Facilitation activities
Building capacity and knowledge of decision makers	Collaborative action research with fertilizer companies, farmers, and the government that builds up evidence and strengthens constituencies of support
	Advocacy to national and county governments
Improving cross-sectoral collaboration	Support to the proposed association for organic fertilizer producers (OFIMAK)
	Support to the participation of smaller companies and farmer groups in cross-sectoral groups and meetings
Support to catalytic business models (input producers and distributors) that can be scaled up	Development of investment readiness of catalytic companies and connection to investors
	Direct investment (e.g. SHONA)
	Development of last-mile distribution models with input manufacturers and agro-dealers
Creation of market incentives for adoption by reducing cost	Voucher schemes for organic fertilizer, designed to run for a sufficient period to change attitudes of a critical mass
Improving farmer awareness, including on integrated soil management Developing holistic, pluralistic extension, and advisory services	Training of public and private extension workers on integrated soil management and organic inputs
	Training of agro-dealers on effective use of organic inputs and an integrated soil management approach
	Engagement with inorganic fertilizer companies to influence them to support an integrated approach to soil management
Product improvement	Funding of R&D in partnership with individual companies or cross-sectoral organizations

77 Chapter 4 employs a simplified version of the MSD approach described in Chapter 1. It focuses on market system development priorities. However, it still covers the analysis of systemic issues and market-based solutions that are the basis for identifying facilitation activities to institutionalize the market based solutions.

4.4 Organic pesticides market system

Organic pest treatments include the following categories of products:

- microbial: viruses, bacteria, fungi;
- macrobial: predatory mites, insects, nematodes;
- botanical pesticides: neem, seaweed extracts, etc.;
- biochemical controls: pheromone traps.


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4.4.1 AEEs in the organic pesticide sector

There are a relatively large number of producers of organic pesticides in Kenya. In the frame of this analysis, 28 producers were identified.[78] Producers include Kenyan companies and internationally owned companies. A sectoral body, the Integrated Biopesticides Manufacturers Association, supports coordination and advocacy.

The structure of the market is similar to that of organic fertilizers, including those listed below.

Producers of organic pesticides: these can be broken down into two:

- **Producers of pesticides for use in Kenya**. This is the vast majority, which is the focus of this research. This includes well-known companies like Real IPM and Koppert Biological Crop Protection. Within this are businesses who manufacture pesticides in Kenya and those that manufacture overseas. An example of the latter is Koppert, which has a large plant in India.
- **Producers of pesticides for export**. In 2024, with funding from the US International Development Finance Corporation, Kentegra, a joint Kenyan and US biotechnology company, started construction of a large factory in Nakuru to process pyrethrum, a key ingredient in many organic pesticides.[79] This is an attempt to revitalize Kenya's export of this product – it is used to produce 80 per cent of the world's supply – and improve the livelihoods of local farmers. If this remains purely as an export product, it is of little interest to us. However, this plant may have a role in the future in providing raw materials for local producers of organic pesticide.

Distributors

This includes the same network of agro-dealers and agrovets that supply organic fertilizer (see section 4.3.1).

4.4.2 Demand for organic pesticides

The main drivers of development of the organic pesticide sector to date have been the export-oriented, intensive floriculture, and horticulture sectors. The banning of certain pesticides in Europe and the demand for organic produce explain this.

In contrast, the field work revealed that, in Makueni and Kirinyaga, current levels of demand for organic pesticides amongst small-scale farmers is very low. Farmers have a low impression of the effectiveness of organic pesticide, especially on crops such as tomatoes. The stocks held by local agro-dealers were very low when compared to inorganic products.

Research published in 2020[80] based on interviews with 300 farmers in Machakos, Embu, Narok, Trans Nzoia, and Nyeri provides a deeper assessment of this situation. The research found a low level of use of organic pesticides compared to chemical pesticides. Some key statistics relating to pesticide use are included in Table 33.

Table 33. Characteristics of pesticide use (based on data from Constantine, K. L. et al. 2020)

Pesticide use	% of interviewed farmers
% using chemical pesticides	87%
% using organic pesticides*	10%
% trained on chemical pesticides	60%
% trained on integrated pest management	37%

78 https://www.infonet-biovision.org/natural-pest-control/biopesticides-kenya#6
79 https://nakuru.go.ke/kentegra-ltd-to-begin-construction-of-a-multi-million-pyrethrum-processing-factory/ (last accessed 30.11.2024).
80 Constantine, K.L. et al. (2020) *Why don't farmers in Kenya use more organic pesticides?*, CABI.

Table 33 refers to commercially bought organic pesticides. Interestingly, 70 per cent of farmers use some other pest control measures in addition to chemical pesticides. This includes cultural controls, homemade plant extracts, etc.

Awareness of alternative pest control methods is therefore not low. In addition, awareness of the potential harmful impacts of chemical pesticide are well known – 42 per cent of farmers reported someone in their household suffering from health conditions arising from chemical pesticide use.

Despite these two factors—awareness of organic pesticides and recognition of the negative health impacts of chemical pesticides—demand for chemical pesticides remains high, while demand for organic alternatives is low. A number of factors appear to explain this discrepancy (Table 34).

Table 34. Perceptions of pesticides by farmers (based on data from Constantine, K. L. et al. 2020)

Perceptions of pesticide effectiveness	%
% who rated conventional pesticides as effective	80%
% who rated organic pesticides as effective	23%
% who think chemical pesticides work on range of pests	40%
% who think organic pesticides work on range of pests	5%

These statistics should be recognized as indicators of perception and not indicators of actual pesticide effectiveness. Several factors explain these perceptions:

- Farmers are used to the instant impact of pesticide use. Chemical pesticide is sprayed on crops, and the pests are seen to more or less instantly disappear. Organic pesticides often work differently, and it takes time for pests to visibly disappear. Even if this time lag does not affect long-term productivity, it is not what farmers expect. As with organic fertilizer, this illustrates the 'mindset' challenge associated with organic inputs.
- Farmers have limited awareness of specific products. Their awareness is often linked to the low number of products available from agro-dealers. For the analysis of this report, 129 different products were identified in Kenya, but most of them do not make it to dealers in rural locations. This number is only about 8 per cent of the total number of pesticides approved in Kenya.[81]
- There is a lack of a critical mass adopting organic pesticides. Some organic pest treatments – e.g. pheromone traps – require geographically adjacent farmers to adopt them together. When adjacent farmers are not using them, their effectiveness is much reduced. This contributes to the sense that they are not effective.

Finally, a point should be made about broad spectrum pesticides that can deal with a range of pests, as set out in Table 34. Farmers prefer them because they are a more cost-effective way to control pests. However, the environmental damage and long-term impact on agricultural ecosystems is high. This represents an area for significant education and attitude change.

Despite these impediments, demand is rising, according to organic pesticide producers. The main driver for this has been an increase in the production of organic food for exports, but it is also noted that farmers producing for local markets are also increasing demand.[82]

4.4.3 Constraints, opportunities and systemic issues

In addition to the challenges already mentioned, a number of other factors impede the development of the sector.

Regulatory bottlenecks: the current regulatory system requires approval from three separate organizations: the Kenya Wildlife Service, Kenya Plant Health Inspectorate Service (KEPHIS), and the Pest Control Products Board (PCPB). The approval process is time consuming and involves duplication. The paperwork that needs to be filled in is designed with conventional pesticides in mind. There are parts that are not applicable for organic pesticides, which then make it more difficult to convince regulatory authorities. But this is not just a technocratic issue – it is also a mindset one. Most of the staff from all three organizations do not understand organic pesticides – they have been trained on and understand conventional products only.

Low local stock levels: Agro-dealers tend to stock a limited number and variety of organic pest treatments. Stock levels are impeded by practical issues. For instance, some organic pesticides require refrigeration, which is not available. Others have a limited shelf life, putting considerable risk on dealers who stock too much when demand is low. In our field research, it was common for farmers not to know about the availability of organic pesticides. In other research, fewer than 5 per cent of farmers reported

81 IBMA, personal communication, September 2023.
82 Discussion with organic pesticide company Juanta on market trends and anticipated growth.

that organic pesticides were available.[83]

Distribution challenges: Limited 'last-mile' distribution models and a lack of awareness of distribution agents about how to use the products affect organic pesticide in the same way as they affect fertilizer.

Product challenges: R&D needs to include the development of formulations that are more effective and that broaden the range of treatments offered. However, R&D processes are costly and lengthy.

Reliance on imported ingredients: Some pesticide producers rely on ingredients that are imported and are subject to taxes that increase costs. For instance, a lack of local supply means that Juanta needs to import pyrethrum from China. This adds significantly to the costs of production. The development of the Kentegra plant may present a cheaper alternative to this, although this is yet to be explored.

4.4.4 Market system development priorities

The following (Table 35) is a list of potential market system development priorities that would support the growth of the organic pesticide sector.

Table 35. Potential market systems development interventions

Market system development priority	Facilitation activities
Improvements to the regulatory system	Training of staff from regulatory authorities and policymakers
	Advocacy to develop streamlined or organic pesticide-focused regulatory process
Development of advisory services	Partnerships to develop capacity of extension workers and agro-dealers to provide accurate information and training on pesticide use
Demand creation	Use of subsidies to make organic pesticides more attractive for a short period of time, to develop a critical mass big enough to influence other farmers
	Use of radio to generate knowledge and interest in organic pesticide
Support to last-mile distribution models	Testing business models that reach last-mile customers and ensure stock levels remain high
R&D support	Partnerships with manufacturers and learning institutions focused on specific product improvements

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83 Constantine et al. (2020) *Why don't farmers in Kenya use more organic pesticides*?.

4.5 Summary organic input services

The analysis of organic input services points to a broader service-market constraint affecting agroecological production. This is most visible in the organic fertiliser and pesticide subsectors, though similar issues may also affect other relevant inputs such as seedlings or planting material. Across these input categories, the principal constraints include weak farmer demand, limited product knowledge and application competence, standards and regulatory barriers, weak last-mile distribution, and the high costs associated with product development and commercialisation. These challenges limit not only the growth of the input sector itself, but also the ability of agroecological production systems to scale in a more reliable and commercially viable way.

The conclusions therefore point toward the need to strengthen the input service market as an enabling function for agroecological enterprise development more broadly. This implies not only improved availability of appropriate fertilisers and pesticides, but also stronger technical support, better distribution arrangements, and more effective commercial models that link input provision to farmer uptake and use. Similar logic applies to other relevant inputs where market access, quality assurance, and technical support remain weak. The input-service challenge is therefore systemic rather than product-specific, even if its effects are currently most visible in the fertiliser and pesticide subsectors.

Additional insights on the challenges discussed in this section, particularly regarding distribution and uptake of organic fertilisers, are explored in more detail in the Biovision brief "*Organic Fertilizers in Kenya: Market Systems and Last-Mile Delivery Challenges*", which complements and deepens the findings of this report.

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Section 5

Market systems analysis of the finance services for AEEs

5.1 The financial needs of AEEs

Access to finance is critical for the establishment and growth of agroecological enterprises (AEEs) and for the replication of AEE business models. Financial services shape the ability of enterprises to invest in production, processing, and market development, as well as to manage risks associated with transitioning to agroecological practices. This section examines the extent to which AEEs in Kenya can access appropriate financial products and services, the constraints they face, and the opportunities to strengthen financial ecosystems in support of agroecological market development.

This study and other research suggest that most AEEs are relatively small-scale businesses, so their investment needs tend to be in the lower SME range. For instance, the Alliance for Food Sovereignty in Africa (AFSA) research in East Africa[84] suggests that most AEEs are small, with 59 per cent generating revenues of less than $50,000 and 24 per cent between $50,000 and $200,000.

AEEs require more than finance alone. Financial Institution (FI) stakeholders in Kenya note that small-scale businesses in the agriculture sector, including AEEs, are characterized by low levels of capacity, often in key areas such as financial management and business planning. This is reflected in the SHONA portfolio, a blended finance facility supporting SMEs, where agricultural SMEs account for 33 per cent of the investment portfolio but absorb 80 per cent of the management support effort.[85]

AEEs also have a number of other characteristics that add cost and complexities to business models, which financing needs to take into account. These include:

- **High procurement costs**: Sourcing produce from dispersed and often unorganised smallholder farmers represents a major cost component for many small and medium-sized processors, reducing margins and investment readiness compared to businesses with more streamlined supply chains based on larger-scale producers.
- **Challenges in ensuring consistency**: Working with smallholders requires managing variability in quality and supply and results in businesses often take longer to stabilise operations, scale, and demonstrate clear growth trajectories (as observed by Burton and Bamber).
- **Nascent end markets**: Although demand is growing, secure and reliable end markets for agroecological products remain underdeveloped, making revenue streams less predictable than in conventional markets and increasing perceived investment risk.

Therefore most AEEs need flexible financing in the lower SME range, accompanied by business development support.


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5.2 Status of AEE financing in East Africa

There is no data on how many AEEs receive financing. However, there is data that shows the amount of lending that, in general, goes to agriculture. This shows that the amount of lending is disproportionately low compared to the contribution of agriculture to the economy (Table 36).

This reflects a well-acknowledged financing gap for agricultural SMEs, which likely also applies to AEEs. AFSA suggests that AEE finance gaps, which are often not met, are between $5,000 and $200,000.[86]

Table 36. Agriculture and lending.[87]

	Kenya	Uganda
Workforce in agriculture	54%	73%
Agriculture contribution to GDP (%)	34%	24%
% commercial lending going to agriculture	4%	12%

84 AFSA (2021) *Supporting African agroecological enterprises. Enabling environment for AEEs in Africa*.
85 SHONA Portfolio summary: available on: https://shonacapital.co/portfolio/ (last accessed 20 January 2024).
86 AFSA (2021) *Agro-ecological enterprises in Kenya: status, effectiveness and ecosystem*, https://afsafrica.org/wp-content/uploads/2021/06/aee-kenya-agro._compressed.pdf (last accessed 24 October 2024).
87 Aceli Africa (2020) *Bridging the financing gap: unlocking the impact potential of agricultural SMEs in Africa,* September, Aceli

5.3 Finance organizations in Kenya

5.3.1 Overview

The types of organizations that can potentially support financing for agricultural SMEs and AEEs are summarised in Table 37.

This analysis focuses on the first five of these financial provider types: banks, private impact investment funds, microfinance institutions, membership-based organizations and financial catalysts. The rationale for excluding the other categories is varies. Development Finance Institutions (DFI) funding is likely to come through other private or public vehicles, such as banks or government funding, so is not considered separately. Challenge funds are a potential source of funding when available but are not a consistent part of the financial landscape. The same can be said to apply to government enterprise funds. Both of these may, however, provide an important source of funding for individual AEEs. Likewise, crowdfunding is mostly used for very small loans or for technological development. The potential of internal value chain financing is dependent on the configuration of specific value chains and is covered, to an extent, in the recommendations to explore the potential of market clusters in Section 3.

Table 37. Finance providers

Finance provider type	Examples
Banks	Equity, Stanbic
Private impact investment funds	Balloon Ventures, Neycha
Microfinance institutions	Juhudi Kilimo, Rafiki Microfinance
Membership-based organizations – cooperatives	SACCOs – e.g. Mwalimu National SACCO Credit unions – e.g. K-Unity
Financial catalysts	Aceli, ABI Trust
Development FIs	African Development Bank, African Finance Corporation
Internal value chain financing	Private agricultural companies
Crowdfunding	ICCO Cooperation
Challenge funds	AgriFI
Government enterprise funds	County government youth enterprise development funds

5.3.2 Characteristics of finance organizations

The finance organizations that are looked at differ in terms of their size, coverage, and the products and services that they provide. From a basic analysis, it is possible to consider which might be more relevant to AEEs.

Commercial banks

There are 41 commercial banks in Kenya,[88] and the value of the financing they provide may be as high as $23.7 bn.[89] This makes banks the largest source of financing available in Kenya. The largest banks in Kenya are KCB and Equity, with KSh 1.55 tn and 1.44 tn respectively, in assets[90] – or $9.5 bn and $8.8 bn, respectively, at current exchange rates. These sums dwarf the sums available from other types of finance providers. Most banks provide a full range of financial products, with basic loans starting at around $500 and extending to well beyond the missing middle range. The sheer volume of finance available suggests that commercial banks represent a key opportunity for growth-oriented AEEs.

However, the figures in Table 36 illustrate the stark reality that, at the moment, despite having all of these funds available, banks struggle to invest significantly in agricultural SMEs. Equity Bank is illustrative of this – it invests less than 5 per cent of its funds into the agricultural sector.[91] Therefore, realizing the potential that banks provide will require efforts to successfully address the underlying cause of this situation – a significant challenge, given the largely unsuccessful effort of solving this over the past 20 years.

Membership-based organizations

Membership-based organizations, including Savings and Credit Cooperative Societies (SACCOs) and credit unions, have over 6 million members in Kenya. SACCOs had an asset base of KSh 890 bn or $5.48 bn in 2022.[92] The principal service of these types of organizations is providing credit for their members, usually very

88 This data is according to PWC: https://www.pwc.com/ke/en.html.
89 Figures from Statistica, but the source is not verified; see Statista, *Net value of loans and advances in the banking sector in Kenya from 2010 to 2022*, https://www.statista.com/statistics/1231622/net-value-of-loans-and-advances-in-the-banking-sector-in-kenya/#:~:text=The%20net%20value%20of%20loans,billion%20U.S.%20dollars%2C%20in%202022 (last accessed 24 January 2024).
90 Data reported in People Daily (2023) *KCB overtakes equity as Kenya's largest bank*, 15 March.
91 Details can be found in Equity Bank Kenya's annual financial reports.
92 SASRA, SACCO (2022) *Supervision annual report*, https://www.sasra.go.ke/download/sacco-supervision-annual-report-2022/.

small amounts. If a surplus remains after this has been accomplished, it is invested into other, usually low-risk, investment vehicles. Some organizations are long established. For instance, K-Unity, a credit union, has been running for 49 years and has an asset base of KSh 6 bn, about $40 m. K-Unity offers a range of financial products, ranging from farmer loans for inputs and working capital of up to $300,000 (the upper end of the 'missing middle'), although deals of this size are limited.[93]

Microfinance Institutions (MFIs)

There are 54 MFIs in Kenya, although this includes 'wholesale MFIs', which finance customer-facing MFIs and other organizations.[94] As an indicator of the value of the sector, according to a report from 2022, the MFI sector had total assets of KSh 250 bn or $1.5 bn.[95] To give an indication of how MFI assets are used, according to the Association of MFIs in Kenya, at the end of 2021, the MFI sector had approximately $124 m of outstanding loans. Agriculture represented a relatively small proportion of this, at about $7.5 m.[96] It is possible that some agricultural enterprises fell into the category of 'business loans', which represented $62 m of the figure. However, during the same period, loans to limited companies were the least common loan, representing only 0.02 per cent of the total number. The majority of loans were to groups and individuals.

Juhudi Kilimo is an example of a large microfinance institution that focuses almost exclusively on the agricultural sector. Most of its clients are individual farmers, as with most rural MFIs, and average loan sizes are very small (approximately $300). However, they can also provide business loans to a small number of clients of up to $32,000, the lower part of the AEE financing gap identified.[97]

The potential of growth-oriented AEE funding from MFIs seems limited. Most of the available funding is going to other investment groups. A limited amount of funding may be available from some MFIs, such as Juhudi Kilimo, but the scale is limited, and it will only be suitable for microenterprises, small SMEs, or startups. Other analysis illustrates this same conclusion.[98]

Impact investment funds

The impact investment sector in East Africa is expanding and, although smaller than the size of the commercial banking sector, is significant. Data available combines private impact investment funds with DFI impact investment funds. For instance, as an illustration, between 2005 and 2015, $4.2 bn was deployed from both sources[99] across the region. Up-to-date figures are not available, but the figures for East Africa have been increasing.

Kenya has and remains a focus for impact investing to the extent that concern is often expressed that it is diverting resources and attention from other countries. It is served by at least 95 impact investors with over 100 specific funding mechanisms.[100] Energy and financial services are the sectors that attract the most investment. There are also a number of funds specifically targeting sustainable agriculture (see below), but agriculture in general remains a relatively small part of the overall portfolio.

In order to support the coordination and growth of the sector, the National Advisory Board for Impact Investing, made up of investors, government, and civil society, has recently been established, through a combination of effort from the Global Steering Group for Impact Investing and the United Nations Sustainable Development Goals (SDG) Partnership.

Recent trends are very relevant for AEEs. Prior to 2008, the focus of most investment was on startups and early-stage businesses, requiring finance in the $20,000–$1,000,000 range. Since 2008, ticket size has been increasing (including for businesses over $3 m), and average ticket size is now $140,000.[101] Mapping by TIFS[102] shows that, of 23 funds, only seven can deal with ticket sizes of under $100,000, and these are generally the smaller funds (Neycha Fund, SHONA Capital, Sabi Fund, OVO Acceleration Fund, Balloon Ventures).

The size of the financial package offered is not the only criteria that will determine suitability for AEEs. Table 38 indicates the focus of and the services provided by impact funds that can deal with ticket sizes of less than $100,000.

93 Interview with Jospeh Ndiritu, Business Development and Marketing Manager, K-Unity, November 2023.
94 Association of MFIs in Kenya (2021) *Sector report*.
95 Augusto Research (2022) *2022 Kenya microfinance industry report,* https://www.agustoresearch.com/report/2022-kenya-microfinance-industry-report/.
96 ibid.
97 Interview with Bernard Kivava, CEO, Juhudi Kilimo, November 2023.
98 Dalberg (2018) *The economics of Agri lending to SMEs*, December (report). https://smallfoundation.ie/wp-content/uploads/2022/06/the_economics_of_agri_sme_lending_in_east_africa_summary_report.pdf (last accessed 30.11.2024)
99 Aceli Africa (2020) *Bridging the financing gap*.
100 GSG, intellecap (2019) *Kenya impact investment landscape*, May.
101 ibid.
102 TIFS (2023) *Food systems investing in East Africa. The role of funds in financing food systems transformations*, July, TIFS.

Table 38. Impact funds that support businesses with less than $100,000 finance

Fund	Focus	Type of finance	Technical Assistance provision	Kenya	Uganda
Balloon Ventures	Small business – sector agnostic	Debt only	Yes	Yes	Yes
Jenga Capital	Sustainable agriculture	Debt only initially	No	No	Yes
Kenya Climate Ventures	Climate-resilient agriculture	Debt and equity	Yes	Yes	No
OVO	Entrepreneurship, sector agnostic	Debt only	Yes	Yes	Yes
Segal Family Foundation	Social enterprises	Debt, grants	Yes	Yes	Yes
SHONA	Agriculture AND other sectors	Debt	Yes	No	Yes
Neycha	Exclusive AEE focus	Debt	Yes	Yes	Yes

An analysis of these funds reveals that some have little focus on agriculture (e.g. Balloon Ventures). This is noteworthy because agriculture is likely to yield lower returns and more risk than other sectors. Unless there is a specific focus on agriculture, it is likely that other sectors will dominate. Many that do have a focus on agriculture focus on high-value exports, where risk is perceived to be lower.

Of those that do focus on agriculture, Neycha[103] is the only fund that explicitly targets AEEs. The others identify sustainable or resilient agriculture as a theme, but none mention organic agriculture, agroecology, or AEEs in their materials. These phrases are also absent from the portfolio of the enterprises supported. AEEs would clearly be attractive to these funds – and some of the AEEs featured in the market systems analysis feature in fund portfolios– but enterprises that do not meet AEE criteria would also be supported and would be competing with AEEs for investment.

This is reinforced by the finding that funds did not score highly for input reduction and that improving environmental performance is the priority area for impact improvement in the TIFS review.

Aceli environment and climate criteria

- Soil health and holistic land management
- Biodiversity, agroforestry, and afforestation
- Circularity, addressing pollution and waste, and reuse of resources
- Use of renewable energy

Financial catalysts

Aceli and ABI Trust in Uganda are examples of financial catalysts. They do not provide financing themselves, but work with FIs to help them develop attitudes, behaviours, and models that lead to more financing going to SMEs, especially in agriculture. They also use this experience to try to shift national finance policy.

In Kenya, Aceli partners with five commercial banks[104] and five active impact investment funds.[105] Most of its funding goes to the commercial banks because of its larger overall lending portfolio. Many of the impact investment funds it works with focus on high-value export products, which have less risk attached.

Banks do seem interested in this sort of support. The best performing banks that Aceli works with issue 8–10 new loans to agricultural SMEs a month under the programme (no comparison with non-supported banks is currently available). The fact that major mainstream banks such as Equity, KCB, and Stanbic are now joining the programme indicates the level of interest.

The average size of loans supported through partnership with Aceli is $104,000, although loans of up to $1.75 m can be covered. This puts Aceli-supported banks slightly under the average of the impact investment funds (average $140,000) but still above the funding requirement of the majority of AEEs.

Aceli products have different layers of incentive. There is a standard incentive to invest in small agricultural SMEs and a higher level of incentive for loans to businesses that meet environment and climate criteria (see box) similar to AEE criteria.

Anecdotal evidence is that banks are starting to shift behaviour, for instance by trying to better understand agricultural value chains. However, very few FIs have been able to apply the environment and climate criteria, largely as a result of the lenders themselves struggling to understand how to apply the criteria. As an example, there have been examples where banks have dismissed organic fertilizer and pesticide companies as offering potential to help meet environment criteria, viewing them as conventional input companies.

103 https://neycha.shona.co/
104 Family Bank, Cooperative Bank, Sidian Bank, Credit Bank, and I&M Bank are already partners. Equity, KCB, and Stanbic are currently being onboarded.
105 Personal communication, Aceli Kenya rep. The names of the impact investment funds are not recorded.

5.4 Constraints and systemic issues

Constraints are immediate factors that limit AEEs' access to finance; these are driven by deeper systemic issues that may be addressed through market-based solutions and interventions to institutionalise these. The first two constraints in Table 39 capture a range of issues and reflect most of the challenges being identified.

The fact that FIs make no distinctions between businesses on grounds of environmental sustainability or social concerns warrants further explanation. All the FIs consulted had no awareness of current market trends with organic agriculture and its growth potential. Equally, none of them understood what agroecology or AEEs were and they do not regard typical AEE characteristics as factors that improve the financeability of an enterprise, which is consistent with the limited interest shown in organic and sustainable agriculture. All this is not surprising when there is a lack of interest in agriculture itself and resonates with Aceli's experience: 'Lenders do not understand agriculture or sustainability. Add the climate and environment angle and it makes it even harder'.[106]

Table 39. Key constraints to AEE access to finance and their underlying causes

Constraint	Systemic issue
Lack of investment-ready AEEs	Lack of capacity within small enterprises, especially in terms of financial planning and management and business development.
	Compounded by lack of quality local BDS providers.
All FIs less inclined to invest in agriculture than other sectors	Perception of high levels of risk in agricultural sector and low levels of profitability. This is seen in the high risk rating given by the Kenyan Central Bank to agricultural investments – requiring banks to have a higher value kept in reserves to cover losses. Therefore, investing in agriculture reduces the amount of lending banks can make.[107]
	It is also influenced by the fact that returns from agricultural SMEs in the region are 4–5% lower than other sectors.[108] There is evidence that lending to SMEs, especially in the $25,000–$500,000 range, is not profitable for conventional FIs.[109]
	Some of the factors underpinning these issues are constraints that hold back business growth, such as a lack of energy, infrastructure, cheap imports, and the vagaries of seasonal rain-fed agriculture.
FIs do little to understand environmental issues as they relate to investment opportunities	FIs do not have the interest or capacity to carry out environmental assessments of businesses. This is a constraint that affects uptake of the Aceli environmental criteria, for instance
	FIs have no market intelligence on the potential of organic agriculture or the long-term implications of unsustainable agriculture.
Financial products are often unsuitable for agricultural SMEs	Many FIs display a lack of flexibility, with a one-size-fits-all mentality that does not fit in with the vagaries of the agricultural sector. For instance, requirements or collateral and payment schedules that do not take into account agricultural seasons.
	Impact investment funds often apply excessive due diligence, especially when core staff are based outside of Kenya, with little understanding of the context

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106 Personal communication, interview with Sharon Mosin-Urner, Aceli, Kenya, November 2023.
107 ibid.
108 ibid.
109 Aceli Africa (2020) *Bridging the financing gap*.

5.5 Opportunities and systemic issues


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The market system opportunities listed in Table 40 are entry points that provide a potential means to bring about change. They may or may not address the specific constraints identified.

Table 40. Market system opportunities in the financial sector

Opportunities	Details
Role of catalysts such as Aceli	Aceli presents an opportunity to shift behaviour of banks and impact investors and influence the policy landscape.
Increase in blended finance	The increased recognition of the role of blended finance (usually a combination of debt, grants, and business support) from donors and investors could present positive opportunities for AEEs that need more flexible arrangements like this – if it can reach small enough ticket sizes.
Kenya Impact Investment Advisory Board	The newly formed National Impact Investment Advisory Board presents an opportunity for advocacy relating to impact investment and AEEs.
Government interest in organic and agroecological production	A national agroecology strategy is in development. Murang'a County has led the way in adopting a county agroecology policy. These developments present opportunities to improve the enabling environment for financial investments into AEEs.
Expansion of PGSs	Capacity to support the expansion of PGSs is growing. PGSs could provide a means to reduce the transaction costs for banks of conducting environmental assessments, making it easier for them to access, for instance, Aceli funding that supports engagement with AEEs.

5.6 Market-based solutions and facilitation activities


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To solve systemic issues in the long term, solutions need to be delivered by market actors. Table 41 suggests some market-based solutions and facilitation activities to enable them.

Table 41. Systemic issues, market-based solutions and facilitation activities in the financial services support sector for AEEs

Systemic issue	Market-based solution	Facilitation activity
Lack of capacity within small enterprises, especially in terms of financial planning and management and business development	Delivery of BDS services to AEEs	Direct delivery of BDS services Strengthening of local BDS providers
Perceived high risks from agricultural investments	Kenya Bankers Association adopts lower risk rating	Advocacy to Kenya Bankers Association, in collaboration with Aceli
	Improvements in market opportunities and business performance of AEEs, improving profitability of agricultural SMEs	Market systems development activities (covered in Section 3)
	Impact investment funds improve their understanding of the agricultural sector and the risks	Production of an investment profile, tailored to funds, outlining the opportunity, risks, and scale possible from the AEE sector
		Support to networking between funds and other stakeholders with an understanding of agricultural risks and how to reduce them – insurance companies, donors, research bodies, etc.

Lack of market intelligence on AEEs and organic agriculture	FIs regularly capture data on the development of the organic agriculture sector, AEE potential, etc.	Initial subsidized collection and promotion of relevant market intelligence with FIs
	FIs have committed capacity and interest in role of more sustainable agriculture	Support to specific FIs to develop systems for ongoing market intelligence
		Sensitisation/development of 'champions' within FIs
FIs do not have the interest or capacity to carry out environmental assessments of businesses		Work with Aceli to strengthen capacity of partner banks
	Impact investment funds have in place systems to track and improve outcomes relating to input reduction and pollution	Support impact investment funds to develop systems and tools to better understand and track input reduction and pollution
Lack of flexibility with most financial products, not suited to agriculture	FIs develop more tailor-made financial products	Collaboration with Aceli-supported banks to test new types of products for AEEs
Excessive due diligence from impact investment funds	Context-based due diligence from impact investment funds and a reduction in the perceived levels of risk (see facilitation activities above)	Support impact investment funds, based outside of Kenya, to get better access to local contextual information, including by connecting them to stakeholders within Kenya

5.7 Summary AEEs and access to finance

AEEs in Kenya range from small, locally embedded enterprises and producer groups to growth-oriented enterprises with the potential to scale and play a catalytic role in market development. Their financing needs and likely sources of finance differ accordingly. The analysis shows that the main finance constraint facing agroecological enterprises (AEEs) in Kenya is not simply a lack of capital, but a weak fit between the characteristics of AEEs and the financial products and risk models that currently dominate the sector. Conventional financial institutions hold the largest potential capital base, but remain cautious about agricultural SMEs because of perceived risk, seasonality, informality, and limited investment readiness. Organisations such as SACCOs and MFIs may offer more flexible arrangements for agricultural enterprises than conventional banks, but their smaller ticket sizes limit their relevance for AEEs seeking to scale. At the same time, the pipeline of AEEs able to absorb external finance remains narrow, reflecting weak access to business development support and limited capacity to meet investor and lender requirements. The findings also indicate that finance cannot be treated in isolation: the viability of AEEs depends closely on the market opportunities available to them, meaning that weak market functioning reduces the effectiveness of financial support. Impact investors may be able to support a limited number of catalytic AEEs, but their role is unlikely to substitute for broader improvements in the financing environment. The broader implications of these findings, and the related recommendations, are synthesised in Section 6.

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Section 6

Conclusions and Recommendations

6.1 General Conclusions

Taken together, the findings of this analysis indicate that the principal challenge is not the absence of interest in agroecological food, but the limited ability of current market systems to organise, support, and scale agroecological production and enterprise activity. The analysis also shows that finance constraints for AEEs are not simply a matter of limited capital, but of weak alignment between enterprise realities, available financial products, and the market conditions needed to support viable investment. The strongest short-term opportunities appear to lie in fresh produce markets, especially where mass-market channels can be supplied more reliably and where market structures support credible differentiation without relying exclusively on high consumer premiums. At the same time, the analysis shows that a stronger agroecological enterprise sector cannot be built simply by supporting individual enterprises in isolation.

The broader implication for systemic change is that the development of a stronger agroecological enterprise sector in Kenya depends on coordinated progress across multiple parts of the market system. This includes producer organisation, market access, aggregation, embedded technical support, input service delivery, and access to suitable finance, supported by more enabling public policy and market institutions. In practical terms, systemic change requires improving the business and coordination functions that connect producers, service providers, and markets, so that agroecological production becomes commercially more viable and agroecological enterprises can emerge, scale, and sustain their role within the wider food system.

This also points to an important sequencing issue. **The evidence suggests that supporting agroecological enterprises alone is insufficient if the surrounding market functions remain weak. The relationship between agroecological enterprises and agroecological primary production is mutually dependent**: enterprises need sufficient supply, coordination, and market access to grow, while producers require enterprises, services, and market structures that make agroecological production commercially more viable. The strategic implication is therefore to combine enterprise support with interventions that strengthen coordination, reduce transaction costs, improve service delivery, and make agroecological food more reliably available in the markets where consumers purchase it.

The report identified a relatively limited number of agroecological enterprises, which is largely attributable to the conservative definition applied in the analysis. By strictly applying agroecological principles, the assessment excluded a number of enterprises that already engage with environmental and social practices or demonstrate the ambition and potential to transition towards agroecological models. However, Biovision's ongoing work in this field has generated important insights. In particular, it has become evident that many agroecological enterprises operate along a transition pathway rather than fully meeting all criteria at a given point in time. Recognising this, Biovision has developed an updated definition of agroecological enterprises, which is included in this revised version of the report. This revised definition aims to better capture the dynamic and evolving nature of such enterprises and will inform future analyses, allowing for a more nuanced understanding of their potential and role within agroecological market systems.

6.2 Recommendations

The recommendations are structured around five key stakeholder groups that play distinct but complementary roles in shaping the development of agroecological market systems. These groups were selected based on their influence over critical functions within the system, including enterprise development, policy and regulatory frameworks, access to finance, implementation support, and knowledge generation. Agroecological enterprises themselves are central to driving innovation and market uptake, while governments and regulators create the enabling environment in which they operate. Financiers determine the availability and suitability of capital, development partners support implementation and coordination, and research and knowledge institutions contribute to evidence generation and learning. Organising the recommendations along these lines allows for targeted and actionable guidance that reflects the specific roles, incentives, and capacities of each group, while also highlighting the need for coordinated action across the system.

Agroecological enterprises and similar types of enterprises

For AEEs, the report highlights that demand exists but is not the primary constraint—rather, weak market systems, limited aggregation, and inconsistent supply are the binding constraints. AEEs should therefore prioritize strengthening their role as market coordinators, not just producers or service providers.

Agroecological enterprises, producer groups, cooperatives, and similar types of enterprises should therefore prioritise business models that strengthen aggregation, embedded farmer training, and last-mile input delivery. In the mango sector, enterprises should test coordination models between producers, buyers, and service providers to improve quality control, supply reliability, and access to services. In the tomato sector, enterprises and producer groups should first strengthen producer organisation, supply consistency, and reliable local market channels before moving into more advanced downstream functions.

Producer groups should work with KOAN, Slow Food Kenya, BVAT, and other relevant service providers to strengthen PGS-based collective marketing and access to differentiated outlets. More growth-oriented enterprises should be supported through incubator and business-development platforms that strengthen governance, business planning, and investment readiness. Input enterprises, especially in fertiliser and pesticide markets, should test distribution models that combine commercial incentives with farmer-facing support, including local agents, bundling, demonstration-based demand creation, and partnerships with PGS-linked markets.

Governments, policy makers and regulators

The report shows that the current policy environment still favours input-intensive agriculture, while agroecology remains fragmented and under-supported. The Ministry of Agriculture and Livestock Development, county governments, and regulatory bodies including KENAS, KEBS, KEPHIS, and PCPB should prioritise the enabling conditions required for agroecological market development, rather than isolated support measures. At national level, priority actions include implementation of the National Agroecology Strategy for Food System Transformation 2024–2033, stronger coordination between national and county levels, and reforms that improve the business environment for organic and bio-based agricultural inputs. Governments should support agroecological or PGS-linked market outlets, farmer-group development, consumer awareness, and extension staff capacity to support agroecological production and PGS-linked marketing. Makueni provides an important county-level entry point because its agroecology policy process has advanced substantially, while Kirinyaga remains important for linking agroecological production to practical market-outlet development and extension support. Regulators should also streamline processes affecting the registration, standards, and market access of organic and bio-based inputs. The recommendation that KENAS should formally recognise PGS, and that KOAN should be recognised as a body coordinating PGS development, should be retained as an important policy ask.

Financiers (donors, investors and lenders)

The report clearly highlights a structural mismatch between AEEs and existing financial products: AEEs are often too small, too risky, or not investment-ready for conventional finance. **Financiers should therefore develop tailored financial instruments** that reflect the realities of agroecological enterprises, including seasonality, smaller ticket sizes, and higher perceived risks. This may include blended finance, revenue-based financing, and products linked to value chains (e.g. contract farming or off-take agreements). Financiers should further distinguish between donor-funded technical assistance and investment-readiness support. The first is needed to strengthen internal business capabilities, management systems, market development, and input-distribution capacity in agroecological enterprises and producer organisations. The second is needed to prepare enterprises for engagement with lenders and investors, including stronger financial planning, documentation, governance, and articulation of viable growth pathways. In parallel, financiers should invest in pipeline development, working with incubators, accelerators and business development service providers to improve the investment readiness of AEEs. **Commercial banks, MFIs, SACCOs, impact investors, and other agri-SME lenders should work with financial catalysts such as Aceli Africa to test more suitable products for smaller agroecological enterprises**, especially where de-risking mechanisms, origination incentives, or first-loss structures are available. Donors and investors should also support pilots that link finance with market-building functions, including PGS-linked market expansion, cluster models, and last-mile distribution systems for fertiliser and pesticide markets.

Development partners (national and international)

Development partners and civil society organisations play a critical facilitation role in addressing systemic constraints identified in the report, particularly in coordination, capacity building, and advocacy. **They should move from parallel projects toward coordinated support** for the weakest market functions identified across the report and related policy material: producer organisation, aggregation, PGS development, local market outlets, input-service delivery, enterprise capability, and policy alignment. Organisations already active in these areas — including Practical Action, Biovision Foundation, KOAN, BVAT, Slow Food Kenya,CIAT / Alliance of Bioversity, and others in the wider agroecology ecosystem — should use joint learning and collaboration to test and scale agroecological market clusters, PGS expansion, embedded training models, and last-mile input-distribution systems. Development partners should support sector-wide coordination, evidence

generation, policy reform, and catalytic finance. The ISFAA Private Sector, Markets and Consumers Thematic Working Group (PSMC TWG) could identify and pursue advocacy issues arising from this report that align with its mandate on agroecological enterprises and market development. This could include working with its member KOAN and with relevant partners such as Slow Food Kenya, BVAT, and PELUM as advised in the "Agroecology in Mass Markets" policy brief (see [A] 2.5 Summary consumer demand) to support sustained advocacy on PGS recognition, including recognition of KOAN by KENAS as a body coordinating PGS development. Partners already working on coordination and finance alignment at larger scale, including the Regenerative & Agroecological Food Systems Transitions (RAFT), may help connect agroecology policy momentum to catalytic investment opportunities. Relevant financing connectors and ecosystem actors that support climate- and nature-positive agri-SMEs and green enterprise development may be worth exploring to enhance enterprise development and access to suitable finance.

Research and knowledge institutions

The report identifies significant knowledge gaps, particularly around agroecological production systems, input use, and business models. Research institutions **should therefore prioritize applied, systems-oriented research** that links production, markets, and enterprise development. Research is needed on the economics of agroecological production; business models for aggregation, PGS-linked market access, input distribution, and embedded services; the effectiveness and economics of organic fertilisers and pesticides; and the design of financial products suited to smaller AEEs. Relevant international and national research institutions should ensure that findings are translated into forms usable by government, enterprises, development partners, and service providers. Particular attention should be given to PGS in larger urban and more complex market systems, and to the validation, commercialisation, and distribution of organic and bio-based inputs. In addition, research should support the development and validation of organic inputs, including their efficacy, cost-effectiveness, and appropriate use, addressing current low adoption and knowledge gaps. Finally, improving data on market demand, volumes, and value chains will help reduce uncertainty and support better decision-making across stakeholders.

Overall, across all target groups, the central recommendation is to shift from fragmented, actor-specific interventions toward coordinated market systems approaches that simultaneously address production, aggregation, market access, inputs, finance, and policy.

Annexes

Annex 1: Selection of priority value chains and products

Process for value chain and product selection

To identify value chains and products to prioritize for this analysis, a selection process identified those with the highest potential for AEE development. The following criteria were used to inform prioritization.

Table A1. Value chain selection criteria

Criteria	Rationale
Domestic demand	Products with high demand (or potential demand) provide opportunities for AEE growth
AEE potential	Value chains with potential for local processing and value addition present more AEE opportunities and increase value to local communities
Nutrition	Improving nutrition is a key value add by agroecology and presents advocacy opportunities
Advocacy potential	Some value chains and products will generate more interest from donors, investors, and policymakers than others
Youth/gender	Value chains and products that are of potential value to young people and women

These criteria were used across a three-step process, as described below.

Table A2. Value chain selection process

Type of assessment	Aggregate market demand assessment	AEE mapping
Rationale	National demand trends can help identify value chains with most potential	Presence of large numbers of existing AEEs indicates greater potential
Method	Review of secondary, predominantly national data related to organic production and consumption	Conducted by Ichuli as part of the SHONA programme. Phone interviews with businesses identified as AEEs by stakeholders
Results	Identified priorities as vegetables and fruits	Clusters of AEEs in horticulture and export crops identified

↓

Type of assessment	Product review
Rationale	For detailed market systems and consumer research analysis, specific products need to be identified
Method	Review of vegetable and fruit sectors using secondary data
Results	Priority products identified as: mangoes – raw and dried; tomatoes – raw and paste.

Results – selected products

The national demand assessment indicated that using organic produce as a proxy demand was greatest for vegetables and fruits. This was mirrored in the AEE mapping data. The fruit and vegetable subsectors analysed in the final product review, and the results, are laid out below.

Table A3. Product-scoring matrix

Product	Domestic demand	AEE potential	Advocacy potential	Nutrition	Youth/gender
Avocado	4	3	5	5	3
Banana	5	2	2	5	3
Mango	4	4	3	3	4
African leafy vegetables	5	2	4	5	4
Tomato	5	5	5	4	4
Onion	4	1	1	3	2
Chilli	3	5	3	3	4

The rationale for the final product selection was as follows.

Tomatoes and tomato puree

Domestic demand for tomatoes is high and will only rise. Studies show that agroecological production of tomatoes provides farmers with a viable opportunity in Kenya. It has a higher return on investment than conventional farming due to higher yields and growing domestic and export demand. There are significant opportunities for AEEs in tomato value addition/processing AEEs due to the increasing demand in Kenya for processed tomato products such as tomato sauce. There is also a reasonable amount of data that can assist market systems analyses.

Since tomatoes require careful management to avoid pests and diseases, the availability of effective inputs such as organic pesticide will be a critical issue picked up in the market systems analysis. Data suggests that horticulture in general provides women with a range of lucrative opportunities, although this is not unique to the tomato value chain.

Although there are no organizations targeting the tomato value chain, there is a huge amount of donor and international interest in horticulture in Kenya. It is seen as a value chain that should be prioritized for growth, both for exports and for increasing domestic and regional demand. There is some attention from organizations such as the FAO on organic production. This interest in horticulture provides significant advocacy potential, meaning platforms for influencing are available and decision makers are already looking for evidence to inform development.

Conclusion: this value chain could provide an interesting case study for AEE-focused market analysis, which may provide data relevant across the horticulture sector, especially for other crops that have a limited shelf life, and which require pest/disease management. The case for inclusion is reinforced by the fact that it is a sector that will remain of interest to national and international stakeholders for years to come.

Mango and dried mango

Mango receives a lot of attention because of the high demand, both domestically and for export. There are increasing opportunities for AEEs that can process organic or agroecologically produced mangoes to juice, jam, pulp, or dried products. Mangoes are suitable for agroecology, and over 10 years ago, USAID identified the increased uptake of agroecological practice as a necessary ingredient to improve productivity and sustainability in the value chain.

Several international organizations are working on mango, including CIAT and TechnoServe. The CIAT programme, in collaboration with Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF), focuses on agroecologically produced mangoes. However, their analysis and interventions are focused on supporting agroecological production and on solving general problems affecting the entire mango value chain. There is no focus on AEEs.

The significance given to mango by both national and county governments suggests that there would be interest in data generated on the value chain. This, along with the potential to align with and collaborate with organizations such as CIAT, presents an advocacy opportunity. The fact that so much research has been done could be an advantage, making it easier to collect general data on the mango value chain and generic constraints and allowing us to focus more on issues affecting AEEs.

Conclusion: mango presents a solid rationale for inclusion from the perspective of AEE potential, consumer demand, and advocacy potential. The question remains of the potential to add value to existing work and whether it is too crowded value chain. As noted, this has some advantages, but it may also mean that it is harder to stand out amongst the crowd.

Annex 2: Kenya consultation list

Table A4. Kenya consultation list

Organization	Name
Sector-wide organizations	
IBMA	X X (male)
ISFAA	X X (female)
KOAN	X X (male)
KOAN	X X (male)
International organizations	
Aceli	X X (male)
Alliance Bioversity-CIAT	X X (male)
BVAT	X X (male)
Enviu	X X (male)
IDH	X X (male)
Netherlands Food Partnership	X X (female)
PELUM	X X (male)
Slow Food Kenya	John Kariuki
World Vegetable Center	X X (male)
Kenyan finance institutions	
Cooperative Bank Nairobi	X X (male, Credit Officer)
Equity Bank, Kirinyaga	X X (female, Food and Agriculture Relationship Officer)
Equity Bank Nairobi	X X (male, Partnerships Officer)
Equity Bank, Wote, Makueni	X X (male, Credit Manager)
Juhido Kulimo	X X (male, CEO)
K-Unity SACCO	X X (male, Business Development & Marketing Lead)
KCB, Nairobi	X X (male, Credit Officer)
Nacico Microfinance, Nairobi	X X (male) (Credit Officer)
Organic input producers	
ABI Organic Agriculture	X X
Andermatt K	X X (male)
Effective IPM Solutions	X X (female)
Juanco	X X (male)
Organic Fields	X X (female)
Safi Organics	X X (male)
Real IPM	X X (female)
Regen Organics/Senergy	X X (male)
Agro-dealers	
New Dawn Agrovets	X X (male)
Makueni Co. Fruit Processing Co-op – Agrovet	X X (female)
Producers	
Dorcas Women's Group	X X (female)
Kangai Ndamba Village farmers (FGD)	X X (female)
Killilio Horticulture Group	X X (male)
Kithiriti farmers fruits and vegetables group (Kirinyaga organic cooperative)	X X (male)
Muhuri Road Organic Farmers Group	X X (male)
Ruchu Organic Farm	X X (male)
Spoondrift Organic Farm	X X (male)

Organization	Name
Traders	
Tomato wholesale market, Kirinyaga	X X (male)
Steve Muthui – farmer and trader, Nakuru	X X (male)
Processors	
Azaavi Food	X X (female)
Burton and Bamber	X X (male)
Iviani Farm	X X (female)
Venjaro Enterprises	X X (female)
VERT Ltd	X X (female)
County governments	
Kirinyaga County	X X (male, Crops Officer)
Kirinyaga County	X X (male, Crops Officer)
Makueni County	X X (male, Mango BDS Service)

Annex 3: Detailed information on the main actors in the mango and tomato value chains

Table A5. Agricultural production AEEs in the mango value chain

Name	Kilima Horticulture Group	Lucas's Self-Help Group	Umoja ni Nguvu Self-Help Group	Fruit Processors
Product	Fresh mangoes (not organic)	Production (organic)	Conventional production of mangoes	Fresh mangoes
Supply	Small farmers	Small farmers	Small farmers	Small farmers from Makueni county
No. of farmers	65	25	30	3,600 active farmers (over 12,000 membership)
Contractual arrangements	Formal contract with the buyer (Marandu Exporters) No contract with the brokers	No contracts	No contracts	No contracts
Employees				8
Customers	90% through brokers and 10% to exporter (Marandu)	Predominantly local market to undifferentiated traders	Predominantly local market	Predominantly local market; specifically targets a fruit-processing factory
Quantities	9,600 MT	Average 30 MT per year	35–40 MT per season	450 MT per season
Finance				By members and support by the county government
Major constraints	Cost of inputs are very high Only 10% of produce has guaranteed market	High cost of inputs Lack of formal markets	Expensive inputs and access to competitive markets	Sufficient working capital to source from its members Access to competitive market for the seasonal crop

Table A6. Small-scale processors in the mango value chain

Name	Martha's Enterprises	Kilele Farms	Miti Food	Manjaro Ltd	Paka Ltd
Size	Small-scale	Small-scale	Medium-scale	Medium-scale	Large-scale
Product	Dried mango powder (organic)	Dried mango (not organic or agroecological)	Dried mango (organic or agroecological)	Dried mango	Dried mango and pulp (not organic or agroecological)
Supply	Predominantly small farmers in Makueni	15 casual staff in mango season	Predominantly small farmers from Makueni, Machakos, Kerugoya, Malindi, and Kisii counties	Predominantly small farmers from Makueni, Kitui, Machakos, Murang'a, Embu, Tana River, Kilifi, Kwale, and Mombasa	Predominantly small farmers from Makueni, Machakos, Embu, Meru, Tana River, and Kwale
No. of farmers	20	Predominantly small farmers from Makueni	Over 200	Over 500	Over 2,500
Contractual arrangements	No contracts	Sources from traders and individual farmers	Only 20 on contract	Formal contracts with farmers	Formal contracts with buyers, not with farmers
Employees	2 during the mango season	Informal, no contracts in place	5 permanent and 5 on a temporary basis	40	300 staff across the country

Name	Martha's Enterprises	Kilele Farms	Miti Food	Manjaro Ltd	Paka Ltd
Customers/growth	Predominantly local market Production volumes low	Predominantly export, but business owner believes higher margins available in local market but needs marketing investment	Predominantly local market	Predominantly local markets Keen to venture into regional markets, including Uganda, Tanzania, DRC Congo, and Rwanda	Customers include Coca Cola East Africa and Delmonte Kenya Puree is supplied as far as Zambia Dried mangoes are mostly sold in bulk to the UK, Germany, and Italy. Keen to expand in the same space, and explore different products to process during mango off-season
Quantities	300 kgs	35 MT between December and April are processed	1,200 MT dried mango, pineapples, and bananas per month	300 MT mangoes, bananas, and other fruits, and orange-fleshed sweet potatoes	Annual capacity is 2,500 MT of puree and 400 MT dried mango
Finance	No formal finance Equipment from local government project National Agricultural and Rural Inclusive Growth Project	The major investment has been the drying machine that was acquired at a cost of KSh 3 m Other investments such as operating cost have come from own funds	Funding from family members The packaging side of the business is outsourced, as the company seeks further funding to buy its own packaging machine	Development funding, e.g. the Foreign, Commonwealth & Development Office (FCDO), Micro Enterprise Support Programme Trust (MESPT)	Acquired €440,000 ($500,000) from the Grameen Credit Agricole Foundation in 2019 to expand its processing capacity
Major constraints	Finance to acquire affordable equipment Lengthy and costly process of certification by Kenya Bureau of Standards	Gross margin: 40% Annual gross profits of $50,000/year High collection costs (transport) Lack of cold storages High energy costs	High cost of packaging Access to affordable credit Market access to big outlets	Costs of sourcing from smallholder farmers Access to finance for investment	Logistic costs of sourcing fruit across the country Energy costs

Table A7. Tomato producer AEE from Kirinyaga and Kiambu Counties

Name	Simba farmers fruits and vegetables group (Members of Kirinyaga organic cooperative)	Chui Organic Farm (group of smallholder farmers)	
County	Kirinyaga	Kiambu	Kiambu
Product	Tomatoes and fresh vegetables (organic) Trained by KOAN but no PGS certification yet	A wide range of organic vegetables, including tomatoes Expired PGS certification from Encert	Tomatoes and fresh vegetables (organic) PGS certification by Encert Limited
Supply/source	Smallholder farmers, Kirinyaga County	Small farmers, Kiambu County	Smallholder farmers in Kiambu County
No. of farmers	25	15	15
Contractual arrangements	Informal	Informal	Informal

Name	Simba farmers fruits and vegetables group (Members of Kirinyaga organic cooperative)	Chui Organic Farm (group of smallholder farmers)	
Customers/growth	Local markets Keen to explore dedicated organic markets	Local markets Interest in dedicated organic markets	Local markets but interest in new dedicated organic markets
Profitability	17–33%	17–33%	17-33%
Major constraints	No premium prices for organic produce Difficult to get the raw materials for homemade pesticides	Market not consistent Expensive organic inputs	Lack of consistency of market, and no differentiation in the market in terms of pricing
Finance	Individual savings/loans Donor support	Individual savings/loans and donor support	Individual savings/loans Donor support

Table A8. Tomato aggregator AEE

Name	Wanjiku Muthiri (aggregator)
Product	Fresh cherry tomatoes and vegetables
Supply/source	Smallholder farmers in Nakuru County
No. of farmers	11
Contractual arrangements	Informal arrangements with farmers who are undergoing Kilimohai certification
Customers/growth	Local markets (Nairobi) Increasing sales in existing market
Profitability	31–54%
Finance	Savings Development of funding support

Table A9. Specialist tomato retailer AEE

Name	Peter's Health Food
Product	Fresh horticulture fruits and vegetable (including tomatoes) from numerous locations, including Kirinyaga
Supply	Predominantly small farmers
No. of farmers	Over 20 farmer groups
Contractual arrangements	Formal contracts with PGS-certified farmers
Customers	Local high-end market
Profitability	20–30%
Major constraints	Getting consistent supply across the seasons Limited access to finance: most support goes to production and not SMEs