



Sustainable Transition to Entrepreneurial Production
in Agriculture through Upgrading

Work Package 3

Participatory Strategy / Scenario Development and Implementation (NETFUND/ NARO)

Authors

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Task 3.3: Participatory development of alternative agricultural transformation pathways (WUR)

Participatory identification of agricultural transformation pathways
in Kitui county, Kenya

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Table of Contents

1. Introduction.....	3
1.1 The STEP-UP project	3
1.2 Workshop objectives	3
1.3 Methods used in the workshop.....	3
1.4 Workshop participants	4
2. Key results of the workshop	4
2.1 Participatory visioning	4
2.1.1 Visioning of a sustainable future for Kitui county.....	5
2.1.2 Visioning of sustainable farming systems in Kitui	8
2.1.3 Visioning of a sustainable mango value chain.....	8
2.2 Backcasting: moving backwards from the vision to the present.....	9
2.2.1 Identification of obstacles to reach the vision for a sustainable mango value chain.....	10
2.2.2 Identification of opportunities to overcome the obstacles	11
2.2.3 Potential interventions for STEP-UP.....	13
2.3 Potential effects of interventions on women, men and youth	14
2.4 Criteria and indicators to measure effects of interventions	16
3. Way forward and closing of the workshop	18
Annex 1: Participants' list	19
Annex 2: Long list of criteria and indicators	22



Participatory identification of agricultural transformation pathways in Kitui county, Kenya

STEP-UP Stakeholder workshop Kitui, 10-12th April 2019

1. Introduction

1.1 The STEP-UP project

Sustainable intensification of agriculture provides a potential pathway to meet the growing demands for food on a global level. However, in practice adoption of many promising SI solutions remains disappointing, amongst others due to poor linkages to input and output markets and high investment risks. In the STEP-UP project, we aim to implement and assess sustainable intensification (SI) and market linkage (ML) strategies to enable small farm enterprises (SFEs) to step up towards food and nutrition security, sustainable development and income generation. The project focuses on banana and mango food value chains in Uganda and Kenya. Kenya is one of the leading mango producers in East-Africa with current annual production of 600.000 – 800.000 tons. However, the bulk of the mangos, primarily of old fibrous cultivars, are wasted because of the lack of processing facilities, bad quality and poor infrastructure.

STEP-UP aims to identify and implement strategies to upgrade production, processing and marketing of mangoes. However, different stakeholders may have diverging views on the desired future. Participatory scenario development and impact assessment are therefore powerful tools to guide discussion and convergence of views on the necessary interventions enabling (agricultural) transformation pathways towards such a future. At the start of the STEP-UP project, a multi-stakeholder workshop is planned to establish a shared vision, to identify the steps needed to reach that vision, and to select relevant indicators that could measure the project's progress towards the vision. This workshop was held on 10-12 April 2019, at the KepCo mango processing facility in Kitui town.

1.2 Workshop objectives

The workshop had the following objectives:

1. Participatory visioning of a desired future for sustainable farming systems and the mango value chain in Kitui
2. Exploring obstacles and opportunities for reaching the vision
3. Identifying interventions for STEP-UP and other stakeholders that could lead to the vision
4. Participatory selection of relevant criteria and indicators that could track the progress towards the vision

1.3 Methods used in the workshop

Participatory visioning

- Timeframe: next 10-20 years
- Visioning:
 1. Kitui county in a sustainable future (including urban areas, services, infrastructure, etc.).
 2. Farming systems in Kitui in a sustainable future
 3. Mango value chain in Kitui in a sustainable future
- The aim is to identify elements of a sustainable future that all stakeholders can agree on; hence to develop one common vision.

Backcasting

- Identification of obstacles to reach sustainable mango value chain (within broader farming systems and Kitui county context)
- Identify opportunities to overcome the obstacles. Distinguish between internal (STEP-UP and stakeholders can influence) and external (no influence) opportunities
- Identify priorities and interventions for STEP-UP

Participatory selection of relevant criteria and indicators

- Revise preliminary list of criteria and indicators based on selected interventions and local relevance
- Use voting to identify the most meaningful criteria.
- Indicators are meant to describe current state, and monitor which way we are going. Are we moving towards success? Track potential negative effects.

1.4 Workshop participants

Stakeholders along the mango value chain: farmers, cooperative chairs, processors, transporters NGOs, mango agents, extension agents, researchers, county government. A full list of participants is given in Annex 1.



2. Key results of the workshop

2.1 Participatory visioning

Participants were introduced to the ideas of participatory visioning and backcasting (Fig. 1). The aim of the first day was to arrive at a common vision of a sustainable future for Kitui county, and farming systems and the mango value chain in Kitui county.



Fig. 1: Participatory visioning and backcasting as introduced to stakeholder in Kitui (Source: <https://www.naturalstep.ca/abcd>)

2.1.1 Visioning of a sustainable future for Kitui county.

The participants were randomly divided into four groups to discuss the question: “What will Kitui county look like in a sustainable future?” Participants wrote down the elements that they found important, and were encouraged to think of different aspects of sustainability: people, planet and profit. Examples of categories to consider for this vision were given beforehand: urban centres, agriculture, health, education, employment, infrastructure, nature and policies. The timeframe used for the visioning was the next 10 to 20 years.

In a plenary feedback session, all elements written down by the participants were classified into the different categories (Fig. 2, Table 1). Food security was added as a separate category. Each group gave a short explanation of their sustainable vision for Kitui county.

Apart from the categories ‘urban centres’ and ‘food security’, all groups thought of elements in every category. Stakeholders mostly agreed on the elements mentioned. The only notable controversy was the wish in one of the groups to construct more dams and boreholes. One of the participants argued that this would lead to potential problems with the depletion of groundwater resources. More faith was placed in the use of water harvesting techniques.



Fig. 2: Groups (different colours) identified elements of a sustainable future for Kitui county



Table 1: Elements of a sustainable future for Kitui county

Urban centres	Agriculture	Health	Education	Employment	Infrastructure	Nature	Policies	Food security
All roads tarred	Availability of markets for local products/ communication between farmers and markets	Easy access to good healthcare facilities (public hospitals as good as private)	Quality education system	Fair income/ better prices for farmers	Improved infrastructure for transport of (agricultural) goods	Conservation of natural resources	Subsidized farming inputs	Be a food secure county
Adequate housing facilities	New and innovative technologies in farming	Decrease of malnutrition rates (Kitui most malnourished county)	Capacity building of human resources	Be the leading exporter of mango/ mango products	More accessible rural/ feeder roads	30% forest cover	Proper implementation of agricultural projects	
Functional sewage system	Utilization of good agricultural practices	Good and comfortable delivery systems for pregnant women	Empower youth on business development opportunities	Have a processing plant for our products	Reliable transport system	10% cover of fruit forests	Proper supervision of county projects (e.g. in construction)	
Established centers of excellence	Subsidized farm inputs/ machinery		Practical education, not only theory	More youth in agriculture	Improved access to water for domestic use and irrigation	Greener environment	Offer financial support to small-scale farmers	
Adequate supply of clean water	Certified seeds, drought resistant seeds			Empower youth on entrepreneurial activities	Construction of dams and boreholes	Conservation of riverbanks and indigenous trees	Zero tolerance to corruption	



Urban centres	Agriculture	Health	Education	Employment	Infrastructure	Nature	Policies	Food security
Two level five hospitals	Provision of extension services			Sustainable incomes through fruit farming	Improved water harvesting facilities/ knowledge	Natural resource harvesting (sand dams, solar energy, bioenergy)	Proper management of public resource funds	
Modern market centers	Cold storage for fruits			Establishment of extraction industries (mining)	Established agro-processing plants			
	More greenhouses			Establishment of cottage industries	Export processing zone			

2.1.2 Visioning of sustainable farming systems in Kitui

Next, participants zoomed in on the 'agriculture' component of the vision, and dealt with the question: "What will farming systems in Kitui look like in a sustainable future?". Farming systems were considered from different sustainability principles (agreed upon during the STEP-UP kick-off workshop in December 2018): economic, environmental, food security and social. Participants were asked to form groups according to the principle that they wanted to discuss. This resulted in a division into three groups only; none of the participants joined the group for the social principle. The groups wrote down their ideas about a sustainable future for farming systems in Kitui, and presented their top-five ideas to the rest of the group (Table 2).



Table 2: (Top 5) elements of a sustainable future for farming systems in Kitui county

	Economic	Environment	Food security
1.	Mechanization	Conservation of catchment areas	Increase water harvesting facilities
2.	Increased farm sizes	More water harvesting techniques	Increase production of drought-resistant crops
3.	Value addition to farm produce + market linkages	Sustainable use of forest products (e.g. timber)	Build a food-market network
4.	Low input costs	Conservation of wildlife	Increase access to agricultural credit facilities
5.	Drought resistant crops & diversity	Controlled/ sustainable use of agro-chemicals and fertilizers	Capacity building on utilization of indigenous crops
Other ideas		Establish facilities for recycling, reduced water, soil and air pollution	Mechanization; reduce post-harvest losses; use of locally available materials to increase production; capacity building on value-addition; training on good agricultural practices; financial support for start-up businesses; construction of aggregation centers; everybody to participate in food production; all farmers to grow a variety of crops

2.1.3 Visioning of a sustainable mango value chain in Kitui

A final step in the participatory visioning was to focus on the mango value chain and discuss the question: "What will the mango value chain in Kitui look like in a sustainable future?". The same three



groups were formed along the economic, environmental and food security principles. This resulted again in a top-five of ideas about a sustainable future for the mango value chain in Kitui (Table 3).

Table 3: (Top 5) elements of a sustainable future for the mango value chain in Kitui county

	Economic	Environment	Food security
1.	Market & standards (certification for export market)	Increase the number of mango trees (for air purification)	Source of income: every farm 300 mango trees for income
2.	Waste management (use of mango peels as animal feed; use mango seeds as a source of oil & fuel)	30% forest/ tree cover	Value addition/ processing plants present
3.	Technology & awareness (adoption of value-addition technologies)	Pest and disease-free mangoes	Indigenous mangoes for local markets
4.	Branding (appropriate branding for improved marketing)	No soil erosion	Fast-maturing mango varieties
5.	Establish collection centers (more centers, well-structured)	No waste from mango production and processing (through recycling)	Intercropping of mango with food crops
Other ideas		Recycling of mango by-products, water; environmental-friendly inputs; reduced pollution; adoption of clean energy.	Increase in mango farming; source of food; source of livelihood; organic farming; reduce post-harvest losses; plant grafted mangoes: good return, easy to harvest; Apple most popular variety; aggregation points for selling mangoes

The environmental elements mentioned were not all related to the mango value chain directly (e.g. 30% forest cover and no soil erosion), and related more to agriculture or land management in general.

2.2 Backcasting: moving backwards from the vision to the present

As a final activity on the first day of the workshop, participants were introduced to backcasting: the identification of the steps needed to reach the established vision (Fig. 3). The backcasting exercise was done for the vision of the mango value chain only; as the focus of the STEP-UP project.

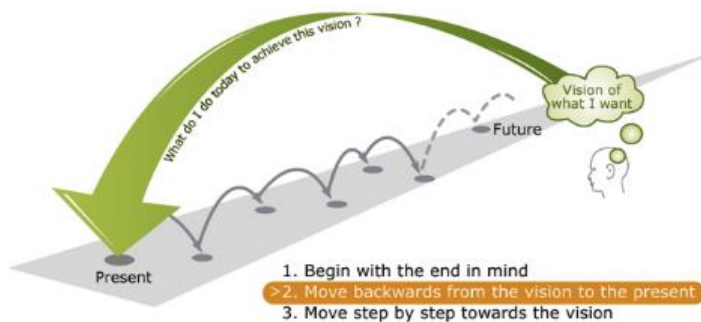


Fig. 3: Backcasting: which steps are needed to reach the vision?
 (Source: <https://www.naturalstep.ca/abcd>)

2.2.1 Identification of obstacles to reach the vision for a sustainable mango value chain

The backcasting started with the identification of obstacles that could arise when aiming to reach the vision. These obstacles were directly linked to the top-five goals contributing to the vision of the sustainable mango value chain for the three sustainability principles (Table 4).

Table 4: Goals and obstacles for reaching the vision of a sustainable mango value chain in Kitui for the economic, environmental and food security principle

Goals	Obstacles
Economic	
1. Market & standards (certification for export market)	<ul style="list-style-type: none"> Excessive use of agro-chemicals (pesticides) No established border standards for mango production
2. Waste management (use of mango peels as animal feed; use mango seeds as a source of oil & fuel)	<ul style="list-style-type: none"> Peeling is labour intensive Lack of skills to use mango for oil & fuel Seasonality, i.e. mangoes not available throughout the year – no constant supply
3. Technology & awareness (adoption of value-addition technologies)	<ul style="list-style-type: none"> Lack of capital Poor management skills Lack of technology
4. Branding (appropriate branding for improved marketing)	<ul style="list-style-type: none"> Lack of skills for branding (developing labels, what information is needed on them) Expensive packaging materials
5. Establish collection centers (more centers, well-structured)	<ul style="list-style-type: none"> Lack of capital Poor management skills
Environment	
1. Increase the number of mango trees (for air purification)	<ul style="list-style-type: none"> Inadequate market for mangoes (other crops fetch better prices) Individual priorities over community priorities Competing land use (small farm sizes)

	<ul style="list-style-type: none"> • Availability of and access to water (mangoes wither, people are reluctant to replace them)
2. 30% forest/ tree cover	<ul style="list-style-type: none"> • Individual priorities; competing land use
3. Pest and disease-free mangoes	<ul style="list-style-type: none"> • Lack of awareness of integrated farming systems • Lack of extension services • Lack of skills and knowledge
4. No soil erosion	<ul style="list-style-type: none"> • Individual priorities; competing land use
5. No waste (through recycling)	<ul style="list-style-type: none"> • No markets for by-products and inadequate technologies to make use of by-products • Lack of space for drying • No policies for waste-disposal management (e.g. to turn peels into compost) • Poor policy enforcement capacity • No designated waste-disposal areas (attitude needs to change)
Food security	
1. Source of income: every farm 300 mango trees for income	<ul style="list-style-type: none"> • Low yields • Perishability • Drought • Poor crop production skills • Inadequate mango trees (varieties)
2. Value addition/ processing plants present	<ul style="list-style-type: none"> • High capital requirement for installation • Lack of steady markets for the mango products • Low and highly seasonal production of mangoes • Bureaucracy • Political influence
3. Indigenous mangoes for local markets	<ul style="list-style-type: none"> • Longer maturity period • Low prices • Westernization (consumer preference for exotic mangoes)
4. Fast-maturing mango varieties	<ul style="list-style-type: none"> • Inadequate research • Poor funding of research
5. Intercropping of mango with food crops	<ul style="list-style-type: none"> • Pest and diseases? • Inadequate space

2.2.2 Identification of opportunities to overcome the obstacles

The second day of the workshop started with the identification of opportunities to overcome the obstacles in reaching the vision for the mango value chain in Kitui. As many of the groups had identified similar obstacles, the obstacles were regrouped into obstacles related to production, post-harvest handling, processing/ value addition and marketing (NB: these categories largely corresponded with the potential strategies identified for the mango value chain during the STEP-UP kick-off workshop in December). Groups were formed around these four categories, and each group picked out the two major obstacles in their view. The groups listed a number of opportunities that would help the overcome the obstacles (Table 5).

Table 5: Obstacles and opportunities to overcome obstacles in the mango value chain

Obstacle	Opportunities to overcome obstacle
Production	
Drought	<ul style="list-style-type: none"> • Construction of (sand) dams, boreholes • Provision of irrigation materials like pumps, drip irrigation • Water harvesting • Planting drought resistant varieties of mangoes • Practicing conservation agriculture (in other crops than mango)
Poor management skills	<ul style="list-style-type: none"> • More extension officers and more regular visits • Addition of more reliable means of transport • Improving means of communication (e.g. videos) • Regular training of farmers
Post-harvest handling	
Perishability	<ul style="list-style-type: none"> • Creation of more collection centres and storage facilities with cold rooms • Encouraging farmers to harvest mangoes when they are mature, not when they are ripe • Breeding varieties with longer shelf life and varieties that can fruit all year round • Proper harvesting techniques • High mechanization for processing • Good transport facilities (better lorries)
Processing/ value addition	
Lack of capital	<ul style="list-style-type: none"> • Formation of private public partnerships • Formation of savings and credit organisations (SACCOs), companies • Application for grants
Inadequate technologies	<ul style="list-style-type: none"> • Training on value addition • Adopting existing technologies • Benchmarking (visits to similar companies/ competitors) • Online research • Out-sourcing of expertise
Marketing	
Low prices	<ul style="list-style-type: none"> • Value addition • Introduction of storage facilities for pulp • Mango varieties that mature at different time of the year • Looking for new markets to reduce saturation • Innovation of new products (cocktails, flakes etc.)
Lack of skills	<ul style="list-style-type: none"> • Visiting exhibitions and international trade fairs • Training on marketing strategies
Lack of certification for export market	<ul style="list-style-type: none"> • Knowing the export market specifications • Knowing competitors (for benchmarking) • Formation of regional blocks • Free trade areas • Inter-governmental policies to control borders

Obstacle	Opportunities to overcome obstacle
Branding	<ul style="list-style-type: none"> Fewer, but busy processors Packaging in tetra-packs which seal better

Discussion after plenary presentation of opportunities

- *Drought/ water availability:* The production obstacle of 'drought' was very much related to the timing of the workshop. The region suffered from a delayed start of the rainy season, which made this topic very relevant at the moment, but not necessarily a general problem throughout the year (i.e. would the workshop have been held at the middle of the season, people may have picked pest and disease pressure). Also, drought would be more severely felt in other, annual crops (and therefore the construction of dams and boreholes, irrigation and water harvesting may also be more related to other crops than mango specifically). Mango was generally perceived to be able to withstand seasonal droughts. As measures to improve water availability for mangoes, the collection of surface water runoff and water ponds were suggested. With irrigation, mangoes could flower twice instead of once per year. One participant also mentioned the combined application of water and fertilizer to induce flowering, whereby the timing of water application was considered crucial. Not all farmers are aware of this practice or irrigate their mangoes. Information on the most appropriate water harvesting techniques for mango is currently lacking, e.g. troughs of basins, terracing?
- *Collection centres and cold facilities:* Cold facilities and storage should be available close to farms. Cooperatives could establish such facilities. But a pilot is required first. The establishment of collection centers was considered as an advantage by transporters too: they could send a lorry to pick up mangoes from one location instead of having to visit individual farms with their own pickers.
- *Better harvesting techniques:* Pruning makes harvesting easier. Grafted mangoes also cause less problems with harvesting. Indigenous mangoes are normally harvested by shaking branches, but this causes high losses. A stick was introduced by the FAO to pick mangoes from the branches.
- *Low prices:* caused by a peak in supply. This peak should be addressed. Mangoes start maturing in August in Zombe, then a bulk in December/ January, and the last ones in April/ May (e.g. variety Kent). Different varieties are required, but the maturity is also climate-related. Processors therefore have to cooperate and source varieties from different areas at different times.

2.2.3 Potential interventions for STEP-UP

The opportunities identified in the first round were still general, and not always within direct reach of the STEP-UP project. The participants were therefore asked to get back into the same groups, pick out the most relevant opportunities and translate these into concrete interventions that the STEP-UP project and related stakeholders could take within the next two to three years (Table 6).

Table 6: Interventions for STEP-UP and related stakeholders to improve production, post-harvest handling, processing/ value addition and marketing in the mango value chain

Obstacle	Interventions for STEP-UP and stakeholders
Production	
Poor management skills	<ul style="list-style-type: none"> • Lobbying at the government to improve extension services • Water harvesting techniques (training/knowledge and supporting access to capital) • Better information on pest and disease management (training) • Nutrient management (knowledge and capital)
Post-harvest handling	
Establishing collection centres	<ul style="list-style-type: none"> • Find areas with many mango trees and a high production • Identify the required number and concentration of collection centres • Finding strong farmer groups • Traditional (charcoal) or innovative cooling system • Better packaging and storage (also use indigenous knowledge to boost storage) • Set up a management structure
Processing/ value addition	
Lack of capital	<ul style="list-style-type: none"> • Public-private partnerships with financial institutions • Support on the formation of a business plan • Legal support to set up SACCOS • Provide linkages to grant opportunities and trainings on how to apply • Review of grant proposals
Inadequate technologies	<ul style="list-style-type: none"> • Training on product development for value addition • Develop standards and training for mango products • Adopting existing technologies – identify appropriate technologies, provide funding to adopt the technology and provide training and awareness • Benchmarking (facilitate field visits to similar companies/ competitors) • Online research – develop a knowledge portal • Out-sourcing of expertise – partnership with NARIG project (Kitui county government)
Marketing	
Improve marketing of mango products	<ul style="list-style-type: none"> • Training on marketing strategies/ market requirements: conduct a training needs assessment among farmers, processors and marketers; identify gaps • Develop a training plan for training of trainers, government and development partners • Conduct research on taste & preferences, branding. Relevant stakeholders: STEP-UP team, county government, processors and farmers • Organize exhibitions and international trade fairs: link with the Ministry of Trade and Industries • Value addition: brand development

2.3 Potential effects of interventions on women, men and youth

The second day ended with a session on the potential effects of selected interventions on women, men and youth. The same groups for production, processing, value addition and marketing discussed what effects they would expect on the different groups if the intervention was implemented, both in positive and negative sense (Table 7).

Table 7: Expected positive (+) and negative (-) effects of interventions in the mango value chain on women, men and youth

Intervention	+ / -	Women	Men	Youth
Production				
Collection centre	+	Cooperative/ farmer group membership required to receive payment; engage women in management; food security; reduced labour because of increased interest from men in mango cultivation; more time because transport is conducted by youth; collection centres serve as market place/ information exchange	Employment opportunities (e.g. management, guard); income through better prices; increased interest in mango farming;	Transport on motorcycles; reduction of crime
	-	Payment for transport; more focus on mango, neglect smaller food crops	Drunkenness after payment; idleness around collection centre	Leave school to earn fast money; on-farm theft (mango profitable); early marriages (money available)
Improved production skills	+	Food and nutrition security; better skills/ knowledge; income	Better skills/ knowledge; income; contract spraying services; hired labour for pruning	Better education through income for payment of school fees
	-	Payment for additional labour inputs because of larger investments in mango	Payment for additional labour inputs because of larger investments in mango	
Processing				
Training on product development	+	Quality products	Quality products; increased income	Increased income
	-	Breeding unhealthy competition; lifestyle diseases	Lifestyle diseases; arrogance	
Linkage to finance/ grants	+	Job creation; improved household food security; improved nutritional status	Wealth creation; well-being; feel secure	Better education; assurance of job opportunities;
	-	Domestic conflicts; infidelity	Infidelity; alcoholism	Misplaced priorities

Commented [DK1]: Why is this a benefit to women, if apparently increased income is only for men and youth?



Intervention	+ / -	Women	Men	Youth
Support for business plan development	+	Efficient business management	Efficient business management; increased access to funds	Successful entrepreneurs; increased access to funds
	-	Impulsive spending	Family negligence	Over-borrowing
Marketing				
Trade fairs	+	Income generation	Entertaining, networking	Adventure, learning
	-	Impulse buying	Drug abuse	Misconduct
Value addition and advertising	+	Creating awareness	Creating awareness	Job opportunities (youth will play a main role)
	-	Overworking (time and resources)		Exploitation
Training	+	Training of trainers; knowledge sharing; saving	Action; results	Technology; sports; quick results; employment
	-	Information overload	Resistance to change; self-centred	Demand payment; punctuality
Research to stakeholders	+	Knowledge transfer; informed decision-making	Innovative + creative; informed decision-making	Job opportunity; knowledge transfer
	-	Not critical	Slow to adopt	Impatient

General points raised on the effects of the interventions under marketing: the type of training is important to determine the potential effects. Conducting a training may also be expensive. For the research to stakeholders: farmer experiences should be taken into account in the research, and research is often time-demanding and results may not always be used.

NB: Some of the topics mentioned were actually constraints or pre-conditions for an intervention, rather than negative effects of it (e.g. resistance to change, being self-centred, slow to adopt, impatient; creating awareness).

2.4 Criteria and indicators to measure effects of interventions

On the last day of the workshop, participants were tasked to think about criteria and indicators that could be used to measure the potential effects of selected interventions. The criteria and indicators serve to describe the current situation (where are we now in terms of sustainability, what is the current diversity between farmers, other stakeholders and sub-counties, and to see what is possible in the current situation: what can 'outstanding' farmers achieve?), and to monitor change (are we moving in the right direction to reach our vision, are there any unintended or negative effects?).



The four principles (economic, food security, environmental and social) identified during the STEP-UP kick-off workshop were taken as a starting point to discuss topics/ things that we aim to achieve or avoid under that principle. These topics could be called 'criteria'. Next, we could identify indicators that serve to measure changes with respect to each of the criteria. Criteria and indicators have causal links, e.g. If with STEP-UP we...

- ... improve income from mango sales, people will spend more income on **nutritious food**
- ... give training on integrated pest management, farmers will reduce the **use of pesticides**
- ... give better information about fertilizers for mango, **mango yields** will increase

A preliminary list of criteria was presented to the participants. This list was discussed in groups formed around each of the four principles. Participants could add criteria to the list, or remove redundant ones. Groups went round each of the principles, and built on each other's work to develop a long list of criteria (Annex 2). It turned out that the results of this exercise were a mixture of criteria and indicators, rather than criteria only. Criteria and indicators were therefore taken together.

As a next step, participants selected the six most important criteria and indicators: the topics that they would like to be improved or achieved in the mango value chain over the next two to three years (Table 8). Groups rotated again on the topics; the first group selected three criteria /indicators, the second group added two, and the last group one.

Table 8: Most important criteria and indicators to describe the current situation and to measure effects of STEP-UP interventions in the mango value chain per sustainability principle

Principle	Most important criteria/ indicators
Economic	<ol style="list-style-type: none"> 1. Increase sales 2. Number of new businesses 3. Number of new mango products 4. Market participation 5. Training on modern production techniques 6. Improved infrastructure
Food security	<ol style="list-style-type: none"> 1. Training on mango production 2. High quality production 3. Improved transport system 4. Increased area of intercropping of mango with food crops 5. Number of new value addition plants for mango established 6. Number of stunted children
Environment	<ol style="list-style-type: none"> 1. Increased number of mango trees and mango tree varieties 2. Adopt integrated pest management control 3. Recycling of waste/ number of waste processing centres established 4. Number of new extension services to farmers 5. Soil fertility 6. Increased water harvesting
Social	<ol style="list-style-type: none"> 1. Number of new cooperatives established 2. Number of new youths' involvement in mango business 3. Reduction of school dropouts due to income earned from mango to pay fees 4. Improved living standards 5. Urban development



3. Way forward and closing of the workshop

The workshop yielded fruitful discussions on a vision for the mango value chain in Kitui, the steps needed to achieve the vision, the possible interventions by STEP-UP and stakeholders and the criteria and indicators that could monitor progress towards achieving the vision. The STEP-UP team is tasked to translate the workshop results into concrete interventions and a plan of action. The team is already taking the first steps on a number of priorities:

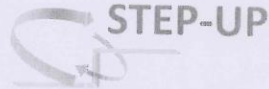
- Conducting a baseline survey to describe current mango production and diversity between farmers (yields, grades, varieties, management practices, prices, processing into different products, marketing of mangoes, etc.). Rashidatu Abdulai will carry out this survey in Kitui Central and Mwingi West in April/ May.
- Conducting a value chain and marketing study on the demand for different types of mango products, value added on different nodes in the value chain, actors involved, etc.
- Supporting processing facilities or other initiatives with the development of a business plan (based on marketing study)
- Conducting training needs assessment and based on that provide training + training materials on mango production, pest and disease management, post-harvest handling, etc.
- Developing and validating a mango harvesting tool
- Exploring opportunities and requirements to export mango flakes to Europe (Germany, the Netherlands)

Closing remarks were made by all stakeholders involved in STEP-UP and the workshop came to an end.

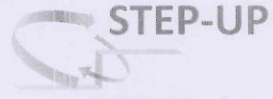


Annex 1: Participants' list

	NAME.	ORGANIZATION.	EMAIL/TELEPHONE	SIGNATURE.
1.	Rashidatu Abdulai	wageningen university	rashiduf20@gmail.com	
2.	Innocent Kiedi	KCC - value addition office	kiedi@kcc.com	
3.	Christine Olanji	Netfund	Christine@netfund.com	
4.	Njoki FATHS	JKUAT Researcher	Njoki@jkuat.ac.ke	
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Annex 2: Long list of criteria and indicators

Long list of criteria and indicators to describe the current situation and to measure effects of STEP-UP interventions in the mango value chain. Topics that were given are presented in grey, topics that were added by the participants are presented in black.

Economic	Food security	Environmental	Social
<ul style="list-style-type: none"> • Crop yield • Income • Post-harvest-loss reduction • Risk reduction • Access to inputs • Market participation • Business training • Increased (quality of) mango production • Generation of revenue by the government • Favourable economic policy development • Adoption of modern production techniques • Health • Living standards improved • Improved education standards • Increased output & sales for processors • Improved GDP • Increased government revenue • Favourable balance of payment due to increased export • Job opportunities • Networking/ partnerships • New businesses/ industries • New mango products • Poverty reduction • Development of infrastructure • Adoption of technologies • Development of market centres • Less reliance on donor funding (independence) 	<ul style="list-style-type: none"> • Food security (enough food) • Nutrition security (quality, diversity) • Improved health • Improved performance (labour, education) • Low mortality rate • Increased fertility rates • High labour production (processors) • Low employee turnover (traders, transporters) • Increased production will improve purchasing power to buy more food • High quality production • Training on mango production • High management practices • Create awareness on various ways of utilizing mango products • Improved transportation system • Formation of cooperatives 	<ul style="list-style-type: none"> • Natural capital (soils, water) • Agro-biodiversity • Efficient use of resources • Pest and disease management • Waste management • Migration of species like birds • Extinction of indigenous trees • Increased mango tree variety • Adoption of energy-efficient technologies • Energy requirements processors • Accessibility of energy (mango waste as source of energy) • Reduction of waste (xx %) • Waste processing centres • CO₂ sequestration of mango trees • Water accessibility & availability • Depletion of water resources • Ground water pollution • Pollution from processors, transporters (air, water, soil) • Soil fertility • Soil erosion reduction • Increased extension services • Number of new environmental policies & enforcement • New pest and disease emergence due to large mango farms • Increase in environmental conservation • NGO/CBO: civil education and conservancy • Development partners: climate change mitigation 	<ul style="list-style-type: none"> • Gender inclusion • Working conditions • Knowledge availability • Social relations in community • Stakeholder participation/ knowledge exchange • Stable and happy families/ society • Peaceful co-existence • Improved literacy levels • Low crime rates

