

A photograph of a lush green agricultural field at sunset, framed by a yellow outline that resembles the map of Africa. The sun is low on the horizon, casting a warm glow over the field. In the foreground, there are large, green, leafy plants, possibly beans or similar legumes.

Training Manual for Resilient and Sustainable Food Value Chain Development in Africa





In line with UNDP's Private Sector Strategy, UNDP assists countries to align private sector activities and investments with the 2030 Agenda for Sustainable Development by influencing investors and businesses of all sizes; embedding the SDGs into their decision-making and practices; and supporting governments to establish enabling policy and regulatory environments, while facilitating multi-stakeholder partnerships.

Working with African governments, private sector, civil society institutions and development partners in the African agricultural landscape, AGRA is committed to catalysing an agricultural transformation necessary for accelerating the achievement of the Malabo Declaration commitments and related indicators from the Comprehensive Africa Agriculture Development Programme (CAADP), the Sustainable Development Goals, and Africa's Agenda 2063.

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This manual is the culmination of the effort and contributions of numerous individuals involved in climate change adaptation and resilience initiatives in agricultural value chains in a number of African countries. The content draws heavily on the experiences as well as case studies from the countries where AGRA and UNDP work. In recognition of the strong partnership between AGRA and UNDP in the development of the manual, the authors extend their gratitude to the experts who provided valuable comments and insights through the online peer review meetings as well as written inputs. The programme partners that provided input and technical guidance include Conservation International, World Agroforestry (ICRAF), Africa development bank (AfDB), United Nations Environment (UNEP), The Nature Conservancy (TNC), and SNV among others. The development of this manual was supported by funds from the Global Environmental Facility (GEF) and managed by the International Fund for Agricultural Development (IFAD).

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Executive Summary

African smallholder farmers' agricultural operations are characterised by low productivity and financial returns, small budgets, low-quality standards, and vulnerability to environmental concerns such as pollution, climate change, and climate variability, environmental and soil degradation, and limited capacity to adapt (Hilmi, 2019). However, despite these limitations, smallholder farmers still supply urban dwellers with up to 80% of their food demands (Mulvany and Murphy, 2015). The smallholder farming system has potential for greener and more productive food value chains.

With UNDP and AGRA having undertaken positive efforts towards the development of agriculture in sub-Saharan Africa (SSA) with clear strategies at the country and regional levels, there is still room for them to support the continent in overcoming various challenges that hamper this progressive transformation. The challenges include lack of capital, poor operation coordination due to inefficient information flows, poor access to inputs, social and economic inequalities, limited agricultural and agribusiness skills, and weak market linkages. In the status quo, these challenges have led to food insecurity, infant and adult malnutrition, stagnant economic growth, environmental degradation, and in some cases, political instability. There are several pillars that Africa needs to acknowledge and also implement in order to transform the continent's agricultural sector into a robust, resilient, sustainable, and economic development vehicle. These pillars include an Integrated Natural Resource Management, Conducive Policy Framework, Enhanced Capacities Across Value Chain Actors, Climate Change Responses, RSFVCD, Appropriate Technologies, Agribusiness Model Adoption, and Research and Development. However, for greater success, these agri-transformation pillars

cannot be pursued in isolation and require an integrated approach.

Africa has significant capacity gaps required to transform its agriculture and food systems particularly at the smallholder farmer level.

AGRA and UNDP have collaboratively developed this greening value chains training manual - The "Resilient and sustainable food value chain development in Africa" Training Manual as part of the efforts of the Global Environmental Facility (GEF) Integrated Approaches Pilot programme. The training manual is based on the green food value chain concept as an approach that generates and recaptures value at each level or link of the food value chain, proactively reducing the usage of the natural environment so as to diminish or mitigate adverse environmental impacts. This food value chain greening approach, referred to as the resilient and sustainable food value chain development (RSFVCD) approach, is applied in this manual.

Training Manual is designed for development practitioners in Africa and aims to advance a holistic approach to agricultural productivity and agribusiness development in smallholder farming systems as well as the health of the ecosystem. The training manual responds to the need for the establishment of a structured process in green food value chain development. The private sector, particularly agriculture-lead-firms and off-takers, are key drivers in the scaling up of the integrated approach to agriculture as they are profit-driven, rendering food systems competitive.

This training guide aims to impart capacities and analytical skills to help value chain actors, especially smallholder producers and farmer support service providers such as extensionists and marketers, to embrace value chain greening.

These key skills will assist the target value chain actors to identify and understand relationships with other key value chain players. The manual blends best practices and lessons learned from projects, programmes, and initiatives that promote food value chain greening.

To further ensure robustness, and to place the manual within the overall context of sustainable and inclusive agriculture and food systems transformation, its development is based on the following set of principles and qualities:

1. A systemic shift towards innovations and incentives that facilitate the commitment of actors to transformation;
2. Focus on smallholder farmers and value chain actors driven by entrepreneurial mindsets;
3. Balance technical capability and the political economy of agriculture and agribusiness for a more practical and action-oriented approach;
4. Integrate the role of technology, particularly digitalisation in shifting the frontier of agriculture and agribusiness in Africa;
5. Promote knowledge and experiencing sharing; and
6. Build on productivity enhancement approaches that fully integrate local knowledge and practices.

The training manual is organized into nine modules that can be delivered sequentially and or independently to fit the context. The manual can serve both as a training of trainers' guide and as a tool to be used to directly training value chain actors. Below are the modules:

1. **Module 1** – Multi- Stakeholder platform, formulation
2. **Module 2** – Food value chain identification for greening
3. **Module 3** - Value chain prioritization
4. **Module 4** – Food value chain mapping
5. **Module 5** - Food value chain analysis and reporting
6. **Module 6** – Value chain greening strategy formulation
7. **Module 7** – Promoting business models
8. **Module 8** – Green food value chain financing
9. **Module 9** – Planning – action planning

The manual also touches on key topics that contribute to building of resilient value chains:

- Foundations of green food value chains
- Circular economy and
- The green food value chain development framework

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Icons used



RESEARCH/INVESTIGATE



TAKE NOTE



CARRY OUT THE EXERCISE



CASE STUDY

Acronyms

AGRA	Alliance for a Green Revolution in Africa
BDS	Business Development Services
BMZ	German Federal Ministry for Economic Cooperation and Development
CA	Conservation Agriculture
CARI	Competitive African Rice Initiative
CSA	Climate-smart Agriculture
HAS	Hot Spot Analysis
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GHG	Greenhouse Gas Emissions
GEF	Global Environment Facility
GPG	Global Public Goods
FAO	Food and Agriculture Organisation
IAP	Integrated Approaches Pilot
ILM	Integrated Landscape Management
ISFM	Integrated Soil Fertility Management
MSMEs	Micro, Small, and Medium Enterprises
MSP	Multi-stakeholder Platform
RFS	Resilient Food Systems
RSFVCD	Resilient and Sustainable Food Value Chain Development
VC	Value Chains
VCA	Value Chain Analysis
SLM	Sustainable Land Management
SSA	Sub-Saharan Africa
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme



Introduction

A.1 Background

The Alliance for a Green Revolution in Africa (AGRA) and the United Nations Development Programme (UNDP) endeavour to scale up integrated approaches with the potential to generate multiple economic, social and environmental benefits from agro-ecosystems and rangelands through improved land and soil health and enhanced vegetation cover.

In most smallholder farming systems, much of the value addition is carried out on-farm, where the actors are interdependent, and mutual rewards are real. Smallholder farming systems have the potential to provide for greener and more productive food value chains. An example is mitigation and reduction of greenhouse gas emissions (GHG), the replacement of a certain portion of a region's food imports with locally produced food, to boost sales revenue for businesses, households, and consumers as well as reducing GHG (Mulvany and Murphy, 2015).

Through AGRA and UNDP, the Global Environment Facility Integrated Approaches Pilot (GEF IAP) also known as the Resilient Food Systems (RFS) program promotes multi-stakeholder platforms at national and regional levels. Through the green food value chain concept, the GEF IAP serves as a framework for coordinating and investing in the interlinked food value chain activities to make them sustainable, viable, and efficient in utilising natural resources available to smallholder agriculture. The green food value chain concept is an approach that generates and recaptures value at each level or link of the food value chain, proactively reducing the usage of the natural environment, (natural resources, ecosystem services, and biodiversity), so as to diminish or mitigate adverse environmental impacts, and/or even have positive impacts, while considering disposal and recycling patterns of generated waste. This food value chain greening approach, which we will also refer to as the resilient and sustainable food value chain development (RSFVCD) approach, is applied in this manual.

The “Resilient and sustainable food value chain development in Africa” Training Manual was designed for African practitioners and aims to advance a holistic approach to agricultural

productivity and agribusiness development in smallholder farming systems as well as the health of the ecosystem. This enhancement will be attained through building the capacity of local and regional actors in priority food value chains. The training manual responds to the need for the establishment of a structured process in green food value chain development. The private sector, particularly agriculture-lead-firms and off-takers, are key drivers in the scaling up of the integrated approach to agriculture as they are profit-driven, rendering food systems competitive.

This training guide aims to impart capacities and analytical skills to help value chain actors, especially smallholder producers and farmer support service providers such as extensionists and marketers, to embrace value chain greening. These key skills will assist the target value chain actors to identify and understand relationships with other key value chain players – through the discourse on challenges and opportunities that exist in agribusiness. The manual blends best practices and lessons learned from projects, programmes, and initiatives that promote food value chain greening.

To further ensure robustness, and to place the manual within the overall context of sustainable and inclusive agriculture and food systems transformation, its development is based on the following set of principles and qualities:

- A systemic shift towards innovations and incentives that facilitate the commitment of actors to transformation;
- Focus on smallholder farmers and value chain actors driven by entrepreneurial mindsets;
- Balance technical capability and the political economy of agriculture and agribusiness for a more practical and action-oriented approach;
- Integrate the role of technology, particularly digitalisation in shifting the frontier of agriculture and agribusiness in Africa;
- Promote knowledge and experiencing sharing; and
- Build on productivity enhancement approaches that fully integrate local knowledge and practices.

A.1.1 Definition of terms

Activity greening: means making environmentally responsible decisions on a value chain activity and turning them into actions. Environmentally responsible decisions and actions are those that reduce the negative impact on the environment by conserving resources, using resources efficiently, and minimising pollution.

Business Sustainability: is the management and coordination of environmental, social, and financial demands and concerns to ensure responsible, ethical, and ongoing success.

Climate-smart Agriculture (CSA): a holistic approach that addresses climate change effects on agricultural productivity and food security. It is composed of three interlinked pillars: 1) sustainably increasing agricultural productivity and incomes; 2) adapting and building resilience to climate change and; 3) reducing and/or removing greenhouse gas emissions (FAO, 2013).

Conservation Agriculture (CA): this technology allows nature to regenerate and retain soil structure through reduced land tillage, thus improving water and nutrient availability for plants and reducing soil erosion. Benefits include reduced costs of machinery use. However, there is an increased need for agrochemicals, such as herbicides, among others.

Economic Resilience: the ability of a business venture or value chain to withstand or recover quickly from economic difficulties/shocks

Economic Sustainability: is the ability of a value chain or value chain activity to maintain its viability over time

Environmental Sustainability: responsible interaction with the environment to avoid depletion or degradation of natural resources and allow for long-term environmental quality.

Global Public Goods (GPG): a good or service in which the benefit received by any one party does not diminish the availability of the benefits to others, and where access to the good cannot be restricted.

Green economy: a low carbon, resource efficient and socially inclusive. In a green economy, growth in employment and income are driven by public and private investment into such economic activities, infrastructure and assets that allow reduced carbon emissions and pollution, enhanced energy and resource efficiency, and prevention of the loss of biodiversity and ecosystem services.

Greening the economy: making investments in technologies, systems and infrastructures that enhance productive economic activities while optimising natural resource utilisation and minimising environmental impacts.

Resilience (of ecosystems): the ability to function and provide critical ecosystem services under changing conditions.

Sustainable development: development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable Land Management (SLM): the full range of practices and technologies that aim to integrate land management, water, biodiversity, and other environmental resources to meet human needs while ensuring the long-term sustainability of ecosystems, services, and livelihoods.

Value addition: is the enhancement of a product or service before it is offered to customers. This can be achieved through semi-processing/processing or storage and bulking services. For example, in a case of maize products, they can be considered value-added if the original raw product, such as maize grains, is modified, changed, or enhanced to increase in value (either by milling or roasting for example).

Value chain (agriculture): a vertical alliance of enterprises collaborating in varying degrees along the range of activities required to bring a product from the initial input supply stage, through the various phases of production, to its final market destination (IFAD, 2014); in other words, an agricultural value chain refers to the whole range of goods and services necessary for an agricultural product to move from the farm to the final customer.

Value chain greening: the process that requires the public sector and economy to create partnerships with all stakeholders (public, private, civil society) in a defined social and cultural context; to verify and evaluate the inherent trade-offs involved and the new roles for the stakeholders; the measurement metrics required for tracking environmental performance; the standards and reverse channels to be considered, without undermining economic opportunities and social consequences of such a process.

Value: the collection of products and services a business offers to meet the needs of its customers, the environment, and society.

A.1.2 Training outline

This manual focuses on equipping practitioners with the knowledge and skills essential for carrying out the following tasks:

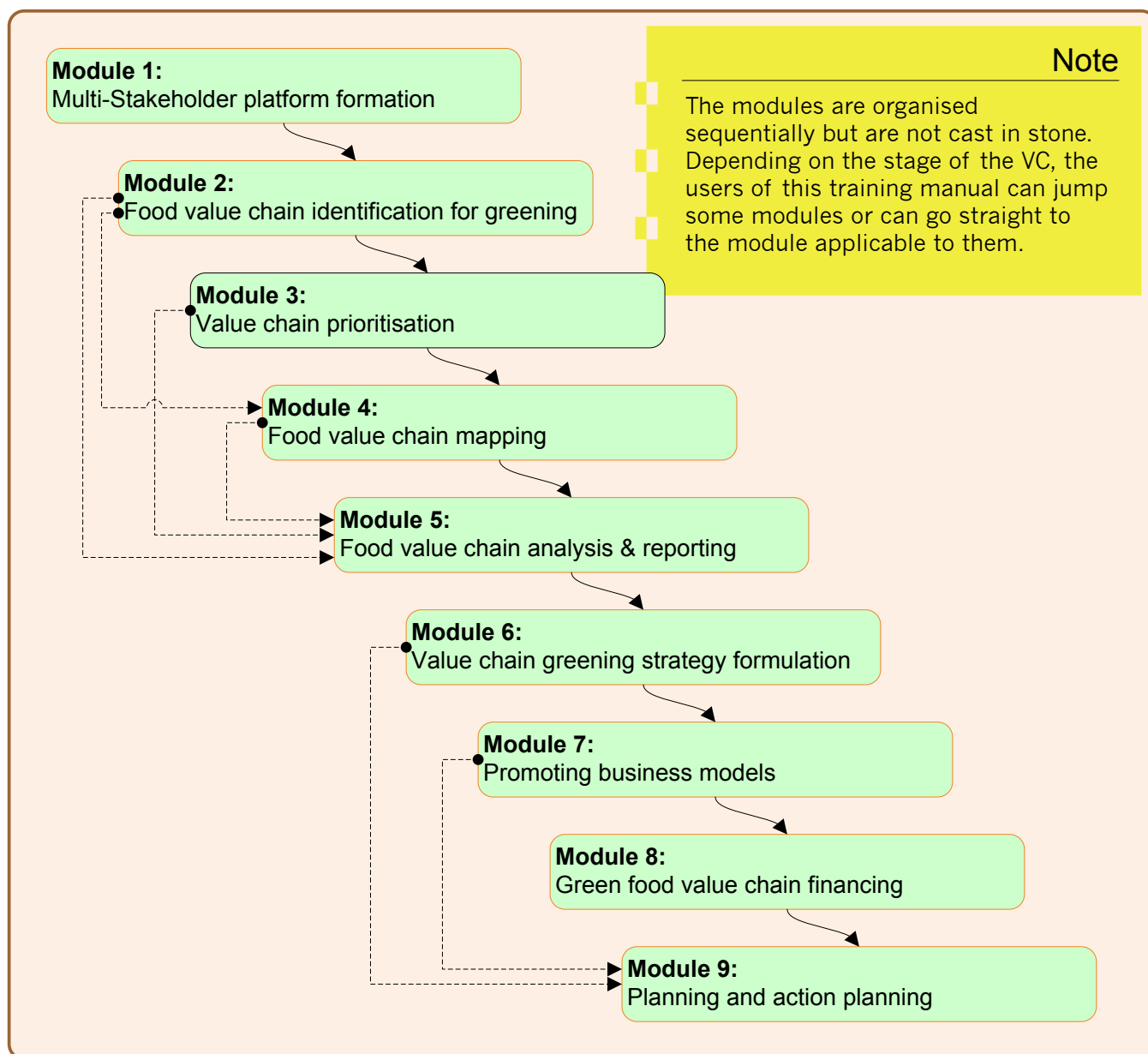


Figure A1. Training outline. The dotted lines are indicative of the flexibility of the manual.

A.1.3 Training objectives

To provide a simplified methodology to understanding the greening of the existing food value chains, by activity and scale of operation

To establish a structured blueprint and process for the development of sustainable and resilient food value chains

To equip training participants (farmer trainers and smallholder farmers) with practical skills to cascade knowledge for achieving RSFVC in their localities

A.1.4 Target groups/audience

This manual is intended for field practitioners who contribute to the development and strengthening of food value chains, including smallholder farmers (either communally, individually, or in groups/cooperatives) as the producers or as input suppliers, transporters, aggregators, processors, and marketers.

It is assumed that the users of this manual have a basic knowledge of agriculture or have an interest in agribusiness development. The audience may also include; farmer groups, community-based commodity aggregators, agri-small and medium enterprises (agri-SMEs), information and communication technology specialists, development agents, financial institutions, researchers, and trainers working with farmers.

Materials required

- Markers,
- Flipcharts/Manila papers
- Training venue – easily accessible (preferably within the community of interest)

A.1.5 Training approach

The training guide is designed to offer the basic appreciation of the different food value chain greening aspects and practices, starting with brief definitions, then outlining value chain building blocks and recommending how practitioners can put this knowledge into practice with regard to existing value chains. The content can either be used

independently or rolled out through the guided group work approach; and it is supplemented with case studies. A combination of group work and plenary sessions to review outputs of exercises, discuss concepts, and provision of practical tools for capturing data required for evaluations will inform the RSFVC development process.

The training manual is organised in modules that allow for in-built flexibility in their use.

At the end of the manual is an evaluation form to assess learners' understanding of the course.

A.2 Thinking Resilient and Sustainable Food Value Chain

A.2.1 Background

African smallholder farmers' agricultural operations are characterised by low productivity and financial returns, small budgets, low-quality standards, and vulnerability to environmental concerns such as pollution, climate change, and climate variability, environmental and soil degradation, and limited capacity to adapt (Hilmi, 2019). However, despite these limitations, smallholder farmers still supply urban dwellers with up to 80% of their food demands (Mulvany and Murphy, 2015). Over the centuries, as local knowledge co-evolved with nature, many communities became resilient to environmental challenges. Local knowledge relies on raw materials and capabilities that are affordable and socially acceptable, such as organic soil fertility inputs and related sustainable land and water management practices. Hence, smallholder farming system innovations and innovators provide for a valuable and relatively costless mechanism of adaptation to and mitigation of climate change, and thus, are the first steps towards the development of a green food value chain economy.

The smallholder farming system has potential for greener and more productive food value chains. An example is mitigation and reduction of greenhouse gas (GHG) emissions and the replacement of a certain portion of the region's food imports with

locally produced food to boost sales revenue for agribusinesses, households, and consumers (Mulvany and Murphy, 2015).

Given this background – which highlights the importance of the smallholder rural farmer - it is paramount to tap into the smallholder farming sector's contribution to sub-Saharan Africa's GDP and the average household's wellbeing to strengthen value chains and make them sustainable through augmenting the communal farmer's benefits from his/her agricultural activities. The smallholder farming system has the potential to create value-added products and other services into greener and more productive food value chains that contribute significantly to long term food security, wellbeing, and economic growth.

A.2.2 Pillars of Agricultural Transformation in Africa

With UNDP and AGRA having undertaken positive efforts towards the development of agriculture in sub-Saharan Africa (SSA) with clear strategies at the country and regional levels, there is still room for them to support the continent in overcoming various challenges that hamper this progressive transformation. The challenges include lack of capital, poor operation coordination due to inefficient information flows, poor access to inputs, social and economic inequalities, limited agricultural and agribusiness skills, and weak market linkages. In the status quo, these challenges have led to food insecurity, infant and adult malnutrition, stagnant economic growth, environmental degradation, and in some cases, political instability. Given that the operating environment is also littered with multiple bottlenecks and risks such as energy shortages, poor infrastructure, and climate change vulnerability, food and nutrition security on the continent are yet to be achieved. There are several pillars that Africa needs to acknowledge and also implement in order to transform the continent's agricultural sector into a robust, resilient, sustainable, and economic development vehicle. These pillars include an Integrated Natural Resource Management, Conducive Policy Framework, Enhanced Capacities Across Value Chain Actors, Climate Change Responses, RSFVCD, Appropriate Technologies, Agribusiness Model Adoption, and Research and Development. However, for greater success, these

agri-transformation pillars cannot be pursued in isolation and require an integrated approach. Given the intricate interrelations between these pillars and the challenges, and existing opportunities, the majority of SSA countries require both technical and implementation support.

Towards the transformation of Africa's agriculture, UNDP and AGRA propose to build on:

1. well-documented and successfully piloted, past and recent, innovative business models;
2. existing finance architecture;
3. available human capital and;
4. prevailing agricultural technologies.

Some of the new agricultural technologies (Agtech) that are relevant to transforming agriculture include appropriate information and communication, soil and water management, renewable energy options, good agricultural & climate-smart practices, crop and livestock breeding research, and technologies. The diagram below (Fig. A2.), shows the interrelationship between RSFVCD and the other agricultural transformation pillars. For specific context, the recommended application of the value chain greening concept is to adopt elements that complement ongoing agricultural transformation initiatives such as the commercialisation of drought-tolerant seeds, which are also viewed as a climate change adaptation response.

Unlike the developed countries, in Africa, there are huge capacity gaps between smallholder farmers and transnational commodity (overseas) markets. Micro, small, and medium enterprises (MSMEs) could fill this gap by playing an intermediary role to stimulate demand-driven and increased agricultural production, improving agricultural commodity quality standards and discouraging the export sale of primary products through localised value-adding agro-processing. Several projects that link overseas markets directly with raw crop produce have been rolled out across Africa. However, due to market dynamics that compelled single large buyer(s) to shift to new sourcing regions, some markets have had to be

discontinued, leaving large propositions of former producers stranded with no alternative market. The development of MSMEs across Africa has

created opportunities for smallholder farmers to participate in markets as producers, employees, or consumers, and thus the shift into agribusiness.

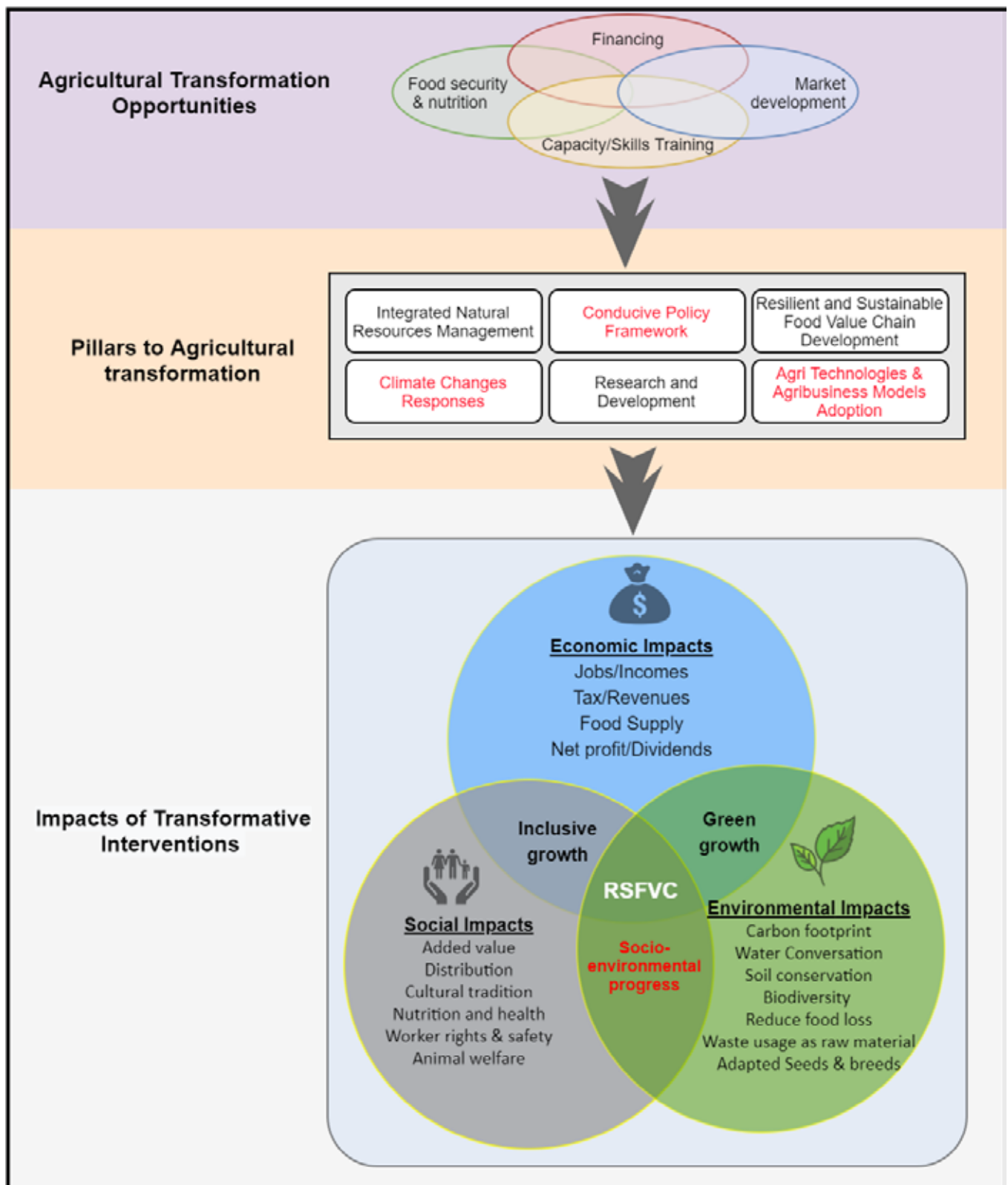


Figure A2. The Role of Agricultural Value Chain Greening in the Transformation of Agriculture in Africa (Source: FAO, 2014)

A.2.3 Foundations for green food value chain development

There are three pillars to RSFVCD that bring about improved human wellbeing (economic impact) and social equity (Social impact), significantly reducing environmental risks and ecological scarcities (Environmental impact) (UNEP, 2011) while also considering, importantly, the economic efficiency of such processes (Figure A2). However, through innovative project designs and integrated initiatives, there are interlinks between the three greening dimensions that emerge through blending: socio-environmental progress, socio-economic (inclusive) growth, as well as environmental impacts (green growth). While various value chain development initiatives deliver interlinked benefits, RSFVCD makes it possible for practitioners to merge the three forms of growth as they deem fit (Figure A3).

It is generally agreed that the bottom line for value chain development is the economic pillar, and more specifically with the potential for market growth, job creation, comparative advantage, and added value achieved through enhanced efficiency. Without a strong economic potential, prospects for sustainable green food value chain development could be relatively low. However, there is a growing consensus that to remain in business and be profitable in the longer term, enterprises and the value chains in which they operate need to be inclusive and green. Focusing on economic development alone risks perpetuating social disparities or environmental damage. Therefore, combining economic objectives with environmental and social goals, along with an enabling institutional environment, enhances the quality of growth.

The environmental pillar to RSFVCD goes beyond focusing on the identification of and minimising the negative effects (pollution or degradation) of a value chain's activities on the environment (land, water, air, biodiversity), but also the larger environmental impacts, such as climate change, resource scarcity and promotion of greener practices. In any case, markets for green services and products have

grown over the past years and are expected to grow further, creating new jobs and opportunities. Many traditional and innovative green products, such as organic food and green technologies, are steadily mounting. Hence, there are ample opportunities for 'green economy' business models, which make optimal use of (scarce) natural resources, use fewer fossil fuels, and result in reduced environmental risk – sustainable development without degrading the environment.

The social pillar of RSFVCD is the human quality aspect, which includes issues like equity, equality, access to resources and benefits, participation, inclusiveness of disadvantaged or marginalised societal groups, and others. A RSFVC should have a net positive social impact on the surrounding communities and society at large.

Given that most value chain finance initiatives require a significantly large amount of financial resources, the absence of or limited economic potential, the prospects for building sustainable and resilient food value chain development based on greater social and environmental benefits is very low. Hence, value chain greening designs need to put together strong business cases that justify the use of commercial, financial resources. However, on the contrary, disregarding socio-environmental returns to value chain development results in the depletion of natural resources over time, and this affects profitability in the long run. Given this interrelationship between the three dimensions, RSFVCD requires a structurally balanced (3-pillar) foundation. In simpler terms, there is a growing view that in order for the enterprise to remain profitable in business in the long term, its focus value chains need to grow in community inclusivity and in the efficient use of natural resources.

Combining economic objectives with environmental and social goals, along with an enabling institutional environment, enhances the quality of growth. Hence, resilient and sustainable food value chains is a concept that combines both sustainable, environmentally friendly practices with a resource-efficient food value chain approach for the social and economic wellbeing of the VC actors (Figure A3).

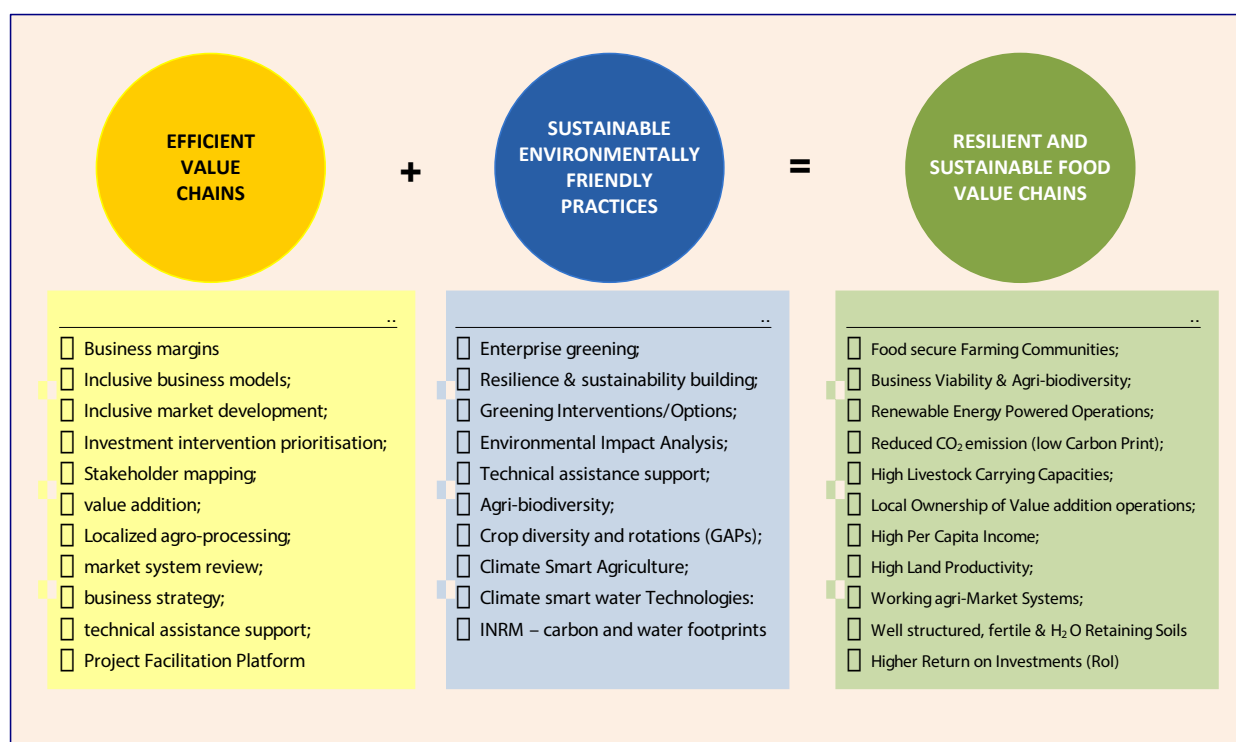


Figure A3. Resilient and sustainable food value chain development (Source: <https://visual.ly/community/infographic/environment/agricultural-multiplier-effect>).

A.2.4 Circular economy

Inherent to RSFVCD is the circular economy. According to the Ellen MacArthur Foundation (2012), it is the industrial economy that is restorative by intention and attempts to enable effective flows of materials, energy, labour, and information so that natural and social capital can rebuild. It is based on the notion of systems optimisation (improved efficiency) rather than components (Kirchherr et al., 2017). It provides new business models that create value in new ways. Hence, the development of RSFVC requires re-thinking of how organisations and individuals act, behave, and operate in terms of greening, while at the same time providing for the same return on capital investments, becoming more efficient by using less land, water, energy, and more resilient to changes and shocks, and yet producing and delivering food sustainably (UNESCWA, 2014). While RSFVCD is anchored on the sustainable development goal (SDGs) 2, which aims to ensure sustainable food production systems and the implementation of resilient agricultural practices that increase productivity, it also addresses the 2030 SDGs as follows: 1 (no poverty), 3 (good health and well-being), 7 (affordable and clean energy), 8

(decent work and economic growth), 9 (industry innovation and infrastructure) and 13 (climate action).

A.2.5 Green food value chain development framework

A green food value chain is one that needs to provide monetary and social value at each stage by proactively reducing the usage of the natural environment (natural resources, ecosystem services, and biodiversity), to diminish or mitigate adverse impacts, or even have positive impacts, while at the same time considering disposal and recycling patterns of generated waste, to recapture value at every stage of the food value chain and thus further reduce environmental impact (FAO, 2014, Hilmi 2019; FAO and CIHEAM, 2016).

The aforementioned green food value chain definition is the basis for the RSFVCD conceptual framework (Figure A4). At the core of the framework is the typical value chain designed to collaboratively increase competitive advantage by linking input suppliers, producers, aggregators, processors, marketers, support services providers, and

regulators. The conceptual framework provides for a circular (and open-ended) non-linear relationship between activities and stakeholders, from the natural environment to final markets (Hilmi, 2019). The food value that is wasted is recaptured with reverse flows that reset such food value from an economic, environmental, social, and cultural

point of view (depicted by the dotted arrows). The assumed conceptual framework attempts to holistically and inherently mitigate the effects of waste management on the natural environment (through harnessing & recycling, rules, and regulations) (FAO, 2014).

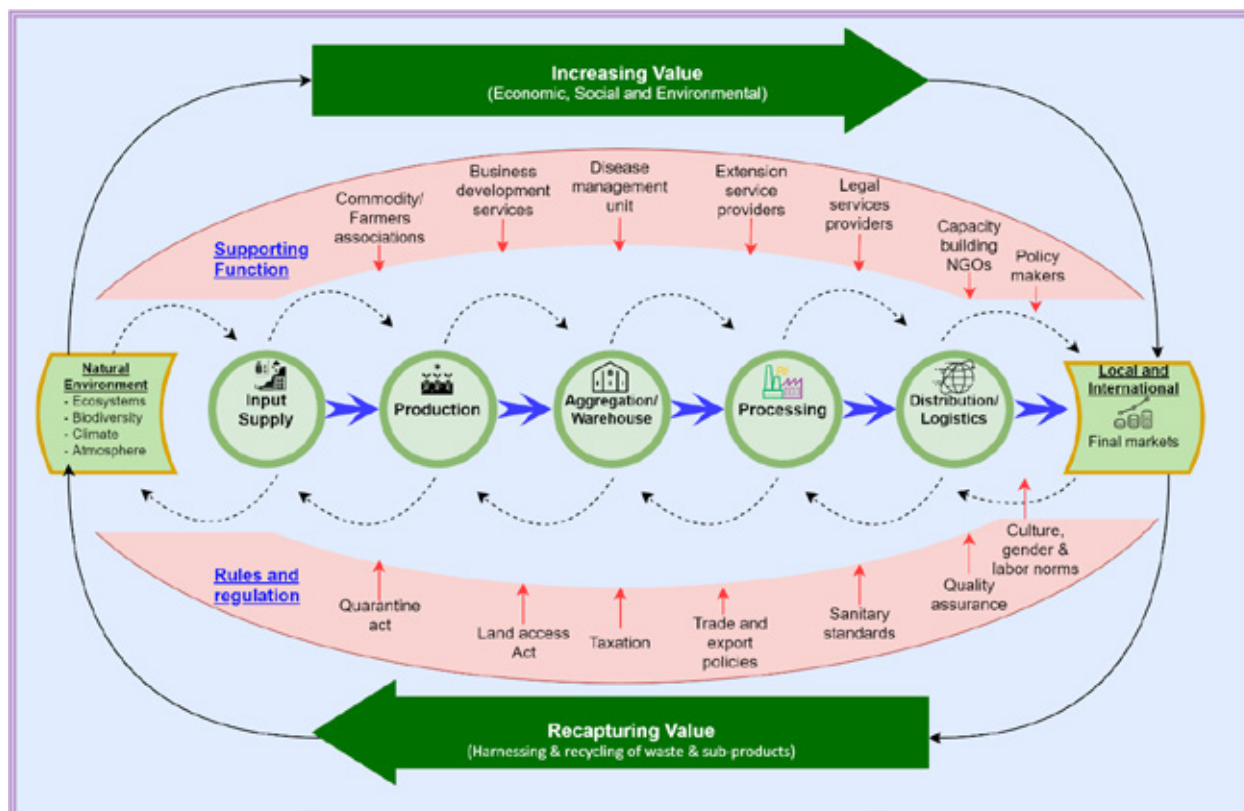


Figure A4. The green food value chain development framework. Adapted from: Martin Hilmi (FAO, 2014)

A.2.6 Resilient and Sustainable food value chain development cycle

The RSFVCD cycle can be simplified into three broad stages, with each stage comprising of numerous activities (Figure A5). Stage one covers VC identification, prioritisation, and mapping;

stage two evaluates gaps in the VC activities as well as causes of the VC inefficiencies, and reports on technologies and models in use, and technological preferences; while stage three is about developing solutions by making sustainable business and greening recommendations, and monitoring performance through M&E activities.

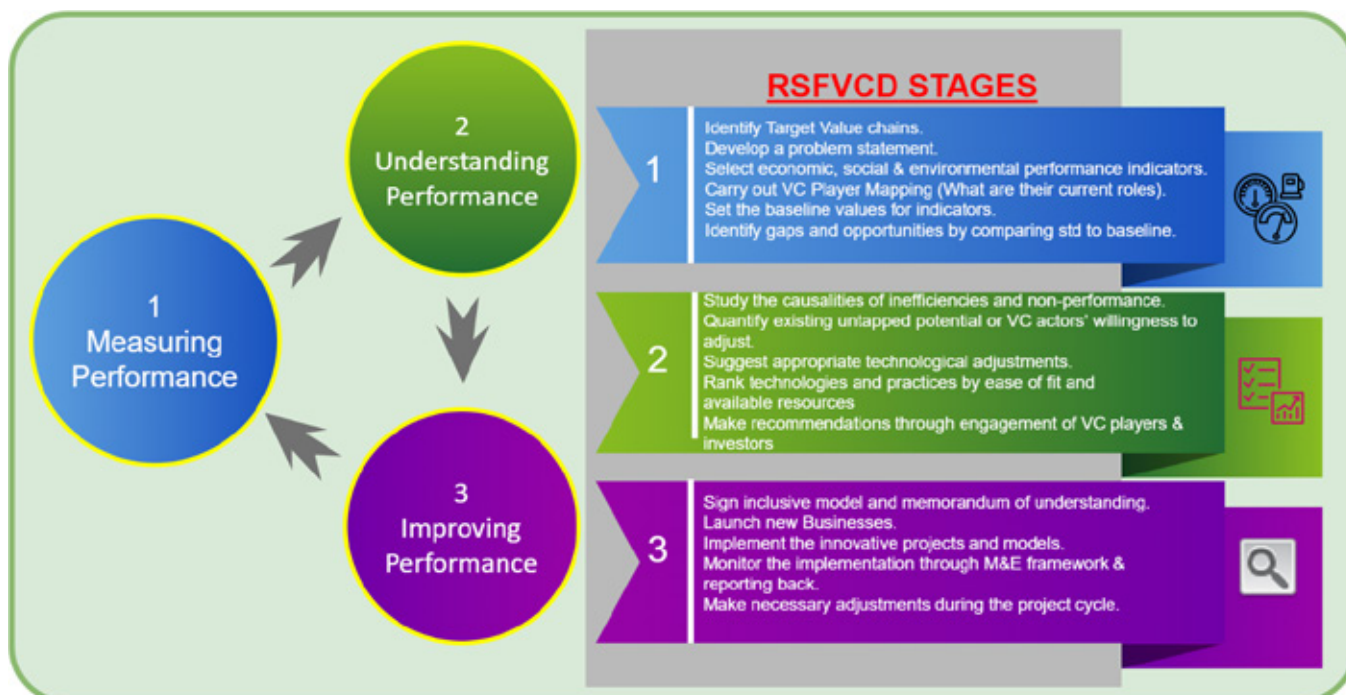


Figure A5. Resilient and sustainable food value chain development cycle

The 3-stage cycle provides guidance on value chain development practitioners, researchers/consultants may continually improve the agriculture sector and/or the individual capacity of target value chain actors. However, depending on the context (objectives, operating environment, and location), the order and content of the steps may differ. Since the RSFVCD is also a repetitive process – given the

dynamics - some steps may change due to new insights. However, with greater detail, such as additional information and knowledge gathered or further stakeholder consultations, a detailed illustration of the cycle may emerge and merge the essential VC aspects and greening practices, as shown below (Figure A6).



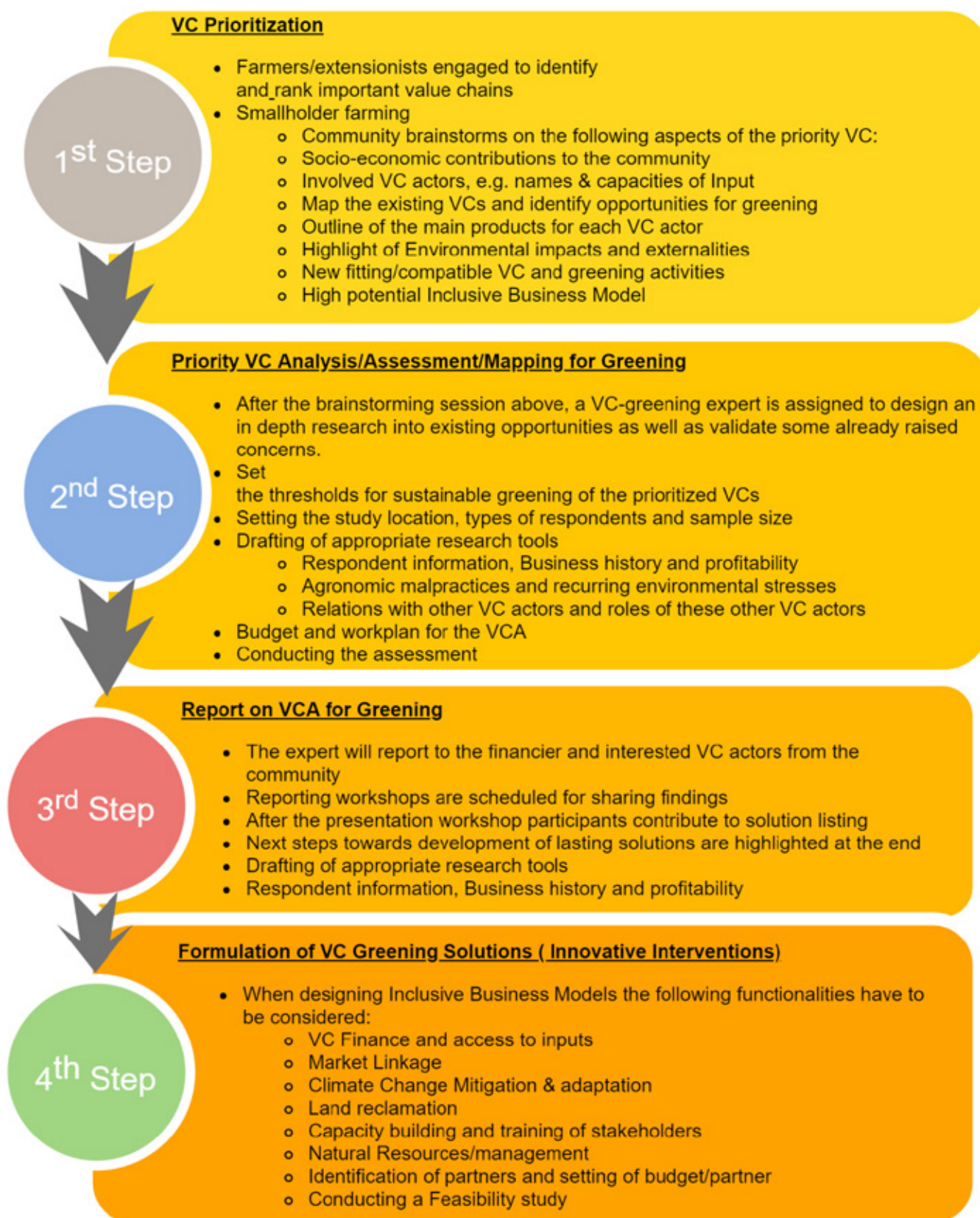


Figure A6. Steps for RSFVC development.

1

Module 1: Multi-Stakeholder Platform formation

1.1 Module objective

- To set up a functional multi-stakeholder platform (MSP)
- To conduct stakeholder mapping through practice

1.2 Introduction

Before embarking on a resilient and sustainable food value chain development exercise, it is important to decide which stakeholders will be involved, for what reason, and at what time. To foster sustainability, there is a need to establish and institutionalise relevant stakeholders' collaboration through the multi-stakeholder forum and beyond.

One way of institutionalizing collaboration between value chain stakeholders is to promote stakeholder synergies that run beyond the focus value chains. The MSP brings together selected participants from various stakeholder groups, whose roles are interlinked by a common food value chain, in our case, that is targeted for greening or strengthening. The model for setting up such platforms depends on the level and scale of the food value chain activity greening envisioned.

Accordingly, the MSP shall be composed of value chain actors operating at any of the levels. The value chain greening scope will determine the focus level. Figure 1.1 provides some examples of VC actors corresponding to different levels.

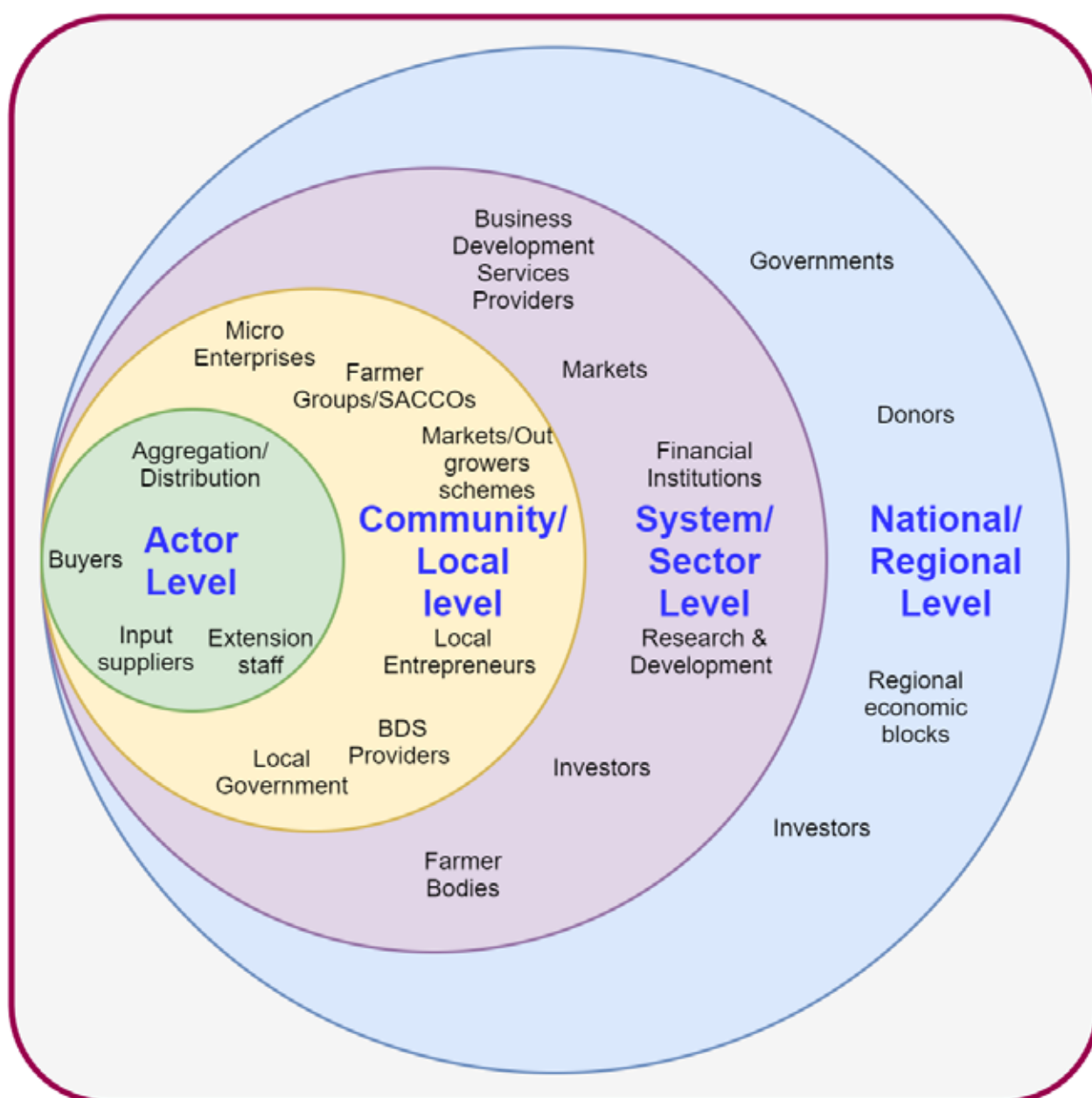


Figure 1.1. Levels of stakeholder groups represented at the multi-stakeholder platform.

Since food value chain greening involves many value chain actors focusing on different yet interrelated activities within the value chain, the MSP should be designed in such a way that it brings together stakeholders from the various activity systems.

Example 1. If they perform similar activities but with different products (wholesalers and processors all buy from the farmers, but their products might differ),

Example 2. With the same product but in different regions to form a consortium on farmer inputs, production, harvesting and aggregation, transportation, processing, and marketing. The MSPs should, at a minimum, have representatives from each one of the following stakeholder groups: Input suppliers, Farmers/Producers, Extension, Off takers/Buyers, Finance providers, Processors, and Policymakers.

Scenario 1: Through such MSP representatives of the same stakeholder group, VC actors from different geo-locations could congregate and take collective action in relation to the specific issue/problem in a selected green food value chain.

Scenario 2: Could bring together representatives selected from several multi-stakeholder platforms to discuss common concerns.



The success of the MSP hinges on stakeholder buy-in into the collaboration purpose, which in this case is the greening platforms. In turn, stakeholder buy-in depends on effective VC actor sensitisation and collaboration agenda in the development process.

1.3 Stakeholder mapping



What is a stakeholder? In your locality, who are the stakeholders that are involved with your target VC?

Any individual, group, or institution (public, private, non-profit, and community-based organisations) and other citizens that act at various levels of the interface (domestic, local, regional, national, international, private and public), linked with any function(s) along the chain and could affect or be affected by the intended changes resulting from greening the food value chain.



A well-developed stakeholder engagement strategy is critical for the success of food value chain greening. Strategy success is measured in the number of stakeholder groups identified and the potential collaborative areas between stakeholders.



What is stakeholder mapping?

Stakeholder mapping is the process of systematically listing and analysing information to determine which groups or value chain players have or will have an interest in food value chain development. Some of the issues of interest include:

- Knowing their interests and influence,
- Whether they will benefit or their connection with the value chain,
- Alliances/synergies with other stakeholders,
- Conflicts with other stakeholders,
- Degree of involvement in the food value chain process,
- The degree of influence in the value chain.



Exercise 1.1: Stakeholder mapping and multi-stakeholder platform setting

Assumption	The background information and relevant definitions covered in chapter one, green FVCD have been provided to participants.
Objective	To enable training participants to set up suitable MSP for conducting selected food value chain greening.
Task	Map stakeholders and set up an MSP to initiate green food value chain development that involves smallholder producers.
Suggested procedure	<p>Work in a group.</p> <p>1st step: Identify assorted smallholder farmers' food value chains that have the potential for greening.</p> <p>2nd step: Using a diagrammatic value chain framework, identify potential actors.</p> <p>3rd step: Find out who is involved at various nodes or points in the process, from input acquisition to final product consumption, i.e., the number of the stakeholders involved.</p> <p>4th step: Identifying food value chain actors; their roles, their objectives, their geographical coverage; their scope of action in the value chain.</p> <p>Guiding questions</p> <ul style="list-style-type: none"> • Which stakeholders are usually included or excluded in given food value chains? • Is the stakeholder relevant? (to determine inclusion or exclusion) • What is their attitude? • Do the stakeholders support or oppose the greening process? • Will the stakeholder benefit or be harmed by the greening process? • What are the stakeholders' concerns and expectations? <p>5th step: Prepare the results on a flipchart.</p> <p>6th step: Form an MSP.</p>
Expected outputs	A populated table or matrix with the list stakeholders, their purposes, and selected relevant information (Annex 1).
Presentation	After the exercise, hold a plenary session where the group will present output on a flipchart.



While forming and facilitating a multi-stakeholder working group, consider the following factors:

- Apply the principles of collaboration, openness, and mutual respect.
- Emphasize the need for inclusiveness so that all are represented, and all have an equal voice.
- Build Consensus.
- Build on relevant competencies from stakeholders.
- Highlight ownership of consultations by all and that all are accountable.
- Information concerning 'how, what, and why' is distributed to all to create understanding and legitimacy.
- Identify existing mechanisms and procedures for consultation and how they can be utilised.
- Assess other mechanisms and procedures that may be required to facilitate stakeholder consultations successfully.
- Introduce and sensitise the participants to the basics of green value chain thinking.

1.4 Key outputs

1. The importance/relevance of a multi-stakeholder platform in food value chain greening initiative established and understood
2. Stakeholder map developed
3. Stakeholder evaluation matrix populated
4. The multi-stakeholder platform constituted or MSP set-up skills imparted



2

Module 2: Food value chain identification for greening

2.1 Objectives

At the completion of this module exercises, the trainees/participants should be able to:

1. Set a general objective on green value chain development
2. Understand the process of compiling the long list of the food value chain

2.2 Introduction

After the formation of the MSP, the next step is the setting up of a general objective for developing a green food value chain.

Examples of RSFVCD objective are:

1. Greening the operations of Smallholder farmers' and related value chain actors.
2. Greening food value chains through waste recycling for an enhanced natural environment and climate change mitigation.



These preliminary and general context objectives will be refined further in the subsequent steps (making them value **chain** and/or **locality specific**).

2.3 Listing of existing/potential value chains for greening

Desk research and past VC study papers can provide an initial listing of existing and potential food value chains that have the potential for a green upgrade. Further to the literature review, field research is conducted at this stage. While carrying out the value chain listing, it is important to comprehensively appraise them by taking into consideration all the value chain steps; thus, from input acquisition to market and consumption.

Value chains listing



In principle, the selected value chains should be the most suited to the local agro-climatic conditions and strong potential for improving income generation for the smallholder farmers. Stakeholder consultation/participation is very important during the product selection stage, and the establishment of MSP provides an avenue for carrying out the consultation.





Exercise 2.1: Value chain greening objective setting and VC chain long listing

Assumption	<ol style="list-style-type: none"> 1. The MSP has been set. 2. The participants have been introduced to and sensitised on the basics of green value chain thinking. 3. There is the participants' willingness to adopt the RSFVCD concept.
Objective	<ol style="list-style-type: none"> 1. To review the current VCs with respect to and set objectives for the green value chain development program. 2. To compile a long list of existing and potential agricultural value chains.
Points of attention:	<ul style="list-style-type: none"> • The success of this process depends on effective planning and coordination of action points. • This exercise ensures that the ensuing steps and the final choice of the value chains are in line with the goals of the overall MSP goal. • Final consumer products of the long/shortlisted value chains should be described exclusively, e.g., 'tomato' can be fresh tomato fruits, tomato concentrate, and tomato sauce, etc. <ul style="list-style-type: none"> • This is relevant because these products have variable characteristics, and may have different end markets, chain actors, quality requirements, etc.
Suggested procedure	<ul style="list-style-type: none"> • The MSP members/participants brainstorm on the greening objectives and settle on set key objective(s) • Identify all possible agricultural products that can be produced per each commodity/service relevant to the local agricultural value chain. List all potential value chains (product based) • Identify various points along specific value chains requiring specific levels of greening
Tools or resources:	Value chain greening manual, <ul style="list-style-type: none"> • MSP mandate, • Respondent/stakeholder questionnaires • impact indicators, • government policies, • other background material
Expected output	Greening objective and a long list of potential value chains for greening. A long list of the <ul style="list-style-type: none"> • existing value chains • potential value chains

2.4 Key outputs

By the end of the module, the participant will have learned how to:

- Set a greening objective
- Long list existing and potential value chains for greening
- Identify various points along specific value chains requiring specific levels of greening

3

Module 3: Value chain prioritisation

3.1 Objectives

Understand the food value chain prioritisation process

3. Collectively as a multi-stakeholder group, develop a value chain selection criteria checklist
4. To carry out a value chain prioritisation exercise

3.2 Introduction

During planning, it is important to decide the sub-sectors, products, or commodities to be prioritised for analysis. The objective specifications can be further fine-tuned to make them specific to a given sector/sub-sector. Clear objectives will simplify food value chain selection for further analysis while also guiding the greening process.

3.2.1 Participants in value chain prioritisation

For participants, having a basic understanding of the green value chain development process and the smallholder farming systems in the focus region are prerequisites for stakeholders' involvement in RSFVCD. While agricultural extensionist and smallholder farmer representatives should form the core of the participants, stakeholder mapping output from Module 1 (one) will be key in the nomination of the participants as it gives insights into/establishes various stakeholders' roles in the value chain. One or more food value chains can be prioritised based on the specific objectives set and the selection criteria developed.

3.3 Value chain prioritisation and selection

3.3.1 Synopsis

During value chain prioritisation and selection, it is important to apply the three dimensions to developing green VCs (i.e., economic,

environmental, and social aspects) while remembering that they are still interlinked, and must be considered together. Neglecting any one dimension may affect the performance of the other two dimensions, which may negate the expected benefits from RSFVCD. Therefore, the holistic approach and inclusion of all the dimensions during the VC selection phase provide a more comprehensive picture of the different value chains under consideration, allowing the greening process to better assess the opportunities and risks at an early stage.

3.3.2 Determine criteria and build an understanding of priorities

Broad examples for the selection criteria could be:

- Compatibility of crop/livestock in a production system
- Potential to generate income and simultaneously make households food secure
- Current income contribution to the value chain actors
- Potential for localised value addition (agro-processing)
- Relative lower labour requirements compared to other agro-enterprises
- Qualities/potential to rehabilitate/replenish natural resources – land, soil, and water
- Crop/livestock-specific market trends (marketability of commodity)
- Gender equality considerations
- Suitability of crop/livestock to local climate



Discuss practical examples/situations that apply to the participants' context for each of the above mentioned selection criteria.

When developing detailed VC selection criteria, the first step is to consider which features/factors are at the top of the ranking priorities and which ones have less weighting. As a second consideration, the criteria should reflect the three dimensions - economic, environmental, and social (Table 3.1).

Table 3. 1: An example of a green value chain development criteria encompassing the economic, environmental, and social dimensions.

Criteria	Sub-criteria
Economic	<ul style="list-style-type: none"> • Market demand prospects (local and/or export) • Opportunities for employment creation • The comparative advantage of production • Level of competitiveness (in comparison to competing producers)
Environmental	<ul style="list-style-type: none"> • Impact of the value chain functions on the environment • Impact of the environment on value chain functions (Low) • The vulnerability of the value chain to the (degraded) environment and climate change. • Green opportunities
Socio-cultural	<ul style="list-style-type: none"> • (Prospects for) Inclusion of disadvantaged groups (poor, women, youth, handicapped, ...) • Working conditions • Impact of the value chain on surrounding communities • Reason(s) and the need for public investment • Evidence of private sector, government and/or donors having plans for investment in the value chain



Based on the criteria guide provided in Table 3.1, discuss and come up with relevant prioritisation considerations that apply to the training participants' contexts.

To foster ownership of the process amongst the stakeholders and to ensure the relevance of the criteria for the local conditions, effort should be made to warrant that the decision on the criteria formulation is carried out in a participatory manner, such as the MSP discussion.

Table 3.2. An example of a list of value chains (livestock or crops) that smallholder farming systems in sub-Saharan Africa could consider for green value chain development.

1. Onion	2. Mango	3. Sorghum	4. Rose geranium	5. Beef
6. Maize	7. Tomato	8. Irish potato	9. Avocado	10. Sheep/goat
11. Beans	12. Poultry	13. Sesame	14. Rice	15. Dairy
16. Cowpea	17. Honey	18. Sweet potato	19. Groundnuts	20. Cassava

3.3.3: Identifying a list of potential products/activities

Once the criteria for selecting the priority value chains have been set, the next step is to make a list of all the potential value chains products/commodities feasible in the geographic area under consideration. This product list is best developed through a participatory process.

Examples of groundnut value chain products include roasted nuts, peanut butter, groundnut shells (for ruminant stock feeds), and vegetable oil.

3.3.4. Ranking of products/activities

Once listed, relative weightings of importance can be attached to each product/value chain.

For example, under the economic criteria, it may be decided that:

- “Market demand prospects” (at 30%)

- “Opportunities for employment creation” (at 30%) are equally more important than
- the “Comparative advantage of production” (at 25%) which is more important than
- the “Level of competitiveness” (at 15%)

Once the weightings have been determined, then a matrix for ranking the value chains can be constructed and analysed (see Module 5).



Exclusion criteria: Potentially may include value chains with products stagnated/falling market demand; the value chain only benefits men; crops/livestock with no potential to make a socio-economic-environmental impact; production resulting in loss of unique biodiversity.

Inclusion criteria: May include the presence of effective local service providers, profitability for chain actors, creates new jobs for disadvantaged, vulnerable groups.



Exercise 3.1: Screening and shortlisting promising value chains for greening (Prioritisation)

Assumption	<ul style="list-style-type: none">• Participants have been introduced to the green value chain development objectives.• Value chain selection criteria have been compiled.• A long list of existing and potential value chains has been compiled.
Objective	<ul style="list-style-type: none">• To help participants identify and be familiar with value chain selection criteria.• To create an opportunity for participants to practice value chain ranking based on appropriate criteria.<ul style="list-style-type: none">• To narrow down possible value chains from a long list to a shortlist.
Task	<ul style="list-style-type: none">• Identify products and undertake a ranking of these products based on chosen criteria.• Select the value chain with a higher ranking for greening.

Method	<ul style="list-style-type: none"> • Work in a small group to ensure efficiency. <p>Step 1: Peruse the greening objective and make considerations of the priorities in the ranking of a potential value chain.</p> <p>Step 2: Based on the long list of the value chains, brainstorm, and decided on the approach to a shortlist of three to five value chains.</p> <ul style="list-style-type: none"> • Option 1: Quick review: When clear evidence and well-documented information are already available, a quick review and validation may be enough in this step. It can be done by the core/selected MSP team and a small selection of resource persons/stakeholders. • Option 2: More extensive review: When sufficient data is not readily available, the long list of value chains should be screened against exclusion and inclusion criteria. Certain exclusion criteria may be applied in an exercise selected by MSP members to fill in the information gaps, which will result in a list of the strong and weak points of each value chain for each criterion and, finally, a shortlist. <p>Step 3: Brainstorm on the provided scoring criteria (Annex 2) from which one can adapt (remove, edit, or add more if necessary) depending on the uniqueness of the identified value chains. The process should be conducted in a participatory manner.</p> <p>Step 4: Score the shortlisted value chains as per the selected criteria, using scores between 1 (very low/poor) and 5 (very good/high).</p>
Tools or resources:	<ul style="list-style-type: none"> • The overall scoring criteria matrix (Annex 3) could aid in defining exclusion and inclusion criteria.
Expected output	<ul style="list-style-type: none"> • A shortlist of potential value chains for greening. • The scoring matrix with the three to five value chains scored.
Human resources:	The green value chain development core team (and a value chain consultant) - possibility of including other important stakeholders.

Refer to Annex 4 for guiding questions that inform the VC prioritisation & selection criteria



Identification of priority value chain: To make decisions on which value chains to focus on, it is important first to develop criteria for value chain prioritisation. Several criteria can be used to rank and select products. The weight of each criterion should relate to the greening objectives.

3.4 Key outputs

By the end of this module, the participants should:

1. be familiar with value chain ranking using the scoring approach
2. have gained a thorough understanding of ways to identify numerous local value chain development, including high potential for greening.

4

Module 4: Food value chain mapping

4.1 Objectives:

- 1) To understand the process of value chain mapping.
- 2) To learn how to conduct gender-sensitive value chain mapping

4.2 Introduction

Mapping a food value chain discovers the interrelationship between VC actors and VC activities as well as the identification of existing challenges/gaps. Figure 4.1 below is a pictographic example of the outcome of a value chain mapping exercise, from a smallholder farmers' perspective.

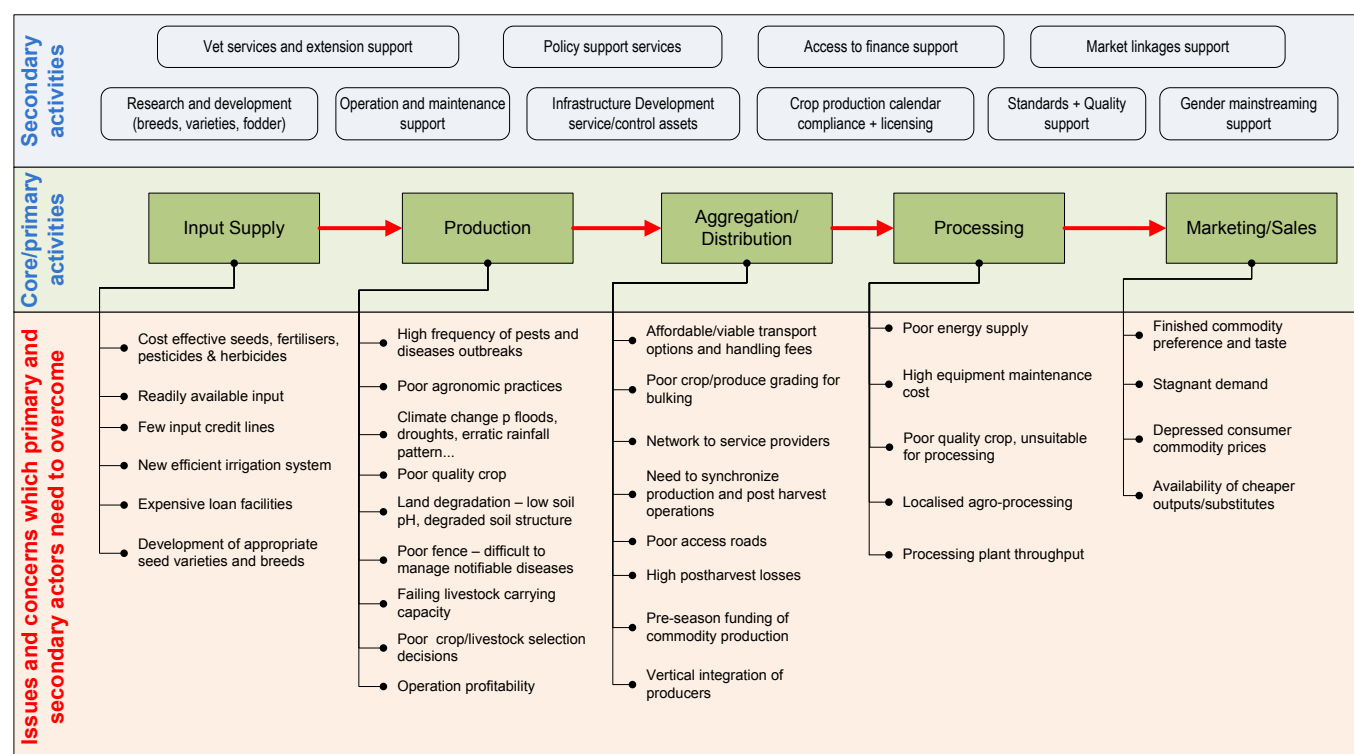


Figure 4. 1. Food crop value chain from the farmer/producer's perspective



During mapping links/functions/activities that build the value chain, challenges are merely identified between value chain players. VC analysis is responsible for quantifying the magnitude of problems and stakeholder contributions.

4.3 The significance of value chain mapping

Mapping the value chain has several objectives:

1. To gain a basic overview of the value chain actors.
2. Outlines constraints before they are analysed at length.
3. To highlight the potential for greater involvement (vertical and horizontal integration) of actors.
4. Visualise networks/connections between actors, core activities, and supporting function, which facilitate the systematic planning of future activities such as VC analysis.

4.4 Key considerations in food value chain mapping

There is no such thing as a comprehensive or all-encompassing value chain map. Rather, there are many potential scopes of the value chain that could be included in an initial mapping exercise, such as:

- the product flows,
- the actors involved in the chain,
- costs and margins at different levels, to mention a few.

It is crucial to choose the dimensions to be mapped, based on context, thus, RSFVCD objective(s), available resources, and the scope of the value chain greening.

Functional, behavioural, and institutional approaches could be taken for mapping the food value chain:

Functional approach: The approach looks at the activities (functions) that are provided within a process. For example, buying, selling, financing, transportation, banking, risk-bearing, market information, etc. There is an exchange (buying), physical (storage), and facilitating (financing) functions.

Institutional approach: This approach looks at ‘who does what’ in the process. It relates to, for example, traders, processors, retailers, etc. Other institutions can be stock exchanges, produce exchanges, banks, etc.

Behavioural approach: This approach considers the behavioural elements of the process by looking at, for example, how traders behave within the process. It also considers behavioural aspects between actors in the process by considering, for example, power structures, relationships, partnerships, etc., between farmers and traders.

The following set of questions can be generally used to capture the functional, behavioural, and institutional aspects to a food value chain map:

1. What are the core processes in the value chain?
2. Who are the actors involved in these processes, and what do they do?
3. What are the flows of products in the value chain?
4. What are the volume of products, the number of actors, and jobs?
5. Where does the product (or service) originate from, and where does it go?
6. How does the value change along the chain?
7. What types of relationships and linkages exist?
8. What types of services feed into the chain?
9. What is the location and position of the poor in the value chain?
10. What key constraints exist at various levels in the chain, and what are potential solutions to those constraints?
11. What is the impact of the value chain functions on the environment: What is the impact of the environment on value chain functions, and are there green opportunities?

4.5 Steps in value chain mapping

This training guide will discuss 8 value chain mapping steps.

4.5.1 Step 1. Mapping the core activities in the value chain

Distinguishes a maximum of five to seven core activities that the raw material is transformed through as it changes in value. These core functions will differ, depending on the characteristics of the chain being mapped. For example, Figure 4.2 shows a simple linear one-product food value chain.

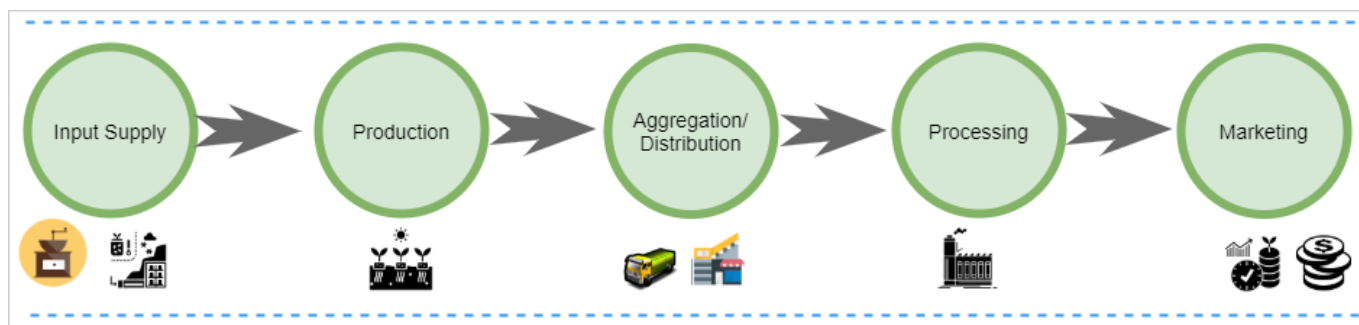


Figure 4.2. A typical agricultural commodity/product value chain, showing major processes.



In instances where there is more than one product produced from the initial raw material, each product will follow its own set of value addition activities all the way to final consumption. In such cases, the process map will be more complex and involve parallel sets of processes (see example in Figure 4.3).

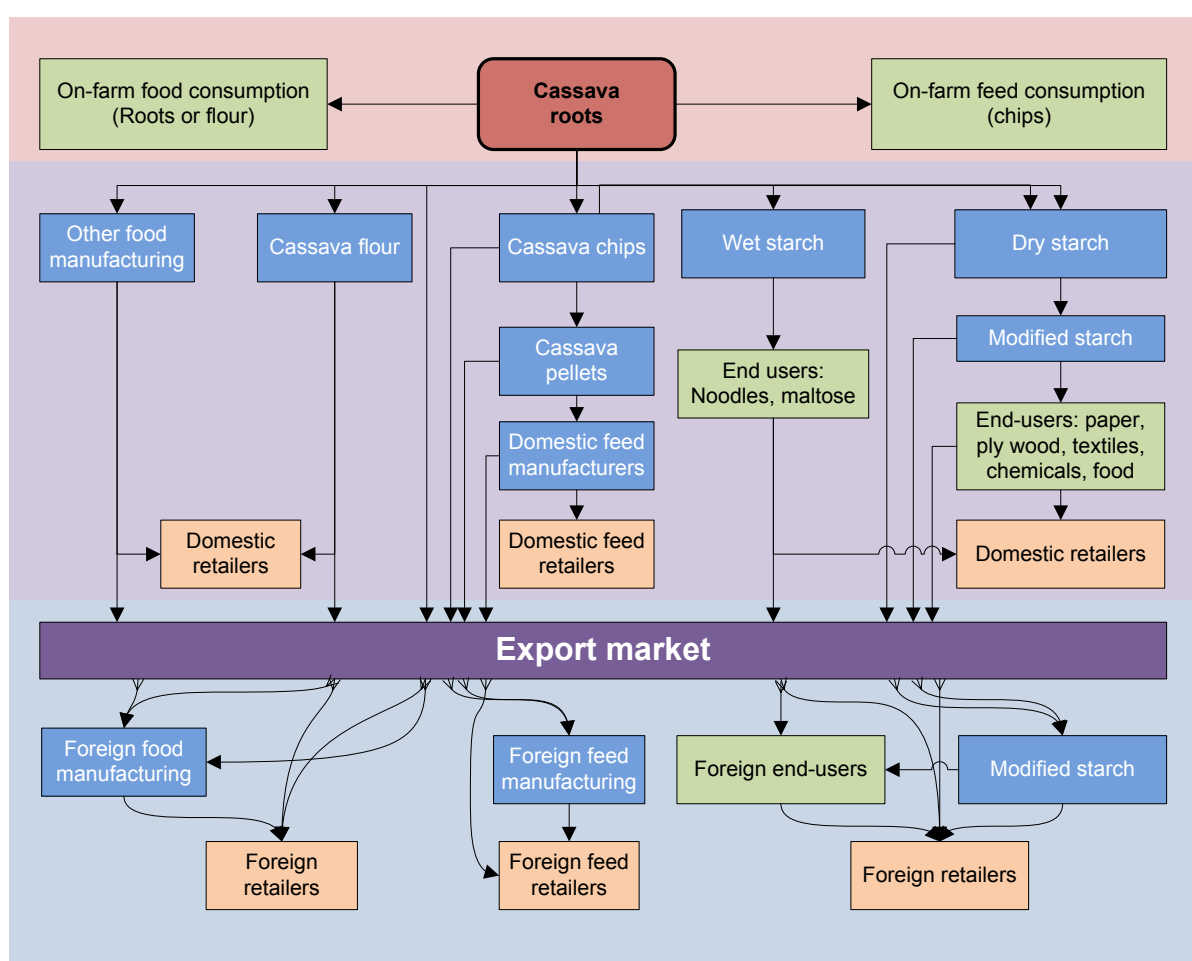


Figure 4.3. An example of a cassava value chain map (Source: Modified from M4P 2008).

4.5.2 Step 2: List the main value chain actors by name, their numbers, and the employment opportunities they offer.

This involves the identification of actors at each VC activity and what they do. At this step, value chain actors are categorised according to their main occupation. (See Figure 4.4 below). For social inclusivity, the map could be further developed by breaking down the actors into the specific social groupings reflective of their role in the VC.

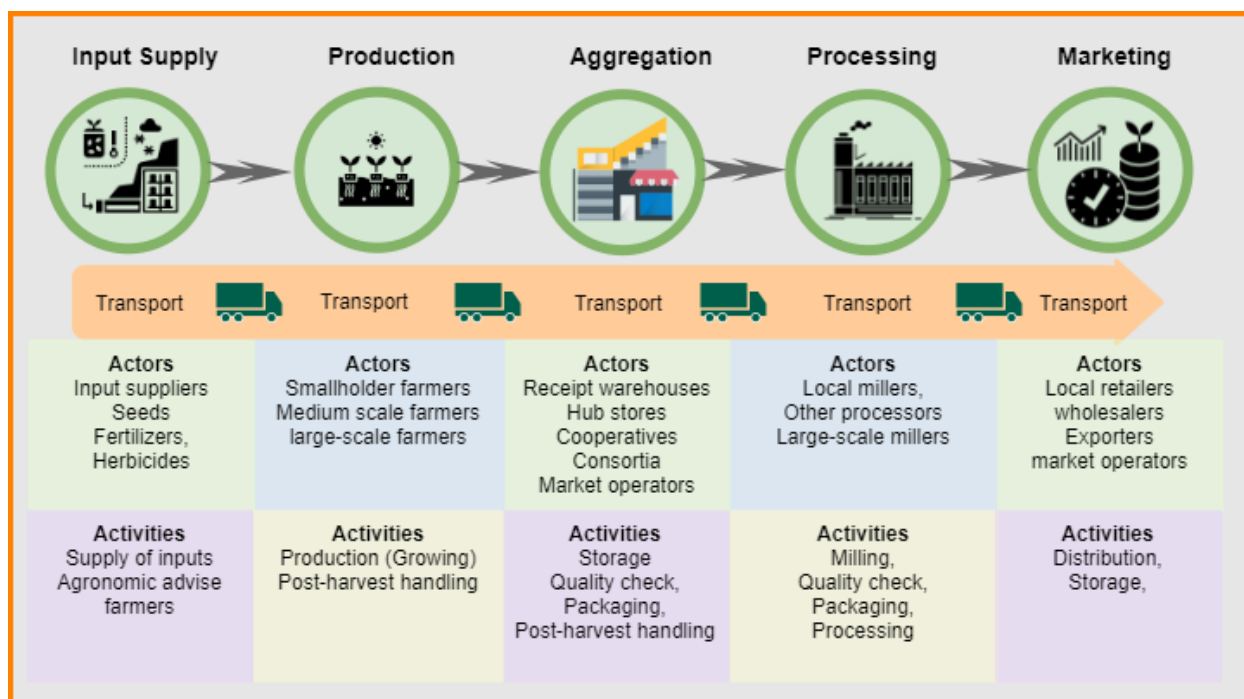


Figure 4.4. Example of VC mapping by specific activities undertaken by named actors.

4.5.3 Step 3. Mapping the flow, volume, and value of products

Once the VC activities are populated with actors, the next step is to map the flows of products through the value chain. This involves identifying the products at each stage of the process as they are transformed from inputs to intermediate materials all the way to the final product. Mapping these flows creates a clear picture of the forms of products that are handled, transformed, and transported at each process stage of the value chain and what waste products and by-products are generated. The dimension of the product volume is added to the VC map as follows in Figure 4.5.

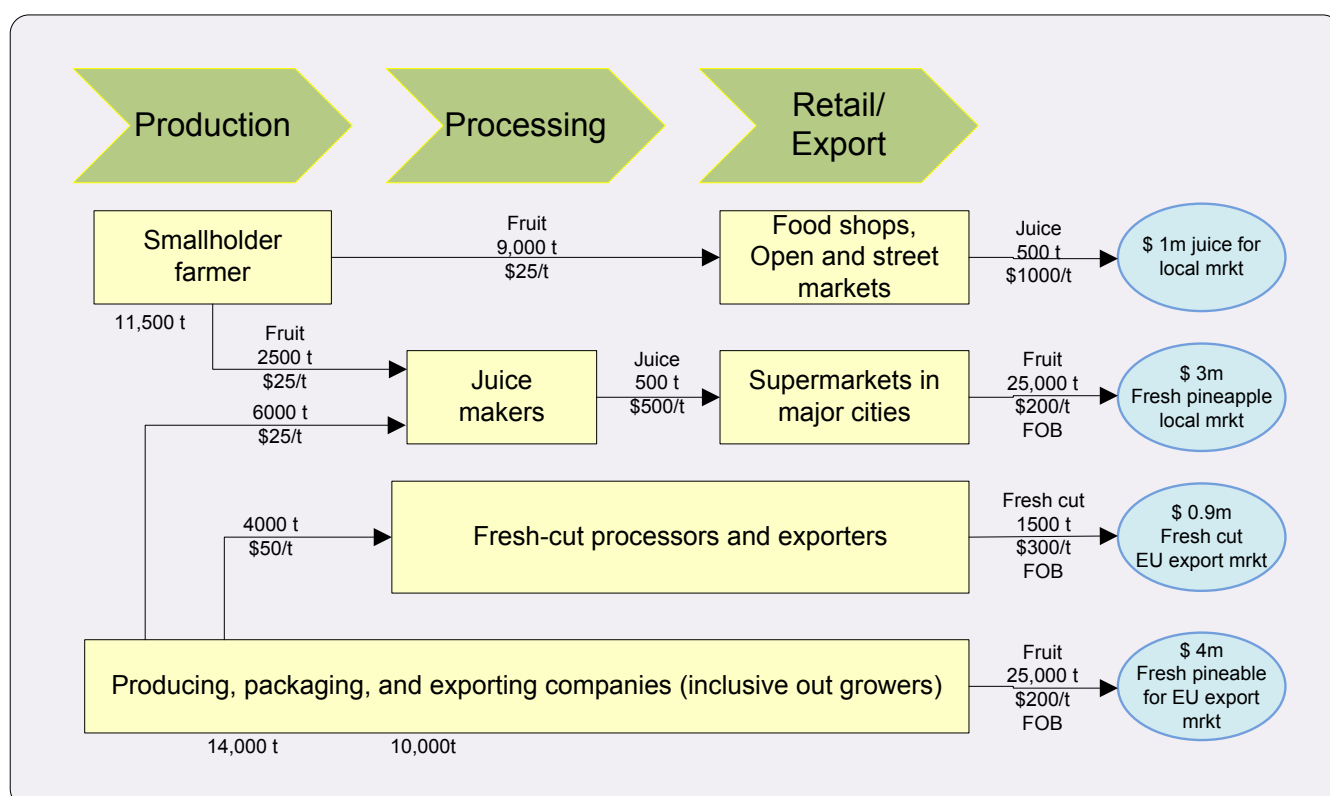


Figure 4.5. Distribution of value in pineapple value chain Ghana.

Besides volume and flow map, and to answer the question on how the value changes throughout the chain, the monetary value throughout the chain mapping can be superimposed into the flow and volume of the product map. Look at the value that is added at every step throughout the chain, providing an overview of the earnings at the different stages. Other baseline economic parameters such as revenue, cost structures, profit, and return on investment, amongst others, can also be populated.

4.5.4 Step 4: Mapping the geographical flow of the product or service

Identify where each of the VC activity is physically located (for example, where are the farms, primary processors, and secondary processors). Start at the place where inputs are produced and sourced from, to the production site, to processors, then to the intermediary trader, wholesaler, retailer, and on to the final consumer. Data are collected in terms of volume, margin, and number of actors indicating the locational or regional differences.

4.5.5. Step 5. Listing of cause of food losses along the value chain

This step lists the cause of food losses throughout the VC activities. FAO classifies the causes of food losses and food waste according to the five VC functions as given in Figure 4.6.

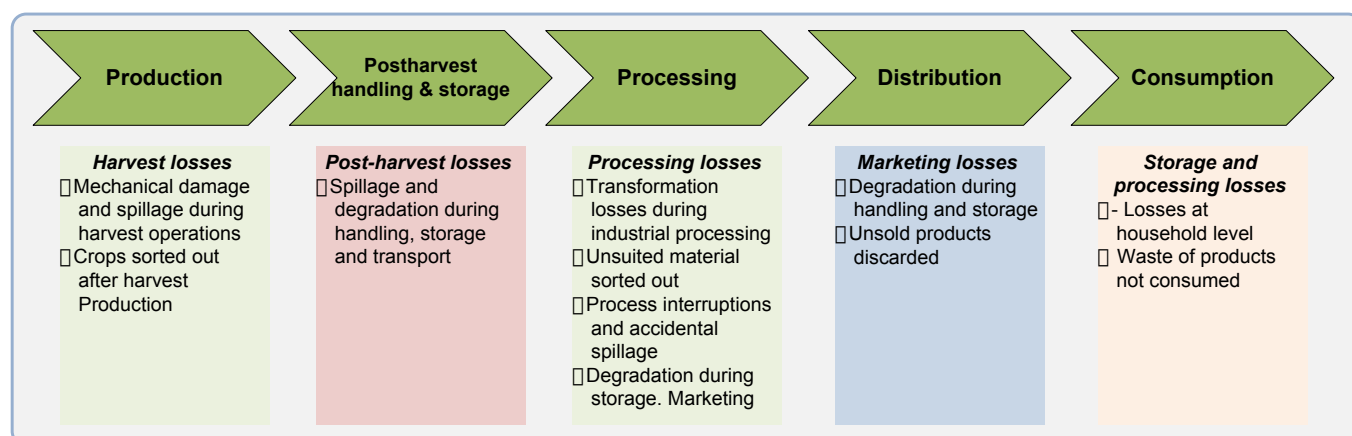


Figure 4.6. Map showing types of food losses that occur along the value chain

4.5.6. Step 6: Mapping relationships and linkages between value chain actors

Using the identified value chain actors from Step 2, outline the kind of relationship the actors have between themselves. Relationships can exist between different VC activities (e.g., between producers and traders) and within the same VC function (e.g., farmer to farmer). Relationships can be:

- 1) Spot market relations: these are once-off interactions between a buyer and seller (e.g., the dotted line in Figure 4.7). Actors make a transaction (including negotiations on price, volume, and other requirements).
- 2) Persistent network relations: actors (buyers and sellers) prefer transacting with each other time and time again. This comes with a higher level of trust and some level of interdependence. Relationships can be formalised by contracts or remain non-contractual.
- 3) Horizontal integration: collaboration between actors conducting the same roles. (see Figure 4.7).

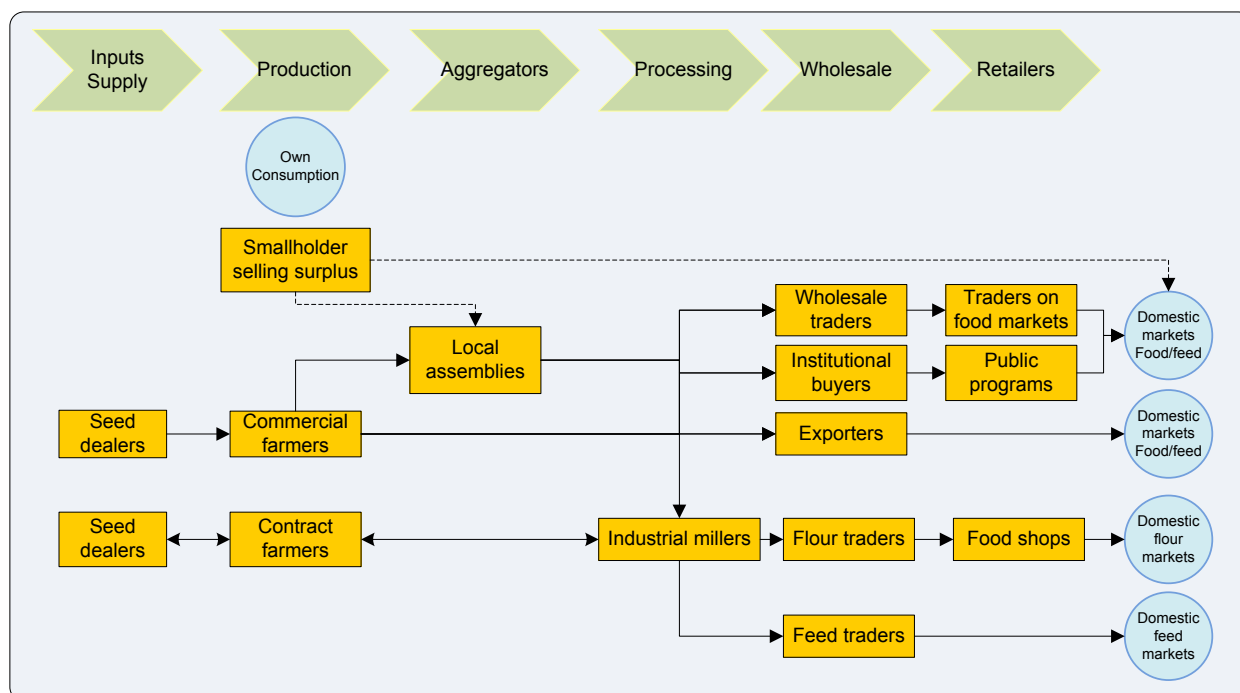


Figure 4.7. Value chain map showing generic maize VC relationships, i.e., connections between chain operators. (Principle: who buys from or sells to which operator?).

4.5.7 Step 7: Assessment of Business Development Services (BDS) that feed into the value chain

Crucial information might be found in the rules and regulations that govern (parts of) the value chain or in services that are feed into the chain. Mapping these secondary services will give an overview of the potential for interventions outside the value chain itself. (Figure 4.8).

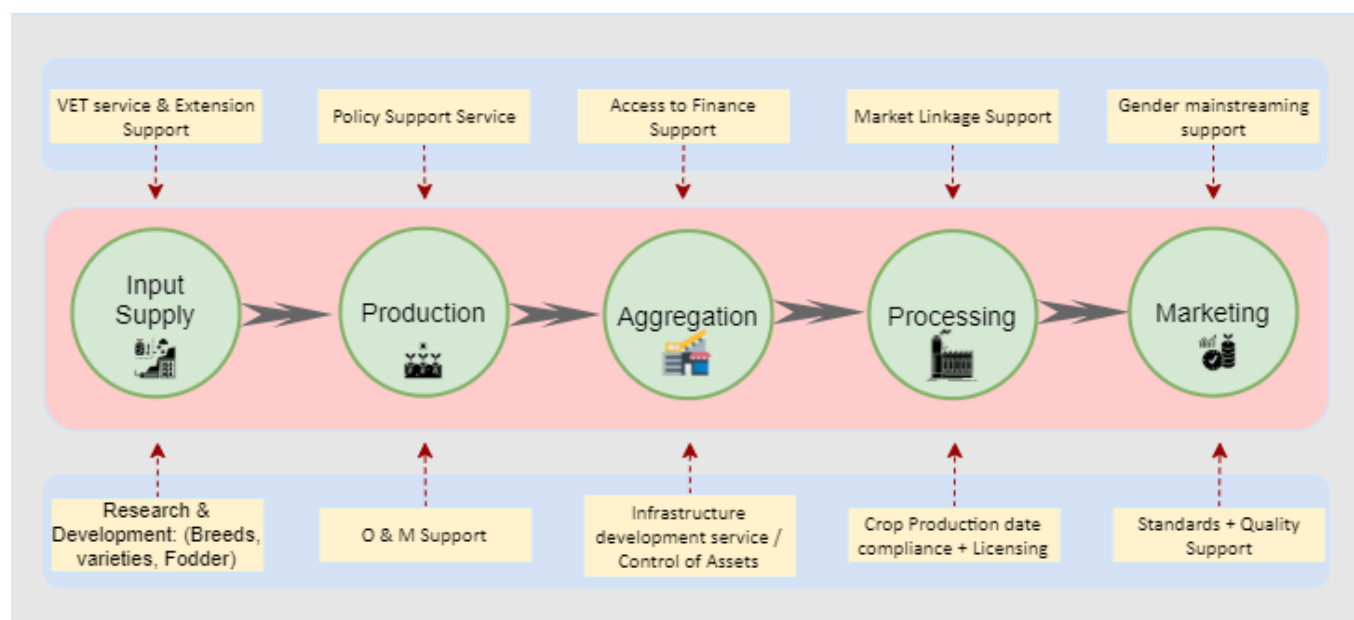


Figure 4.8. Value chain BDS map

4.5.8 Step 8: Outlining VC constraints

Constraint mapping should be tailored in line with the greening objective. Among the examples are the constraints to greater efficiency, constraints to upgrading, or constraints to greater involvement of the smallholder farmers. Below is an outline of constraints both at each VC function, and the crosscutting ones (Figure 4.9).

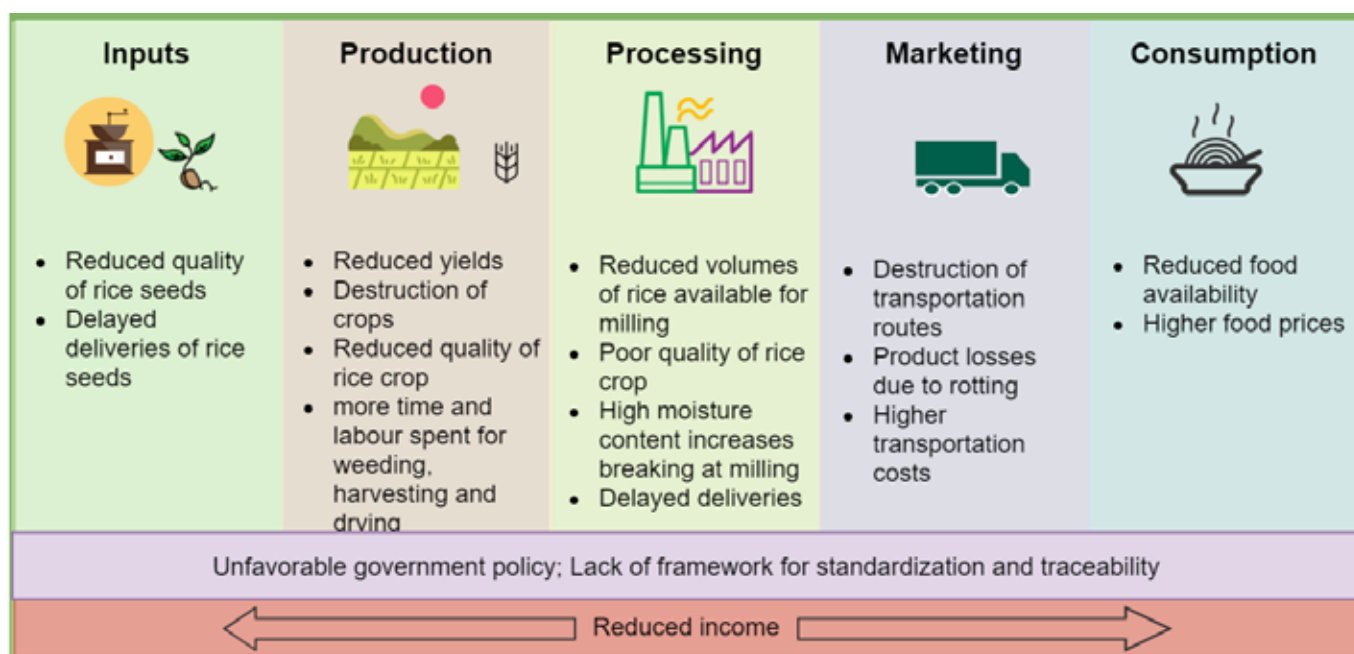


Figure 4.9. An example of constraints along the rice value chain.

4.5.9 Step 9: Gender mapping

To ensure that VC analyses use a ‘gender lens’ to gain a thorough understanding of the gender issues and respond to social realities and ensure the implementation of gender-sensitive greening development, gender mapping can be done. The gender analysis of a VC includes gender mapping, the analysis of gender roles, and the gender division of labour, the assessment of the position of women in the chain, and the institutional and legal framework. The aim is to disaggregate the value chain structure and quantification according to gender differences.

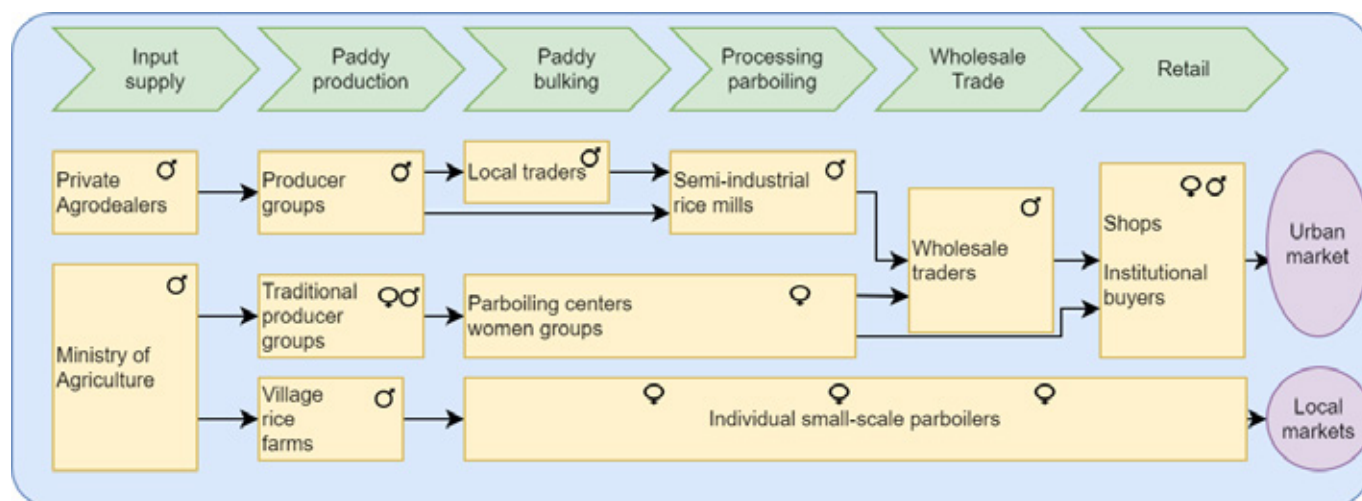


Figure 4.10. The ‘gendered’ value chain map: Showing representation of men and women in different groups of value chain operators in the rice value chain in Nigeria.

4.6. Value chain mapping results

At the end of the value chain mapping is a value chain map matrix.

4.6.1 Making a value chain mapping matrix

After mapping the selected value chain components using the developed maps, a value chain map matrix that summarises the key information from the 8-step mapping exercise in one table (Table 4.1) is populated.



The matrix forms the basis for designing questionnaires, determining which actor groups to interview, the information to be gathered, significant information gaps that exist, and the geographical locations to concentrate fieldwork in.

Table 4. 1. Value chain mapping matrix.

Parameters	Inputs	Production	Collection	Pre-processing	Factory processing
Inputs		Seed, fertilizer, plant protection drug Technique, soil, labour source Capital	Fresh leaves and buds	Fresh leaves and buds	Fresh leaves and buds Dried leaves and buds
Activities	Compost making	Producing fresh leaves and buds	Collecting fresh leaves and buds Selling to factory	Drying Preservation	Buying fresh leaves and buds Pre-processing buds Selling finished products
Outputs	Seed, fertilizer, plant protection drugs Technique, soil, labour source Capital	Fresh leaves and buds	Fresh leaves and buds	Dried leaves and buds	
Actors	Seed company Fertiliser Agency Plant protection agent Extension centre Bank, farmers (organics)	Farmer	Collectors	Some involvement	Limited (some workers)
Participation of the minorities	Not much	Planting > Management > Protection > Harvesting	Not much	Preservation difficult	
Challenges		Plant protection Difficulties in getting good quality varieties Lack of technical knowledge	Difficult to transport	Lack of funds for effective kilns	
Possible solutions		Periodical spraying Changing planting mechanism Setting up convention Technical training (plant production)	Upgrading roads	Investment in kilns	

4.7 Key outputs

- Training participants appreciate (design and baseline) the socio-economic-environmental performance indicators for the value chain performance measurement.
- The learners understand the eight steps of developing a complete value chain mapping report
- At the end of the exercise, training participants will have acquired skills critical for conducting on value chain mapping exercise.

5

Module 5: Food Value Chain Analysis & Reporting

5.1 Objective

Learn how to analyse value chain mapping data against known performance standards

1. Learn how to summarise, present and interpret summarised VCA findings
2. How to identify environmental hotspots.

5.2. Value chain analysis

Value chain analysis is a way of visually exploring how actors are performing (efficiently or inefficiently) in order to create a competitive advantage for itself. Value chain analysis helps quantify VC's potential to add value to a commodity and earn higher margins. Normally skilled consultants are hired to carry out comprehensive value chain analysis. The analysis runs along a series of core activities as well as at supporting function level. This stage provides the following outputs:

- compares the status quo against other economies/projects in different settings,
- shows the number of new opportunities, as well as show the tonnage of a commodity in deficit.
- depicts resource use/availability trends at each chain link over time – a cycle, season or year, e.g.:
 - labour shortages for agro-processing
 - and product gluts (oversupply) on to the market for a producer/aggregator

However, despite smallholder producers having limited analytical skills, they need to have some level of appreciation/knowledge of the measurement units for business performance in order for them to contribute to their own business strategy. Therefore, this part of the training aims to assist value chain actors grasp that the hired consultants' findings as well as investors' designed investment plans are based on existing opportunities.

5.3 Food value chain analysis objectives

These include:

1. Making a comparative analysis between the performance of the value chain locally against known standards from elsewhere
2. Consolidating the output and production deficit in commodity (in tonnes), for the large

community/industry/sector or country

3. Helping participants adopt and use standard indicators to quantify potential, monitor performance, and to justify activity greening.

5.4 Key considerations in food value chain analysis and reporting

In order for this exercise to be systematic, analyses will be conducted on data collated at different points along the value chains. The agenda behind value chain analysis is to quantify performance, opportunities, constraints, and the viability of existing value chain activities as well as assigning contributions to specific value chain players. Value chain analysis findings attempt to answer questions about current activity outputs compared to recommendations, in terms of commodity volume (tonnes), prices and cost of production, average income and profit/loss (in local currency), as well as the proportion of actors serving the local community.



For most VC actors, assistance/guidance from a qualified value chain development or agribusiness specialist is required when conducting the VC analysis exercise. The intention is to assist stakeholders that are less familiar with the VC concept by capacitating them with basic skills to embrace and interpret VCA findings and subsequently contribute to value chain greening.

5.4.1 The roles of core value chain activity analysis

Value chain analysis at all levels draws a comparison between performances in different geo-locations or different management styles and technologies. Below are some indicators used to compare performance across the entire value chain. The indicators used are either qualitative or quantitative.

1st - Input supply activity indicators:

Examples of performance comparison are poor seed germination rate (%), poor adaptability to environmental conditions measured in yield rate (e.g., kg/ha), and pest & disease tolerance.

2nd – Production activity indicators:

Some of the qualitative metrics/indicators include poor management, low literacy, inability to calibrate equipment, use of obsolete technology, sources of labour, number, and distribution. Yield in tonnes, livestock mortality rate (%), average land use, cost of labour. Some proxy indicators such as % malnutrition can be used to assess food insecurity within a community

3rd – Aggregation activity indicators:

Commodity collection sites availability/ accessibility, ease of producer mobilisation, grain quality: % moisture content, strenuous matter content, postharvest losses (kgs or %)

4th Agro-processing activity indicators:

Obsolete equipment, availability/lack of new technology, affordability of technology Agro-processing throughput (kg/day), Rate of Return on Investment (R.o.I) as a %

5th Marketing activity indicators:

Accessibility, good/poor market linkage
Market share, supply deficit (%), market growth

5.4.2. Analysis of the VC's support activities

Value chain analysis, when focusing on a single value chain, draws comparisons between eco-socio-environmental performances of value chain activities in different geo-locations or under different management.

5.4.3. Comparison by Weighting

This analysis method may be considered when making comparisons of several value chain functions across several criteria/metrics. Weighting is used to arrive at aggregate scores/rankings for various VCs by ensuring that the value chain with the highest average score across metrics is considered a priority VC for the greening exercise.

The Weighting Criteria

Weightings can be assigned an absolute numeric score, for example, 1, 2, 3, or 4 or proportionate, where all the criteria have a combined weighting of 100%. For example, with proportionate weighting, if there are three criteria, i.e., Economic, Environmental, and Social and depending on the objective, value chains could be weighted as:

- Criteria 1/Economic (30%);
- Criteria 2/Environmental (50%) and
- Criteria 3/Social (20%).



Table 5.1. A snapshot, only selected criteria (randomly generated).

	CRITERIA	WEIGHT	CASSAVA	MAIZE	COWPEAS	RICE	MANGO	LIVESTOCK
ECONOMIC	Market demand prospects (local and/or export)	8%	3	4	1	2	2	5
	Opportunities for employment creation	8%	5	5	3	2	3	5
	Comparative advantage of production	7%	3	3	3	5	5	1
	Level of competitiveness (in comparison to competing producers)	7%	1	1	2	3	3	1
	Sub-Total	30%	0.92	1	0.67	0.88	0.96	0.94
ENVIRONMENTAL	Impact of the value chain functions on the environment	12%	3	3	5	3	3	2
	Impact of the environment on value chain functions (Low)	12%	1	2	2	2	4	5
	Vulnerability of the value chain to the (degraded) environment and climate change.	12%	2	4	4	3	4	5
	Green opportunities	14%	1	2	2	1	4	5
	Sub-Total	50%	0.86	1.36	1.6	1.1	1.88	2.14
SOCIO-CULTURAL	(Prospects for) Inclusion of disadvantaged groups (poor, women, youth, persons living with disability)	4%	2	2	4	4	5	5
	Working conditions	4%	5	5	2	3	1	2
	Impact of the value chain on surrounding communities	4%	3	3	5	1	2	2
	Reason(s) and need for public investment	4%	1	1	5	1	5	4
	Evidence of private sector, government and/or donors having plans for investment in the value chain	4%	1	3	1	5	4	5
	Sub-total	20%	0.48	0.56	0.68	0.56	0.68	0.72
	TOTAL Score	100%	2.26	2.92	2.95	2.54	3.52	3.80

5.5 Environmental Impact and Externality Analysis

All value chains are rooted in the natural environment without which the production of goods and services would not be possible. Operators source materials and energy inputs from nature and feed them into the agribusiness processes, which means they benefit from ecosystem services. In addition to physical goods and commercial services, reduction in raw waste disposed and GHG emissions of operators are also considered as value chain output categories as they affect the ecosystems at the local level. Another category is the waste generated by the consumers of the product.

5.5.1 Hot Spot Analysis (HSA)

The environmental considerations for RSVCD have three features:

Feature 1: Value chains causing negative impacts on the environment (Sustainability) – Type 1

- The value chain should be environmentally friendly, i.e., economic development should be as resource-efficient as possible, or, if this is not feasible, fully account and compensate for

the imposed environmental costs

Feature 2: Value chains affected by climate change and environmental degradation (Resilience) Type 2.

- The value chain should be able to resist, circumvent or compensate for climate change and increasing resource scarcity

Feature 3: Value chain services and products that compensate for the negative environmental impacts (Greening opportunities).

- Introduction of innovative technologies, products, and services necessary for the greening of the food value chain such as promotion/introduction of:
 - renewable energy
 - technologies that reduce emissions
 - technologies that reduce waste
 - services that increase resource use efficiency



Hot spot analysis (HAS) is qualitative in the sense that it categorises the environmental impacts into degrees of severity using a scale of (1) to (3), with each degree corresponding to a qualitative description.

Table 5.2. Interaction between value chains and the environment

Value chains causing negative environmental impacts on the environment (Sustainability)	Value chains affected by adverse climate change and environmental degradation (Resilience)	Value chain services and products that compensate for the negative environmental impacts (Greening opportunities)
<ul style="list-style-type: none"> • Production, marketing, and consumption damage the environment (soil erosion, pollution, etc.) • High, uncompensated GHG (CO₂, methane, and others) • Wasteful utilisation of scarce resources (especially water) • Generation of harmful waste 	<ul style="list-style-type: none"> • Directly: <ul style="list-style-type: none"> • Reduced productivity • Increasing production costs and risks <ul style="list-style-type: none"> • Food insecurity • Indirectly: <ul style="list-style-type: none"> • Rising resource prices (water, energy, raw materials, waste disposal) • Changing consumer demand 	<ul style="list-style-type: none"> • CO₂ sequestration and sale of carbon credits • Supply or use of products and services conducive to a green economy (environmental technology, technology for renewable energy production and services, organic agriculture, eco-tourism)



Although the general value chain development methodology applies, a special focus on the market potential for new ‘green’ products is emphasised.

5.5.2 Steps to evaluating the negative impact of the value chain activities on the environment – (Type 1)

Step 1: Define the value chain activities (product life-cycle phases) and environmental and resource categories (this outcome populates Table 5.3):



For each sector, the value chain activities, environmental and resource categories need to be defined prior to attempting to carry out the HSA.

Table 5.3. Assessment of causality impacts of the value chain activities on the environment component.

Sector:	Value chain stages				
Resource categories	Inputs supply (description)	Production	Aggregation/ Distribution	Processing	Marketing
Material consumption	description and assessment				
Energy					
GHG Emissions					
Water consumption					
Land (erosion, pollution)					
Air pollution					
Water pollution					
Waste					
Biodiversity					

Rating scale: 0: not relevant, **1:** low, **2:** medium, **3:** high

The last column is meant for details of technologies in use and how they influence the rate of pollution or energy consumption

Step 2. Determine Type 1 (sustainability) environmental hotspot’s relative influence on the core value chain functions/activities (Table 5.4)

- 1) Classify an environmental impact in terms of its consequences on the environment:
 - a. One criterion is the level of resource consumption (usage) or the resource intensity, compared to technical alternatives or other value chains.
 - b. Another criterion is the damage or the potential damage to local ecosystems.
- 2) Estimates the significance of the impact for the environment:
 - a. The higher the share of the resource consumption is in relation to the stock of the resource available at local, national and global levels, the greater the significance.
 - b. Also, determine whether the damage to ecosystems is acceptable given the ecological limits.
- 3) Combine the results of steps 1 and 2.
 - a. To determine a hotspot, multiply the numbers of both rankings, i.e., the points assigned to resource consumption (1) by the points assigned to the ecological capacity (2).
 - The result is a number between 1 and 4, 6, or 9, and a big total (6 and 9) signifies a hotspot.

Table 5. 4. Determining Type 1 environmental hotspots

Step 1: Assessing the level of resource utilisation (demand on the resource)	Step 2: Assessing the significance of the environment (ecological capacity)	Step 3: Identification as “hot spot.”
Criterion 1: Resource intensity (water, energy/carbon emission, materials) used per unit of product, in comparison with other VCs and technical alternatives: <ul style="list-style-type: none"> ✓ High resource intensity (3) ✓ Medium resource intensity (2) ✓ Low resource intensity (1) 	Resource consumption in relation to the stock of resources available at the local, national, or global level: <ul style="list-style-type: none"> ✓ Resources used (almost) completely (3) ✓ Competition for resources (2) ✓ Reserve still available (1) Modified by social consideration <ul style="list-style-type: none"> ✓ Competition with other local needs (1) ✓ The priority of local needs over global goals (0) 	e.g. 3 x 2
Criterion 2: Potential damage to the local ecosystem (deforestation, pollution, loss of biodiversity/ecosystem services) <ul style="list-style-type: none"> ✓ Complete loss of ecosystem services (3) ✓ Significant damage (2) ✓ Interference with the ecosystem (1) 	Potential damage in relation to the local limits of ecosystem use: <ul style="list-style-type: none"> ✓ Damage unacceptable (3) ✓ Damage can be compensated (2) ✓ Damage within limits, fully reversible (1) 	
The higher number of both criteria (between 1 and 3)	The higher number of both criteria (between 1 and 3)	Product of steps 1 & 2

Step 3. Determine value chains affected by climate change and environmental degradation (Type 2) (Table 5.5)

Type 2 analysis assesses the adverse impacts of climate change and environmental degradation on the food value chain. It attempts to quantify the prevailing technical and market risks.

- Some impacts are direct,
 - e.g., 1. crop failure as a result of erratic rainfall,
 - e.g., 2. as declining soil fertility leading to agricultural productivity decline,
- While other impacts are felt indirectly, such as hailstorm that will cause tomato fruit/flowers to drop.
- The severity of the problem is realised through:
 - increased costs and lower profitability,
 - a shortage of raw material supply,
 - untenable livelihoods of smallholders or workers,
 - and subsequent migration.

Such issues could lead to a loss of sustainability if no proper action is taken to address them.

The process of assessing the impact of the environment on the food value chains can be summarised into three steps, see table below:

Table 5. 5. Determining Type 2 environmental hotspots

Step 1: Assessing the impact on VC operations	Step2: Assessing the adaptive capacity	Step 3: Identification as “hot spot”
Criterion: Exposure and sensitivity of VC operations to the environmental impacts: <ul style="list-style-type: none"> ✓ Severe shortages/high cost/high risk of production losses (3) ✓ Significant shortage costs and risks (2) ✓ Minor impact, medium to long-term (1) 	Possibility of adapting to resource scarcity: <ul style="list-style-type: none"> ✓ Low adaptability – resource or ecosystem service (1) indispensable and the value chain cannot compensate shortage (3) ✓ Medium adaptability – adaptation is possible at a high cost (2) ✓ High adaptability – the resource or ecosystem service can be easily replaced; adaptation possible at an acceptable cost (1) 	
The score between 1 &3	The score between 1 &3	Product of steps 1 & 2



Adaptive capacity evaluation should be guided by expert knowledge. For instance, many severe water and energy problems may turn out to be solvable with better technology, and due to the ability to adapt, hence, instead of low adaptability, it ends up being rated 1, for high adaptability.

Step 4: Determine value chain services and products that contribute to the creation of a green economy

In this section, the private sector identifies business opportunities in climate change and environmental degradation related challenges (Table 5.6).

- Energy efficiency enhancements: minimum tillage reduce the use of fossil fuel used
- GHG emission-reducing technologies: e.g., conservation agriculture-related technologies, have the potential to reduce GHG emissions in the production stage of the value chain
- Renewable energy opportunities: technology developers and providers, service providers
- New innovative products and services: development of clean technology (e.g., ISFM), organic agriculture, certification bodies.

Table 5.6. List of (new) green opportunities for services and/or products

(Unmet) Demand or problem	Related green product/ service What	What is the ‘green gain’ (compared to its non-green competitor)?	Who are the buyers of this service/ product (give examples)	Why is the product/service produced in this country or region? What is its relative competitiveness?



Exercise 5. 1: Environmental hot spot analysis

Assumption	That the participants have been taken through the basics of hotspots. The output of modules four has been availed to the participants.
Objective	To equip participants with basic skills on how to capture different dimensions of a value chain.
Task	To map the environmental hotspots of a selected food value chain
Methods	<ul style="list-style-type: none"> • Work in a group. <p>1st step: Define the value chain stages (life-cycle phases) and environmental and resource categories.</p> <p>2nd step: Specify the relevance of each resource category at every stage of the value chain.</p> <p>3rd step: Determine Type 1 (sustainability) environmental hotspot</p> <ol style="list-style-type: none"> 1) Classify an environmental impact in terms of its consequences for the environment: 2) Estimates the significance of the impact for the environment: 3) Combine the results of steps 1 and 2. <p>4th step: Value chains affected by climate change and environmental degradation (Type 2).</p> <ol style="list-style-type: none"> 1) Assess the severity of the environmental impacts on the value chain. 2) Asses the adaptive capacity. 3) Combine results of step 1 and 2. <p>5th step: Prepare a hot spot analysis matrix.</p> <p>6th step: Identify value chain services and products that contribute to the creation of a green economy.</p> <p>Step 7: Prepare the results on a flipchart.</p>
Expected outputs	<ul style="list-style-type: none"> • Hot spot analysis matrix.



5.6 Value chain analysis reporting

Table 5.7. Outline of a VCA report

Introduction	The introduction provides background information regarding the VCA. It describes the context of the study, including the nature and composition of the MSP, and the duration of the VCA exercise. It should also include a problem statement and outline the purpose and objectives of the VCA. Also, give a summary of the report in the introduction.
Methodology	This section covers the VCA methodology. Emphasis should be placed on the methods or tools used for data collection and analysis. Sources of secondary and primary data and information is described.
Analysis and findings	Present the findings of the analysis: <ul style="list-style-type: none"> • MSP composition • Stakeholder maps • List of prioritised value chains (based on scoring matrix output) • Complete value chain mapping matrix (based on relevant value chain maps) • Hotspot analysis results
Conclusions	Summarise the key findings of the VCA and their implications on the green value chain development process. NB: the conclusions should be based on hard evidence gathered during the VCA process, rather than on the subjective opinions of team members or key informants.



Recommendations	The recommendation should be presented in line with the green food value development objective. 1. With clear evidence, it should provide: <ul style="list-style-type: none"> • Value chains' current performance, • Opportunities, • Challenges 	
	Challenges	Opportunities
	Poor energy	Green Growth Fund
	Expensive transport for in-puts and to market	Affordable Input loans
	Poor access/farm roads	Agriculture Subsidies/ primary processing?
	Inefficient irrigation system	Environmental finance
	Expensive agriculture loans	Fixed Asset fund/microcredit
	Shortage of agricultural in-puts seed & chemicals	Irrigation Fund/Guaranteed funds
	Poor Livestock Breeds	Livestock Restocking fund
		Market development
	Non-viable market Prices and poor market terms	New Offtake markets
	Poor Access to market info	Contract farming
	High post-harvest losses	ICT Platforms & messaging
		Marketing Platforms
	New pest and diseases without known treatment	Aggregation Centre
	High Pest & Disease out-break frequency	Capacity/ Skills Training/ Immunization programs
	Poor agronomic practices	Agro-processing
	Land degradation – low pH & poor soil structure	Good Agricultural Practices (GAPs) in Crop & Livestock
	Climate Changes – floods & midseason droughts	Disaster Monitoring
	Declining livestock carry-ing capacity	Postharvest Management
	Poor crop /livestock selec-tion decisions	Soil Analysis
		Crop Protection
		Climate Change responses
		Business Management
Secondary information sources	These include other studies, reports, data time series, and web pages – that should be listed in a references section in alphabetical order.	

References	<ol style="list-style-type: none"> 1. The number and nature of the annexes will vary according to the information authors wish to avail. The report may include annexes on Multi-stakeholder analysis matrix 2. Economic evaluation checklist 3. Environmental evaluation checklist 4. Social evaluation checklist <p>Overall score matrix</p>
Annexes	

5.7. Key outputs

1. Value chain Demo Analysis Conducted
2. Summary of Results or VCA Reports populated/compiled.
3. Hot spot analysis procedure (qualitative approach).





6

Module 6: Value Chain Greening Strategies

6.1 Objective

1. To understand how to formulate greening strategies for identified opportunities and challenges.
2. Ability to interpret and implement VC experts/consultants' value chain development recommendations/greening strategies.
3. To demonstrate how to engage the private sector in smallholder producers' inclusive initiatives.

6.2 Introduction

The development of greening objectives is informed by outputs from Modules 3, 4, and 5. It is important to ensure that the greening objectives set are always S.M.A.R.T. The next step succeeding the greening objective setting is the greening strategy formulation. However, the successful adoption of any FVC greening strategies depends on value chain actor buy-in.

6.3 Strategy formation

VC strategy development should speak to those economic-socio-environmental dimensions of project impact and also generate incentives (greater profits – financial and non-financial) for all value chain actors involved in the greening initiatives, including smallholder farmers. The vehicles for good greening strategies are transformative business and financial models, as well as competitive market linkages.

Given the fact that the GEF IAP FS pilot is smallholder producer-focused, there are two main strategy options that this manual will discuss:

- Improving value chain performance
- and curing market failures.



Green solutions are in production technology, the organisation of business processes, and consumption habits that aim at reducing inputs, reusing material, maintaining equipment and productive capacity, and recycling waste. By-products are not considered as waste but as raw materials that enter another value chain, thus capturing value from waste.

A good greening strategy flourishes on strong business cases that leverage on the most innovative resource-saving technology(ies), and take into consideration the costs, benefits, and the possibility of harmonised economic, ecological, and social interests.



In scenarios where economic and environmental objectives are in conflict, win-win conditions must be distinguished. VC greening strategy designs target economic and environmental benefits, while the socio-benefits are usually treated as secondary benefits except in cases where gender equality, income and resource distribution become less equitable.

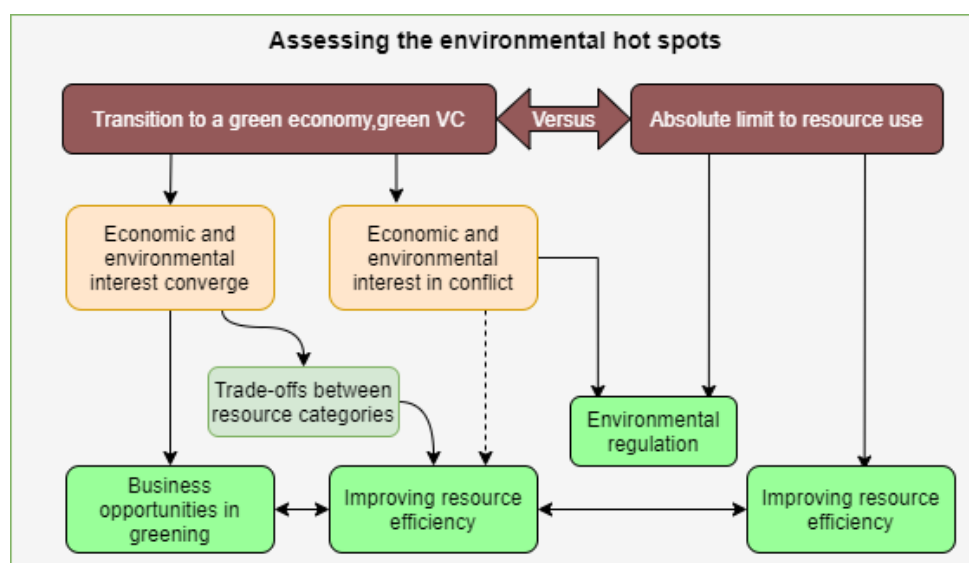


Figure 6.1. Strategic considerations for greening value chains. (Source: Adapted from Springer-Heinze, 2018).

6.3.1 Strategic option 1. Management of natural resources and ecosystems

If the analysis of environmental impacts detects local limits of resource use, then, the focus should be a spatial development strategy to protect the natural resources and ecosystems in the areas where the value chain operators are located.

According to GEF-UNDP (2017)¹, below are some important examples of ecosystem management strategies that food value chain greening stakeholders may consider during the development of RSFVCs:

- Sustainable land management (SLM)
- Climate-smart agriculture (CSA)
- Integrated landscape management (ILM)

Sustainable land management (SLM)

Across a range of different land management units, SLM is vital to the achievement of sustainable landscapes. It promotes various practices that preserve and enhance ecosystem services in all land-use systems. These practices allow the same area of land to produce an increased output by using resources more efficiently and reducing negative environmental impacts and externalities. SLM interventions can, however, be broadly broken down into two management techniques:

- Improved soil water management:
 - including proper soil preparation,
 - crop selection
 - timing of planting to reduce run-off
 - mulching and intercropping
 - utilise available water resources, even in the absence of irrigation.
- Improved soil management:
 - No over-use/inappropriate use of fertilisers,
 - crop rotation,
 - intercropping with leguminous species,
 - reduced tillage,
 - incorporation of agricultural residues, composting
 - Integrated soil fertility management.

Integrated landscape management (ILM)

ILM uses the entire landscape or place-based ecosystem planning to shape development projects, thereby contrasting with sector-based approaches (e.g. water, health, agriculture). The

landscape approach offers tools for allocating and managing land to achieve economic, social, and environmental objectives in areas where agriculture and other productive land uses compete with environmental and biodiversity goals. Evidence shows that farmer-managed natural regeneration contributes to food security by improving the fodder available to animals, reducing the loss of fertile topsoil, and rising incomes, while adaptation to climatic variability is enabled by diversifying local livelihoods. The ILM approach originated from biodiversity protection and conservation organisations but is increasingly popular among governments and the scientific community given the simplicity of the practice.

Climate-smart agriculture (CSA)

Climate-smart agriculture is a relatively newer concept with a strong focus on tackling negative climate impacts and conserving agricultural water and soil resources as well as the ozone within a specific locality or value chain. It is a holistic approach that “integrates the three dimensions of sustainable development by jointly addressing food security and climate change challenges. It is anchored on three pillars, namely:

1. sustainably increasing agricultural productivity and incomes,
2. adapting and building resilience to climate change and
3. reducing and/or removing greenhouse gas emissions, where possible.”

6.3.2 Strategic option 2: Improving resource efficiency

Enhancing the resource efficiency of the value chain is the basic strategy for greening and a core element in a circular economy. This option relies on resource-use efficient technologies, such as:

- Energy-saving technology, which reduces emissions and saves money at the same time
- Water use efficiency to overcome increasing water shortages

To arrive at technical and organisational innovations that improve the water, energy, and material efficiency, there is a need to determine the sources

¹GEF-UNDP (2017) Study on Options and Opportunities to Make Food Value Chains More Environmentally Sustainable and Resilient in sub-Saharan Africa

of waste and by-products along the value chain that may be transformed into raw materials in other processes.

To enhance productivity through some improved resource use, the following VC greening strategies may be used:

- On-farm diversification
- Off-farm diversification
- Sustainable intensification

On-farm diversification

It refers to the maintenance of multiple sources of production and varying what is produced across the farming landscape and over time. These types of diversification (on-farm temporal diversification (e.g., crop rotation) and on-farm spatial diversification (e.g., intercropping, mixed farming)) are employed at the plot or farm levels.

They allow farmers to adapt to changing climate and weather variability while enhancing the productivity of their livelihood components and spread production and/or product risks. Diversified agricultural systems contribute to resilience in a multitude of ways, ranging from pest and disease suppression to increased production and climate change buffering.

Diversified agroecological systems can work for smallholders as well as industrial farms. More concretely, this means the use of locally adapted varieties and species, more labour-efficient systems and technologies, a maximisation of multiple outputs, and low external inputs. The basic idea is that agricultural systems should be redesigned

to maximise biodiversity, stimulate healthy ecosystems, and secure livelihoods.

Sustainable intensification

It brings together the practices that optimise production relative to inputs, including land, water, fertiliser, and improving the livelihoods of farmers, while minimising negative impacts and externalities, such as pollution or deforestation. In other words, it means making more efficient use of the land available, which often requires access to new, improved seed, varieties, and new technologies. Although sustainable intensification is a promising pathway to food security, environmental sustainability, and resilience, “it should go beyond top-down technologies for production and embrace holistic approaches including indigenous knowledge, practices and solutions” (AGRA, 2016). Requirements include better use of improved seeds and fertilisers. There is a transition from a traditional, subsistence-oriented rural economy to market-driven value chains.

Integration of Diversification and Intensification of VC activities

- The transition from the single current value chain activity (of crop-livestock production, position A in Figure 6.2) to multiple value activities needs a greater resource base and the concerted effort and incentivisation of actors – private sector companies, consumers and government to attain sustainable development. There are two types of VC activity integration:
- Vertical and horizontal integration (see Figure 6.2).

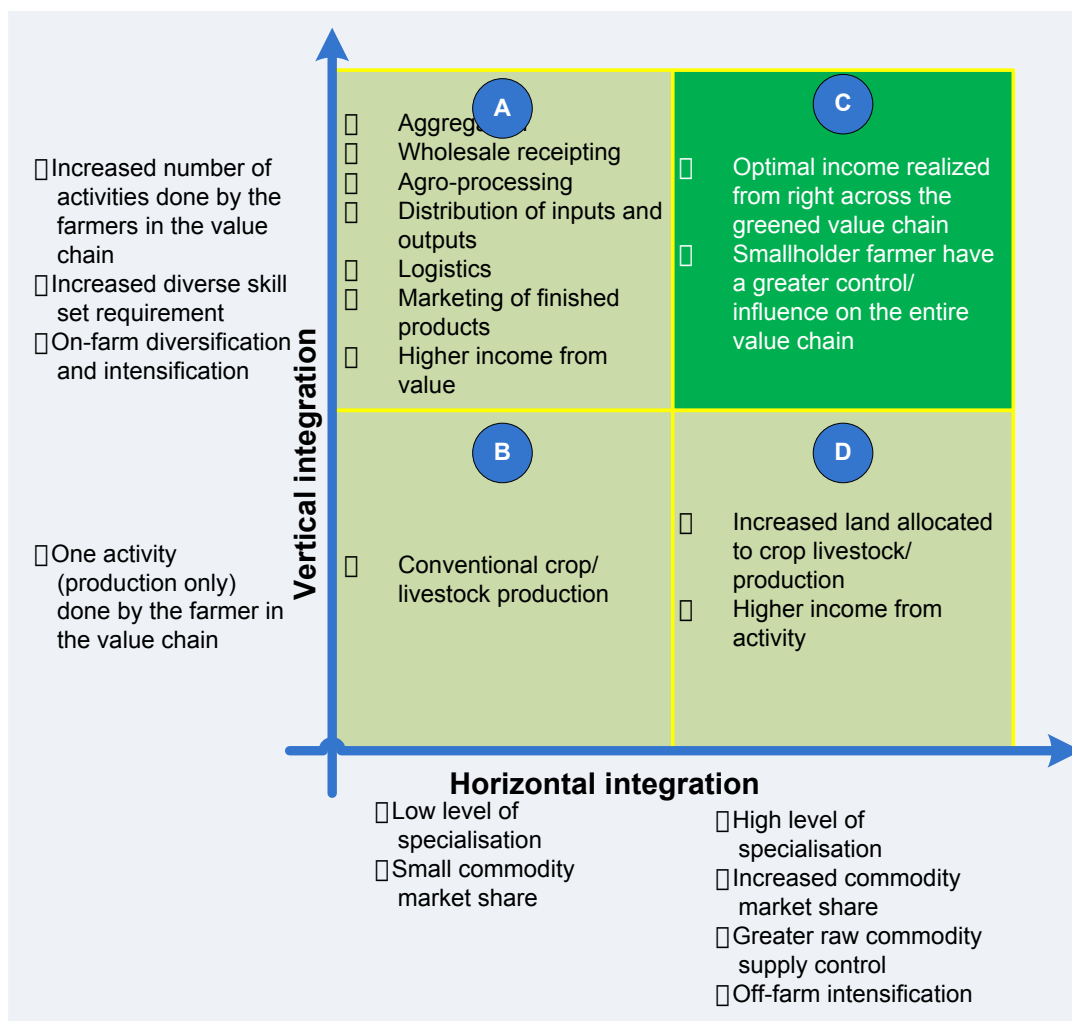


Figure 6.2. Value chain greening progression.

6.3.3 Strategic Option 3: Environmental regulation policy

In scenarios where there are no incentives for the value chain operators to support a greening strategy, situational policy and regulatory frameworks become paramount for resilient and sustainable food value chain development. Environmental policy can influence value chain greening initiative in two ways:

1. Positive incentive, public payments enabling green investment.
2. Taxation or environmental legislation.



Regulatory instruments include:

- Environmental standards,
- Investment aids covering part of the cost of equipment,
- Environmental taxes,
- Restrictions on land use,
- Outright bans on certain products and technologies etc.



Exercise 6.1. Pre-VC greening strategy scoping

Assumption	Basic concepts of greening strategies have been provided/explained to the participants.
Objective	To train participants on how to collect intel that (is required and) will inform the greening strategy formulation.

Task	How to use VCA findings and recommendations for greening strategies
Suggested procedure	<ul style="list-style-type: none"> • Work in groups. <p>1st step: From the list of the selected value chains, choose one value chain product of interest.</p> <p>2nd step: Assess the growth potential of the value chain chosen</p> <ul style="list-style-type: none"> ✓ Which factors drive demand growth in general? ✓ How important are they for the value chain? ✓ Which opportunities for growth exist? <p>3rd step: Assess the selected value chain's competitive advantages:</p> <ul style="list-style-type: none"> ✓ Can the value chain respond to market trends and requirements? ✓ Which competitive advantages does it command? ✓ What are the competition-related constraints in agri-food product sales? ✓ Is there growth in consumer demand for climate-sensitive food products? (Product availability and or awareness, import competition, income growth). <p>4th step: Assess the existing gaps in the selected value chain:</p> <ul style="list-style-type: none"> ✓ How does the position of the value chain compare with the possibilities for economic growth? ✓ Which constraints, needs, and opportunities must be addressed, and how big is the gap? <p>5th step: Evaluate why the economic potential of the selected value chain has not been realised</p> <ul style="list-style-type: none"> ✓ What are the factors behind stagnation? ✓ Are there patterns of market failure and dysfunctional business linkages hampering development? <p>6th Step: Carry out an environmental appraisal:</p> <ul style="list-style-type: none"> ✓ What are the value chain related constraints on low-carbon production growth – water, land? ✓ Are there opportunities for low-carbon farm productivity gains, substitute farm outputs, land use alternatives? (list them). ✓ What is the infrastructure capacity for low-carbon constraints in the value chain? (transport, power, storage, and distribution) <p>7th Step: Appraise the financial constraints of the selected value chain</p> <ul style="list-style-type: none"> ✓ Do value chain actors have easy access to credit and development loans, interest costs; <p>8th Step: Evaluate the existing regulatory framework and enforcement:</p> <ul style="list-style-type: none"> ✓ Food safety, supply contracts, foreign ownership;
Expected outputs	<ul style="list-style-type: none"> • A compilation of outputs in each step touching on relevant value chain stages.

6.4 Value chain greening strategic plan implementation

The value chain greening strategies formulated should address the following questions:

- (1) Who will do what?
- (2) What organisational structure is required?
- (3) What resources and people are needed?
- (4) How will resources and people be effectively and efficiently mobilised?
- (5) What are the necessary monitoring and control mechanisms?

Various strategies could be informed by some specific objectives, such as:

- To reduce the environmental impact of the production process by adopting relevant and sustainable production technologies.
- To provide capacity building to VC stakeholders in production and to promote climate-smart agriculture and water technologies.
- To reduce the adverse environmental impact of waste streams from agri-food enterprises' (agro-SMEs) waste.
- To promote waste management and treatment capacity of VC actors
- To upgrade existing value chains to be more sustainable and more profitable (efficiency)



Keep each of the above objectives S.M.A.R.T – (Specific, Measurable, Attainable, Relevant and Time-bound)



Exercise 6.2: Value chain greening strategy designing exercise

Assumption	Activity 6.1 has been successfully carried out, and its output is available.
Objective	To equip participants with basic skills on how to synthesise the outputs from exercise 6.1 into strategies.
Task	To set an integrated greening strategy for a selected food value chain
Method	<ul style="list-style-type: none"> • Plenary session, value chain expert moderated • The value chain expert to guide the group through discussing the economic, social, end environmental aspects within the strategic formulation context. The following steps can guide the process <p>1st step: Strategic questions around economic growth</p> <ul style="list-style-type: none"> • What specific problems and requirements need to be addressed to unlock market development? • What specific combination of private investment and public goods is needed? • Why has the economic potential not been realised yet? • What are the factors behind the stagnation and the patterns of market failure hampering development? <p>2nd step: Strategic questions around environmental sustainability</p> <ul style="list-style-type: none"> • Can the value chain keep going in the face of absolute resource limits? Which are these, and who should bear the cost of adjusting to them? • What direction should greening take, and which resources should get priority? <p>3rd step: Strategic considerations on the social aspects</p> <ul style="list-style-type: none"> • How does value chain greening interact with livelihoods, food security, the position of women, and the social fabric in general? • What precautions should be taken to safeguard vulnerable groups? <p>4th step: Strategy setting:</p> <ul style="list-style-type: none"> • Who will do what? • What organisational structure is required? • What resources and people are needed? • How will resources and people be effectively and efficiently mobilised? • What are the necessary monitoring and control mechanisms?
Expected outputs	Green food value chain development strategy Lead actor(s) for specific value.

6.5 Private sector engagement

6.5.1 Principles of engagement

The identification of potential partners for value chain greening initiatives commences with the food value chain mapping exercise. The mapping output is a list of the main VC players, critical support service providers, and public actors. After evaluating the stakeholder landscape for potential partners and reviewing existing synergies in the sector, the lead actor gets in touch with the potential partners. The engagement can be enhanced by observing the following principles:

- Know why you want to engage, i.e., the purpose, the prospective partner's public's level of influence
- Who do you want to engage: consider, apart from MSP members, who else is affected/interested in the greening exercise? Identify the hard-to-reach groups and individuals, and establish the other collaborators/connectors
- Endeavor to start together through building relationships and working together towards common outcomes
- To ensure legitimacy and sustainability, build trust. This requires honest intent, listening to understand; keeping the people at the centre; accessibility, recognition, and celebration; and closing the feedback loop. The feedback loop is one of the most important elements of the engagement process, without which, it is difficult to show real respect for partners' contribution. Closing the feedback loop should happen throughout the engagement, not just at the end.

6.5.2 Steps to follow when bringing private sector on-board

The following steps could facilitate bringing of the private sector players on board:

- (1) Seek contact with potential partners
- (2) Identify shared interests and establish common ground
- (3) Discuss the options for cooperation starting with informal partnerships
- (4) Jointly define objectives and expected impacts
- (5) Assess opportunities and risks of the intended cooperation
- (6) Establish contact persons and responsibilities
- (7) Invite the private company/partner to be part of the action planning.
- (8) Support the planning process



Besides the private sector who have a direct interest in specific food value chains, there may be other important groups whom the MSP can work with. Mobilising and promoting civil society alliances or consumer pressure in combination with press work and other public relations measures could have a direct influence on the behaviour of stakeholders in the value chain. This is particularly important on matters of environmental standards, where civil society and consumers are important political players exercising considerable influence on businesses. Involving the press can also produce a wider impact on influencing policy and lawmakers to take a more business-friendly and reform-oriented stance. All these involvements should be at the discretion of the MSP, be issue-based, and should inform the greening strategies.

6.6 Key outputs

1. Strategic considerations for greening value chains established.
2. Strategy implementation process outlined.
3. Private sector involvement outlined.

7

Module 7: Green Business Models

7.1 Objective

- 1) To develop a strategy for promoting green business models.
- 2) To promote creative thinking amongst collaborating VC actors to develop private sector engaging and smallholder producer inclusive agribusiness models.

7.2 Introduction

At field implementation, adoption of food value chain greening strategies necessitates innovative remodelling and/or rolling out of some new appropriate business models by the value chain practitioners. Value chains will evolve as enterprises make better products, adopt new resource-efficient technologies, change business processes, and engage with other partners during the greening process.

To simplify the current discussion, there is a need to define the following terms:

Business model: is the rationale of how an organisation such as an enterprise creates, delivers, and captures value for itself, its clients, and society.

Business linkages: Business models only work if they are connected to the value chain's raw material suppliers and output buyers. If one operator changes the business model (the product, the volume of a commodity), its partners most likely must respond accordingly – in line with appropriate new business conditions.

7.3 Green business model canvas

A business model can be described through nine building blocks. The nine-building blocks are incorporated into a Business Model Canvas, which is a strategic management and entrepreneurial tool to describe, design, challenge, invent, and pivot your business model. These building blocks apply to green business models.

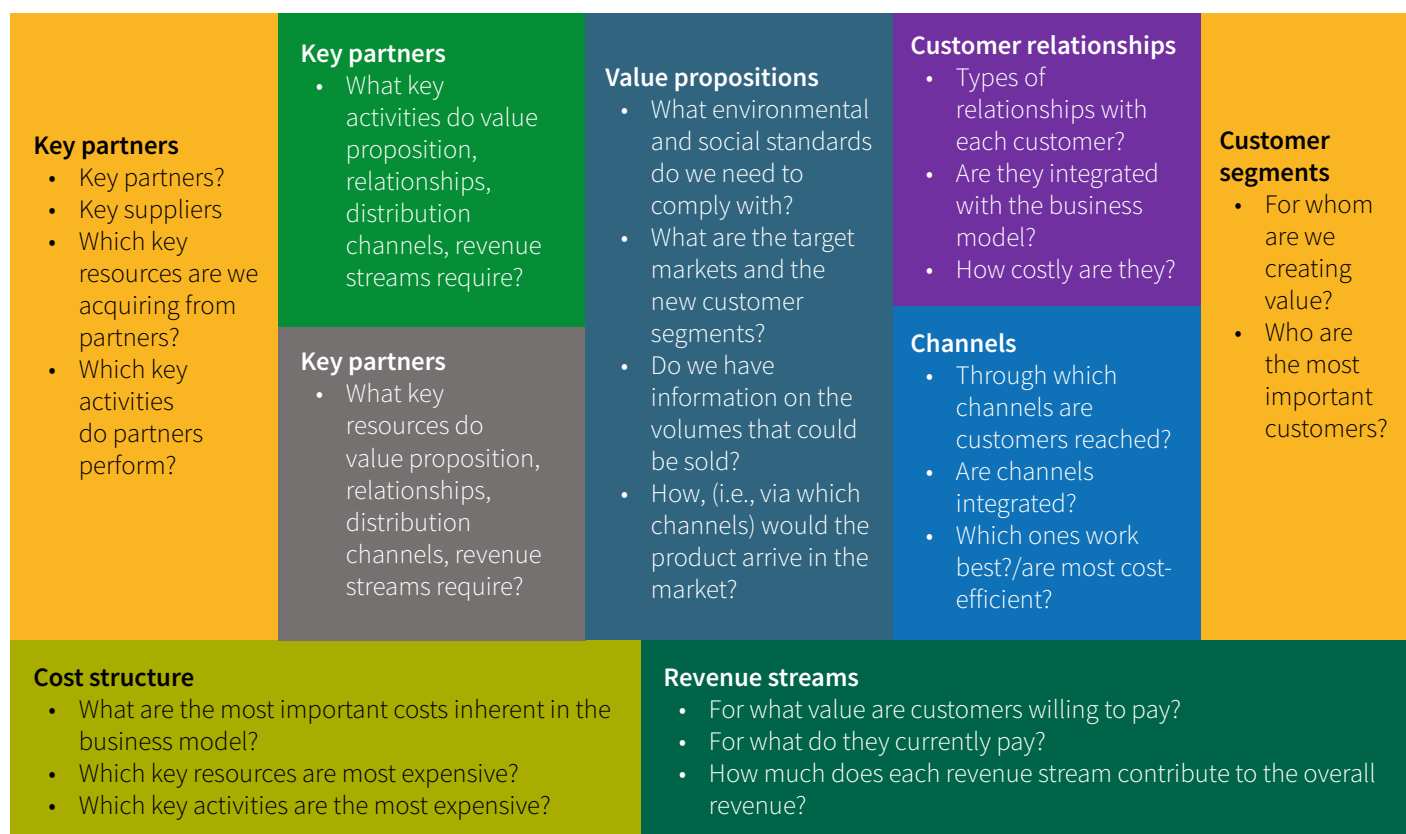


Figure 7. 1. Business model canvas and its building blocks

7.4 Developing an improved business model



Exercise 7.1. Business model development

Assumption	Participants have been taken through the basics of business model development and introduced them to the business model canvas.
Objective	To equip participants with the necessary skills in designing business models based on the business model approach.
Task	To develop a business model of a selected value chain
Method	<ul style="list-style-type: none"> Group work The value chain expert or an experienced moderator to guide the group through the process <p>Step 1: Start with “customer segments.”</p> <ul style="list-style-type: none"> Identify and list the target markets and buyers based on an identified greening/VC gap: Answers distinguish market segments ranging from rural, urban to “luxury” markets. Alternatively, service existing consumer markets and develop new markets through innovative products and services and thereby increase competitiveness. <p>Step 2: Establish the “value proposition” to the customers.</p> <ul style="list-style-type: none"> Type and quality of the product: Food product quality ranges from low to medium and high; possibly with certification and label to fetch a premium price Focus on value creation through the delivery of innovative and green products and services <p>Step 3: Next in line are the marketing “channels”.</p> <ul style="list-style-type: none"> Sales to traders or to end consumers: The marketing linkages range from “arms-length” sales on open markets to regular delivery to selected buyers Build on circular models facilitating the reuse of resources throughout the value chain <p>Step 4: Establish “customer relationships”.</p> <ul style="list-style-type: none"> Long-term customer relationships based on economic, environmental, and societal values <p>Step 5: Key activities.</p> <ul style="list-style-type: none"> Production system/technology: In agriculture, low input intensity farming can be distinguished from high input intensity. Farm technology can be either manual or fully mechanised. Processing activities range from artisanal to semi-industrial. <p>Step 6: Key Resources.</p> <ul style="list-style-type: none"> Key resources in agriculture: Farm size, land, plantations, equipment and infrastructure Use of recycled, renewable and sustainable materials <p>Step 7: Key partnerships.</p> <ul style="list-style-type: none"> List the strategic partnerships along the value chain, including the private and public sectors and communities Define each partner’s role in the proposed initiative Produce a map showing the flow of resources and product among actors (refer to Figure 7.2) <p>Step 8: identify cost and populate the cost structure.</p> <ul style="list-style-type: none"> Identify and value all cost-saving opportunities through energy and resource efficiency in the production and all stages of the value chain <p>Step 9: Document the revenue stream.</p> <ul style="list-style-type: none"> Deliver economic, environmental, and social value to customers, the companies, and society
Expected outputs	The business model of a selected value chain on a canvas
Presentation	Flipchart
Due	The group work will take at most 1 hour 15 minutes, a further 30 minutes for the plenary, to review the process and clarify any arising questions and issues.

7.4.1 A quick check to assess the quality of a business model

Once the entrepreneur has cast the business idea into the business model canvas, he or she should examine its quality. Here are several points to check:

- **Profitability:** A successful business model must be profitable. A quick check should look for the production cost, the expected turnover, and the investment required. The criteria of a detailed financial analysis are treated in the next chapter.
- **Internal consistency and completeness:** Are the connections between the building blocks conclusive? Is the information complete?
- **Feasibility in practice:** How big is the difference between the new business model and earlier versions? How much time and additional competencies are required?
- **Availability of chain partners:** What are the implications for key partners and service providers? Are they able to deliver the required resources?
- **Ecological sustainability:** Does the proposed investment or intensification have an impact on the consumption of fossil fuels, deforestation, and loss of biodiversity or on soil fertility?
- **Social inclusiveness:** Does it have an impact on labour intensity, availability of basic foods, or the working conditions? Does the business model benefit the disadvantaged in society?
- **Competitive advantage and comparative advantages of the business** – competitive advantage is built on a firm's ability to become the most efficient in a special business area than everyone else.

Below are three examples of business models that traditional maize producers who have decided to rotate the cereal with soya bean can adopt. Each of the three models requires a different set of value chain actors. The proposed two-crop business models improve soil fertility, land productivity in a year reduces chemical usage to control pests and diseases.

Soya-Maize Business Model 1

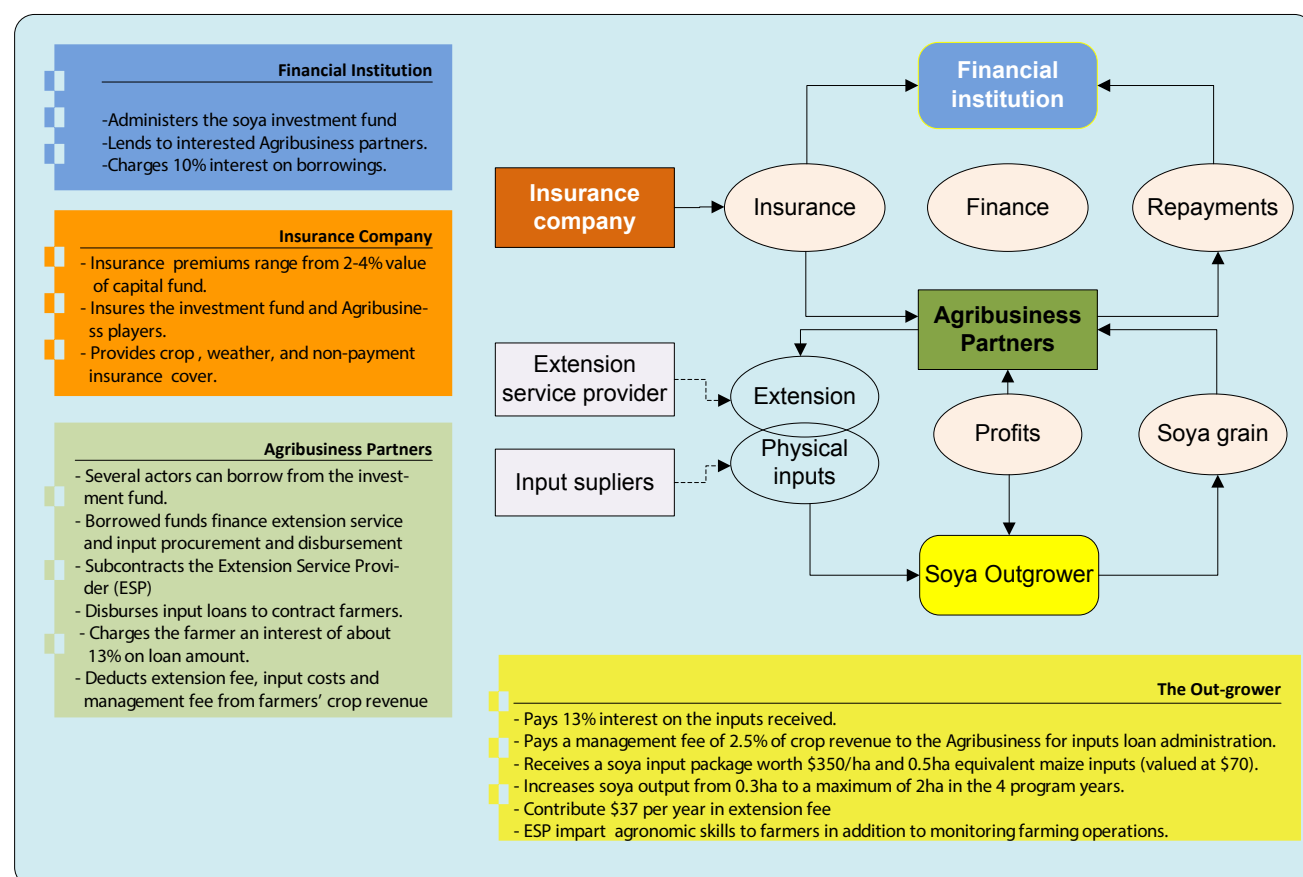


Figure 7. 2. Business model 1



Maize-Soya Business Model 2

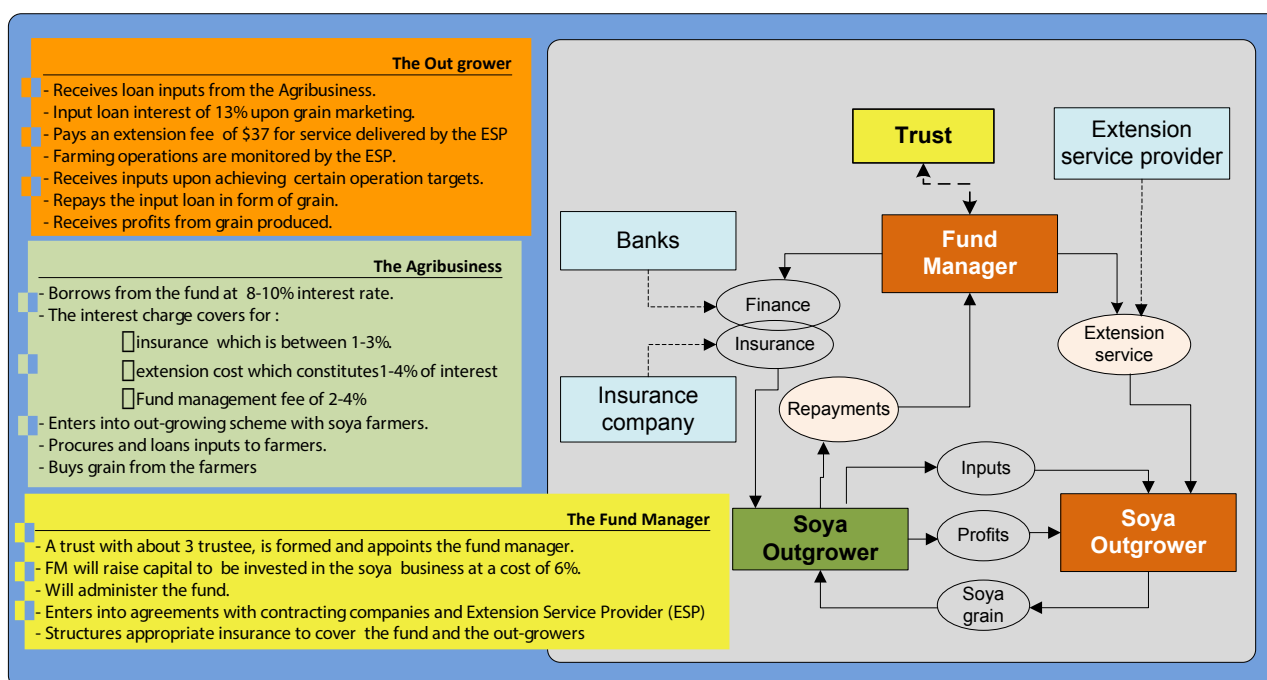


Figure 7. 3. Business model 2.

Maize-Soya Business Model 3

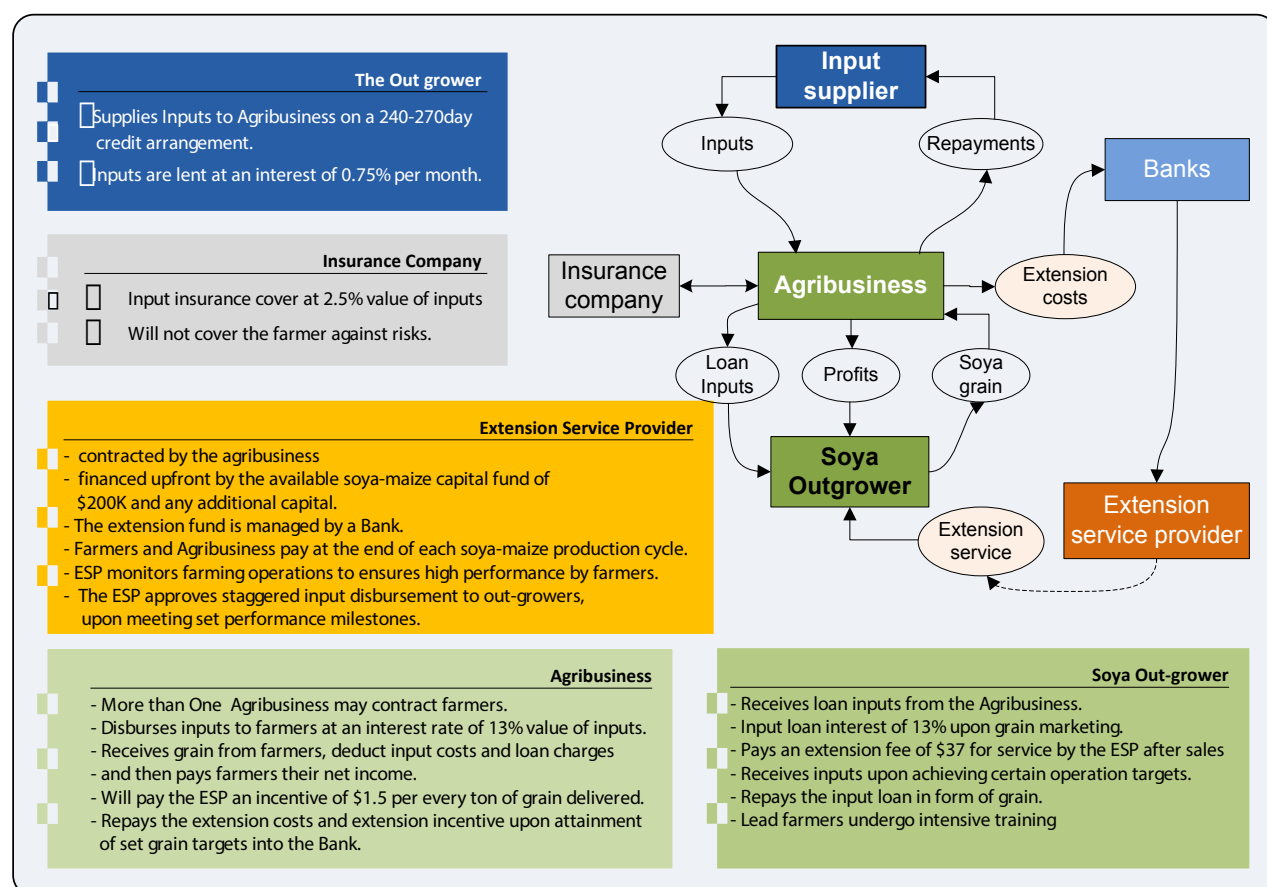


Figure 7. 4 Business Model 3.

7.5 Case studies

Here are some innovative value chain greening related business opportunities:

Case study 7. 1: Rice Value chain

Introduction

Nigeria imports much of its rice, resulting in the commodity price being expensive for many Nigerians. Hence, through the Competitive African Rice Initiative (CARI), a project was initiated to support the African rice value chain, specifically rice production in Nigeria, and at the same time to assist low-income smallholder farmers (GIZ 2017). Already, smallholder farmers in Nigeria are increasing their income with the assistance of an international rice initiative. Higher yields and better quality will make the country less dependent on expensive rice imports.

Case Study 1:	Competitive African Rice Initiative (CARI)
Country & District:	Nigeria
Number of participating farmers:	76,000 farmers
Other VC actors involved:	Private sector
Year:	2013-2017

Challenges/Identified problem(s): Being the most populous country in Africa, Nigeria's rice demand is very high. This high demand is mostly supplied through imports making rice in Nigeria very expensive.

Opportunities and Justification (Innovation): The CARI project has provided an opportunity for smallholder farmers to intensify their production. Since the project's launch in 2013, CARI rice farmers have doubled their harvests and significantly improved the quality of their rice. The smallholder farmers increased their incomes on average, almost threefold between 2013 and 2016. The farmers were introduced to dry season farming, and were able to farm twice a year, increasing production volumes (CARI, 2017). Rice policy advocacy platforms were established to dialogue on policy reforms and to discuss advocacy actions and strategies and activities for improving the rice value chain.

Participating stakeholders, roles and potential investment: The Competitive African Rice Initiative (CARI), German Federal Ministry for Economic Cooperation and Development (BMZ), the Bill and Melinda Gates Foundation and the Walmart Foundation, non-governmental local organisations and companies and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and local partners.

Recommendations: The CARI rice project supports both a sustainable increase in the intensity of small-scale rice cultivation and the development of inclusive business models. Such models improve access to inputs, services, and equipment, and create a more stable market for produce. It fosters business linkages between all actors of the value chain. Consumers are thereby able to purchase locally produced rice at competitive prices and enjoy better quality rice. The application of various business models is important to achieve widespread increases in income.

Local processing – Parboiling has been improved, and some processors have been able to expand their businesses through the project.

Case study 7. 2: Onion Value Chain

Introduction

The role of the Onion Value chain in West Africa

Onions represent an important share (10-25%) of total vegetable consumption throughout West Africa, and it is the most widely traded raw vegetable within the ECOWAS sub-region. Onions remain a major cash crop for Niger, Mali, Burkina as well as the northern sectors of Nigeria, Benin, and Ghana. Similarly, the coastal countries, especially Ghana, Togo, Benin, and Cote D'Ivoire serve as the major export destinations for the producing countries, presenting huge intra-regional trade opportunities. Sahelian onion production is estimated at over 1.2 million MT, with Nigeria and Senegal as major producers. The major exporters are Niger and Burkina Faso, which export to Ghana, Ivory Coast, and other countries. Niger produces over 600,000 MT, with exports valued at US\$ 90 million annually. Ghana produces onions but also imports considerable amounts from within and outside the region.

Case Study 2:

Country & District:

Number of participating farmers:

Other VC actors involved:

Development and Use of Improved Onion Storage Facilities

Ghana, Upper East Region, Bawku District

3,000 farmers

Onion farmers in the district, onion seed dealers, traders, Northfin Foundation, Ministry of Local Government and Rural Development (MLGRD), Canada's Department of Foreign Affairs Trade and Development (DFATD), Ministry of Food and Agriculture, Ghana Institute of Management and Public Administration (GIMPA).

Year:

2014-2016

Challenges/Identified problem(s): Poor storage facilities compromising product quality and price.

Opportunities, Options, and Justification (Innovation): Locally-made, mud-fabricated aerated storage units were constructed for farmers to store onions for three to four months to preserve quality and sell at higher prices (6-8 times the glut time price) during the lean season for higher incomes. The beneficiaries of the onion project in the Upper East region can now store their produce using the prototype storage structure introduced by Northfin Organisation. This facility has prolonged storage life of the onions enabling the farmer to sell later at competitive prices. The beneficiaries can now also access loans more easily because of the assurance in their sales. Some of the onion beneficiaries have opened bank accounts, which hitherto was impossible due to low yields and the subsistence nature of their farming.

Participating stakeholders, roles and potential investment: In the Onion Farmer's livelihood and Value Chain Improvement PPP project in the Upper East region, Northfin Foundation was the private sector operator, with the Ministry of Local Government and Rural Development (MLGRD) as the public-sector party with funding from Canada's Department of Foreign Affairs Trade and Development (DFATD) and MLGRD. The Ministry of Food and Agriculture (MOFA), MLGRD and the Ghana Institute of Management and Public Administration (GIMPA) were responsible for the monitoring and evaluation component of the project. As part of its duties, MLGRD was also responsible for the governance of the project.

Recommendations: This case study illustrates how improved well-ventilated storage facilities for onions can reduce postharvest losses, prolong the lifespan of onions, and maintain good quality for sale during the lean season at competitive prices.

Case study 7. 3 :The role of the soybean value chain in Burkina Faso

Introduction

The role of the soybean value chain in Burkina Faso

In Burkina Faso, soybean is an alternative value chain replacing cotton. Most farmers are abandoning cotton production due to persistently low prices and continued land degradation resulting from cotton farming without the addition of sufficient nutrients from external sources.

Case Study 3:	Enhancing Soybean Productivity and Marketing
Country & District:	Burkina Faso, Po in Nahouri province
Number of participating farmers:	1,400 farmers
Other VC actors involved:	Seed supplier, output markets
Year:	2014-2015

Challenges/Identified problem(s): Low yields due to soil infertility, low access to improved seeds, and poor output market access

Opportunities, Options, and Justification (Innovation): Access to information on the advantages and benefits of soybean to the soil through agriculture extension radio program; as well as information and training on micro-dosing technology from LAVODEC. Also, LAVODEC offered a credit facility for the acquisition of inputs and still does aggregation of outputs as they source for large-scale buyers. Through this integrated approach, on average, farmers have improved their soybean yields from below 1 MT per hectare to over 2 MT, equivalent to average profits of FCFA 250,000 (US\$ 500). An example is farmer Karim Napon, who, by 2015, had almost doubled soybean yields and profits, that is, 2.3 tons per hectare and FCFA 420,000 (\$840), respectively.

Participating stakeholders, roles and potential investment: LAVODEC develops a soybean value chain by supplying seeds produced by local seed companies in Burkina Faso. AGRA funded the producers through Réseau MARP- Burkina soybean production project. The extension services are provided by officers from l'Institut de l'Environnement et des Recherches Agricoles (INERA), and the Institute for Agricultural and Environmental Research in Burkina Faso provides monitoring and agronomic support. Private input suppliers also play a significant role.

Recommendations: This case study illustrates a scenario where an integrated approach touching on various value chain actors (seed producers, input suppliers, aggregators, and financial institutions/arrangements) could go a long way towards enhancing the agricultural productivity of smallholder farmers. It also highlights opportunities for the greening of the value chain. In this case, the integration of micro-dosing, which reduces the amount of chemical fertilisers applied, and in effect, the carbon footprint, while enhancing agricultural productivity.



Case study 7. 4: Farmer associations making a difference in Ghana

Introduction

Farmer associations making a difference in Ghana

For many years, most farmers in the West Gonja District in Ghana practiced traditional farming methods.

Case Study 4:	Enhancing soybean productivity and marketing
Country & District:	Ghana, West Gonja district
Number of participating farmers:	1 Farmer Association
Other VC actors involved:	Seed supplier, output markets
Year:	2014-2015

Challenges/Identified problem(s): Low agricultural productivity, lack of diversification, low access to improved seeds, lack of market information.

Opportunities, Options, and Justification (Innovation): Through the association, the farmers are trained on agricultural diversification and intensification through the integration of farming system approach to agricultural production. Suglo Konbo trains its members on the appropriate management and use of animal manure to support crops, and the use of crop residue as animal feed for enhanced whole-farm productivity. The association provides improved seeds, fertiliser, as well as tractor services to plough an acre of cropland of members' choice at the start. On average, this initiative increases crop yields from as low as 0.5 MT per hectare to over 3.5 MT per hectare by the third season (e.g., the case of Adam Sheini).

Participating stakeholders, roles and potential investment: Suglo Konbo trains farmers on modern farming practices starting with diversification, planting in rows, dibbling and doing band placement of fertilisers, as well as harvesting crops at the right time when the crops are physiologically mature. It also provides Post-harvest management for quality produce and market linkages. AGRA initially funded the farmer association to initiate the process, while E-soko, a market information system, provided regular market information via mobile phone, using SMS and voice mail.

Recommendations: This case study illustrates the importance of farmer associations in enriching value chains. It brings out the benefits of diversification, not only in the aspect of a farmer having a choice of what to produce, but also the integration of crop-livestock production systems for enhanced agricultural productivity in the farm. This provides an opportunity for a green food value chain development/upgrading. The association also facilitates the provision of basic value chain-related services such as input and output market linkages. It is also through the association that the members can access to real-time updated market information. Through the initiative, the farmers made the transition from a subsistence to business-oriented self-sufficient enterprises with a surplus to dispose of. It underpins the importance of collective action.

Case study 7. 5: Anchor Farm Model Doubles Maize and Soybean Yields in Malawi

Introduction

Anchor Farm Model Doubles Maize and Soybean Yields in Malawi

The anchor farm model uses an anchor farm, a large commercial farm, as a hub to bring surrounding farmers together, who are encouraged to form a group, known as a 'club' of 10-20 people. Each club elects a leader who attends training on the anchor farm, before sharing this knowledge with club members and other farmers. The anchor farm focuses on production-specific crops, using demonstration plots and field days to showcase the impacts of crop rotation, good agronomic practices, the use of fertilisers and improved crop varieties, post-harvest handling, and business skills, such as calculating costs of production, as well as profit and loss.

Case Study 5:	Anchor Farm Model Doubles Maize and Soybean Yields in Malawi
Country & District:	Kasungu and Dowa districts, Malawi
Number of participating farmers:	Over 24,000 farmers
Other VC actors involved:	Clinton Development Initiative (CDI) which acts as a "broker"; Aggregator and output buyers
Year:	2010-2015

Challenges/Identified problem(s): The approach seeks to overcome the challenges related to low technical knowhow, declining soil fertility, poor access to produce markets, and low yields.

Opportunities, Options, and Justification (Innovation): CDI acts as a 'broker' between the clubs and local banks to assist farmers secure loans to buy inputs. To qualify for a loan, farmers raise the 15% deposit, but instead of receiving cash, the loans facilitate the purchase of inputs such as fertiliser and improved seed. Following harvest, the grain is taken to a central location where buyers collect the grain. This is also when banks receive loan repayments. The anchor farm also links farmers to four large soybean buyers. The arrangement provides an opportunity for other development practitioners and institutions to participate. For instance, in 2010, the anchor farm received a grant from AGRA to support the farm's extension activities, particularly in efforts to highlight the benefits of Integrated Soil Fertility Management (ISFM) and best practices in soybean agronomy. ISFM is a soil management practice that works to improve soil health, and in turn, soil production through the use of minimum tillage, crop rotations, proper application of fertilisers, and the incorporation of crop residues to improve soil health. Over 24,000 farmers have received training on ISFM practices, with ISFM practices now practiced on nearly 9,000 ha. Farmers also grow crops on larger areas and are obtaining higher yields. On average, soybean yields have risen from 0.7 MT per hectare to 1.3 MT per hectare, while maize yields have more than doubled from 1.3 MT per hectare to 3 MT per hectare.

Participating stakeholders, roles and potential investment: The CDI, AGRA, Ministry of Agriculture, smallholder farmers and the Dutch Government

Recommendations: The anchor farm approach provides a fertile avenue for value chain greening initiatives since the existing forum could easily be transformed into a multi-stakeholder approach for green VC development. ISFM encompasses the principles of climate-smart agriculture and provides a unique opportunity for value chain greening.

Case study 7. 6: A rice powered green revolution in Burkina Faso

Introduction

A rice powered green revolution in Burkina Faso

For a long time, farmers had been struggling to access good quality seed of the key crops at affordable prices.

Case Study 6:	A rice powered green revolution in Burkina Faso
Country & District:	Burkina Faso, Bama Province of Bobo, Bobo Dioulasso
Number of participating farmers:	1,300
Other VC actors involved:	Seed producers, Input suppliers, Marketers
Year:	2012-2018

Challenges/Identified problem(s): The formal seed sector was able to supply less than 6% of the national demand for seed. When available, high quality seed was expensive and often only found in shops that were far from farmers' villages. This left farmers with no option but to continuously use self-saved seed, which led to low yields, since the health and quality of the seeds were not assured. Naturally, this meant that neither the farmers nor the country produced enough rice and other important crops.

Opportunities, Options, and Justification (Innovation): The availability of certified seed of improved varieties, coupled with good agronomic practices through the NAFASO network. By joining the network, the rice yields of the smallholder farmers have nearly doubled – from an initial 3.5 MT per hectare to the current 5.5 MT per hectare, and they are making a good return from selling the rice seed. Farmers growing seed rice for NAFASO have made an average of US\$ 1800 per hectare. Buoyed by this success, they have increased the planted area to 1,200 hectares, earning as much as US\$ 11.9 million by 2015.

Participating stakeholders, roles and potential investment: Neema Agricole Du Faso (NAFASO) a local seed company; the Rockefeller Foundation and the Bill and Melinda Gates Foundation; AGRA, National Research Institute (Institut de l'Environnement et de Recherches Agricoles); National Seed Service (Service National des Semences); Extension service officials; Association of Agro-dealers in Burkina Faso (AGRODIA) and a private agro-dealer, AGRIFARE.

Recommendations: This case study showcases how stakeholders working together can bring the desired change in smallholder farming communities. It highlights how such a concerted initiative could effortlessly translate into a green revolution. It also presents an opportunity for not only rice value chain greening, but also the rice seed value chain growth.



8

Module 8: Green food value chain financing

8.1 Objectives

1.To introduce finance options that are available for green food value chain development.

8.2. Introduction

Finances are required for green food value chains to succeed and also to generate economic growth. In real life, even in circumstances where technology remains unchanged or becomes more efficient, practitioners are required to invest additional capital before they can post increased growing business turnover. Despite the existing growth potential, many smallholder producers and small-scale value chain actors have always had difficulties meeting their capital expenditure needs. The coming together of small homogenous operators with interests in a common value chain creates the possibility of linking finance solutions to the development of business/market linkages. Figure 8.1 shows some financial issues in green food value chain development.



Value chain financing refers to financial products and services that flow to or through any point in a value chain that enables investments that increase actors' returns and the growth and competitiveness of the chain. Even small technological changes often increase working capital. Better capacity utilisation implies additional financial needs because more raw material must be purchased. To obtain the necessary financing, operators must present a business plan and financial analysis. Developing an appropriate VC finance solution depends crucially on a previous investment calculation.

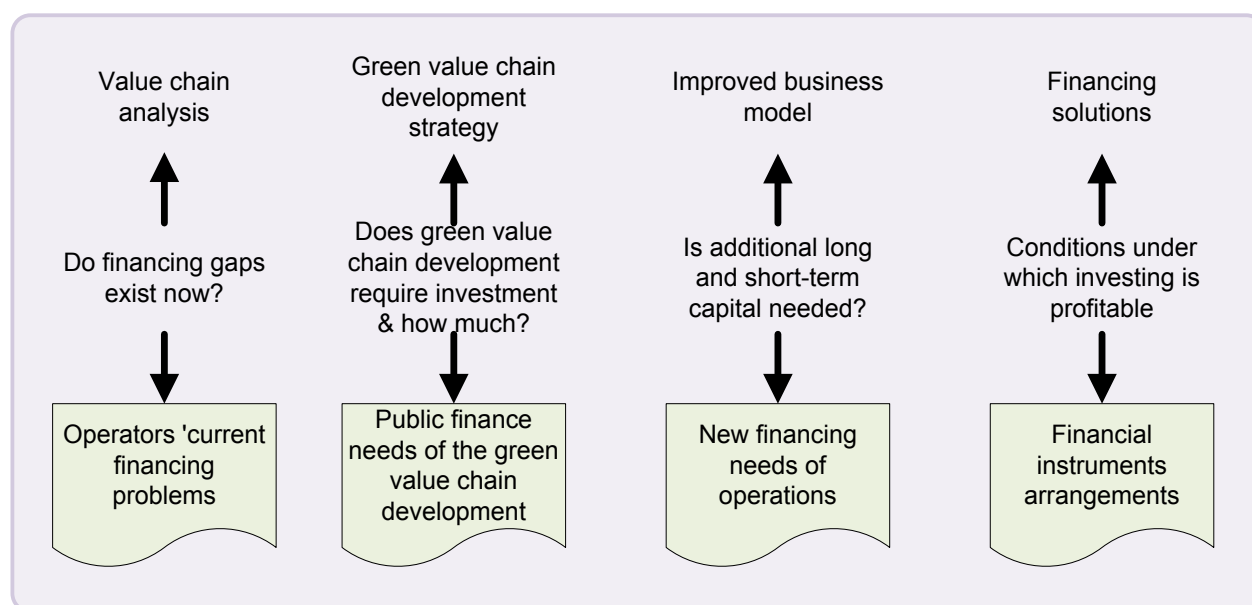


Figure 8. 1. Financing issues in green food value chain financing

Sustainable financing: most sustainability-conscious financial institutions encourage their clients to become greener through supply chain finance by offering them the opportunity to build into specific green-oriented scheme incentives.

8.2 Developing financing solutions

The procedure for developing finance solutions has three steps:

Step 1: Analysing the financing needs arising from business model improvement and the require-

ments for collective investment,

Step 2: Choosing financial instruments and arrangements to solve the financing needs, and

Step 3: Enhancing the mutual understanding of financial institutions and small entrepreneurs.

8.2.1 Determine financing needs and gaps

Estimate the aggregate financial needs of the value chain.

- A financing gap exists wherever enterprises cannot cover the financing needs adequately and have to get by with internal resources, often to the detriment of other cash needs within the enterprise and household.
- The identification of gaps defines the possible intervention areas in value chain projects. Value chain actors and financial institutions need to understand the problems behind the shortage of liquidity and the lack of access to credit. These issues have to do with risk, lack of information, transaction cost and scale of business, as well as with financial literacy and trust.

8.2.2 Design responsive financial instruments and arrangements

The green value chain development process should support financial instruments and arrangements to mobilise the volume of funds needed for upgrading and should seek solutions to respond to the typical financing problems of small-scale enterprises and smallholder farmers.

- Identify potential sources of funding, whether internally within the value chain or externally in the financial system.
- Analysts review the range of available financing instruments assessing their aptitude for the business models in question. The result of this exercise is the identification of financial instruments which can be used to mend the financing gap. In most cases, a comprehensive financing arrangement includes financial instruments as well as non-financial services.

8.2.3 Facilitate financing solutions

Based on the financial analysis of their business model, enterprises must be able to calculate their investment needs, prepare financial plans, and propose them to financial institutions professionally.

- Assist with supporting financial literacy and provide orientation on how to identify and describe potential sources and financial instruments.
- In green value chain development, the MSP should promote the mutual understanding between VC actors and financial institutions, providing financial institutions with the necessary information on the one side, and supporting the financial literacy of enterprises and producers (smallholder farmers) on the other.
- External development agencies can also play the matchmaking role (however, their direct involvement in the financing arrangements or direct financing, offering financial or finance-related business services is discouraged).

8.2.4 Aggregate financing needs and gaps of the value chain

So far, the analysis of financing needs and gaps referred to individual enterprises and their business models. Next, we return to the value chain. We can infer the aggregate financing needs of the entire value chain by multiplying the financing needs derived from business models with the number of operators sharing the same model (Figure 8.2).

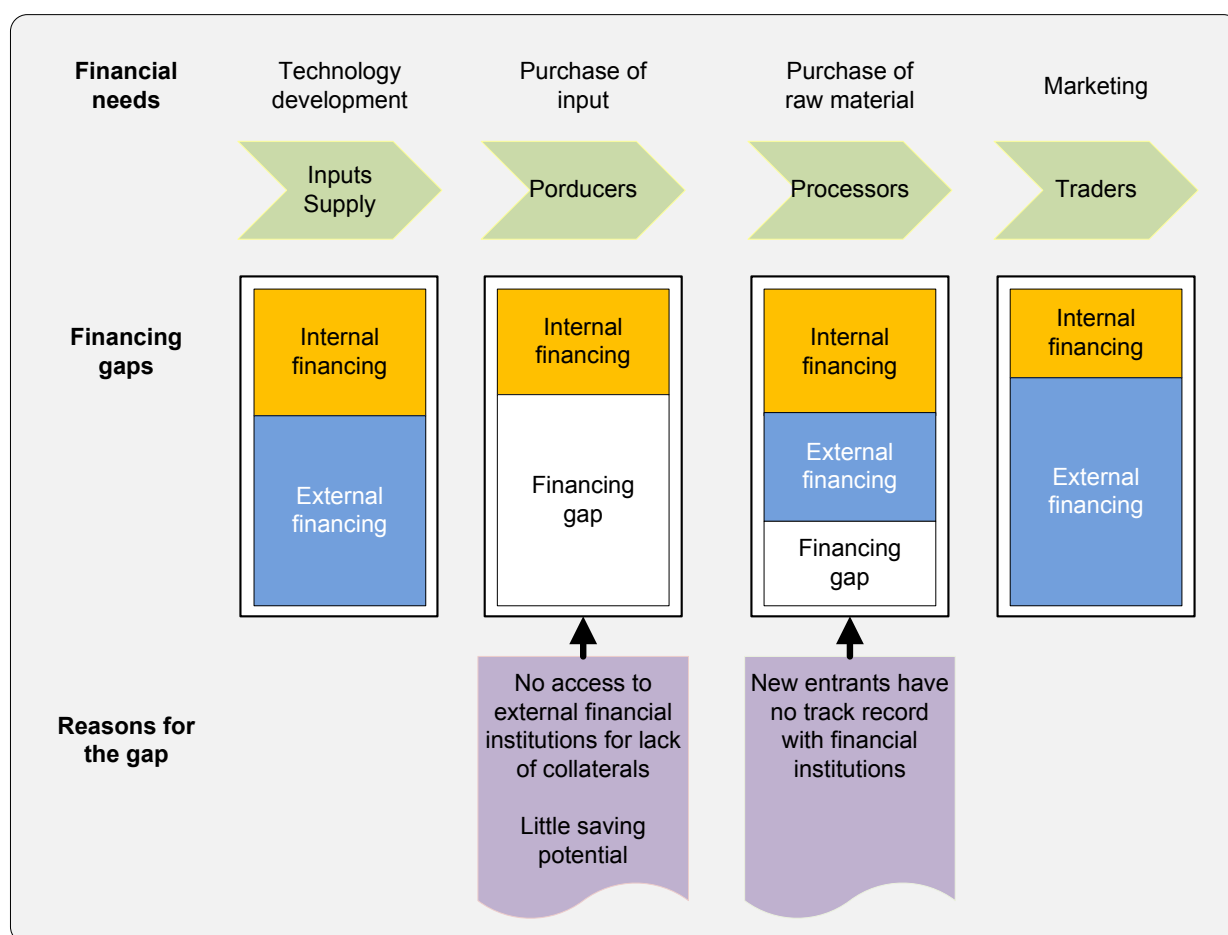


Figure 8.2. Financial gaps existing across a complete value chain

8.3 Financing solutions

Finding solutions to close the financing gaps is a key task in value chain development.

Table 8. 1. Overview of financing instruments

Lending Period	Enterprise Finance	Value Chain Finance	
	Lending Products	Internal VC Finance	External VC Finance
Short-Term (up to 12 months)	Based on hard collateral: <ul style="list-style-type: none"> Working capital loans Revolving credit lines Based on soft collateral: <ul style="list-style-type: none"> Short-term lending by Microfinance institutions Savings and loan co-operatives 	Based on contracts: <ul style="list-style-type: none"> Trade credit Supplier credit and buyer credit in the form of pre-finance in-kind and/ or cash interlinked with commercial trade or production contracts 	Based on hard collateral: <ul style="list-style-type: none"> Trade finance Accounts receivable finance, warehouse receipt finance, factoring, export financing with letter of credit based on contracts: Short-term loans based on supplier/buyer contracts
Medium to Long-Term (1 to 5 years and beyond)	Based on hard collateral: <ul style="list-style-type: none"> Leases Bank loans, term loans Based on soft collateral: Long-term lending by Microfinance institutions Savings and loan co-operatives	Based on ownership: <ul style="list-style-type: none"> Equity investment into partner enterprises 	Based on hard collateral and contracts: <ul style="list-style-type: none"> Triangular term loans based on supplier/buyer contracts, third-party guarantees, and long-term association support

8.4 Risk Management

Risk management is integral to financing arrangements; hence, risk management instruments must be factored into financing solutions.

8.4.1 Types of risks in value chains

Given the diverse array of actors and linkages between them, in a typical agricultural value chain, risks and uncertainties are integral. Thus, to ensure sustainable green value chain development, effective risk management is crucial. Typical risks along agricultural value chains include:

1. Weather-related risks: Periodic deficit and/or excess rainfall or temperature, hail, storms.
2. Natural disasters (including extreme weather events): Major floods and droughts, hurricanes, cyclones, typhoons, earthquakes, and volcanic activity; pests and disease, pandemics
3. Biological and environmental risks: Crop and livestock pests and diseases, food contamination
4. Market-related risks: Changes in supply/demand that impact domestic/international prices of inputs and/or outputs, changes in market demands for quantity and quality, changes in food safety requirements
5. Logistical and infrastructural risks: Changes in transport, communication, energy costs, degraded and/or undependable transport, or infrastructure, labour disputes
6. Management and operational risks: Poor management decisions in asset allocation and livelihood/enterprise selection or input use, poor quality control, forecast, and planning errors, breakdown of farm equipment, use of outdated seeds
7. Public policy and institutional risks: Changing or uncertain monetary, fiscal, tax, financial policies, changing or uncertain regulatory, legal policies, trade, and market policies, land policies. Governance related uncertainty, weak institutional capacity
8. Political risks: Security-related risks and uncertainty with domestic or external politico-social instability, interruption of trade
9. Health risks: the occurrence of a pandemic or

epidemic could influence the process.

8.4.2 General risk management instruments

Actors in the value chain have a broad range of instruments to deal with individual risks. They can be categorised in the following groups:

- Technology development and adoption (R&D, postharvest technology, software development, IT, education programs)
- Enterprise management practices (e.g., farm diversification, certification, just-in-time management, inventory control, food safety practices, logistics planning, early warning systems)
- Financial instruments (e.g., credit, insurance, warehouse financing)
- Investment in infrastructure (e.g., transport/communication, energy, informatics and knowledge transfer, storage and handling, processing facilities, weather stations)
- Policy and public programs (regulatory measures, agricultural policies, property rights, labour laws, disaster management, safety nets)
- Private collective action (action by cooperatives, industry associations).

8.4.3 Financial risk management

There are assorted financial instruments designed for risk management strategies against natural disasters, market-related risks, and operational risks. The common financial instruments are:

- **Natural Disasters:**
 - Disaster insurance, e.g., Loss and Damage instruments
- **Market-related risks:**
 - Price index insurance
 - Area index insurance
 - Warehouse receipt
- **Operational risks**
 - Guarantee banking focused on SMEs in value chains can ease the process of acquiring mainstream credit
 - Contract farming hedges price risks
 - Traditional insurances (e.g., hail)
 - Savings and credit
 - Micro-insurance for life and endowment to focus on the risks of the producer

Their potential strongly depends on

- availability (especially in rural areas),
- access (for all participants of the value chain),
- affordability, financial literacy (participants

need to understand the instruments)

- reliance (are instruments available and do they work with a long-term perspective?)



9

Module 9: Planning and action planning

9.1 Objectives

1. To understand the issues to consider during action planning
2. To outline key aspects to consider in budgeting and investment planning

9.2 Introduction

Action planning is a culmination of the green food value chain development process. This step considers developing a detailed plan and, importantly, an action plan with the agreement of all MSP members. The action plan is a road map for implementing a food value chain greening initiative by clarifying what will be done, who will do it, and how it will be done. The plan describes what needs to be achieved, what activities are required during a specified period, what resources (money, people, and materials) are needed for the greening initiative to be successful. In short, the action plan will outline roles and responsibilities, estimated investments, and the budget required to implement a green food value chain development initiative.

Given that the smallholder farmer is at the core of this training manual, in addition to being well represented on the MSP, it is important to understand that they are the main actors in action plan preparation. Their active participation in the process will ensure higher buy-in rates and will enable them to take realistic and concrete steps towards a participatory green value chain development planning.

9.3 Implementation

The key element of community action planning is an active, intense MSP-based workshop, carried out over a period of 2 to 3 days, depending on the level of engagement and the cohesion of the forum.



The output of the workshop is a food value chain greening action plan that will contain a description of the priority VC, a list of VC greening objectives, greening strategies, and options, business model outline,

partner details and roles, implementation timelines, supporting budget, a summary of outputs & impacts.

The execution of the action planning workshop will require a minimum of preparation, training materials, and a motivated group of smallholder farmers, a competent moderator/facilitator/organiser who will take the lead in making the announcements, location selection, training materials collection, and finally in running the workshop.

9.3.1 Materials required

- Markers,
- Flipcharts/Manila paper
- Training venue – easily accessible (preferably within the community of interest)

9.3.2 Action plan considerations:

1. List and clearly understand the tasks and actions needed to implement the designed strategies.
2. List stakeholders, organisations, and individuals that need to be involved in each action and the task each is responsible for.
3. Clearly delineate and specify the resources (finance, people, equipment, information, etc.) required to complete each activity.
4. Clearly specify the timeframes for each activity, making realistic estimates of required times, resource requirements, etc.
5. Identify risks, gaps, and weak links in the action plan and how these will be addressed.
6. Set priority activities and tasks. Begin with the most important tasks and activities.
7. Split the action plan into short-term and long-term priority areas.
8. Address those involved and obtain commitment by written agreements, sector work programs, budgets, etc.
9. Ensure that coordination mechanisms are agreed upon.
10. Agree on a monitoring and evaluation system.



Exercise 9. 1: Action planning

Assumption	Green food value chain development strategies have been set
Objective	To equip participants with practical skills on how to develop value chain greening action plan
Task	To compile an action plan for the greening of a selected food value chain
Method	<ul style="list-style-type: none"> Guided group activity/facilitated by a moderator The group will pick one of the mapped food VCs, as their case study. Table 10.1 should be provided to each group, for compilation <p>Steps:</p> <ol style="list-style-type: none"> 1. Indicate the names of the members (participants), state the greening strategy/objective derived from the strategy-setting exercise. 2. List all the tasks and actions that need to be taken to implement the designed strategies along the value chain. 3. From the stakeholder maps developed in the value chain mapping exercise, compile a list of stakeholders, organisations, and individuals that need to be involved in each greening action and which task each is responsible for (Proposed value actors & roles). 4. Based on prioritised gaps, document the proposed action plans for RSFVC (Figure 10.1): <ul style="list-style-type: none"> o Good agricultural practices o Resilience building practices & sustainability technologies o Structural/model changes 5. Clearly delineate and specify the resources (finance, people, equipment, information, etc.) required to complete each activity. 6. Clearly specify time frames for each activity, making realistic estimates of required times, needed resources. 7. Identify risks, gaps, and weak links in the action plan and how these will be addressed. 8. Set priority activities and tasks. Start with the most important tasks and activities. 9. Split the action plan into short-term and long-term priority areas. 10. Address those involved and obtain commitment (may include contracts & MoUs), sector work programs, budgets, etc. 11. Ensure that coordination mechanisms are agreed upon. 12. Agree on a monitoring and evaluation system.
Expected outputs	Green food value chain development action plan (e.g., Figure 9.1.)

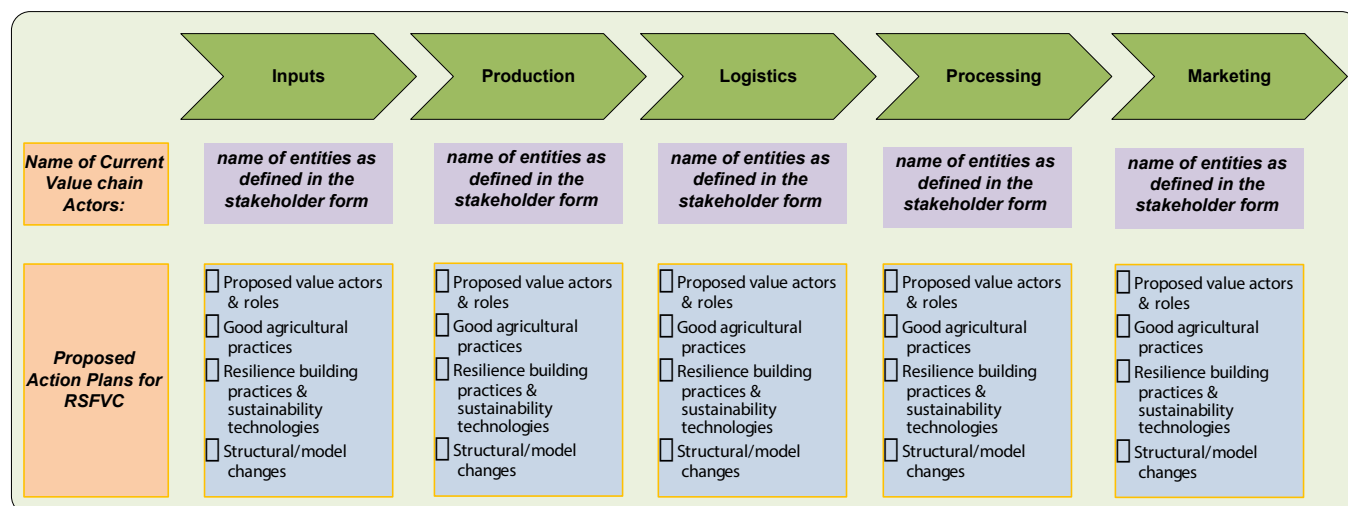


Figure 9. 1. Outline of value chain greening action plan

9.4 Key outputs

1. The participants will appreciate and internalize the process of action plan development
2. A dummy action plan



Table 9. Action plan template

Date:

TEAM MEMBERS

GREENING STRATEGY / OBJECTIVE

ACTION	ACTOR RESPONSIBLE	REQUIRED RESOURCE	RISKS/GAPS/WEAK LINKS	PRIORITY	START	END	NOTES
Strategy #1:							
Strategy #2:							
Strategy #3:							

Bibliography

- FAO (2014) 'Green food value chain development concept note', in M. Hilmi (ed.), Proceedings of the Knowledge Exchange Forum for the Development of Green Food Value Chains, 27–28 November 2014, Rome.
- Hilmi, M., 2019. A field practitioner's perspective on developing green food value chains. Food Chain 7, 1–24. <https://doi.org/10.3362/2046-1887.17-00006>
- Kirchherr, J., Reike, D. and Hekkert, M. (2017) 'Conceptualizing the circular economy: an analysis of 114 definitions', Resources, Conservation & Recycling 127: 221–32 <https://doi.org/10.1016/j.resconrec.2017.09.005>
- Mulvany, P. and Murphy, B. (2015) 'Sustaining local food webs: insights from Kenya and the UK', Food Chain 5(3): 181–202 <https://doi.org/10.3362/2046-1887.2015.009>
- Springer-heinze, A., 2018. ValueLinks 2.0. Manual on Sustainable Value Chain Development, GIZ Eschborn, 2 volumes. GIZ, Eschborn.
- United Nations Economic and Social Commission for Western Asia (UNESCWA) (2014) Green Agricultural Value Chains for Improved Livelihoods in the Arab Region, Beirut: UNESCWA.
- GEF-UNDP (2017) Study on Options and Opportunities to Make Food Value Chains More Environmentally Sustainable and Resilient in Sub-Saharan Africa

Annexure

Annexe 1. Multi-stakeholder analysis matrix

Stakeholder/Value chain actor	Stake/Mandate	Potential role in the VC development	Marginalised?	What is their attitude?	Support the greening process?	Oppose greening process	Will the stakeholder benefit from food value chain greening	Will the stakeholder be harmed by the greening process?	Stakeholders' concerns?

Annexe 2. Economic evaluation checklist

NB: For each question, provide both the descriptive answer and a rating on a scale of 0 to 3 with: 0: not relevant, 1: low, 2: medium, 3: high

Market demand prospects (local and/or export)	Inputs supply (description)	Production	Aggregation/ Distribution	Processing	Marketing
1. What are the prospects for market growth?					
(i) Volume and value of (local and export) market demand in the last 5 years.					
2. Is there (seasonally) unmet market demand?					
(i) Are traders/customers willing to buy more of the product/ service?					
(ii) Volume of unmet market demand					
(iii) Price of products (and variations during the year)					
(iv) Volume of production and consumption					
3. Is there scope for import substitution?					
(i) Share (%) of gross domestic production (GDP)					
(ii) Volume and value of export and import					
Opportunities for employment creation					
1. How many persons (male/ female) are currently (self) employed in the value chain or sector? (estimation)					
(i) Number of persons (M/F) (self) employed in the value chain or sector and trends.					
2. Has (self) employment in the sector in the last 5 years increased, decreased or remained the same?					
(i) What are the drivers/ causes of the increase or decrease?					

(ii) Labour intensity: number of persons employed in various VC stages					
(iii) Number and size (workers) of SMEs in the value chain, both formal and informal					
3. What are the growth prospects and opportunities for employment creation?					
(i) Available labour force (size, skills and education)					
Prospect for (local) value addition					
1. What has been the added value in the (sub) sector in the last 5 years? (estimation)					
2. Has the added value in the sector in the last 5 years increased, decreased or remained the same?					
3. Can new products/services be developed through processing or product improvement for which a market exists?					
Comparative advantage of production level of competitiveness (in comparison to competing producers)					
1. What are the production costs per unit relative to the benchmark?					
(i) Can the product be supplied to the buyer/ consumer at an attractive price?					
(ii) Cost of production/unit					
(iii) Product prices					
(iv) Product quality					
(v) Certification /labelling					
(vi) Proximity to market					
(vii) Costs and possibilities for packaging					

(viii) Labour costs (compared to surrounding production areas)					
2. What are the other comparative (dis) advantages of the product/VC in national and export markets? E.g., product differentiation, product quality, standards/labelling, image, proximity to markets, other.					
(i) Number and type of key competing products					
3. Which competing imported products are found in the markets, for what price, and at what quality?					
(i) Can local products substitute imports?					
(ii) If yes, how?					
(iii) Prices and quality of (imported) key products					
4. Are infrastructure, a qualified labour force, raw materials, and inputs sufficiently available at comparative prices and sufficient quality?					
5. Do enterprises in the sector have the management and technical capacity for upgrading and innovation?					
(i) Availability of key inputs, resources, and skills					
Profitability: Level of net profits by (potential) SMEs in the sector					
Prices of products/services					
Costs of production					
Tax levels					
What is the level of net profits by (potential) SMEs in the sector?					

Annexe 3: Overall Matrix

This matrix presents the 'key' (minimum) criteria for value chain analysis, comparison, and selection. Criteria can be added or removed on a need-to basis, depending on the value chains of interest.

Selected Key Criteria		Value Chain 1				Value Chain 2		
I	Economic Component	A	B	C	Underlying data for the score	B	C	Underlying data for score
1	Market demand prospects (local and/ or export)							
2	Opportunities for employment creation							
3	Prospect for (local) value addition							
4	Comparative advantage of production. Level of competitiveness (in comparison to competing producers)							
5	Potential Profitability: by (potential) SMEs in the sector							
II	Environmental Component (HSA)							
6	Impact of the value chain functions on the environment							
7	Impact of the environment on value chain functions							
8	Green opportunities							
II	Social Component							
9	(Prospects for) Inclusion of disadvantaged groups (poor, women, youth, refugees, minorities, persons living with disability)							
10	Working conditions							
11	Impact of the value chain on the surrounding communities							
12	Prospect for products/services for the Base of the Pyramid (BoP)							
TOTAL (max score = XX points)								

A = Weight of criteria of total %; B = Score; C = Weighted score

Scale: Scores: 1 = Very poor/Very low; 2 = Poor/Low; 3 = Acceptable/Moderate; 4 = Good/High; 5 = Very good/Very high

Annexe 4. Key considerations when selecting a food value chain to be greened

a. On the current food value chain:

- What is the dominant food value chain?
- Who are the principal actors?
- What is the relation between national food production and food consumption?
- How is food production (farming, fishing) organised?
- What farms and fishery types are dominant?
- What is the size and nature of livestock and aquaculture production?
- Where is primary and secondary processing done, and by whom?
- Where is food being transported from, and how?
- How is food consumption being organised?
- What is the share of supermarkets and out-of-home consumption in total expenditures?

b. On natural resources:

- What is the nature and extent of land use: is there expansion or contraction of the agricultural area? What is the situation regarding land degradation? How are crop yields compared to similar regions/potentially attainable yields? How is pastureland being used?
- How are fisheries managed? What is the status of fish stocks? Is there aquaculture, and what are the related environmental impacts?
- What is the situation regarding plant and animal breeds: availability, diversity, quality, genetic potential?
- What is the nutrient use efficiency, amount of nutrients (minerals) being used, nutrient losses?
- Is water being used sustainably and efficiently in irrigation and food processing? Are groundwater levels being monitored? Is there a potential for expansion of irrigated area?
- What are the amounts and proportions of fossil and biomass fuel used, in which food system activities?
- What are the overall environmental impacts: GHG, nutrient losses, pesticide emissions, soil and water quality?
- How are property rights and land tenure organised?

c. With respect to food demand:

- What is the food security situation (stability of food availability, food access, food utilisation)?
- What is the nutritional security situation (prevalence of undernutrition, over-nutrition, other forms of malnutrition)? What is the trend in diets over the last 10–20 years? What are the expectations for the future? What is the share of livestock products in diets?
- How much fossil fuels and packaging are used in food consumption? How much food waste occurs? What is happening to food waste, food residues, and human excreta?
- What is the fate of nutrients entering urban food systems?

d. With respect to actors, institutions, regulation:

- What kinds of regulations are in place to regulate food system activities and the use of and access to natural resources?
- What kinds of environmental regulations are in place? How are they implemented and enforced?
- Which subsidies are installed? What is the tax regime? Are there import and export tariffs?

Annexe 5. Environmental evaluation checklist

NB: For each question, provide both the descriptive answer and a rating (the main question) on a scale of 0 to 3 with: 0: not relevant, 1: low, 2: medium, 3: high

Impact of the value chain functions on the environment	Inputs supply (description)	Production	Aggregation/ Distribution	Processing
1. Which environmental issues play a role in the VC, and how?				
2. Which (natural) raw materials are used in the VC?				
(i) Use (and origin) of raw materials				
3. What type of energy is consumed?				
(i) What level of energy (none renewable) is consumed?				
4. Does the VC impact on the land and its future production potential?				
(i) If yes, how?				
(ii) Level of soil loss				
(iii) Level of soil fertility loss				
5. What impact does the VC have on water resources?				
(i) consumption				
• quantity				
(ii) pollution				
• quality				
6. Does the VC cause (low/high levels of) a				
(i) Air pollution, and if so, which?				
• If yes, how?				
(ii) GHG emissions?				
• If yes, how?				
(iii) Waste produced?				
• If yes, how?				
(iv) Carbon footprint				
7. (How) does the VC impact on biodiversity?				
(i) (Key) impact on biodiversity				

Impact of the environment on value chain functions (Low vulnerability of the value chain to the (degraded) environment and climate change.				
1. How vulnerable is the VC (or are specific sections of the VC) to climate change and environmental degradation?				
2. What is the impact of extreme weather, rising temperatures, reduced rainfall (reliability)/ water availability on the (performance) of the VC? (determines risks)				
3. To what extent is the VC able to cope with the negative impacts of climate change? (Risks for and sensitivity of the VC)				
4. What is the adaptive capacity of the VC actors to the changing environment and climate? (Their adaptive capacity determines the severity of the risk)				
Green opportunities				
1. What is the potential in the VC for products and/or services which are conducive for a greening?				
<ul style="list-style-type: none"> List of concrete new products and/or services with low levels: using cradle to cradle concept/ regenerative concept. 				
(i) GHG emission				
(ii) pollution				
(iii) waste				
(iv) resource use				
2. What is the potential in the VC for products and/or services that compensate for GHG emissions?				

Annexe 6. Social evaluation checklist

NB: For each question, provide both the descriptive answer and a rating on a scale of 0 to 3 with 0: not relevant, 1: low, 2: medium, 3: high

(Prospects for) Inclusion of disadvantaged groups (poor, women, youth, refugees, minorities, persons living with disability, etc.)	Inputs supply (description)	Production	Aggregation / Distribution	Processing
1. Do disadvantaged groups have a (potential) function in the VC? If so, which groups, and which function/ role?				
2. Is the number of disadvantaged groups active/ employed in the value chain relatively high? For which groups?				
3. Do they have the necessary skills, and is greater inclusion feasible?				
4. Do disadvantaged groups control assets, equipment, and sales income?				
5. What are the barriers to entry for disadvantaged groups? What are the causes?				
Working conditions				
1. What are the health and safety risks for entrepreneurs and workers in the (different stages/functions of the) VC?				
<ul style="list-style-type: none"> List and level of health and safety risks; 				
(i) incidence of occupational accidents in the workplace				
(ii) working time lost due to sickness				
(iii) worker perceptions of physical and mental wellbeing				
2. How prevalent is freedom of association, and how is it regulated?				
(i) Existence of freedom of association/collective bargaining regulations and laws				
(ii) coverage of workers/ enterprises in practice; workers' recognition of right to organise				
3. Is child and/or forced labour present in the VC?				

• If so, at what level and in which activities?				
(i) Number or percentage of child and/or forced labourers				
(ii) Relevant regulations and enforcement, by companies, government and/or other institutions/ standard bodies				
Impact of the value chain on surrounding communities				
1. Are the rights to food, health, property (land) and water (access and use) of surrounding communities respected?				
(i) If yes, how?				
(ii) Risks for and type of violations (food, land, water, health) in surrounding communities.				
2. Is there a risk of the VC causing or being subject to conflict(s)/ tensions in society?				
a. If so, how and why?				
b. Potential conflicts (and costs) between VC actors and communities				
c. Relationship between tensions and conflict in a country and the VC: e.g. inclusions/ exclusion of certain minorities.				
3. Do individuals, workers or communities have access to grievance mechanisms in case of human rights violations?				
4. Are there any other risks of human rights violations in the value chain?				

Annexe 7. Hotspot analysis report (An example of hotspot analysis results, rice value chain in Benin)

Upland, rainfed rice production	Water pollution Downstream silting	<u>*Increasingly unreliable rainfall</u> <u>Erosion, loss of soil fertility</u>
Lowland/swamp production	Lowering of water tables Loss of biodiversity and ecosystem service of swamps	<ul style="list-style-type: none"> • <u>*Temporary flooding</u> • Iron toxicity • Loss of soil fertility -
Irrigated rice	Water scarcity aggravated	Inefficient irrigation, variable water supply, plastic waste in fields
Bulking/storage		Increased variability of climate conditions
Parboiling	<u>*Overexploitation of wood - Air pollution</u>	Rising fuelwood prices - decreasing water availability
Milling	High carbon emissions	Inefficient use or high energy cost (operating below capacity)
Transport	High carbon emissions	
Storage/ packaging		Losses due to inefficient storage
Cooking		
Hotspots (Springer-heinze, 2018)		

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*Empowered lives
Resilient nations.*