Food and Agriculture Organization of the United Nations

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

SFVC METHODOLOGICAL BRIEF

Developing sustainable food value chains

Practical guidance for systems-based analysis and design

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Abbreviations

BM	business model
CLA	collaborating, learning, and adapting
EE	enabling environment
ETP	endangered, threatened or protected
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FTE	full-time equivalent
GDP	gross domestic product
ICT	information, communication technology
ITC	International Trade Centre
MT	metric tonne
NPC	nominal protection coefficient
SCP	structure-conduct-performance
SDG	sustainable development goals
SFVC	sustainable food value chain
SMART	specific, measurable, achievable, realistic and time-bound
SWOT	strengths, weaknesses, opportunities and threats
ToC	theory of change
USD	United States Dollar
VA	value added
VC	value chain
VCA	value chain analysis
VCA/D	value chain analysis and design
VCA4D	value chain analysis for development
VCAT	value chain analysis tool

1. Introduction

This brief provides a rigorous and standardized approach for value chain analysis and design (VCA/D).[1] It assumes that a specific value chain (VC) has already been selected and describes how to complete the first two steps for its sustainable development, namely analysing the VC and designing an upgrading strategy and development plan for it.[2] The next step, beyond this brief, is the implementation of this plan by the VC stakeholders, facilitated by a catalytic VC development project ("facilitation project"). The brief is primarily based on FAO's Sustainable Food Value Chain (SFVC) framework (FAO, 2014).[3] The SFVC approach promotes a systems-based development of agrifood value chains that are economically, socially and environmentally sustainable, as well as resilient to shocks and stressors.

A food VC consists of the full range of actors from capture/production to consumption, and their coordinated value-adding activities that transform raw materials into food products. A VC development approach is a holistic method, which examines all the elements – actors, support providers, their operational environment, their complex interlinked behaviour, and their technical, economic, social and environmental performance to devise an upgrading strategy to improve the sustainability impact and resilience of the chain.

While the SFVC methodology is elaborate and detailed, it remains in essence a scanning tool, i.e. it is broad rather than deep. Throughout this brief, there are references to various in-depth analytical tools that can be applied to explore a key issue in greater detail. Using some of these tools to delve deeper into selected issues may be recommended activities for the development plan culminating from this methodology.

The SFVC methodology is highly participatory in nature and stakeholder-driven. To promote engagement, three multistakeholder workshops are included: (i) inception of the work; (ii) analysis validation and vision development; and (iii) VC development plan validation. In addition, creating or upgrading a multistakeholder platform for the VC is an integral part of the overall SFVC development approach. The overall goal is to deliver a VC development plan that all relevant stakeholders agree to. The plan will include strategic activities, task deadlines, responsible stakeholders and costs for execution.

The end-product of the application of the methodology is a VC report with four components. The first two components, a functional analysis and a sustainability assessment, make up the VC analysis. The last two components, an upgrading strategy and a development plan, represent the VC design.

- Value chain analysis is intended to collect and analyse all information needed to make strategic decisions for upgrading a value chain to increase its competitiveness and contribution to achieving the sustainable development goals (SDGs).
- The approach takes a systems perspective, analysing the behaviour and performance of value chain actors influenced by a complex environment. Value chain upgrading is based on the identification of systemic causes of value chain bottlenecks and centres on the development of systems-based solutions.
- Sustainability relates to the triple-bottom line, requiring an analysis of the economic, social and environmental impacts. Sustainability also relates to the value chain's resilience to shocks and stresses.
- The ultimate goal is to develop a concrete upgrading plan for the sustainable development of a selected value chain.

1 In this brief, the term "VC report" refers to the VC analysis and design report, while "VC team" refers to the national and international consultants who have developed the report.

2 For guidance on how to select a VC, please see FAO, 2021.

3 It is recommended that you read the 2014 publication before reading this brief. An earlier version of this 2023 guide, focused on aquatic products, was developed and field-tested in 12 African–Caribbean–Pacific countries in the context of the EU-funded FISH4ACP project (2020–2024). It integrated the Value Chain Analysis for Development (VCA4D) framework (European Commission, 2018) into the SFVC framework.

The methodology is based on extensive secondary and primary data collection. The latter includes (depending on context and available resources) field observation visits, expert groups, focus groups, actor interviews, key informant interviews and surveys.

The process of implementing the methodology starts by setting up a core VC team, which includes international as well as national members. Once the core VC team is established, its members are trained on the methodology and provided with the VC report template. Thereafter, the overall process goes through seven steps (see Figure 1). Critical progress checkpoints are highlighted in Figure 1: the three stakeholder workshops and the three successive versions of developing the VC report, each of which needs to be subjected to validation by the stakeholders and actors along the value chain. The core VC team develops the different components of the VC report in parallel, continuously deepening and refining the analysis and sharpening the strategy and development plan. Based on the local context, the complexity of the value chain, its geographical area, and the application of the methodology in full or rapid form (depending on resource availability), the indicated timeline may shorten or lengthen.

Figure 1. The seven steps of the VC report development process

1	**Desk review** ■ Task distribution and secondary data collection plan ■ Secondary data collection and analysis ■ Preparation of **first draft report based on secondary data**	**Month 1**
2	**Field work inception mission** ■ Rapid appraisal through visits to local markets and key actors' interviews ■ Multistakeholder **inception workshop** ■ Preparations for field research phase (primary data collection plan)	**Month 2**
3	**Field research** ■ Data collection (key informant interviews, surveys, direct measurements) ■ Data analysis ■ Completion of functional analysis and sustainability assessment	**Month 2-5**
4	**Validation mission** ■ Participatory **validation workshop** to discuss VCA findings and a project vision ■ Finalization and clearance of the **VCA part of the report** ■ Preparation of work plan for the upgrading strategy formulation	**Month 5**
5	**Upgrading and planning** ■ Full formulation of a vision and core upgrading strategy (ToC) ■ Development of upgraded business models and development plan ■ Preparation of closing mission	**Month 5-8**
6	**Planning mission** ■ **Planning workshop** to present and discuss the development plan ■ Discussions with potential financial partners ■ Stakeholder meetings to discuss roles in implementation phase	**Month 8**
7	**Report finalization** ■ Finalization of **VC report** by including insights from planning workshop ■ Distribution of VC report ■ Initiation of implementation phase	**Month 9**

Source: Authors. 2023

2. Functional analysis

The functional analysis is about describing and understanding the structure and dynamics of the value chain. This includes three key aspects: (i) discovery of the VC elements (full range of VC actors, input and service providers, enabling environment, natural environment); (ii) all stakeholders, their behaviour, their interactions and their dimensions (numbers, volumes, values); and (iii) identifying root causes for observed underperformances. The analysis focuses on understanding VC actors´ behavioural aspects, i.e. why actors choose particular markets, technologies or governance mechanisms over others that may seem more rewarding or efficient (e.g. not using improved agro-inputs and equipment, not recycling waste, not participating in groups, etc.).

To assure a holistic and in-depth understanding of the VC, the functional analysis works systematically through four steps (see Figure 2). Each step presents an opportunity to identify options for the upgrading strategy.

2.1 The value chain map

A VC map is a flow chart that provides a general picture of the VC from production to consumption, indicating the functions, actors, the linkages between them, and the main channels (see example in Figure 3). It facilitates an understanding of the structure and dimensions (volumes, values, and numbers of actors) of the VC. The VC map allows for the identification of possible leverage points, i.e. those points in the system where upgrading can have the biggest impact because it influences or affects large volumes of product or numbers of actors.

Once the VC map is completed, it is complemented by a brief text describing the map – viz., the different functions, actors and channels, and the overall dimensions (volumes, values, jobs, and numbers of actors). It also provides an indication of how and why each of these four elements is changing over time (dynamic perspective).

2.2 End-market analysis

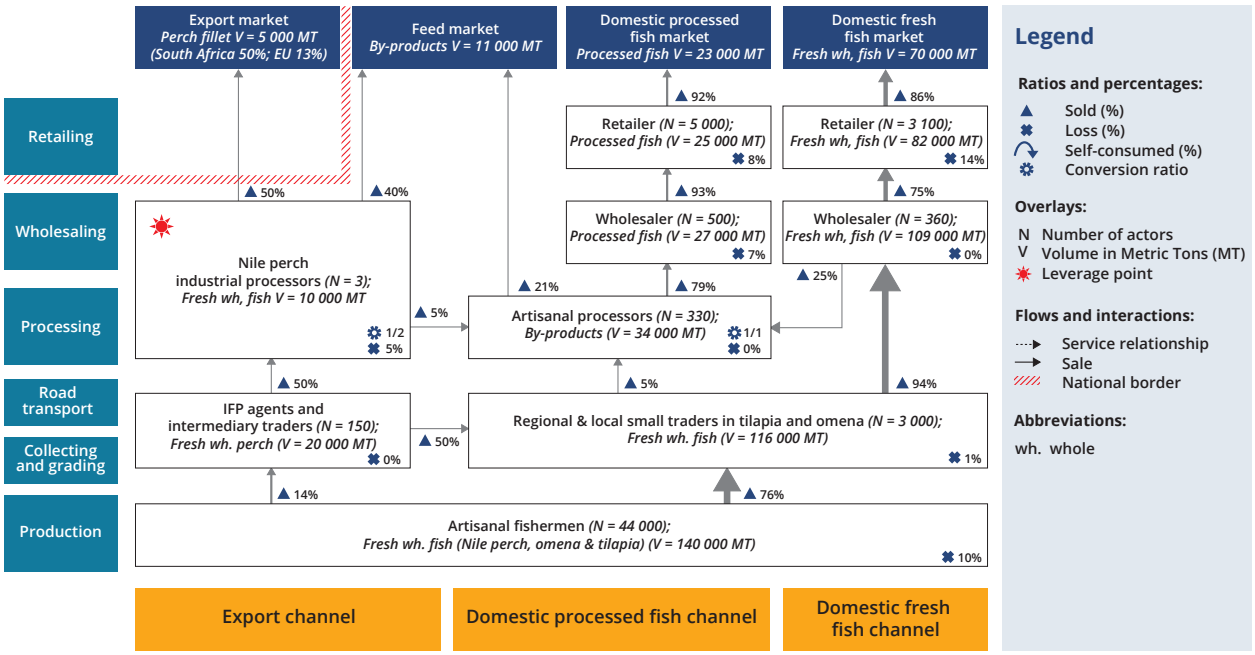
The next step of the functional analysis is the identification of concrete, end-market opportunities, because the (economic) performance of the VC is ultimately determined by its ability to capture value in an end-market, where consumers make their purchase decisions from a set of competing alternative products.

Through secondary data, market reports, interviews with local retailers, traders and overseas buyers, a (domestic) consumer survey, and other means, a detailed understanding of existing and potential end-markets is established. This includes market sizes and growth rates, trade flows, customer purchasing trends, prices and price trends, packaging, market drivers, market segments and channels, competitors, flow of products to end-markets, client order specifications, critical success factors, barriers to entry (standards), operational practices (logistics), unique selling propositions and consumer buying processes as overall perceptions.

Figure 2. Four steps in functional analysis

Source: Authors' elaboration.

Figure 3. Lake Victoria capture fisheries value chain map

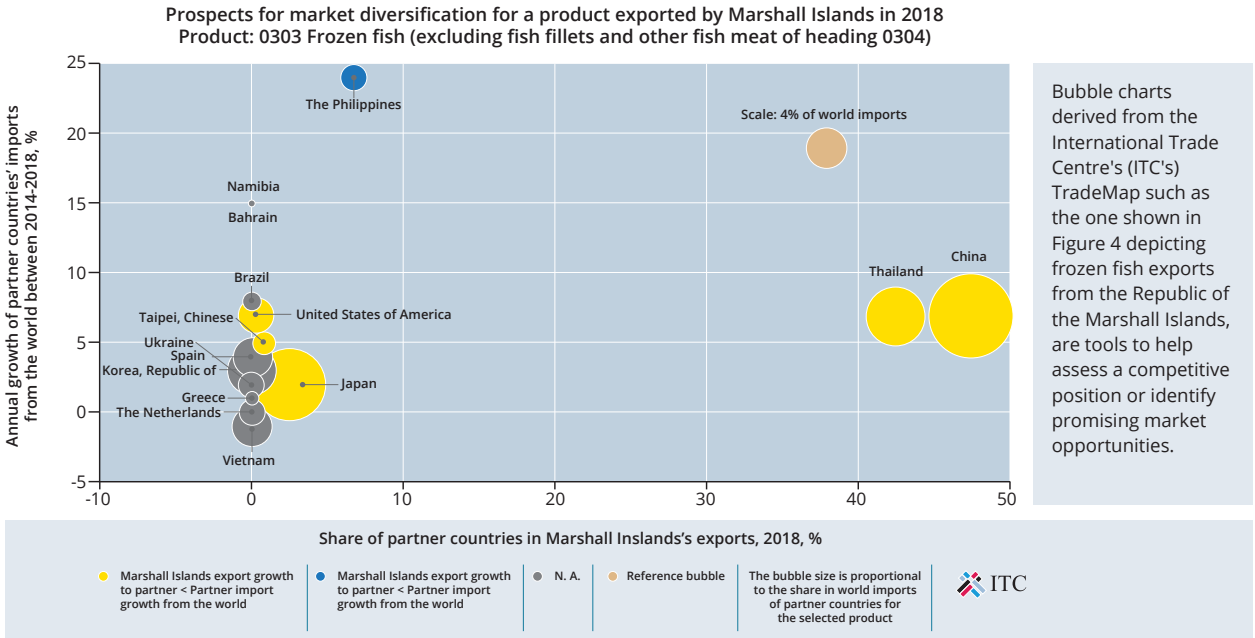


Developing a VC map consists of six steps:

1. Determine the functions
2. Determine the actor types by function
3. Indicate the product flows
4. Identify the main channels
5. Provide dimension overlays (data layers)
6. Indicate leverage points

Source: Adapted from USAID. 2008. *The Kenya fisheries value chain: an AMAP-FSKG value chain finance case study, microreport #122*. www.fao.org/sustainable-food-value-chains/library/details/en/c/263587/

Figure 4. Example of Trademap bubble chart



Bubble charts derived from the International Trade Centre's (ITC's) TradeMap such as the one shown in Figure 4 depicting frozen fish exports from the Republic of the Marshall Islands, are tools to help assess a competitive position or identify promising market opportunities.

Source: Macfadyen, G., Duong, G., Stege, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2022. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report.* Rome, FAO.

Key points to be considered while analysing end-markets:

- Growing segments of the domestic market, import substitution and export markets are the main categories of opportunities. Globalization simultaneously increases competitive threats in domestic markets (imports) and opportunities in overseas markets (exports).
- Market opportunities should include not only those for the currently marketed product (e.g. undifferentiated whole pineapple) but also for potential, value-added products that may not yet exist in the VC (e.g. branded organic pineapple juice).
- Upgrading strategies for VCs often assume increased sales. It needs to be clear in which markets these can be realized and what needs to happen throughout the VC, working back from (with detailed specifications of) the market to the producers (or extractors such as gatherers, hunters or fisherfolk), to capture market share.
- End-markets include not just retail sales of food products to households, but also business-to-business (B2B) sales to restaurants, hotels, food services firms, street food vendors, etc., as well as to other industries such as feed manufacturing. In this context, restaurants and feed processors are usually seen as end-markets as the VC commodity will typically be mixed with many other inputs. In case of street food vendors specialized in selling the VC commodity (e.g. grilled maize cobs, smoked fish), the household is typically seen as the end-market. This explains why value addition by the vendor is included in the overall calculation of the value added by the VC as a whole.
- The behaviour of end-consumers in the domestic market has to be analysed – what, where and how do they buy, prepare and consume their food products, why and how do they discard packaging, and how do they handle food leftovers? What opportunities exist to sell more (or greater value) to domestic consumers?

2.3 Analyses of the VC elements

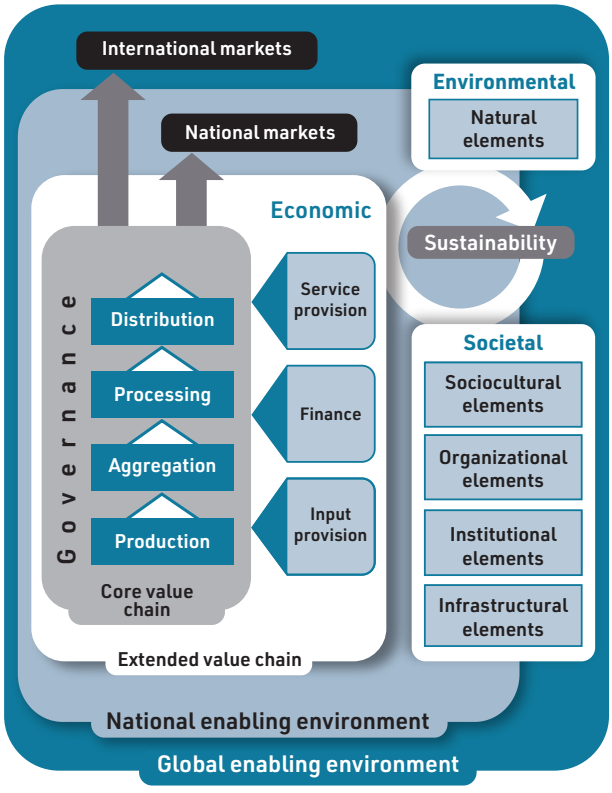
The objective of this part of the analysis is to identify concrete and feasible opportunities to reduce or remove operational inefficiencies (bottlenecks), social costs, ecological footprints, and/or to increase economic, social, environmental, or resilience benefits.

To do so, the VC elements are analysed across four layers (see Figure 5):

- **Layer 1: Actors in the core VC;**
- **Layer 2: Input suppliers & service providers in the extended VC;**
- **Layer 3: The societal enabling environment; and**
- **Layer 4: The natural environment.**

The analysis of the first two layers, the actors and support providers, focuses on examining their current business models and behaviours to determine, among others, why they are not already taking advantage of a known market or upgrading opportunities (what missing incentives or capacities constrain them). The analysis looks at: (i) the current situation as well as the dynamics (trends and drivers); (ii) the differences between types of actors within a functional level; (iii) the importance of the VC in the overall net income; and (iv) all information needed to compile operating accounts, which are prepared for all actor types as part of the economic assessment.[4]

Figure 5. The sustainable food value chain framework



Source: FAO. 2014. *Developing Sustainable Food Value Chains: Guiding Principles.* Rome, FAO. http://www.fao.org/3/a-i3953e.pdf

[4] By "operating account", we refer to all revenues, costs and resulting profits of a firm, from which we may calculate various economic indicators such as profitability, direct and indirect value addition, contribution to the national economy, etc.

The following three concepts lie at the core of the analytical approach and need to be identified:

- **Root causes** – the ultimate reason for observed underperformances.
- **Binding constraints** – constraints that need to be tackled first in the sequencing of the upgrading activities.
- **Leverage points** – nodes in the VC where many actors or large product volumes come together, and where a small change can lead to large impacts.

The analysis of the third and fourth layers, the societal and natural elements, looks at how the broader enabling environment, comprising societal and natural elements, influences the performance of VC actors and support service providers. Many systemic (root) causes of VC bottlenecks and, thus, the greatest opportunities for improving VC performance and its resilience, lie in this broader environment rather than the chain itself.

2.3.1 The value chain actors

Layer 1 focuses on the VC actors, i.e. those who produce or procure from the upstream level, add value to the product and then sell it to the next level downstream. The analysis is organized by function and describes the current situation, how it is evolving and why.

The analysis typically includes a **qualitative analysis** covering the following elements:

- Location (to allow for the development of a geographic mapping of the VC);
- Nature of the decision maker (age, education, ethnicity, gender, wealth, household size, etc.);
- Functions covered by the actor (e.g. aggregation and processing);
- Procurement practices (input quality, perceptions of suppliers of inputs, services, finance);
- Operational practices (activities, labour versus capital intensity, quality standards);
- Marketing practices (contracts, markets, pricing policies, transaction mechanisms);
- Infrastructure and equipment used (capacity, sophistication, state of repair, energy source);
- Functional performance (volumes, loss rates, conversion rates, labour productivity);
- Competitiveness (comparing functional performance to benchmarks);
- General business skills (e.g. accounting, pricing, planning, negotiating);
- Main challenges (operational, financial and market) and risks that the actor faces;
- Main successes (what worked well in the past and yielded results); and
- Main ambitions of the actor (how actors see the future of their businesses).

At this stage, five generic types of actors are distinguished – producers, aggregators, processors, distributors (wholesale and retail) and end-consumers. The end-market analysis covers end-consumers and the consumption function, including waste management (level, channel of disposal). In each of these actor categories, there may be distinct sub-groups (e.g. modern and artisanal processors), increasing the number of actor types to be depicted in the VC map.

2.3.2 Support providers and factor markets in the extended value chain

Layer 2 looks at the current performance of the extended VC, including the availability, accessibility, effectiveness and quality of inputs and services, the dynamics (what is changing) and drivers (why this status, why these changes). The objective of the analysis is to identify potential gaps in inputs and services provision as well as in factor markets that represent opportunities for upgrading.

Three main types of support services are assessed at this stage:

1. The **provision of physical inputs** (such as fish fries from hatcheries, tractors, hoes, outboard motors, boats, processing machinery, chemicals (e.g. salt, lime, fertilizer, fuel), drying racks, feed, ice, and packaging materials);
2. The **provision of non-financial services** (such as training and extension services, transport and storage logistics, ICT, processing (if the processor does not take ownership of the product to be processed), repair services, market and price information); and

3. The **provision of financial and risk management services** (including insurance products).

In addition, **four factor markets** are analysed – **labour, energy, land** and **water**.

2.3.3 The societal environment

This section provides an analysis of the current social business enabling environment (BEE) that affects the performance of the value chain, how this environment is changing and how it can be upgraded to improve sustainability impacts.

Societal elements are classified into four categories:

1. **Formal institutional elements** (such as national policies, regulations, laws and standards, official strategies and plans);
2. **Informal socio-cultural elements** (such as norms, unwritten codes of conduct, cultural preferences, social habits, and levels of corruption and crime);
3. **Infrastructural elements** (such as electricity grids, roads, ports, agroprocessing parks, and ICT networks); and
4. **Organizational elements** (such as ministries, public agencies, inter-professional associations, research and development facilities, and any relevant, ongoing projects and programmes).

2.3.4 The natural environment

This section analyses how the natural environment is favourable (or not) for the analysed value chain. It **describes how the natural environment impacts the competitiveness of the value chain** in the areas of extraction (catching, hunting, gathering) or farming. It identifies the key strengths, weaknesses, opportunities and threats that derive from the natural environment, which need to be taken into account when developing the upgrading strategy.

The natural environment includes elements such as – climate and climate change; quality and quantity of water available for production and processing (rivers, lakes, coastal waters); unique genetic resources; qualities and quantities of raw materials available for extraction (e.g. current fish stock rates for capture fisheries); geography (ease with which inputs and outputs can physically move to, from and within the country, based on topography and global location); and the absence or prevalence of diseases and other natural disasters (e.g. floods, hurricanes).

2.4 Governance analysis

Value chain governance refers to the coordination of VC stages and the relationships and decision-making between VC actors, making it possible to bring a commodity from primary production to end-use. Information on governance is usually not available from reports or statistics, but requires interviewing key VC actors.

In this section, the focus of the analysis shifts from assessing how well the individual elements function to assessing how well the VC functions as a whole, i.e. how well the elements are linked and if all necessary elements are present. Three kinds of linkages can be identified at this stage, which together form the governance structure of the chain:

1. **Vertical linkages** between actors at different stages of the chain, which refer to how producers, aggregators, processors, wholesalers and retailers engage in transactions, for example through contracts;
2. **Horizontal linkages** between actors at a particular stage of the chain, for example, producer cooperatives or trade associations; and
3. **External linkages** between actors and other stakeholders in the VC, which include links to suppliers, service providers, financial institutions and public organizations such as ministries, research centres and projects.

All vertical and many external linkages are in fact market systems (exchanges) where supply meets demand in an environment linked to institutions and support providers in the next layer. This is where this VC methodology takes on a **market systems approach** to understand these markets and what can be done to improve them.

This section is mainly organized by VC channels, analysing the governance structure along the vertical linkages in each channel. Specifically, it analyses the dynamic nature of the formal and informal relationships between actors, and the factors that influence these relationships. It describes the nature of linkages, the reasons behind such linkages, how they have been changing over time and how well they are working in terms of their core function – **delivering food to the population**. This section also includes the identification of upgrading opportunities to improve the governance structure through new or upgraded linkages. The components to be systematically analysed are listed in Table 1.

Table 1. Main components of the governance analysis

Components	Examples of practices and factors to be considered
Vertical linkages – External linkages	• Price discovery and price setting • Standard applications • Presence or absence of quality premiums • Dependencies (e.g. credit lock-ins) • Levels of coordination and information exchange • Nature of the dominant coordination and transaction arrangements • Impact of possible volatile supplies throughout the year • Transaction costs and benefits (e.g. contract farming to access inputs) • Capacity building through transactional relationships (e.g. embedded training)
Horizontal linkages	• Levels of competition vis-à-vis collaboration between similar actors • Collective action such as joint inputs purchase, value addition, or marketing • Associated economies of scale or scope • Role of associations, cooperatives, unions, etc., and barriers to entry into such organizations • Presence of leaders for the various VC actor types
Market power	• Role of business strategies and practices of large/influential actors (e.g. big, monopolistic, industrial food processors) or collectives (e.g. a prominent cooperative or association), which function as channel captains • Vertical power imbalances that can lead to exploitation (e.g. fish-for-sex) • Asymmetries in size, knowledge or financial means • Dependencies on certain actors for critical inputs, finance or market access • Role of asset specificity (i.e. having assets that lock the actor into a limited set of buyers) • Isolation of actors • Relative importance of VC related activities to the actors' overall economic activity • Political power and the intertwining of business and political interests
Trust	• Length of relationships • Incidence of cheating, corruption, non-payment • Levels of transparency • Role of cultural factors • Presence of enforced formal dispute resolution mechanisms
Social capital	• Ability to access resources through social networks based on family, community or other ties; or conversely, social obligations to work in groups or share benefits with group members
Formal and informal rules	• These are cross-cutting components across the above factors that influence the rules (institutional and socio-cultural) placed on the governance structure

Source: Authors' elaboration.

3. Sustainability assessment

The objective of the sustainability assessment is to analyse the VC performance in terms of its economic, social and environmental impacts, and to identify critical sustainability issues (hotspots). For this assessment, the focus of the analysis shifts from how the environment impacts the VC (functional analysis) to how the VC impacts the environment. The sustainability analysis is constituted of five parts. The first three parts delve into the economic, social and environmental impacts specifically. Throughout these three sections, the analysis assesses not only direct impacts on the actors, support providers and workers in the VC, but also the externalities (unintended impacts) it generates beyond the structure. Part four of the sustainability assessment looks at resilience as a meta-dimension of sustainability – how vulnerable is the VC to external shocks such as an economic crises, social unrest or natural disasters? The fifth and final part of this section presents a heat map reflecting the overall sustainability performance of the VC (see Figure 6). This heat map then feeds into the strategy development. Based on expert assessments, three sustainability levels are distinguished in the heat map: (i) red indicates a high concern area, or a highly unsustainable situation that requires immediate attention; (ii) yellow indicates a sustainability concern that needs to be addressed in the medium-term; and (iii) green indicates that there are no significant or immediate sustainability concerns. The sustainability and resilience assessments are broad rather than deep. They are a scanning tool that indicates the hotspots that need to be further investigated.

Figure 6. Example of a value chain sustainability heat map

Economic Sustainability	Social Sustainability	Environmental Sustainability
Net income	Job-related income distribution	Electricity use
Trend in net income	VA distribution	Fuel consumption
Return on sales	Poverty	Renewable clean energy use
Return on investment	Discrimination	Carbon footprint
Number of jobs in full time equivalent (FTE)	Women's economic involvement	Water and ice consumption
Number of FT jobs	Gendered division of labour	Water pollution
Number of wage labour jobs	Gendered access to resources	Soil erosion
Number of family/self-employed jobs	Women's decision-making & leadership	Soil fertility
Average wage for hired workers	Food availability	Associated species
Average wage for proxy family labour	Food accessibility	Vulnerable ecosystems
Total value of net wages	Food utilization (nutrition, safety)	Endangered, threatened and protected (ETP) species
Direct value added (VA) at VC level	Food supply stability	Genetic resource use
Indirect VA at VC level	Labour rights	Stock status and dynamics
Total VA	Child and forced labour	Plant biosecurity
Contribution to trade balance	Job safety and security	Plant growing practices
Rate of integration	Job attractiveness	Animal biosecurity
Net impact on public finances	Collective action	Animal husbandry
Private investment	Coordination of transactions	Feed and fertilizer use
Nominal protection coefficient	Social cohesion	Use of drugs and chemicals
Direct resource cost ratio	Cultural traditions	Air pollution
Consumer surplus	Policy and regulations	Inorganic waste pollution
Consumer evaluation	Access to finance	Organic waste pollution
Consumer preference	Access to natural resources	Food loss
Price relative to substitutes	Access to information	Food waste
Resilience		
Redundancy	Diversity	Connectivity
Collaboration	Learning and adaptation	Participation and inclusion
Key		
Not concerning	Concerning	Highly concerning

Source: Authors' elaboration.

3.1 Economic assessment

The economic analysis focuses on the actor-level and VC-level contributions to economic growth. It contains six domains:

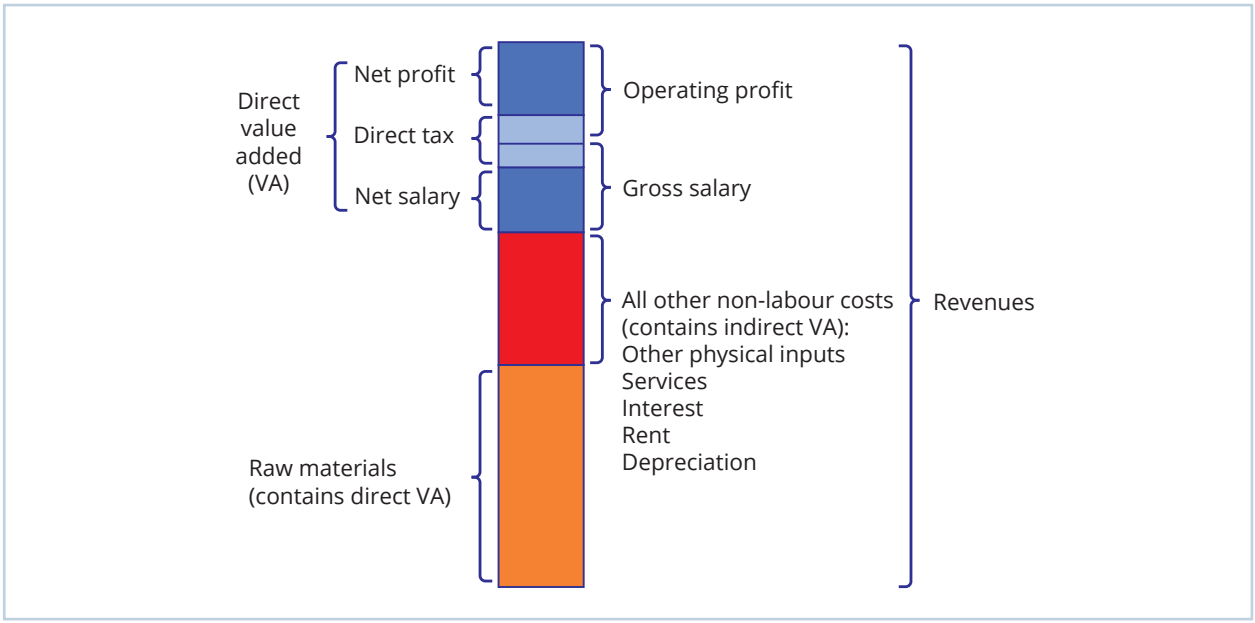
1. Profitability (financial analysis)
2. Employment (see Figure 8)
3. Value added
4. Effects in the national economy
5. International competitiveness
6. Value for end-consumers

Each domain includes a number of sustainability impact indicators, with 'value added' (VA) being the central concept. VA is the difference between the revenue from goods sold and the total cost of goods and services purchased from other firms (see Figure 7).

FAO's VCA-Tool (VCAT)

VCAT is a flexible software package that allows the VCA team to systematically organize and integrate the collected physical quantity and financial data into a combination of products, activities, actors and aggregated levels (e.g. VC level). The software allows one to clearly map the baseline scenario (current situation) at both market prices and reference prices from which all economic sustainability indicators are calculated. The tool also feeds into the development of an upgrading strategy for the VC as it allows for an ex-ante analysis of the socioeconomic effects of different upgrading options.

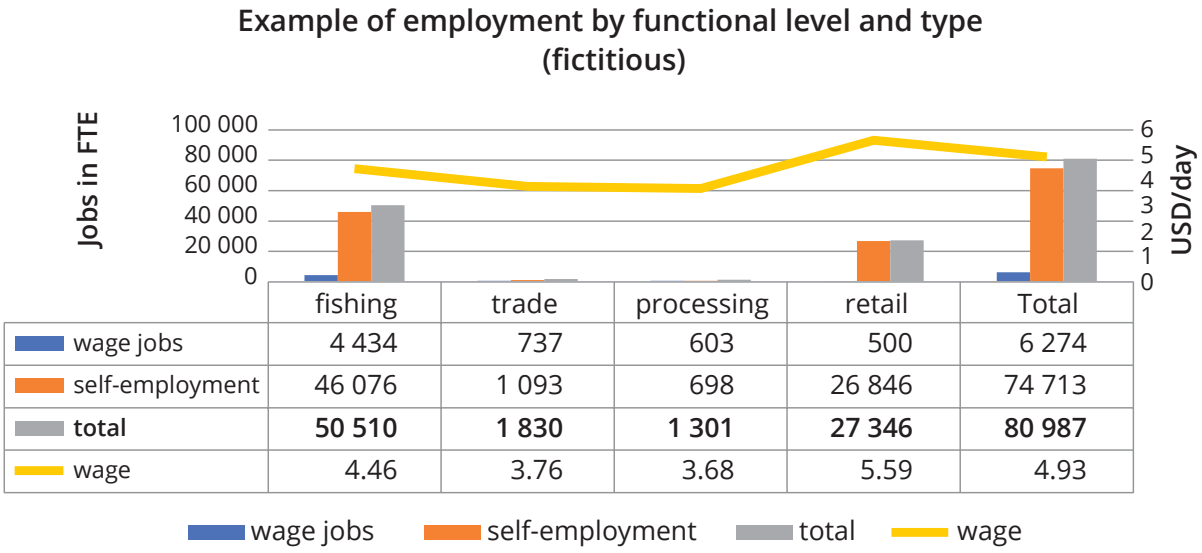
Figure 7. The value-added concept (at actor level)



Source: Authors' elaboration.

This VA concept distinguishes between raw materials bought from the preceding actor in the VC and other costs. Essentially, value added consists of wages, profits, taxes, interest, depreciation, and rent. As the assessment's main focus lies in the value added captured by employees, asset owners and the government, we include rents, interest and annual depreciation under other costs. The economic analysis uses FAO's VCA Tool (see box) and an associated excel-based spreadsheet (Economic Picture Tool). While highly recommended, the VCAT is not an obligatory part of the methodology since training the team in its use and application in the VCA is often too time-consuming in many VCA/D processes.

Figure 8. Number of jobs and type of employment along the value chain



	fishing	trade	processing	retail	Total
wage jobs	4 434	737	603	500	6 274
self-employment	46 076	1 093	698	26 846	74 713
total	**50 510**	**1 830**	**1 301**	**27 346**	**80 987**
wage	4.46	3.76	3.68	5.59	4.93

Source: Authors' elaboration.

3.2 Social assessment

The objective of the social sustainability assessment is to measure the social impacts of the VC activities (positive and negative) across six core social domains. Each of these six domains starts from a framing question; and each domain is broken down into four sub-domains (see Table 2) with three key questions per sub-domain. The social expert in the VCA team answers these questions and gives a rating (1-to-5 scores) for each sub-domain. The analysis culminates in a hotspot map (showing social sustainability at the sub-domain level), and a spider diagram (visualizing social sustainability at the domain level).

Social Profile Tool

The social sustainability analysis uses the Social Profile Tool, an excel-based spreadsheet inspired by the VCA4D approach. The tool involves expert-scoring based on a combination of qualitative and quantitative data organized around a set of 72 questions and 25 quantitative indicators. It is a strategic device to help highlight potential areas to address through value chain upgrading.

Table 2. Social domains and sub-domains

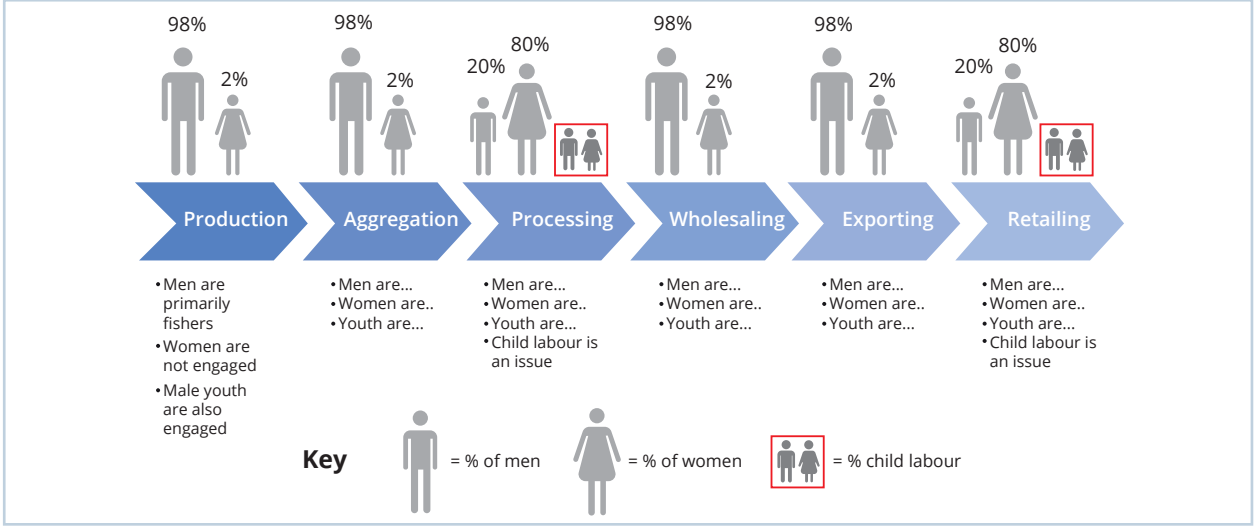
1. Inclusiveness	4. Decent employment
1.1. Wages and employment distribution	4.1. Respect of labour rights
1.2. Value added distribution	4.2. Child and forced labour
1.3. Poverty and vulnerability	4.3. Job safety and security
1.4. Discrimination	4.4. Attractiveness
2. Gender equality	**5. Social and cultural capital**
2.1. Women's economic involvement	5.1. Collective action
2.2. Gendered division of labour	5.2. Coordination of transactions
2.3. Gendered access to productive resources	5.3. Social cohesion
2.4. Women's decision-making and leadership	5.4. Cultural traditions
3. Food security, safety and nutrition	**6. Institutional strength**
3.1. Availability of food	6.1. Policy, regulations and standards
3.2. Accessibility of food	6.2. Access to finance
3.3. Utilisation of food (nutrition, safety)	6.3. Access to natural resources
3.4. Stability of food (trends)	6.4. Access to information

Source: Authors' elaboration.

The social heat map (part of the sustainability heat map in Figure 6) and the social sustainability spider diagram (similar to Figure 10) can also be used for monitoring purposes, i.e. to track changes over time and to identify issues that require more in-depth analysis by short-term experts (such as gender or decent employment experts) at a later stage.

The social sustainability assessment uses a range of tools (for example gender mapping; see Figure 9) to determine the inclusiveness of the value chain. It also involves a closer examination of the distribution of economic benefits, such as the components of value addition (e.g. operating profits of women's enterprises versus enterprises led by men).

Figure 9. Example of value chain gender mapping



Source: Authors' elaboration.

Environmental Footprint Tool

The environmental analysis uses an excel-based tool that provides a framework for organizing the results of the analysis and has a sustainability scoring function that feeds directly into the development of the heat map. The tool helps experts in identifying the main areas of environmental concern that, if prioritized by the VC stakeholders, could be tackled through the VC upgrading strategy.

Table 3. Environmental domains

1. Climate impact
1.1 Electricity use
1.2 Fuel consumption
1.3 Renewable clean energy use
1.4 Carbon footprint
2. Water footprint
2.1 Water & ice consumption
2.2 Water pollution & wastewater treatment
3. Soil quality
3.1 Soil erosion
3.2 Soil fertility
4. Biodiversity and ecosystems
4.1 Impacts on associated (non-target) species
4.2 Status of vulnerable ecosystems
4.3 Status of ETP species
4.4 Responsible use of genetic resources
4.5. Stock status, dynamics & extraction pressure of target species
5. Plant health
5.1. Application of plant biodiversity measures
5.2. Appropriate plant growing practices
6. Animal health and welfare
6.1 Application of biosecurity measures
6.2 Appropriate animal husbandry & handling
7. Toxicity and pollution
7.1 Responsible use of feed and/or fertilizer
7.2 Responsible use of drugs & chemicals
7.3 Air pollution
7.4 Inorganic solid waste pollution
7.5 Organic solid waste pollution
8. Food loss and waste
8.1 Food loss
8.2 Food waste

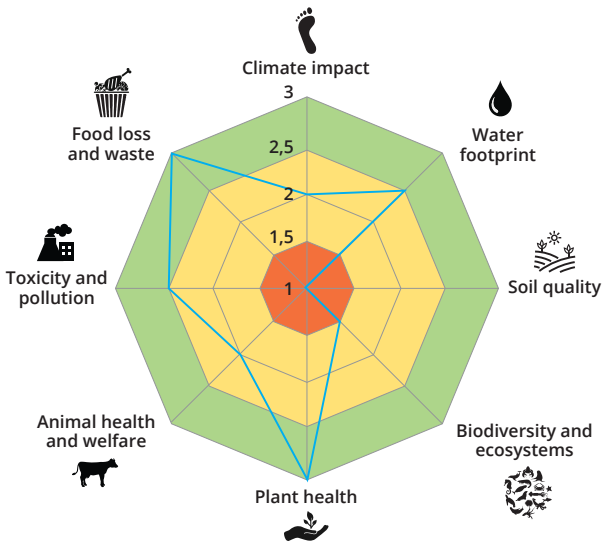
Source: Authors' elaboration.

3.3 Environmental assessment

The environmental sustainability analysis assesses the value chain's impacts on the natural environment by categorizing these impacts according to severity. The analysis identifies critical areas (hotspots) that may require more in-depth measurement and analysis at a later stage. Eight environmental domains are examined in detail. Each domain comprises several sub-domains (see Table 3) and several indicators need to be measured and discussed to assess the environmental sustainability at each sub-domain level.

The outcomes of the environmental sustainability analysis are an environmental sustainability heat map (visualizing environmental sustainability at sub-domain level) and an ecological footprint of the VC in the form of a spider diagram (see Figure 10). The information needed for the environmental analysis is collected based on secondary data, key informant interviews, firm and consumer level interviews and surveys. The analysis examines environmental impacts across the different stages of the value chain, from primary production to consumption, making a distinction between different groups of actors in order to get an overview of what specific parts of the value chain have the smallest or the largest impact on the natural environment.

Figure 10. Example of an environmental sustainability spider diagram



Source: Authors' elaboration.

3.4 Resilience assessment

Resilience is part of the analytical approach to assess whether or not a shock has recently happened or a stressor is still ongoing. It is a meta-dimension of sustainability – how are economic, social and environmental sustainability that relate to performance under normal circumstances, affected by shocks?

The framing question for this section is the following – is the VC resilient (or rather vulnerable) to shocks and stressors? In other words, does it maintain its ability to generate and deliver value? The answer relies on the functional analysis and feeds into the vision, strategy and VC development plan. A rapid qualitative assessment, based on six domains (see Table 4) that are reflected in the sustainability heat map, is used to judge resilience.

Resilience defined

Resilience is the capacity of an agrifood value chain to continue generating and delivering value (food products and services) in the face of abrupt or more gradual disturbances in supply or demand during recovery from unexpected shocks, the avoidance of tipping points, and adaptation to ongoing change. This includes anticipation, mitigation, preparation, absorption, adaptation and recovery. When resilience declines, a system moves closer to its critical thresholds and, consequently, disturbances have larger effects on the system (Vroegindewey and Hodbod, 2018; IPCC, 2012).

Table 4. Resilience domains

Structural resilience domains	Behavioural resilience domains
Redundancy	Collaboration & governance
Diversity	Learning & adaptation
Connectivity	Participation & inclusion

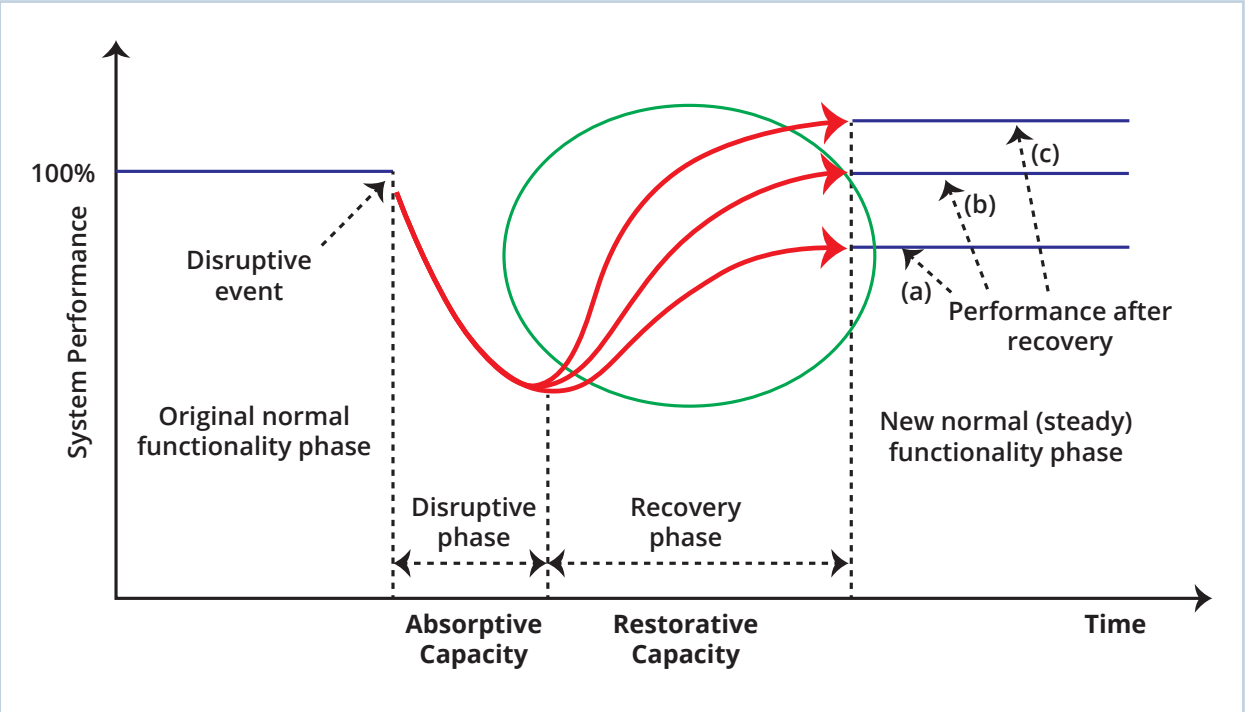
Source: Authors' elaboration.

The analytical process for this section consists of three steps:

- **Step 1** – listing the most relevant shocks and stressors;
- **Step 2** – assessing how resilient the VC is to such (potential) shocks and stressors; and
- **Step 3** – gauging the sustainability impact pathways of such (potential) shocks and stressors.

When assessing the impact of a shock or a stressor, the scenario can be categorized into three phases (see Figure 11): (i) the disruptive phase, (ii) the recovery phase, and (iii) the new normal phase. While the disruptive phase is important in terms of minimizing the short-term impact on vulnerable groups, it is the recovery phase that is especially critical for long-term impact. The new normal for the VC can be associated with a worse, similar or better sustainability performance, depending on the nature of the recovery process. It is, therefore, important to evaluate how the shock can be used for positive transformation.

Figure 11. Post-shock recovery process for market systems



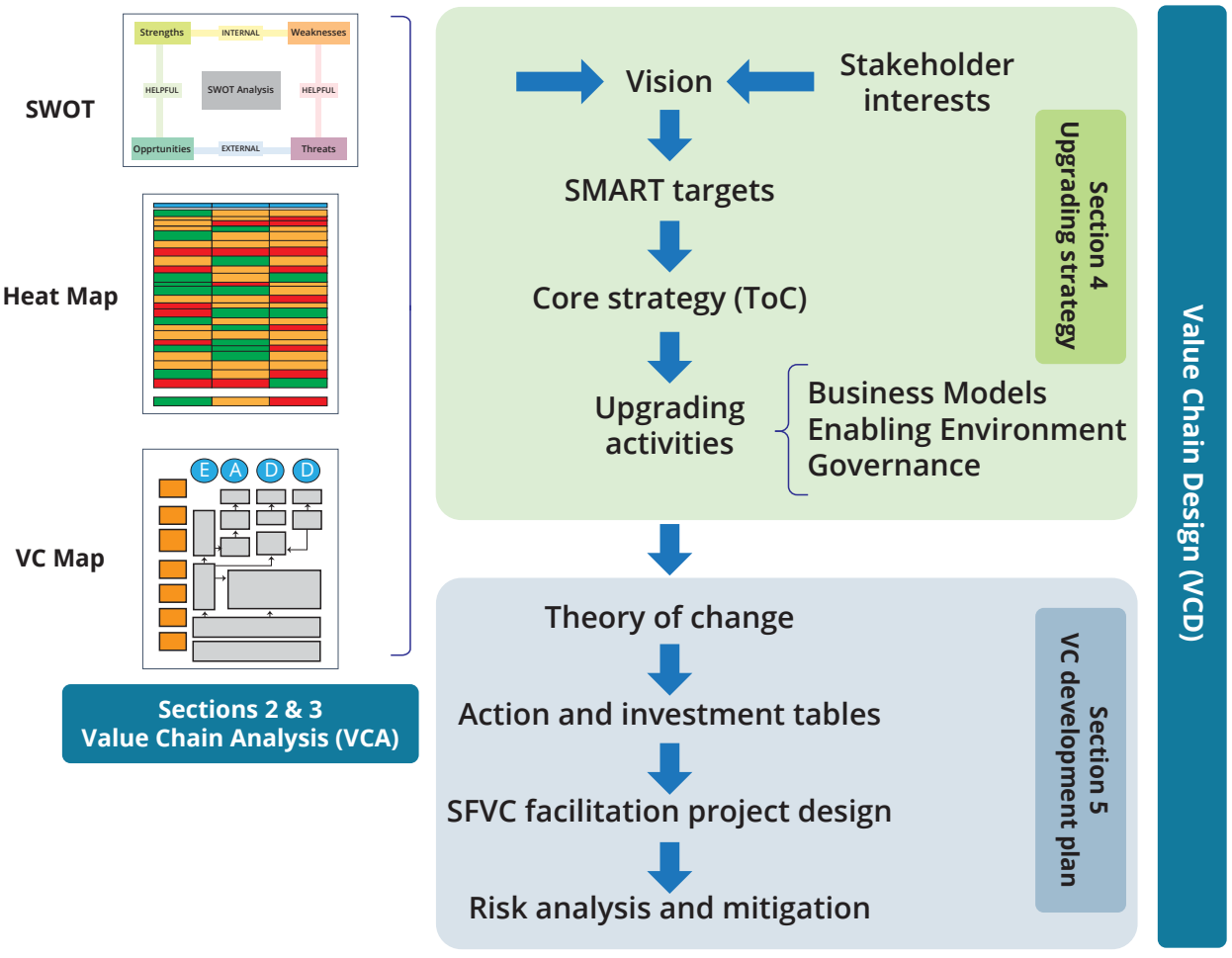
Source: Sarker, P. & Lester, H.D. 2019. Post-Disaster Recovery Associations of Power Systems Dependent Critical Infrastructures. *Infrastructures* 2019, 4, 30. www.mdpi.com/2412-3811/4/2/30

4. Vision and upgrading strategy

In Sections 4 (vision and strategy) and 5 (VC development plan) of this present VCA/D brief, the process transitions from analysis to design (see Figure 12). Informed by a strengths-weaknesses-opportunities-threats (SWOT) analysis, the sustainability heat map and the VC map, and driven by the varied interests of the VC stakeholders, a vision – i.e. a set of concrete targets – a core upgrading strategy and associated theory of change (ToC) for the VC are developed through a participatory process facilitated by the VCA team.

Based on the core strategy, the VCA team then works out detailed upgrading elements (related to business models, the enabling environment, governance) and assesses them in terms of their expected sustainability impact. Thereafter, the VCA team translates the strategy into a VC development plan, which consists of a log-frame, an activities table, an investment (and financing) table, a facilitation project design, and a risk assessment.

Figure 12. The steps from analysis to design



Source: Authors' elaboration.

4.1 SWOT analysis

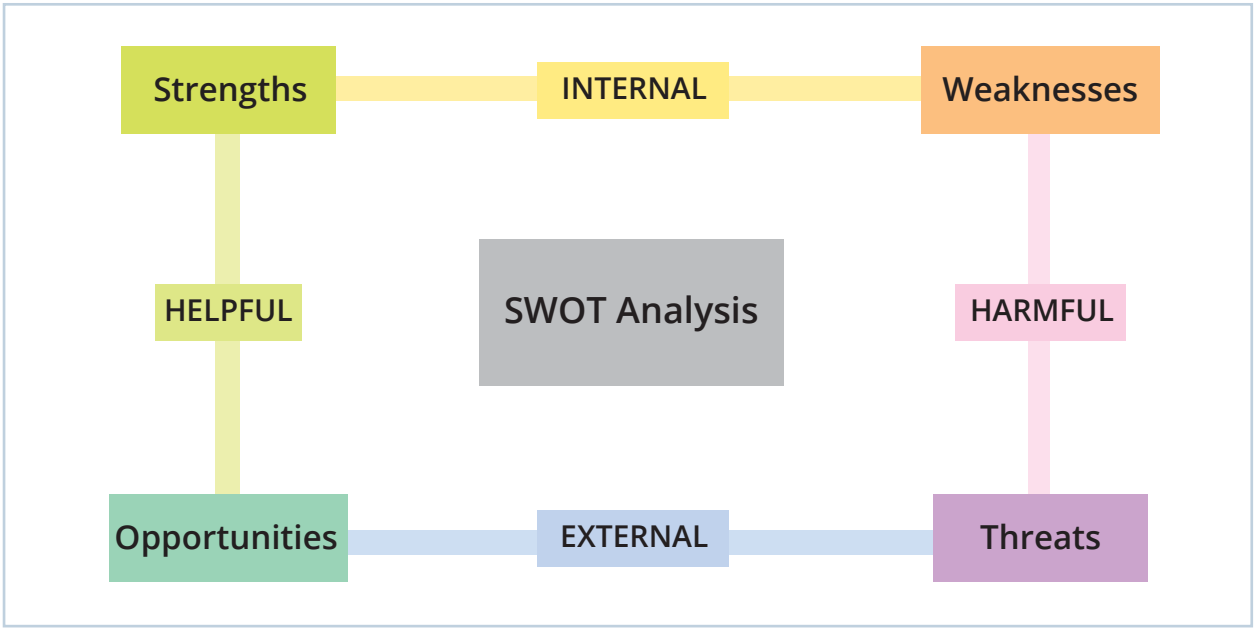
The SWOT analysis is a tool that facilitates a shift from analytical complexity to strategic simplicity. Four sets of factors (strengths, weaknesses, opportunities and threats) that can foster or hinder the development of the VC are extracted from the functional and sustainability analyses (see Figure 13).

Several core strategic options emerge from the four factors:

- For each opportunity, what strengths can be leveraged and what weaknesses can be addressed, to take advantage of them?
- For each threat, what strengths can be leveraged and what weaknesses need to be addressed, to take action to mitigate them?

Typically, different strategic options are placed on the table and not all of them are equally relevant or even feasible. Which strategic options to choose depends on the vision for the VC, which is discussed next in this brief.

Figure 13. SWOT analysis



Source: Authors' elaboration.

4.2 Vision, upgrading strategy and ToC

A **vision** for the VC consists of a short vision statement that is linked to an interrelated set of concrete goals. The vision needs to reflect what the stakeholders can and want to achieve within a certain period (e.g. 10 years). The vision is accompanied by a short narrative on the process by which this vision emerged; for instance, why certain priorities were set, why targets were set at a certain level, and why some sustainability hotspots were ignored by the stakeholders, and so on.

A good vision statement:

- inspires;
- is shared;
- promotes the SDGs;
- is realistic;
- aligns with national development plans; and
- deals with potential trade-offs.

Concrete goals have to be:

- **S**pecific
- **M**easurable
- **A**chievable
- **R**elevant
- **T**ime-based

The accompanying box provides an example of a vision with SMART targets for the tuna VC in the Republic of the Marshall Islands.

"In 2031, RMI will have strengthened its position as a global leading hub for tuna using containerization and value-addition through a sustainable value chain that will generate local employment, protect the country's water security and increase its resilience." (Macfadyen *et al.*, 2022).

The following SMART targets are planned to be achieved by 2031:

- 30 percent of tuna flows in the country will be in containers
- Export value of USD 55 million
- Direct VA of USD 32 million
- Over 1 000 jobs in the country
- Water footprint not changed from 2021, in absolute terms

Note: RMI = Republic of the Marshall Islands

Realizing a vision and achieving goals requires a core **upgrading strategy**, which is generally defined as "a method or plan chosen to bring about a desired future". This strategy indicates the main strategic thrust, i.e. "a compelling theme that knits together otherwise independent activities and focuses the energies of the various stakeholders on the complementary strategic actions needed to realize a shared vision" (FAO, 2014).

Developing a core strategy that maximizes impact is about targeting all critical constraints simultaneously or in the right sequence. The integrated strategy should target:

- the vision that was agreed upon;
- the most promising market opportunities;
- the actors and stakeholders that are most likely to implement the strategy;
- the upgrading opportunities across the four layers of the VC where upgrading will have the biggest impact relative to the vision (i.e. the leverage points, root causes of key bottlenecks).

In practice, complexity can hinder success. Therefore, the chosen strategy and associated VC development plan should be as clear and simple as possible. The question that needs to be asked to identify the best strategy is – of all the identified strengths, weaknesses, opportunities and threats (covering all the bottlenecks, leverage points and upgrading options), which are the most important to realize the vision?

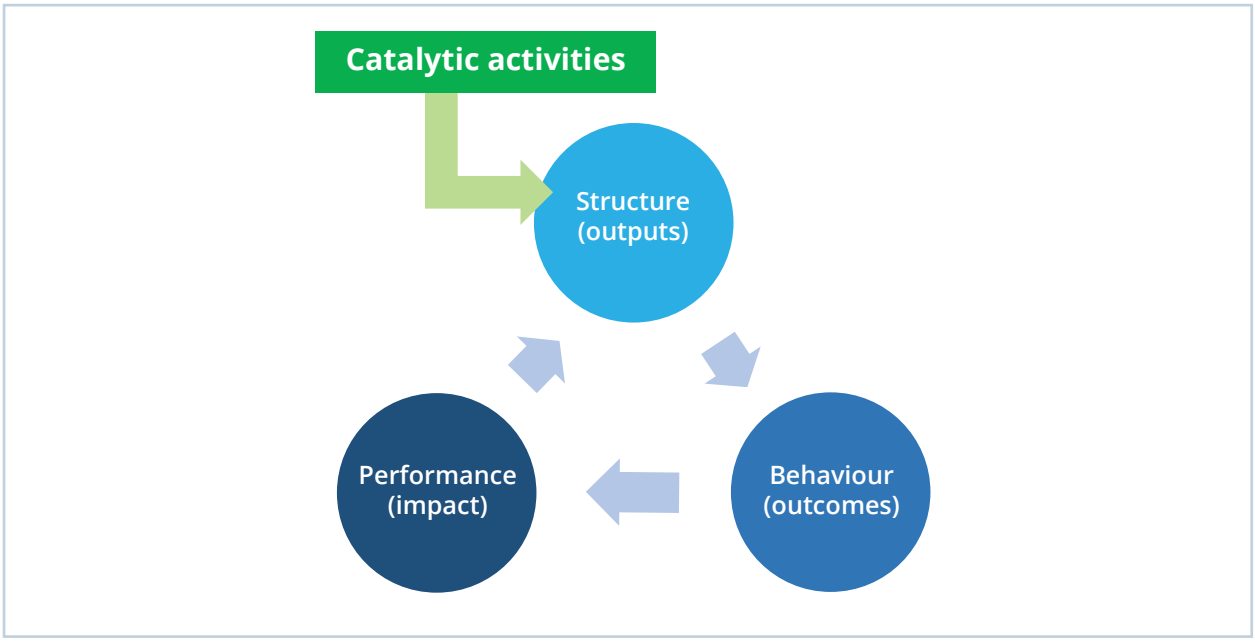
In the context of VC development, **an upgrading strategy** is the chosen integrated approach to simultaneously tackle all binding constraints through system-based solutions to realize the vision. System-based solutions are those that bring about self-sustained mechanisms through catalytic interventions (i.e., the solution is found within the system and does not depend on sustained, project-based, support).

The upgrading strategy is then presented through a ToC, which follows the logic of the structure-conduct-performance (SCP) paradigm where structure, conduct (or behaviour) and performance are dynamically connected (see Figure 14). The upgrading strategy includes catalytic activities by the project that lead to changes in the structure (outputs) that are assumed to resolve bottlenecks and change the incentives for, and capacities of, both private and public VC stakeholders, resulting in changed behaviours (outcomes). Two sequential types of outcomes can be identified at this stage (intermediate) – outcomes at enabling environment (EE) and support provider levels (e.g. the government adopts a new regulation on inputs or an input dealer adopts

the provision of extension advice) that will lead to outcomes at the actor level (e.g. actor will adopt the new input). The change in behaviour of the transformed structure will impact the sustainability performance (impact) of the VC (assumed to realize the vision). The changed performance then feeds back into the metamorphosing structure of the VC.

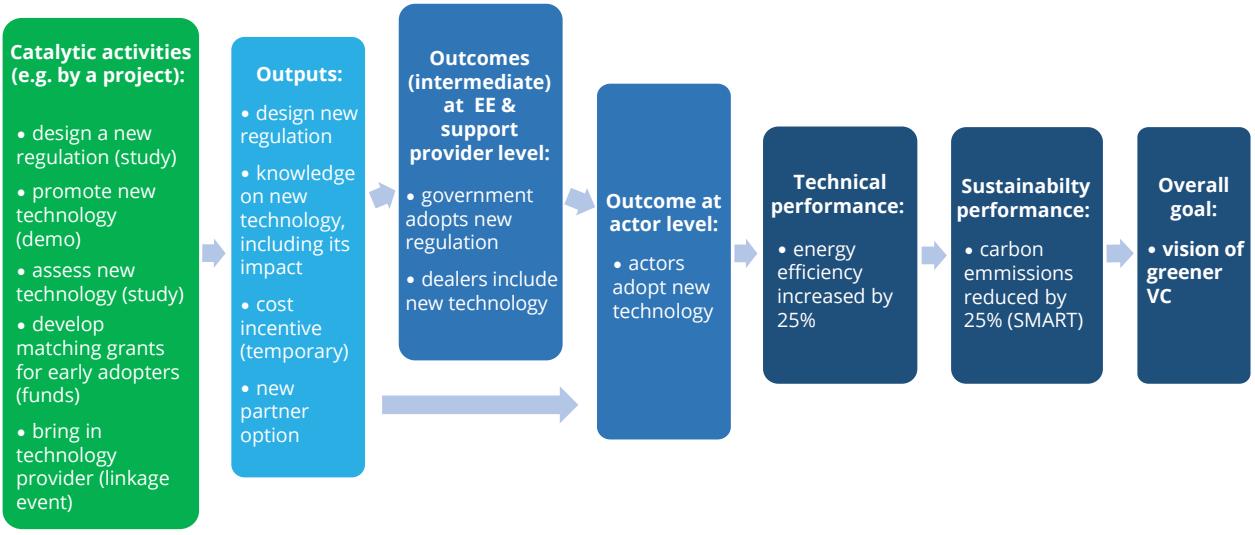
These causal relationships in the ToC are further stylistically illustrated for the adoption of a new (e.g. greener) technology in Figure 15. This illustration provides examples of activities, outputs, EE/support provider level outcomes, actor level outcomes, technical performance, and sustainability performance, but does not necessarily reflect a complete, credible ToC.

Figure 14. Structure-conduct-performance paradigm



Source: Authors' elaboration.

Figure 15. Stylistic illustration of the ToC – Greener technology



Source: Authors' elaboration.

4.3 Upgrading activities

After the vision, goals and core strategy are agreed upon by a critical mass of VC stakeholders, detailed upgrading activities are developed, comprising three types of upgrading elements:

1. Upgraded business models (at individual firm level) compare the current business models with new proposed ones for core actor types and/or for support providers (e.g. different scales or technologies of production or processing, different standards, different markets). A narrative description is combined with a side-by-side comparison of the operating accounts of the current and upgraded firm.
2. Upgraded enabling environment elements (e.g. policy, legal or regulatory change, public investment, government capacity building) propose improvements that strategically address critical weaknesses in the enabling environment.
3. Upgraded governance (at the system level) strives to improve the relationships (linkages) between the VC stakeholders, including core actors, support providers, the public sector and civil society.

4.4 Anticipated sustainability impact

To complete the upgrading strategy development, the upgrading strategy is linked back to the sustainability impact it is expected to have. Three questions lead the development of this section:

1. **Will the strategy lead to the realization of the vision and deliver impact at scale?** A rough calculation of how the SMART targets will be achieved based on the level and impact of all upgrading elements combined.
2. **Will the strategy generate important positive or negative economic, social or environmental externalities?** A mostly qualitative discussion with some quantification, where possible, to place the VC in the broader national context (linking back to heat map hotspots).
3. **Will the strategy increase the resilience of the VC?** A mainly qualitative discussion based on the framework presented in Section 3.4.

In terms of VC report development, this section will reflect the outcome of an iterative process, and the strategy will be shaped and further refined in negotiation between the various stakeholders. In finalizing the vision and core upgrading strategy, the three dimensions above – vision/strategy alignment, externalities, resilience impact – need to be considered by the VC stakeholders who will make the decision in a discussion facilitated by the VC team.

5. Value chain development plan

The last step in the process is to translate the core strategy into **a concrete VC development plan for implementation**. The recommended activities are not independent solutions to individual problems but together constitute an integrated implementation plan of interdependent outputs and outcomes to simultaneously tackle all binding constraints standing in the way of achieving the established vision and goals.

The VC development plan presents how the agreed upon individual stakeholder contributions will lead to the realization of the vision and has four main components:

1. **Overall log-frame for VC upgrading**
2. **Activities and investment tables, with financing mechanism**
3. **A SFVC facilitation project design**
4. **A risk analysis with mitigation strategy**

To seek the consent of a critical mass of VC stakeholders and to develop an initial plan on how investments will be financed (implying the participation of financial service providers and investors), the implementation plan is presented and discussed in the planning workshop, i.e. the final stakeholder workshop of the VCA process.

The overall VC development plan includes the set of strategic activities that *all VC stakeholders have to engage in together and indicates who will implement them, when, and at what cost.*

5.1 Overall log-frame for VC upgrading

Building on the ToC (see Section 4.2), a log-frame is created for the overall VC development plan, and not only the facilitation project. It links outputs to outcomes and then on to impacts, and lists indicators with baseline and target values, sources of verification and assumptions. For each output and outcome, there are assumptions on what needs to be in place beyond the outputs for the outcomes to occur; and then beyond the outcomes for the impacts to occur. A recommended format is illustrated in Table 5, which is based on the tuna VC in the Republic of the Marshall Islands.

Table 5. Example of a VC development log-frame (tuna VC in Marshall Islands)

Impact	Impact indicator 1	2019 baseline	2025 target	2031 target	Assumptions
Increased exports, value addition and job creation in the tuna purse seine (PS) VC in Marshall Islands	Annual value in USD of exports from PS vessels in Marshall Islands	10 823 503	39 175 558	55 182 344	n/a
		MoV[1]: MIMRA[2] records			
	Impact indicator 2	**2019 baseline**	**2025 target**	**2031 target**	
	# of FTE jobs in tuna PS core VC in Marshall Islands (gender disaggregated)	177 (47 women)	313 (80 women)	410 (102 women)	
		MoV: survey of VC actors			
	...	...	...	...	
Outcome 1	**Outcome indicator 1**	**2019 baseline**	**2025 target**	**2031 target**	**Assumptions (to achieve impact)**
PS fishing companies adopt containerization for sale to canneries	Annual volume of PS-caught tuna leaving Marshall Islands in containers	16 000	75 000	110 000	Container shippers can provide the numbers of empty reefer containers. Containerizing product makes financial sense given reefer transport cost and fish prices paid by canners/ traders. Labour availability is not a constraint.
		MoV: MIMRA records			
Output 1.1	**Output indicator 1**	**2019 baseline**	**2025 target**	**2031 target**	**Assumptions (to achieve outcome)**
Star loader technology demonstrated based on feasibility study, grant, purchase and demonstration	Completed star-loader demonstration	0	1	1	A containerization company will confirm interest in co-financing a star loader with the project.
		MoV: Feasibility study. Grant. Star loader delivery documents. Demonstration report.			
...	...	...	...	...	...

Notes: [1] Means of Verification.
[2] Marshall Islands Marine Resources Authority.

Source: Adapted from Macfadyen, G., Duong, G., Stege, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2022. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report.* Rome, FAO.

5.2 Activities and investment tables

5.2.1 Overall VC activities table

The VC development activities table (see Table 6 for an example of the tuna VC in the Republic of the Marshall Islands) lists all the activities that need to be implemented by the VC stakeholders (both public and private) and by the SFVC facilitation project (and possibly other development partners) to generate the outputs and outcomes that are needed to realize the vision. The table, thus, depicts the critical interplay between the project and the VC stakeholders and should highlight the roles played by "change champions", which may be a lead ministry or a lead firm in the VC. Based on Table 6, a Gantt chart-type

timeline can be put together for what needs to take place and when, taking causal dependencies into account. Finally, activities considered to be low hanging fruits should be identified. These refer to the activities that are non-controversial and relatively small activities that keep the development momentum going between the (possibly protracted) analysis and design phase and the implementation phase.

Table 6. Format for the activities table (example of tuna VC in Marshall Islands)

Outcome 1: PS fishing companies adopt containerization for sale to canneries		**Funding source**	**Est. total cost (USD)**	**Type of cost**	**Timing (by when)**
Outputs	**Activities**				
Output 1.1 Star loader technology demonstrated based on feasibility study, grant, purchase and demonstration.	**Activity 1.1.1** Conduct feasibility study and develop grant mechanism for acquiring container stuffing machines (star loader).	SFVC project	25 000	Facilitation / studies	June 2022
	Activity 1.1.2 Purchase container loading machines with 50/50 matching grant allocated.	SFVC project and private sector	900 000	Plant and equipment	March 2023
	Activity 1.1.3 Demonstrate the star loader, train container engineers, link to technical support provider.	SFVC project	25 000	Event and training	April 2023
Output 1.2 HACCP plans for containerization prepared.	**Activity 1.2.1** Prepare HACCP plans for containerization.	SFVC project	25 000	Facilitation/ studies	September 2022
Output 1.3 Infrastructure linking support provider PII site to main port is upgraded.	**Activity 1.3.1** Conduct inspection and determination of need for upgrading transport infrastructure linking shore-based facilities.	Government (Ministry of Works)	150 000	Facilitation/ studies	December 2022
	Activity 1.3.2 If necessary, complete civil engineering works to ensure structural integrity of transport infrastructure linking shore-based facilities.	Government (Ministry of Works)	300 000	Infrastructure	December 2024
Outcome 2: PS fishing companies channel more fish through Marshall Islands to higher value markets					
Outputs	**Activities**				
...	...	...	...	...	...

Source: Adapted from Macfadyen, G., Duong, G., Stege, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2022. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report.* Rome, FAO.

5.2.2 Overall VC investments table

The investment table (see Table 7, or an example of the pineapple VC in the Republic of Suriname) provides an overview of the investments needed to realize the vision's scale of impact and how these investments are expected to be financed. This links directly to the information presented in Section 4.4, and the costs listed in Table 6. The table also illustrates how blended finance strategies can be applied to fund investments in the upgraded business models identified in the VC strategy. This section of the VC report also presents and discusses the financing mechanism in some detail, which can include, for example, loan products, matching grants, equity stakes, de-risking tools, and so on.

Table 7. Format for investment needs & financing table – USD million (example of pineapple VC in Suriname)

Use of funds	Source of funds				Total funds by use
	Private funds		Public funds		
	Private equity	Private lending	Public investment	SFVC project grant	
Technical assistance and grants	0	0	2.3	1.78	4.08
Loan support facility	0	0	0	0.47	0.47
Working capital and capital expenditures (capex) at farm level	2.9	1.9	0	0	4.80
Working capital and capex for post-harvest handling, processing, and input and support functions	3.4	0.6	0	0	4.00
Total funds by source	6.3	2.5	2.30	2.25	**13.35**

Source: FAO. 2021. *Sustainable Pineapple Value Chain Development in Suriname*. Unpublished project document.

The resulting financial leverage ratios, i.e. the dollars of investment generated per dollar of SFVC facilitation project funding, therefore, are:

- Public funds leverage: (2.3/2.25) = 1.02
- Private funds leverage: (8.8/2.25) = 3.91
- Overall leverage: (11.1/2.25) = 4.93

5.3 SFVC facilitation project modalities

The specific modalities of the project are worked out in three parts. First, key steps for project implementation start-up are provided. Second, the project activities are fleshed out further. Third, an expenditures-by-year overview is provided to facilitate the project's budget management.

Project inception phase: To assure a seamless, uninterrupted transition from the analysis and design phase to the implementation phase, a list of key start-up steps for immediate implementation during the project inception phase is provided.

Project activities: For those activities detailed in Section 5.2, involving the SFVC facilitation project, additional information is provided in a table (example provided in Table 8) including a brief description of the activity, deadline for completing the activities, required non-financial resources, potential partners, and pre-conditions required for providing project support (linking to the sequencing of activities).

Project budget: To aid with implementation and planning, an expenditures-by-year table (example provided in Table 9) needs to be developed for the project budget.

Table 8. Example of an SFVC facilitation project design (example of tuna VC in Marshall Islands)

Activity description	Timing	Resources required (non-financial)	Partners (potential)	Pre-conditions for providing support
Output 1.1 – Star-loader technology demonstrated based on feasibility study, grant, purchase and demonstration				
Activity 1.1.1: Conduct feasibility study and develop grant mechanism for acquiring 1 container stuffing machine (star loader).	June 2022	Finance and legal experts	Private sector investors	Confirmed interest in principle from potential private sector actors to commit their own resources. ToR for study prepared and approved by project management.
Activity 1.1.2: Purchase container loading machines with 50/50 matching grant allocated.	March 2023	Procurement experts	Private sector investors, providers of container stuffing machines	**Activity 1.1.1** (more detailed feasibility study) confirms initial financial viability of container stuffing machines contained in this report. Confirmed interest from potential private sector actors to commit their own resources for the balance of costs not provided by the project. Legal agreements in place between project and beneficiaries covering use and maintenance of equipment provided with project funds. Suppliers commit to penalties in the form of reductions to payments for any late supply.
Activity 1.1.3: Demonstrate the star loader, train 5 container engineers, link to technical support provider.	April 2023	Trainers, training programme, training facility	Container shipping companies to provide trainers	Engineers in Marshall Islands identified and available for training. ToR for trainers prepared and approved by project management.
Output 1.2 - HACCP plans for containerization prepared				
…	…	…	…	…

Source: Adapted from Macfadyen, G., Duong, G., Stege, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2022. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report.* Rome, FAO.

Table 9. Proposed phasing of SFVC project budget in USD (example of tuna VC in Marshall Islands)

Activity	2022	2023	2024	2025	SD total
Increased containerisation of PS-caught tuna for sale to canneries					
Activity 1.1.1 Feasibility study and development of grant mechanism for acquiring container stuffing machines	25 000	-	-	-	25 000
Activity 1.2.1 Purchase container stuffing machines *	112 500	112 500	-	-	225 000
Activity 1.3.1 Training reefer container engineers	25 000	-	-	-	25 000
Activity 1.4.1 Prepare HACCP plans for containerization	25 000	-	-	-	25 000
Increased landings in, and exports from, RMI to higher value markets					
Activity 2.2.1 Training provided for CA staff in fish hygiene issues	-	35 000	-	-	35 000
Activity 2.2.2 Training provided for private sector in fish hygiene issues	-	40 000	-	-	40 000
Activity 2.5.1 Complete 12 vessel audits and investment specifications	-	40 000	-	-	40 000
Activity 2.5.2 Complete audit of loaning plant facilities, and sites being used by existing or potential containerization companies	-	25 000	-	-	25 000
Activity 2.6.3 Prepare vessel and shore-based Sanitary Standard Operating Procedures	35 000	-	-	-	35 000
Greater levels of storage and sorting of tuna in RMI prior to export					
Activity 3.1.1 Complete feasibility study of potential cold store in RMI	100 000	-	-	-	100 000
Activity 3.2.1 Agree arrangements for provision of finance from financiers to private sector for cold store investments	-	30 000	-	-	30 000
Improved social and environmental sustainability of the value chain			-		
Activity 4.1.1 Develop and disseminate communication products for social sustainability aspects of the upgrading strategy	20 000	20 000	20 000	10 000	70 000
Activity 4.1.3 Complete cultural and gender audit of companies and provide guidance on interventions to improve cultural/gender sensitivity and job attractiveness of current operations and facilities	25 000	-	-	-	25 000
Activity 4.2.1 Complete energy and water audits of companies and provide guidance on interventions to improve sustainability of current operations and facilities	25 000	-	-	-	25 000
Activity 4.2.3 Development of grant mechanism for acquiring offgrid solar power systems and hybrid solar diesel systems by the private sector	-	15 000	-	-	15 000
Activity 4.2.4 Purchase of off-grid solar power systems and hybrid solar diesel systems	-	-	87 500	-	87 500
Activity 4.2.5 Complete a study aimed at increasing the use of renewable energy to meet the electricity needs of onshore VC activities within the upgraded Delap and PII port areas	-	-	35 000	-	35 000
Activity 4.3.2 Task force meetings and upgrading oversight	50 000	50 000	50 000	25 000	175 000
Total	**442 500**	**367 500**	**192 500**	**35 000**	**1 037 500**

Notes: * assumes 50 percent advance payment required at the end of 2022 with balancing payment on delivery in early 2023.
RMI = Republic of the Marshall Islands.

Source: Adapted from Macfadyen, G., Duong, G., Stege, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2022. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report.* Rome, FAO.

5.4 Risk analysis

The risk analysis (see Table 10 for an example of the tuna VC in the Republic of the Marshall Islands) reflects the risks that can prevent the achievement of the envisioned impact, and develops associated mitigation strategies affecting the overall as well as project-specific activity plans.

The risks need to be described in terms of their nature (e.g. economic, societal, environmental) and assessed in terms of level (how likely the risk is to happen, and how significant the impact will be on the VC, if it occurs), while mitigation measures need to be proposed for them. They can be associated with possible external shocks; weaknesses in the VC; or assumptions made in association with the activities, outputs and outcomes. The table is to present the risks from the highest to the lowest overall risk level.

Table 10. Risk analysis table (example of tuna VC in Marshall Islands)

Risk description	Likelihood (1-5)	Impact (1-5)	Overall risk	Mitigation
Container shipping costs and container availability reduce competitive position vis-à-vis carrier vessels	3	5	16	Working closely with container shipping companies
Economic leakage from Marshall Islands of the benefits from the upgrading strategy due to foreign ownership of core VC actors	4	4	16	Strategy also involves support to country-based/owned service support providers and national government capturing benefits through taxes and fees
Private sector unwilling/unable to invest in container stuffing machines	3	4	12	Specification of suitable grant mechanism and further assessment of containerization viability
COVID-19 impacts on implementation of upgrading strategy activities	3	4	12	Re-assessment of risks during project inception, and adapted implementation methodologies
EU (DG SANTE) do not approve Marshall Islands competent authority CA based on current legislation and associated fish hygiene control standards	3	4	12	Work with CA and supporting organizations and projects (PEUMP , FFA , World Bank) to take steps required by DG SANTE
Investments in cold storage are not financially (or environmentally) viable	5	2	10	Feasibility study to be completed prior to investments
Lack of stakeholder enthusiasm for strategy post FISH4ACP	3	3	9	Participatory nature of FISH4ACP methodology, creation of task force
Renewable energy not viable and financially competitive	3	3	9	Feasibility studies, grants provided by FISH4ACP
Continued difficulties in attracting labour to work in the sector	2	2	4	Activities in strategy aimed at addressing social hotspots
Climate change impacts threaten investments	4	1	4	Appropriate siting and climate-proofing investments

Note: Overall risk = likelihood x impact. Scores are necessarily subjective and reflect the views of the authors.

Source: Adapted from Macfadyen, G., Duong, G., Stege, M., Sahib, M., Bain-Vete, M. & Gillett, R. 2022. *The purse seine tuna fishery value chain in the Marshall Islands: Analysis and design report.* Rome, FAO.

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This brief is part of the SFCV methodology package, which includes the full SFVC Methodology Guide, a report outline, analytical tools, training materials, terms of reference, example reports, and more. These resources are listed and described in the full guide (available at: sfvc@fao.org).

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This brief outlines a rigorous and standardized approach for value chain analysis and design, taking a systems perspective to analyse and influence the behaviour and performance of value chain actors influenced by a complex environment. The brief also covers the design of upgrading strategies and associated development plans, based on the identification of root causes of value chain bottlenecks and using a participatory and multistakeholder approach. The brief is primarily based on FAO's Sustainable Food Value Chain (SFVC) framework which promotes a systems-based development of agrifood value chains that are economically, socially and environmentally sustainable, as well as resilient to shocks and stressors.

FOOD SYSTEMS AND FOOD SAFETY DIVISION (ESF)

SFVC@fao.org
Website: www.fao.org/sustainable-food-value-chains

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Vialle delle Terme di Caracalla
00153 Rome, Italy

and

DIVISION OF AGRIBUSINESS AND INFRASTRUCTURE DEVELOPMENT
Food Security and Food Systems Unit

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Vienna International Center
Wagramer str. 5, 1220 Vienna, Austria

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