VALUE CHAIN ANALYSIS FOR DEVELOPMENT

METHODOLOGICAL BRIEF FOR AGRI-BASED VALUE CHAIN ANALYSIS

Frame and Tools - Key Features

Version 2 - February 2021

Value Chain Analysis for Development is a tool funded by the European Commission / INTPA and is implemented in partnership with Agrinatura. It uses a systematic methodological framework for analysing value chains in agriculture, livestock, fishery, aquaculture and agroforestry. More information can be found at: https://europa.eu/capacity4dev/value-chain-analysis-for-development-vca4d-

Agrinatura (https://agrinatura-eu.eu) is the European Alliance of Universities and Research Centers involved in agricultural research and capacity building for development.

The information and knowledge produced through the value chain studies are intended to support the Delegations of the European Union and their partners in improving policy dialogue, investing in value chains and better understanding the changes linked to their actions.

Authors:
Pierre Fabre, Marie-Hélène Dabat and Olimpia Orlandoni.

Design
Sara Baumgart

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Purpose

The Value Chains (VCs) considered in this brief are the sequences of productive actors that contribute directly to supply a specific good to the domestic and/or export market. **VCs are major channels for agricultural development** due to their capacity to mobilise resources from various economic sectors, create economic value and generate employment. They offer an operational framework for engaging with farmers, businesses and policy makers to improve income generation in an inclusive and sustainable way.

Past development operations frequently focused on increasing agricultural produce, whilst often ignoring the market and other economic drivers involved. Production activities are part of a wider network of interdependent businesses and it is therefore essential to examine them within the VC as a whole.

Moreover, interventions in agriculture seldom paid enough attention to the related environmental and social impacts. Yet, decision makers must ponder the fact that **VC activities take place in, and influence, a social and environmental context**.

The European Commission/Directorate General for International Partnerships (EC/INTPA) is committed to promoting investment in agriculture and policy dialogue (through budget support or other schemes). In order to achieve the overarching goal of sustainable and inclusive development, support to agri-based VCs requires that economic, social and environmental dimensions be thoroughly considered. By setting out the many effects of the VC operations, the likelihood of unintended consequences will be reduced and bottlenecks and leverage points identified.

1.1 WHY VCA4D?

The purpose of Value Chain Analysis for Development (VCA4D) is **to provide decision makers with evidence-based information to feed sustainable development strategies**. It is directed to policy makers and stakeholders, and in this regard aligns with the EU aims as an aid provider, and fits within its policy dialogue approach.

Analysing VCs sheds light on impact, uncovers main pathways, and identifies at which stages of the chain and for which actors, investment and support can generate benefits, eliminate drawbacks and constraints and foster sustainability and inclusiveness.

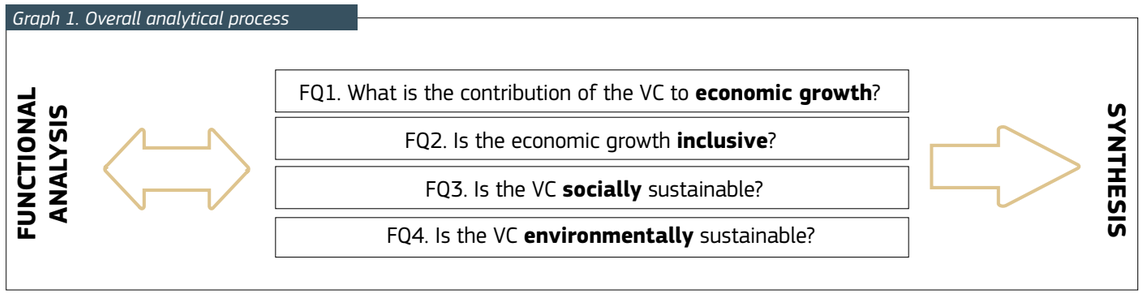
VCA4D measures key indicators that, when properly assessed and contextualised through expert discernment, provide fundamental information on a VC's impact and sustainability. This allows for the establishment of baselines and of an accurate description of the situation of actors. The ensuing image of the VC helps visualise practical operations, projects and policies and can be valuably used in the policy dialogue. Over time it enables the tracking of how development actions contribute to Sustainable Development Goals and EC/INTPA's strategic objectives.

- *The VCA4D method delivers select information on major impacts of the VC activities, but is not a thorough study on all aspects of the VC.*
- *VCA4D studies inform on the impacts generated inside the country. When deemed necessary, they may be supplemented with an analysis of activities taking place beyond the borders of the country.*
- *The value chain analysis (VCA) provides a picture of the VC for a given year. VCA4D can be mobilised later on for updates to assess the evolution of the VC in the various domains.*

1.2 ANALYTICAL PROCESS IN A NUTSHELL

The goal of a VCA4D study is to answer the following four Framing Questions (FQ) (Graph 1) using evidence-based elements, i.e. supported by quantitative indicators or explicit expert assessment.

Graph 1. Overall analytical process



To answer these questions, VCA4D focusses on:

- providing quantified and evidence-based information, combining primary and secondary data collection, and
- making sense of it through an integrated multidisciplinary analysis by a team of international and national experts in economics, social affairs, and environment.

The analytical process is three-fold:

1. Implementing a **functional analysis** by setting out the overall VC operating features and inquiring about its general organisation and the main trends and market perspectives.

   Functional analysis is both a starting point by which the team of experts arranges its work plan, and a continuous work of refinement throughout the study. It benefits to and from the other forms of analysis, allowing to build a common understanding.

   It includes the definition of a typology of actors and the identification of sub-chains. Both are used by the whole team and must be relevant to outline the benefits and drawbacks for the various stakeholders at the various stages of the VC.

2. Performing **economic, social and environmental analyses** in order to respond to the four **Framing Questions**. These investigations are guided by a set of sub-questions, called **Core Questions (CQ)** (Table 1), which:
   - point to required significant indicators;
   - guide the assembly and processing of data (quantitative and qualitative);
   - give directions for interpreting the results, highlighting specific aspects of impact.

   The work process encompasses determining data needs and availability, carrying out collection of field information, processing and computing data, and direct interpretation of results.

   - *A selection of indicators provides a genuine basis for answering the Core Questions by evidencing hard facts in a quantitative way. Because they inform on key processes or state of affairs, these indicators are crucial for decision makers. They contribute to shape a consistent framework for analysis and allow to compare situations and depict evolutions.*
     They are identified in the CQ tables of the chapters of this Brief.
   - *Orders of magnitude are often more important (and easier to capture) than very precise figures. They are usually sufficient for decision-making. Moreover, numbers with several digits make reading more difficult, and are pointless considering the statistical uncertainty of most results.*

   The economic, social and environmental analyses are led in parallel by the relevant experts and share important elements, such as: the same typology of actors and sub-chains; parts of the data base, e.g. production levels, volume of flows, and technical coefficients (mainly economic and environmental experts). They also interact for specific investigations and analysis, e.g. on the VC governance, on marginalised groups, and on income and job distribution (mainly economic and social experts).

3. Making a **Synthesis** of the information produced which gives meaning to the many results, individual and combined.

   Evidence-based indicators and qualitative assessments are reviewed and discussed among the team of experts. The way they relate to each other is examined, analysing interactions and trade-offs. To appraise their significance, they may be compared to other available information (order of magnitude of other activities, benchmarking with other sectors or countries…). They are analysed in relation to the economic, societal and natural endowment context of the country, determining as much as possible how this context affects the VC results and how the VC operations impact on it.

   Eventually, the synthesis combines:
   - **answering the four Framing Questions;**
   - **taking an integrated perspective on growth, inclusiveness and sustainability;**
   - **shedding light on risks, strengths and overall benefits;**
   - **recommendations.**

- *To be effective, the multidisciplinary team has to work in an integrated way and with a collaborative mindset.*

The goal is to enable decision makers' own judgement by informing them on each of the four framing questions. Deliberately, the VCA4D method does not aggregate all the knowledge elements into one single indicator.

It is to be noted that although those studies are neither a project formulation nor a project evaluation process, the team of experts is expected to provide its views and recommendations, connecting their knowledge and the indicators within a comprehensive and systemic perspective on the VC.

- *In their conclusion, the experts may call for relevant complements to their work, e.g. technological benchmarking of some stages of the chain, targeted agronomic diagnosis or further understanding of the stakeholders' interactions with territorial authorities.*

1.3 LAUNCHING THE ANALYSIS

VCAs are realised upon request by EU Delegation (EUD) or EC/INTPA and their partners. All studies start with a discussion engaging the team of experts, the EUD, EC/INTPA, and the VCA4D Project Management Unit (PMU), in order to ascertain the VC challenges and issues, contextual questions and the particular expectations of decision makers and stakeholders.

Close attention must be paid to the EUD involvement in the VC. Understanding the context, motivations and specific needs that led to the request is crucial. From this early understanding, the experts determine the main difficulties, key issues and expectations. They outline the preliminary scope of analysis that they will refine during their initial field work, particularly regarding the delineation and the components of the VC system.

- *The experts' time is limited. They must carefully decide on which data is most important so as to focus on the most relevant aspects for the decision makers and not lose time collecting information that will not significantly improve the results.*
- *At an early stage they must appraise the status of the secondary data, statistics and other information at hand. Then they have to arrange for the collection of information during missions; conducting additional surveys if necessary; and identifying and training of national experts, students, or surveyors involved in the study whenever appropriate.*

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Table 1. Framing and Core Questions

FRAMING AND CORE QUESTIONS		
Economic Analysis	**Social Analysis**	**Environmental Analysis**
FQ1. What is the contribution of the VC to economic growth?	**FQ3. Is the VC socially sustainable?**	**FQ4. Is the VC environmentally sustainable?**
CQ1.1. How **profitable and sustainable** are the VC activities for the actors involved? CQ1.2. What is the contribution of the VC to the **GDP**? CQ1.3. What is the contribution of the VC to the **agriculture sector GDP**? CQ1.4. What is the contribution of the VC to the **public finances**? CQ1.5. What is the contribution of the VC to the **balance of trade**? CQ1.6. Is the VC **viable in the international economy**?	CQ3.1. Are **working conditions** throughout the VC socially acceptable and sustainable? Do VC operations contribute to improving them? CQ3.2. Are the **land and water rights** implemented throughout the VC socially acceptable and sustainable? CQ3.3. Throughout the VC, do actors foster and put into practice **gender equality**? CQ3.4. Do VC activities contribute to upgrading and securing the **food and nutrition conditions**? CQ3.5. Is **social capital** enhanced by VC operations and equitably distributed throughout the VC? CQ3.6. Do the VC activities contribute to improving the **living conditions** of the households through acceptable facilities and services?	CQ4.1. What is the potential damage of the VC on r**esource depletion**? CQ4.2. What is the potential damage of VC on **ecosystem quality**? CQ4.3. What is the potential damage of the VC on **human health**? CQ4.4. What is the potential impact of the VC on **climate change**? CQ4.5. Does the potential impact of the VC on **biodiversity** deserve specific studies?
FQ2. Is this economic growth inclusive?		
CQ2.1. How is **income distributed** across actors of the VC? CQ2.2. What is the **impact of the governance systems on income distribution**? CQ2.3. How is **employment distributed** across the VC?		
Addressing the 4 Framing Questions		
Cross-cutting CQ. Which **risks** may affect the performance of the VC?		

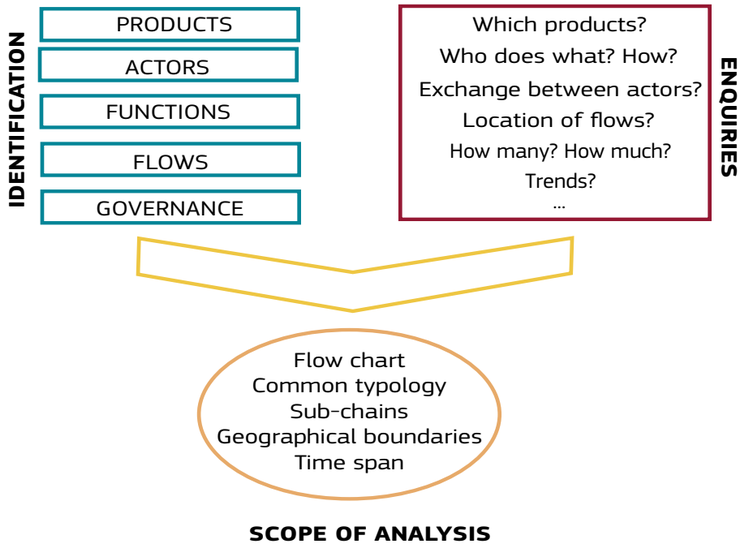
02

Functional analysis

The functional analysis aims to build an overall description of the value chain system. It identifies and characterises the main actors and stakeholders involved, and expands on some of the main strategic development challenges faced. From the outset of the study, it allows the multidisciplinary team to elaborate a **general common understanding** of the VC operations, and to ascertain the scope of analysis. Essential elements include determining a **typology of actors**, the various **sub-chains** and the **geographic and time frames**, which form the basis of all the analyses in order to reply to the framing questions.

Key components forging the value chain system are: the sequence of **products**, the **actors** involved, the **functions** they fulfil, the **flows** linking the actors and the overall organisation and **governance** of the VC (Graph 2).

Graph 2. Overview of the functional analysis



The functional analysis extends over the whole study period, progressively building the overall image of the VC operations. It feeds the other analyses with shared information. It helps to guide the course of the study through harmonising the various experts' perspectives on its general configuration.

2.1 FUNDAMENTALS OF THE FUNCTIONAL ANALYSIS

In practice, the construction of the common interdisciplinary framework for the VC encompasses a broad range of information, quantitative data and qualitative assessments. It proceeds by:

- **Exposing the main features of the value chain** (Table 2; Illustration 1);
  The building blocks portraying the VC include the series of product(s) along the chain from farms to end-markets (i.e. domestic markets and ports of export); the succession of steps from the initial (agricultural) production to the final in-country consumer market or point of export; the actors involved at each stage; the geographical location of the activities and operations; the main material, financial and information flows among actors and between stages of the VC.

- **Reviewing the main technical processes and practices** (Table 3);
  For this task, the team documents the various technologies used at every step of the VC. It lists categories of activity, collects or measures technical coefficients (e.g. raw material/processed product) and productivity ratios, benchmarks, and outlines the main physical constraints. It also brings into focus existing technical diagnoses (e.g. agronomic or industrial) and production challenges but does not carry out a thorough technical investigation (although the report may recommend it for the future).
  Particular attention has to be given to: (i) seasonality of activities, (ii) diversity of quality of products, (iii) use of sub-products and losses.
  The descriptive elements derive mainly from secondary sources, complemented by specific economic and environmental data collection undertaken by the team whenever needed.
  Therefore, all experts refer to the same technical data and elements (e.g. yields, loss rates, processing coefficients, etc.) for a coherent analysis.

- **Examining the VC organisation and governance, overall and at every level** (Table 4);
  This investigative work is based on organisational, institutional and/or "structure and conduct" analysis. Evidence comes from secondary sources and complementary economic and social investigations.
  Particular attention has to be given to: (i) the relative weight of the VC product in the overall activities of each actor and thus in their strategies, (ii) coordination arrangements between agents (Illustration 2), (iii) market trends, (iv) policies and projects shaping the context.
  When dealing with an export product, a rapid market analysis should shed light on demand trends, business structure (highlighting dominant actors), and possibly on price differentials with competitors and the share of the value of the exported product in the final consumer goods abroad.

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Table 2. The building blocks of the VC description

	KEY ELEMENTS	USUAL INDICATORS & TOOLS
Main products	• E.g. cocoa, beef, banana, fish, tomato concentrate, ready meals, clothes... • Product at various stages: cotton/thread/clothes, paddy/white rice... • Co-products, by-products: oil/oil cake, rice bran, leather... • Varying quality level (top/bottom of the range) and standards	• List, with main quality features
Functions & steps	• Sequence of technical and organisational functions along the chain (progressive elaboration of the end-product: nature, quality, place of delivery...), i.e. input supply, production, assembly, processing, wholesale, export, retail, etc.	• **Matrix of functional relations** • **Resources and utilisation table**
Actors	• Operators directly involved in the production chain and important input and service providers: activity, size, number; • Technical practices of different types of farmers, processors, sellers, providers... including existing diagnosis (e.g. agronomic diagnosis of farming systems and studies on environmental degradation). • Business organisation of each type of actors: – number of units, locations, equipment sharing... – relative importance of the VC production in the overall activity of the actors – internal decision making (Who? How?...)	• Description: activity, capital, volumes... • Relative value of the various farm products • Number of people and/or enterprises
Location of activites	• Areas of production, sites of marketing, places of consumption... • Ports of import and export • Exports: place of final consumption	• **Map (actors, flows)**
Flows of products	• Physical transfers of products between actors • Marketing networks and distribution channels • Imports: actors involved, volumes, time seasonality, quality • Exports: channels and typology of exporter, logistics, regulatory framework	• **Flow chart** • **Matrix of flows and exchanges** (physical, financial...) • Matrix of relationships • Diagram of information flows • Maps

- *In practice, for every VCA4D study, COLEACP (www.coleacp.org) will provide information on:*
  - *market trends on national, regional and international markets, combining analysis of publicly available data and own market insights;*
  - *the main data sources;*
  - *useful complementary elements or sources.*

Illustration 1. Founding elements of the Functional Analysis, example of a rice value chain

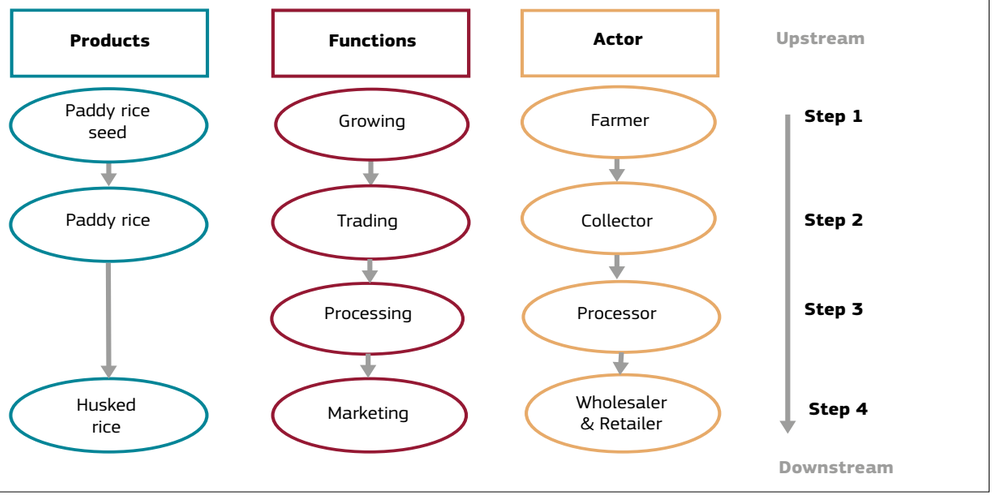


Illustration 2. Matrix of relationships, example of a cocoa value chain

Types of actor	Wet bean farmer	Certified wet bean farmer	Certified wet bean farmer	Dry bean medium fermentary	Wet bean fermentary	Certified wet bean fermentary
Wet bean fermentary	Open market					
Certified wet bean fermentary	Open market	Contract				
Dry bean exporter		Open market	Open market		Contract	
Certified dry bean exporter				Vertical integration		Contract

This investigation uses a wide range of quantitative data. Quantitative information and indicators include volumes, number of people and enterprises, prices at different stages, etc. They come from official statistics, secondary data, surveys and interviews. They inform in a tangible way on the reality of the elements put forward and on their representativeness. They may be calculated more easily and appear more clearly by using the tools proposed in Tables 2, 3 and 4. Data quality must be carefully assessed (see note in section 7.1).

2.2 LAYING THE FOUNDATION OF THE WHOLE ANALYSIS

In the early stages of the study, the functional analysis unveils possible options for carrying out the economic, social and environmental analyses. The multidisciplinary team has to set the priority elements to review the subsequent data collection and its overall strategy by answering the following questions:

- **What is the defined scope for the analysis?**
  Actors involved and identified channels, timeframe (year, period, season...) and geographic scope (zones, regions...).

- **Are there specific activities, actors or production systems to focus on?**
  Particular context (technical, environmental, social, policy-related...) or issues raised by key actors (local decision makers, private sector, EU Delegations...) may point at special study needs.

- **What is the common typology of actors to be used by all experts?**
  An appropriate typology of actors fulfilling the same function allows for describing and assessing the diversity of situations, benefits and drawbacks in the value chain, and potentially the foreseeable evolutions.

This common typology is essential for analysing the farming actors, and possibly processors and traders. It must be determined and agreed upon through an interdisciplinary discussion within the whole team. Key features used for shaping the typology are contextual. Common differentiating variables involve the specific quality of produce, the size of the business, the productive equipment and capital, the technological processes in use (agricultural mechanisation, irrigation, artisanal or industrial processing, etc.). Geographical and ecological zones may also be significant for distinguishing types. Usually, typologies are based on the structural features setting the production conditions and the market access. The resulting performance and impact for each type of actors are evidenced by the economic, social and environmental analyses.

The purpose of exposing various types of actors in the VC analysis is to assess and compare their situation linking it with production processes and/or economic, social and geographical conditions, therefore shedding light on the actors' diversity and dynamics. This range of situations may entail varied diagnoses and more targeted recommendations.
The use of the same common typology of actors by all experts secures consistent and structured results. However, individually, experts may also use more detailed sub-categories for deepening particular analyses.

- **What are the relevant sub-chains that will sharpen the analyses?**
  Using relevant technical, economic, geographical, environmental, organisational or social criteria, the team reviews the actual configuration of the flows of the VC product. Specific channels assembling some actors at certain stages often appear due to particular constraints or shared interests: geographic proximity, technological match, social or commercial organisation, etc. Identifying such combinations of actors and the specific features of their exchanges and inter-actions (technical, financial, commercial, social….) outlines sub-sets within the overall VC system, thus named "sub-chains". Particular development issues (e.g. on-going private projects, sectorial challenges or policy concerns) can also guide in defining the relevant sub-chains to analyse. Sub-chains must be examined separately as "parts" of the VC, considering their distinctive characteristics and casting light on their activities, organisation and outcomes.

  Sub-chains encompass particular series of actors, the flows between them and possibly the specific arrangements and governance system linking those actors. A sub-chain may comprise the whole series of functions (from farm to end-market) in a separate way or involve common actors with other sub-chains. Sub-chains often tally with specific types of actors of the common typology (Illustration 3).

  The purpose of considering the sub-chains in the VC analysis is to assess their distinct economic, social and environmental performance and impact, and compare them, leading to comprehensive diagnoses. It helps to detect and appraise areas of improvement and leverage points. It facilitates the elaboration of targeted recommendations (by making clear the consequences for distinct types of actors) and provides evidence and insights of many kinds (technical, marketing, managerial, geographical…) to actors and policy makers for conducting appropriate operations and policies.

Illustration 3. Sub-chains flow chart, example of a rice value chain

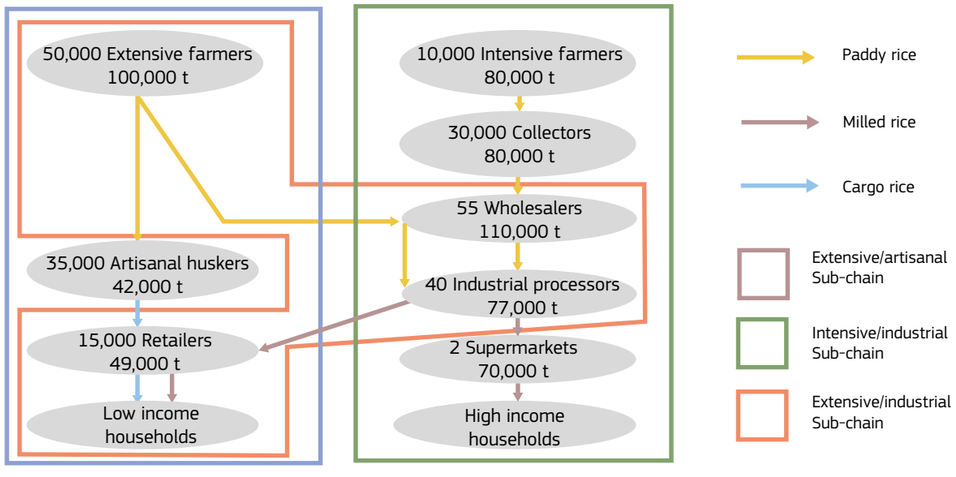


Table 3. Technical processes and practices

COMPONENTS/ ELEMENTS	TYPE OF INFORMATION	USUAL INDICATORS & TOOLS
Agricultural Production	• Natural and physical environment • Agronomic/aquacultural practices, inputs (seeds, chemicals…), water and soil management, husbandry… • Associated crops • Cropping seasons • Cropped areas • Labour force: quantity, origin • Volume of production • Prices	• Farm typology • Yields (area, water, labour…)
Services and agrodealers	• Input supply • Access to and use of counselling and extension services • Access to and use of financial services • Prices	• Typology
Farm equipment & infrastructures	• Inventory: type, age, state, condition of use, management modalities • Maintenance and rehabilitation needs (and cost) • Irrigation schemes	• Tables, maps
On-farm post-harvest	• Stocks, on-farm processing, transport • Product quality • Physical yields and loss	• Technical yields and labour productivity. • Level of loss
Downstream processing	• Physical facilities: type, age, state… • Management modalities: ownership, conditions of use… • Management of stocks • Physical yields and losses • Prices	• Typology • Technical yields • Labour productivity • Level of loss
Marketing and trade	• Farmers' market access • Transport • Types of traders • Physical facilities: type, age, state… • Ways and means of collection Management of stocks • Physical yields and loss • Prices	• Typology • Technical productivity • Production cost • Level of loss
Regional infrastructures	• Type (roads, dams…), state • Capacity and needs	• Matrix, tables, maps

- *In view of preparing for further work, the team must keep in mind that the higher the level of detail (e.g. a detailed typology of the actors), the greater the amount of data needed (on the technological processes, quality of the product, costs, flows, etc.) and the ensuing level of resources required (time, logistic support…).*

- *VCA4D studies examine the operations of the VC only within the country, even when (part of) the VC production is exported.*
  *Systematically applying **the same methodological format** to all studies, allows for comparisons and better clarity for national decision makers. It also makes it possible to remain within the resources available for the studies (time and cost).*
  However, when deemed necessary, the experts may complement the economic and environmental analyses of the in-country segments of the VC with a rapid investigation on the foreign segments. These elements then serve as a complement to the standard analysis.

Table 4. Organisation and governance

COMPONENTS/ ELEMENTS	TYPE OF INFORMATION	USUAL INDICATORS & TOOLS
Marketing networks and **distribution channels**	• Production/supply area, agents involved, terms of trade, stock management • Network structure (system nodes, bottlenecks, clusters…) • Changes in actors involved (in and out the network) • Information channels and flows on product availability, accessibility, collection, prices) • Competitors	• Flow diagram • Matrix of relationships and information flows • Maps
Stakeholders strategies (particularly farmers' strategies)	• Dependence of the agents to the VC activities: economic, access to services and inputs… • Importance of the VC product(s) among farmers' crops • Internal decision making (Who? How? …)	• Description • Relative value of the various farm products • Risk analysis matrix
Horizontal coordination between VC agents with the same function	• Agents involved in the VC, with their specialisation and size differentiation • Associations of actors: function, number, volume of flows, internal relations and competition • Conditions for entry (« barriers ») • Organization and management of strategic functions and services (water, labour, stocks…)	• Matrix of actors' relationships • Diagram of information flows • VC maps
Vertical coordination between VC agents in demand-supply relationship	• Structure (leverage points…) and competition (monopoly, oligopoly…) • Circulation of information: origin, channels, content, organisation… • "Contractual" terms: types of arrangement, conditions, nature of engagement… • Market supplies over time, seasonal variability, long run demand trend • Export: price differential with competitors and final good • Public support and regulatory services	• Matrix of relationships • VC maps • Diagram of information flows • Calendar of activity
Business environment	• Regulatory background (permits, authorisations, terms of use…) • Certification and standard setting • Public service and infrastructure provision • Vocational training • Public-private dialogue	• Description • Chronograms, tables
Policy framework	• Fiscal (taxes, subsidies…) • Financial (credit…) • Trade (liberalization, tariffs…) • Territorial (decentralisation…) • …	• Description • Chronograms, tables
Governance system of the VC	• Formal and informal rules (overall and at various VC stages) • Dominant coordination arrangements: market, modular, relational, captive or hierarchical • Export: international business structure	• Description and diagram

2.3 A STRATEGIC EXAMINATION OF THE VC

The analysis of the technical characteristics and organisational features of the VC and of the general environment in which it operates provides the essential elements needed to outline the VC strategic position.

Determining the main **Strengths, Weaknesses, Opportunities, and Threats** (SWOT) regarding the VC helps to grasp a full strategic picture and to explain past performance and potential development of the VC. The SWOT matrix (Illustration 4) is a synthetic tool that helps to combine the main findings of the functional analysis and the drivers stemming from the economic, social and environmental investigations done for answering the framing questions. Therefore, it can only be completed and fine-tuned in the concluding steps of the VC study.

Illustration 4. SWOT analysis matrix, example of a maize value chain

	POSITIVE	NEGATIVE
INTERNAL	**STRENGTHS** • Experience • Processors' know-how • Reputation of products • Flourishing domestic market • Coordination and social capital	**WEAKNESSES** • Difficult access to land • Physical access to production zones • Low productivity • Low wages in the processing sector • Lack of information on prices • Future policy uncertainty
EXTERNAL	**OPPORTUNITIES** • New trends in consumption • New actors emergining • Opening of external markets • Policy changes	**THREATS** • Land pressure (reduction of fallow) • Rural insecurity • Rising transport cost • Decrease of the international price • Environmental protection standards • Increasing competition

Functional analysis deliverables

In the team's conclusive deliverables, the functional analysis must provide a multidisciplinary structured presentation of the VC including:

- A general description of the products, stages and technical processes.
- The types of actors, their main features and practices.
- The input dealers and support services.
- The flows, their volumes, with a clear view of end-markets considered and geographic distribution.
- The organisation and governance.
- A description of the business environment, policies, institutional and societal context.
- The major market trends.
- An overview of the strategic importance and trends of the VC for the actors and for the country as a whole.
- A SWOT matrix highlighting the main advantages, challenges and shortcomings deriving from all these elements.

In order to quickly check consistency and facilitate reading, the experts are encouraged to use visual presentation tools such as:

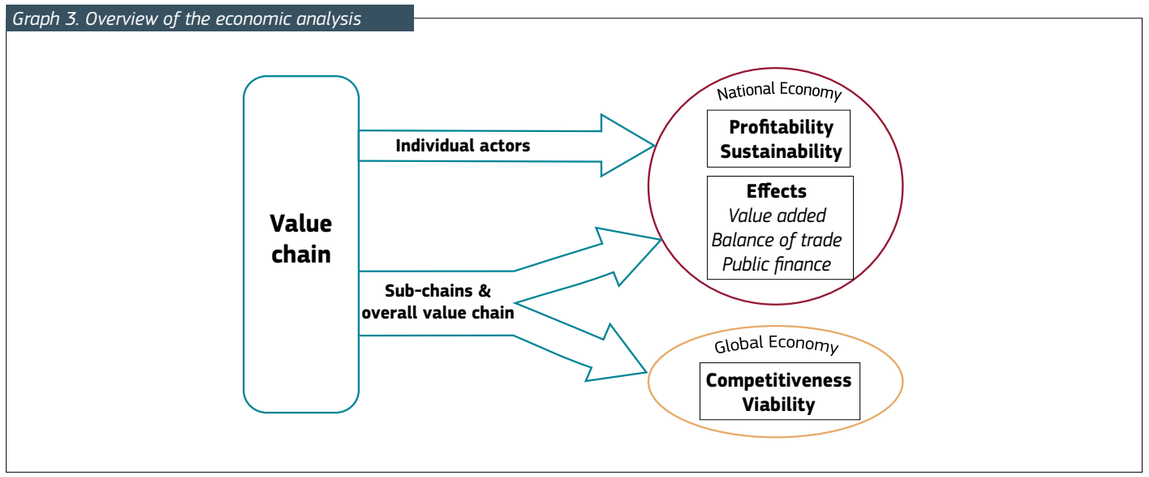
- Matrix of functional relations.
- Resource and utilisation table.
- Matrix of flows and exchangesFlow diagram and mapping (including relevant indicators of volumes, numbers, prices, sales, revenues…), showing relevant sub-chains.
- SWOT matrix.

03

What is the contribution of the value chain to economic growth? (FQ1)

The economic analysis aims at measuring and interpreting the **profitability and sustainability** of the value chain operations for all the actors directly involved. Its purpose is to inform on the economic **effects** of the value chain within the national economy in terms of **growth generation** and **distribution of incomes**. It also assesses its **competitiveness and viability** within the global economy (Graph 3).

Graph 3. Overview of the economic analysis



The approach is based on robust review and data collection (primary and secondary) and encompasses four steps of computation dealing with:

1. the extent to which profit level ensures financial sustainability to the VC actors identified in the typology;
2. the overall growth and distributive effects within the national economy;
3. the extent to which the VC operations are competitive and viable in relation with the international economy;
4. how the sub-chains perform differently (profitability for actors, efficiency).

- *Precision of data and computation: the economic analysis must not focus too heavily on measuring with an absolute precision, which requires time for collecting detailed data. Decision makers only use orders of magnitude.*

3.1. PROFITABILITY & SUSTAINABILITY FOR ACTORS

This step is often referred to as "financial analysis" with its broad sense of analysis of individual businesses (farmer, processor, trader…). It is **implemented for every average individual type of actor** as defined in the common typology (see chapter on functional analysis).

The main tool used is the **Operating Account** (Table 5) **built on actual flows** for every type of actor. It allows for the calculation of the actor's Operating Profit.

Flows registered over the period (usually the year) are (Illustration 5):

- the **production outputs**, i.e. the VC product and possible by-products;
- the **Intermediate Consumptions (IC)**, i.e. goods and services used as inputs and totally transformed ("consumed") during the annual production process. They differ from the investment which corresponds to the costs incurred for services, materials and equipment which are only fully utilised (used up) over several production cycles;
- the **cost of external workforce, land fee, royalties, banking and insurance services** (i.e. interest on loans and insurance premium), and **taxes** on operations.

The resulting **Gross Operating Profit** does not inform on provision for past or future investment. Subtracting depreciation (i.e. the amount considered to be used up during the annual production process) leads to the Net Operating Profit. It is to be calculated only if depreciation of investment is relevant (order of magnitude considering the share of investment benefiting to VC activities) and available through reasonable investigations.

All flows (revenues and expenses) are valued at actual market price, i.e. at prices used for the transaction, or, when in kind, at corresponding market prices. Flows that do not constitute real market exchange are not taken into account except for the farmers' home consumption.

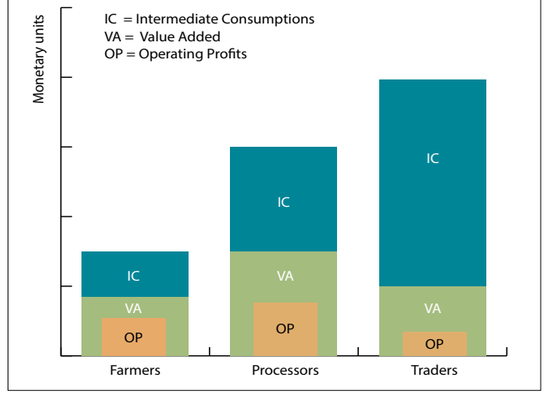
- *Farmers' operating accounts, are based on actual flows:*
  - *sales (of the VC product) and outlays (expenses for local and imported inputs, workforce, etc.);*
  - *market value of home consumption;*
  - *subsidies for operations they receive directly;*
  - *benefits given in kind to the external workforce (food, by-products…) are valued at the market price of these products.*
- *No theoretical value of family labour is added to the costs (i.e. no opportunity cost nor shadow pricing) so that the resulting operating profit measures the actual return to the farm, informing on the exact remuneration of the family labour, i.e. its income.*

Table 5. The Operating Account

EXPENSES	REVENUES
Intermediate Consumptions (IC) (*Goods and Services used as inputs*) …	**Production** .Sales .Home-consumption
Value Added (VA) .Wages & Salaries* .Land fee** .Royalties .Financial charges (Interest on loans) .Taxes on operations	**Subsidies for operations**
Operating Profit (OP)***	

*Without valuing unpaid family labour
**In case of tenant farming: rent, share-cropping…
****Gross OP = Revenues – Expenses*
Net OP = Gross OP - Depreciation

Illustration 5. Actors' operating accounts along a value chain



Customary account analysis looks over the profitability and sustainability per type of actor. However, in VCA4D studies, an actor's operating account only relates to the activities dedicated to the VC production and the calculated profit applies solely to the actor's involvement in the VC. Therefore, its significance for the actor's business and strategy as a whole depends on the weight of these activities in the actor's economy. When needed, this relative importance can be approximately assessed considering the proportion of resources mobilised (area, working time…) and/or its share of total income.

Furthermore, a practical way to appraise the profitability and sustainability of the VC for family farmers is to consider the working time spent (when it can be estimated) by comparing the farmer's operating profit to the official minimum wage, to the salary provided by plausible alternative employment opportunities, or to a minimum acceptable living income.

The CARD tool
to anticipate climate change impact

Evaluating financial sustainability of farms involves questioning their capacity to face climate change consequences. The Climate Adaptation in Rural Development assessment tool (CARD) developed by IFAD enables easy access to crop yield projections for 17 major annual crops in 54 African countries up to 2050. For every crop, this simple tool allows to select the regions or agroecological zones, rainfed or irrigated cropping, and three levels of risk. Testing the operating account with these yield projections allows us to get a sense of the impact of climate change on the farmers' position in the future.
CARD is based on the IPCC modelling RCP8.5 scenario which projects the highest concentration in greenhouse gas and global warming.
The CARD Microsoft Excel file can be downloaded from https://www.ifad.org/en/web/knowledge/publication/asset/41085709

3.2 TOTAL EFFECTS WITHIN THE NATIONAL ECONOMY

Consolidating the VC accounts

The operating accounts of all the VC actors (per types) are consolidated into one single operating account encompassing all the flows within the whole value chain, in order to assess the VC impact both on the VC actors together and on the remainder of the economy.

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- *In the VC consolidated operating account:*
  - *the final VC* production *is valued at the price of final consumption in the domestic market and at FOB gate price for the exports;*
  - *the consolidated Value Added (VA) is the sum of the VA of all the direct actors (at all steps of the VC);*
  - *the consolidated Intermediate Consumptions (IC) add up only the goods and services supplied to the direct VC actors by agents outside of the VC. (NB: therefore, the VC product channelled along the chain does not appear as an IC in the consolidated account).*

Computing Total Effects

The sum of the VA generated by all the actors operating within the VC limits (i.e. actors producing, processing or channelling the VC product) is called **Direct VA**, while the sum of the VA generated by all the suppliers external to the VC (i.e. actors providing intermediate goods and services to the VC actors, therefore not handling nor processing the VC products) is called Indirect VA. **Total Value Added** adds up these direct and indirect components, revealing the overall generation of VA entailed by the VC (Graph 4).

Total VA = **Direct VA (VC actors)** + **Indirect VA (suppliers external to the VC)**

Similarly, every constituent of the VA, i.e. salaries and wages, land fees, royalties, financial charges (interest on loans), taxes on operations, and operating profits is made of a direct (VC actors) and an indirect (domestic IC suppliers) parts.

NB: Subsidies for operations granted to VC actors are added separately. They increase the profits of the VC actors but are not part of the Total VA which measures the additional value created by the VC. From the accounting viewpoint, the balance of the consolidated VC account is thus equal to the sum of the VC actors' operating profits minus the subsidies for operations they receive directly.

Table 6. Core Questions and Indicators for the financial analysis of actors

Framing Question 1: What is the contribution of the VC to economic growth? *(Particular attention must be paid to the calculations of the indicators in bold)*	
CQ1.1	**How profitable and sustainable are the VC activities for the actors involved?** *Indicators*: **Operating Accounts of every type of actor; Net Operating Profit; Return on turnover** (operating profit/production); Current Benefit/Cost ratio (operating profit /total expenses); Estimates of Return on Investment (if relevant and available); **Benchmarks for farmers' net income** (minimum wage, livelihood needs, job opportunities…).

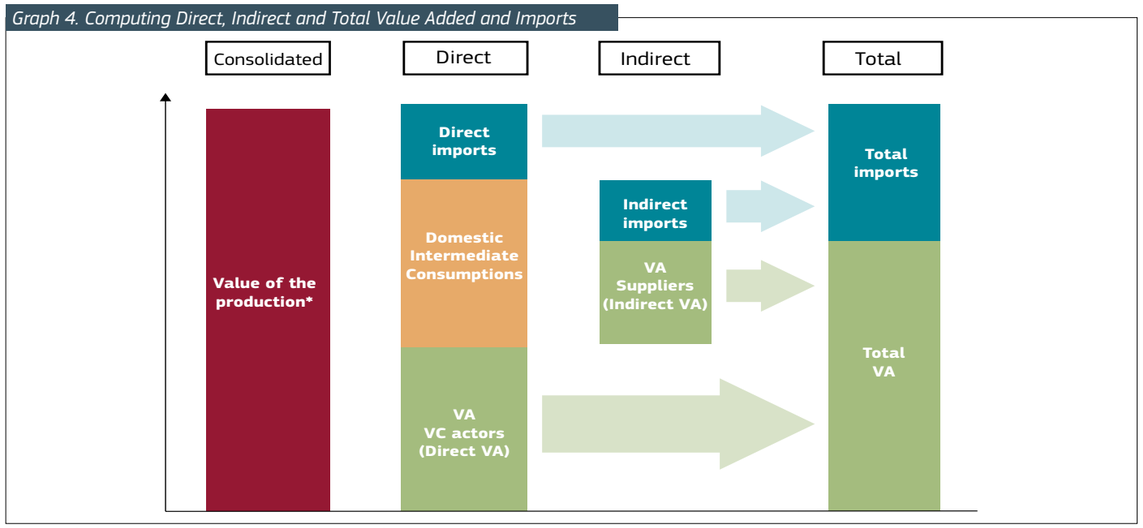
Imports of IC by the actors within the limits of the VC are called **Direct Imports** while imports incorporated in the intermediate goods and services supplied by the agents external to the VC are called **Indirect Imports**.

Total imports = **Direct imports (VC actors)** + **Indirect imports (suppliers external to the VC)**

Indirect Value Added and Indirect Imports result from "backward linkages" which are the activities entailed by the supply of intermediate goods and services to the VC actors by agents external to the VC. They are calculated by using suppliers' accounts, or national statistics when easily available.

- *Computing Indirect Value Added and Indirect Imports is only required for the very few intermediate consumptions that amount to a substantial share of the total production value. Only those sizeable IC significantly alter the order of magnitude of the Total VA and Total Imports.*

Graph 4. Computing Direct, Indirect and Total Value Added and Imports



** Not including subsidies for operations granted to actors*

Analysing the Total Effects

a) Contribution to growth

Growth is usually estimated by the Gross Domestic Product (GDP), which is the sum of the Value Added created by all the domestic agents. The Direct VA measures the contribution of VC actors to growth and the Indirect VA the contribution of the domestic IC suppliers to growth. **Total Value Added measures the overall contribution to national growth entailed by the VC operations.**

More specifically, the Direct VA created by the VC agricultural actors **contributes to the agriculture sector growth**. Its share of the Agriculture GDP informs on the weight of the VC in this sector.

b) Driving effect within the domestic economy

Total VA also informs on the **level of integration within the domestic economy** of the activities generated and induced by the VC.

The Rate of Integration indicates the portion of the value of the VC production which eventually remains within the national economy.

$$\text{Rate of integration} = \frac{\text{Total VA}}{\text{Production of the VC}}$$

This ratio estimates the extent to which VC actors draw on domestic productive capacities of intermediate goods and services. This driving capacity is a key development process as it strengthens domestic activity and economic growth.

Combined with an analysis of the market dynamics and local production potential of ICs, the Driving Effect Ratio informs on the involvement of domestic business in supporting the activities of the VC.

$$\text{Driving effect Ratio} = \frac{\text{Indirect VA}}{\text{Direct VA}}$$

c) Income distribution

In practice, Value Added consists of incomes distributed to
- Households: salaries, wages, operating profits (including subsidies to operations) of family businesses, rents;
- Financial institutions: interest on loans and insurance;
- Public entities: taxes, operating profit of public companies;
- Enterprises: operating profits.

Therefore, reviewing Total Value Added and taking due account of the subsidies for operations granted to VC actors shed light on the impact of the VC on the **overall distribution of incomes to agents**. This will be more thoroughly analysed to answer the Framing Question 2 on inclusiveness.

The **public funds balance** is reckoned using the formula:

$$\text{Impact on Public funds} = \underset{\text{[Total taxes + Total OP of public companies]}}{\textit{Benefits}} - \underset{\text{[Subsidies + other public outlays]}}{\textit{Costs}}$$

d) Balance of trade

Importing IC denotes loosing foreign currency for the national economy while VC exports (if any) bring foreign currency gains. Matching both allows to assess the **Balance of Trade of the VC** :

$$\text{Impact on Balance of Trade} = \text{VC exports} - \text{Total imports}$$

3.3 COMPETITIVENESS AND VIABILITY WITHIN THE INTERNATIONAL ECONOMY

Countries are part of the worldwide economy, and as such, the viability of the VC in the global economy must be assessed.

Domestic products somehow compete with those available in the international market. International competitiveness is assessed with the **Nominal Protection Coefficient (NPC)** which compares the national and international prices of every VC product.

$$\text{NPC} = \frac{\text{Domestic price of the product}}{\text{International parity price of the product}}$$

(Parity price: see box on p.21)

A NPC > 1 means that the domestic value is higher than the international market price. Thus, the overall VC remuneration is higher than it would be if applying international parity prices. In some ways the domestic market is protected, and the VC product is not competitive with similar international products.

An indication of the overall economic gain or loss for the national economy is given by the **Domestic Resource Cost ratio (DRC)**. The DRC compares:
- the actual internal cost for the economy given by the actual remuneration of the domestic non-tradeable factors (e.g. labour, capital, land, environmental goods) mobilised in the VC, and
- the net value created within the economy: estimated using international parity prices (of IC and production), i.e. from the opportunity standpoint of international markets.

The DRC measures the value of domestic factors necessary to gain one foreign currency unit.

$$\text{DRC} = \frac{\text{Non tradeable domestic factors at market price (exluding transfers)}}{\text{Production at international price} - \text{Tradeable intermediate goods and services at international prices}}$$

Table 7. Core Questions and Indicators for the analysis of the Total Effects

Framing Question 1: What is the contribution of the VC to economic growth? *(Particular attention must be paid to the calculations of the indicators in bold)*	
CQ1.2	**What is the contribution of the VC to the GDP?** *Indicators*: **Value of final VC production**; Consolidated operating account of the whole VC and relevant sub-chains; **Total Value Added and components** (Wages, Taxes, Financial Charges, Operating Profits); **Total Value Added in percentage of the GDP; Rate of Integration into the Economy;** Driving effect ratio.
CQ1.3	**What is the contribution of the VC to the agriculture sector GDP?** *Indicators*: **VC agricultural actors' Value Added in percentage of the agriculture sector GDP.**
CQ1.4	**What is the contribution of the VC to the public finances?** *Indicators*: Taxes, subsidies and operating profits of public enterprises; other receipts and outlays of the government budget; **Public Funds Balance.**
CQ1.5	**What is the contribution of the VC to the balance of trade?** *Indicators*: **VC Exports; VC Total Imports; Balance of trade of the VC;** Return on Foreign Currency outlays (FC net balance/FC outlays); Total Imports/VC Production).

By comparing internal cost and potential external gain the DRC raises the issue of the sustainability of the VC. A DRC < 1 means that the VC is viable in the global economy because the value of domestic factors which are consumed is lower than the value they produce (from the standpoint of the international markets and considering the present level of remuneration of domestic factors).

- *To keep clear and comparable results among VC studies, the computational process for DRC is:*
  - *i. to eliminate "transfers", i.e. taxes, subsidies, land fees and financial flows;*
  - *ii. to value tradeable goods and services using international parity prices;*
  - *iii. to use actual domestic market prices for all other flows. No shadow pricing is to be applied on items such as wages, land and exchange rate.*

- *All international prices used are parity prices, i.e. the value of the same product imported from international markets or exported to international markets:*
  - *Import Parity Price = Border price + Internal domestic cost for delivery.*
  - *Export Parity Price = International price - Cost of delivery to the international place (for which price is set).*

Software for the economic analysis

*The economic calculations can be done using spreadsheets or an existing software such as **AgriFood Chain Analysis** (AFA, developed by Cirad).*
The AFA software facilitates the systematic organisation of physical and economic data. It ensures coherence, e.g. to ascertain that physical supplies and utilisations are balanced or that prices used are consistent. It automatically calculates indicators (financial profitability for the actors, direct value added at sub-chains and whole chain levels, total effects, sustainability within the international economy). It can easily test different sets of prices, make sensitivity analysis, and facilitate comparisons and simulations. This software also operates as an information system to store data. It requires an initial training for using it.

3.4. COMPARING SUB-CHAINS

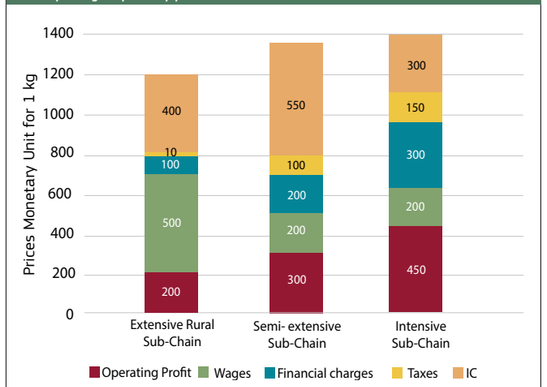
The economic analysis gathers evidence on **how sub-chains perform differently**.

Indicators of profitability, direct value added generation, income distribution or employment are estimated for every sub-chain as a whole and at different stages. They can also be broken down according to farm types, or related to one unit of product (kg, ton, functional unit…) or area (ha…) thus informing on varied aspects of the sub-chains performance.

Gaps revealed by these indicators point to relative advantages and drawbacks anchored in the technical, social and economic grounds of every sub-chain (Illustration 6). They allow appropriate recommendations to be drawn up.

NB: The detailed performance of every sub-chain regarding income distribution to different types of actors is carefully examined when tackling Framing Question 2 on inclusiveness.

Illustration 6. Comparing the price structure of sub-chains, example of a pineapple value chain



- Intensive Urban Sub-Chain has elevated costs due to strong fertilizer use and high financial charge.The resulting quality allows a high price (1400) on urban and international markets. Impact on public finance is positive but with an important loss in foreign currency due to imported fertilizers and package (350 out of the 450 IC cost).
- Semi-Intensive Sub-Chain has a lower cost of imported inputs and generates the highest operating profit for 1 kg of pineapple.
- Extensive Rural Sub-Chain generates incomes to smallholder farmers and wage-earning jobs.

Table 8. Core Question and Indicators for the analysis of competitiveness

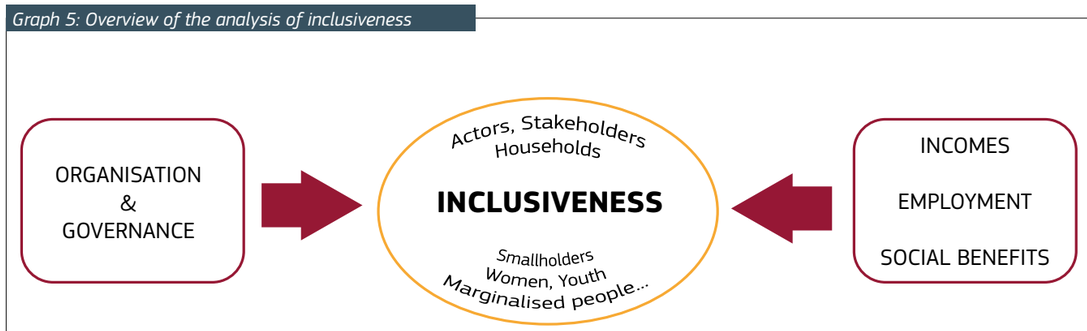
Framing Question 1: What is the contribution of the VC to economic growth? *(Particular attention must be paid to the calculations of the indicators in bold)*	
CQ1.6	**Is the VC viable in the international economy?** *Indicators*: **Nominal Protection Coefficient (NPC)**; Effective Protection Coefficient (EPC); **Domestic Resource Cost Ratio (DRC)**; Share of the export price (FOB) in the final consumer price in the importing country.

04

Is this economic growth inclusive? (FQ2)

To build an image of the inclusiveness of the value chain, the economic and social experts highlight how the VC **organisation** and **governance** involve the various stakeholders and how the **incomes** and **employment** generated are distributed among social groups. The value chain specific impact on vulnerable groups such as subsistence-oriented farmers, smallholders, **women**, **youth**, and **marginalised people** (landless rural workers, minority communities…) is closely documented (Graph 5).

Graph 5: Overview of the analysis of inclusiveness

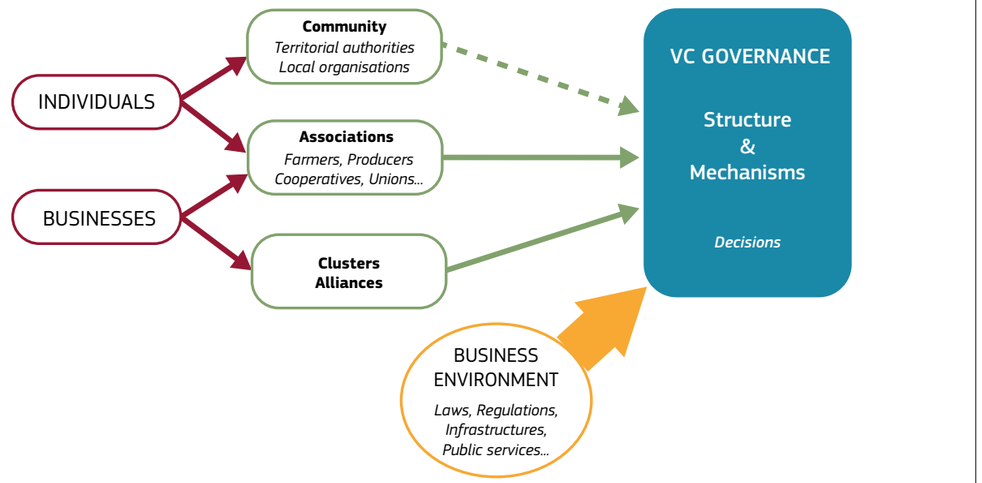


Sub-chains may have mixed outcomes on inclusiveness. Inasmuch as significant differences are evidenced, conclusion and recommendations will gain in relevance and precision.

4.1 PARTICIPATION IN THE VALUE CHAIN GOVERNANCE

The way the stakeholders along the value chain are **involved in decisions** is a key determinant of inclusiveness (Graph 6) as decisions are made at each step of the VC, leading to unequal influence in steering the VC and taking advantage from its activities.

Graph 6: Main elements of the analysis of governance



Information on these issues stem mainly from:

- reviewing the horizontal and vertical **coordination**, the rules and arrangements in place and the access to information (Table 4);
- investigating on the **social capital**, particularly on the various associations (farmers and producers' organisations, business alliances, workers' unions…), the power relations (including local authorities), the community involvement, and the level of trust (see Social Profile, chapter 5).

The ensuing global picture allows for the identification of the processes that strengthen or limit the enforcement of rules (on land, working conditions, etc.) and the stakeholders' bargaining position (through contracts, organisations, policy measures and regulations, taxes or subsidies). Altogether, analysing the governance mechanisms and social relations points at major favourable or negative drivers (Illustration 7):

- the power of **producers' organisations**, the transparency of information and the confidence between actors play a key role in setting the price;
- **market networks** and **firms' integration** regulate negotiations on the working conditions and price bargaining;
- **involvement of women or vulnerable people in decision-making processes** may influence the income distribution among actors;
- **assets and access to resources** determine the capacity to get a decent return on labour;
- training and compliance (and valid registration) to certification schemes may lead to increased revenues.

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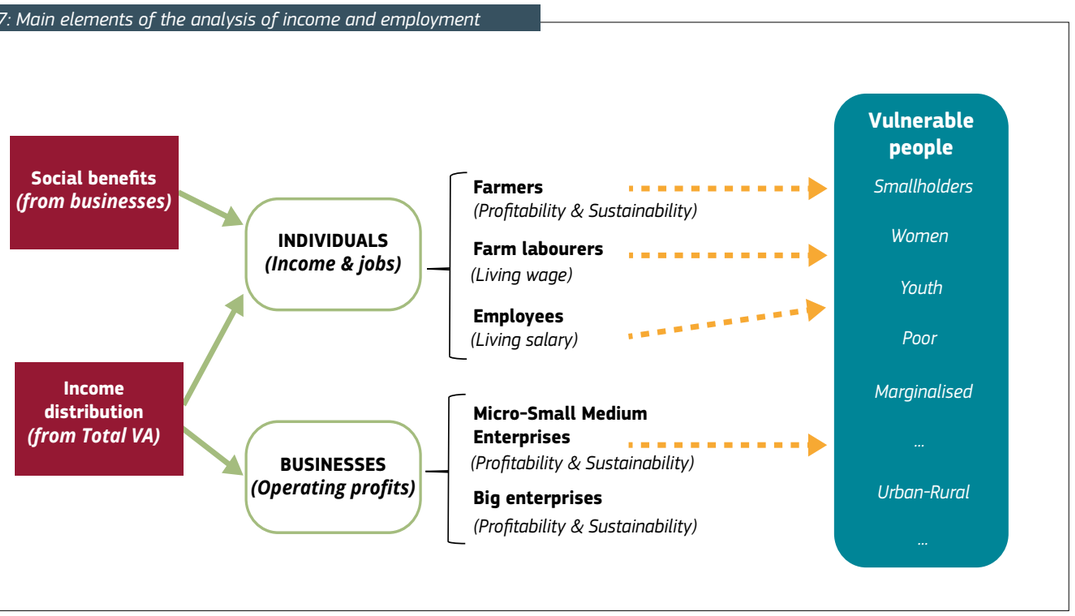
Illustration 7: Involvement in sub-chains, example of a fresh beans for export value chain

Smallholders in open market *Individuals scattered in remote areas*	**Smallholders with contract** *Members of formal and informal groups*
Participation in collective governance	
• No coordination: sales to brokers and middlemen (without direct contact with export companies) • Sales negotiated on spot with brokers and middlemen. No organisation to build social capital	• Contract provides close ties with export companies (including certification and support for management) • Early agreement on prices, collection times and produce quality • Membership in various formal and informal groups
Access to Services	
• Few extension services and no targeted counselling • Limited training (from brokers) on agronomic and food safety practices	• Contractual extension services on production and management practices and training on new market compliance requirements • Support for credit facilities and funding for a collection and grading house
Indicators	
• Yield around 6 t/ha • Reduced farm gate price • Operating Profit ~6400 MU/1000 sqm² • Loosing market shares over time	• Yield around 10 t/ha • Operating Profit ~ 30,000 MU/1000 sqm² • Sustained market share

4.2 INCOME AND EMPLOYMENT

Income distribution and employment creation are tangible indicators of how households and businesses take advantage of the VC operations (Graph 7).

Graph 7: Main elements of the analysis of income and employment

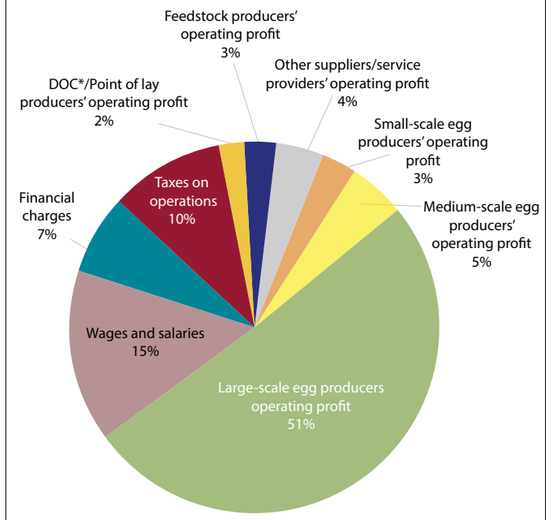


Inclusiveness is evidenced by various indicators of **revenue distribution** (Illustration 8):

- depicting some processes at work:
  - i.e. Level of **farm gate price**;
  - **share of the farm gate price in the final price,** i.e domestic consumer price or FOB export price, in the case of export and if possible in the final consumer price abroad (Illustration 9);
  - **value of social benefits** of all kinds bestowed by VC operators (plantations, cooperatives, firms…) to farmers and workers.

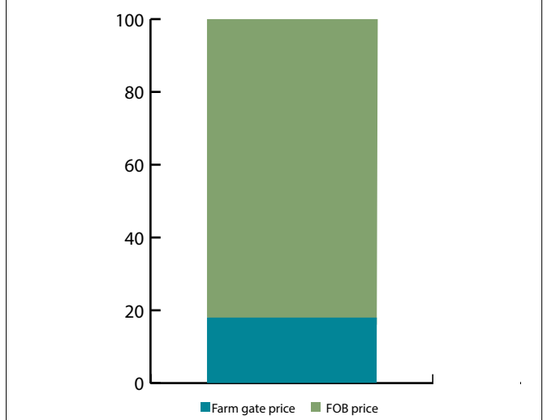
- measuring the level of actual benefits:
  - farm income i.e. **farmers' operating profit**. Income of smallholders and larger farms should possibly be distinguished. NB: at the farm level, wages that the family workforce earn on other farms for VC operations increase the global income;
  - total **wages** of farm seasonal labourers;
  - total **salaries** and Total **operating profits** (including direct subsidies) of individual businesses, of Micro, Small and Medium Enterprises (MSMEs) and of larger companies directly involved in the VC downstream (processing, marketing, financial services if relevant…) and upstream (IC suppliers) enterprises.

Illustration 8. Distribution of income, example of an egg value chain



*DOC - Day old chicks

Illustration 9: Share of the farm gate price in the FOB price example of a cocoa value chain



- *National VCs that export commodities are part of larger international value chains with final consumption abroad. The exported VC product can be processed abroad. When this commodity is the major component of the final consumer good (as in the case of tea, coffee, cocoa, cotton for garment, "ethnic" merchandise, etc.), a rough estimate of the share of the farm gate price (or FOB export price) in the final consumer's price gives an indication of how the value is distributed along the chain. It draws attention to the negotiating power of the national VC. It also gives a hint on the stake of developing downstream domestic activities (processing or trading). A specific study may be recommended when deemed necessary.*

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- *Beyond the outright income measurement of farmers and MSMEs based on their Operating Profit, the precariousness of their situation is assessed in the analysis of their financial sustainability, including the possible impact of Climate Change (see box on the CARD tool in chapter 3).*

Indicators measuring **jobs and self-employment** are expressed by the number of people involved and Full-Time Equivalents (FTE). Jobs are generated at all the stages of the VC and by the ICs suppliers (backward linkages) (Illustrations 10 and 11). They include:

- **Full time and part-time occupation** within farm households and family businesses along the chain (family workforce and seasonal labourers);
- **Employees of formal sector** enterprises upstream and downstream, and public services.

Data can be collected from specific survey or secondary documents (databases, statistics…). Rapid suitable computation provides an approximate number of FTE.

Moreover, assessing inclusiveness requires as far as possible to detail skilled and unskilled jobs and to what extent they benefit women, young people, urban or rural people, migrants, etc.

- *When used for the economic analysis, the software AFA calculates the distribution of incomes and provides support for reckoning the jobs.*

- *Portraying income, employment and social benefits of small-holders, women, youth or specific marginalised groups helps to put things into perspective (balancing benefits and shortcomings, taking trade-offs into account…). For instance, a VC with a high female labourers participation may in fact be unfavourable to women if they are underpaid.*

Illustration 10. Impact on employment and inclusiveness, example of an egg value chain

Production. Large-scale egg production has limited peri-urban employment opportunities (150,000 FTE), especially for women and youth with low levels of education as it needs increasingly high skills. Layer feed price instability disfavours medium/ small-scale producers (respectively 10,000 and 300,000 producers) as they have little access to business advisory and affordable finance services.

Dowstream VC activities. Table egg distribution is more inclusive than production, creating employment particularly for male youth. Income is spread among 600 "wholesalers" and a highly profitable 18,500 micro-retailers in urban and peri-urban areas.

Upstream VC activities. Soya is the major input for egg production. Its cultivation has attracted annually 20% more smallholder farmers of both genders and provided opportunities for seasonal employment in rural areas (300,000 FTE).

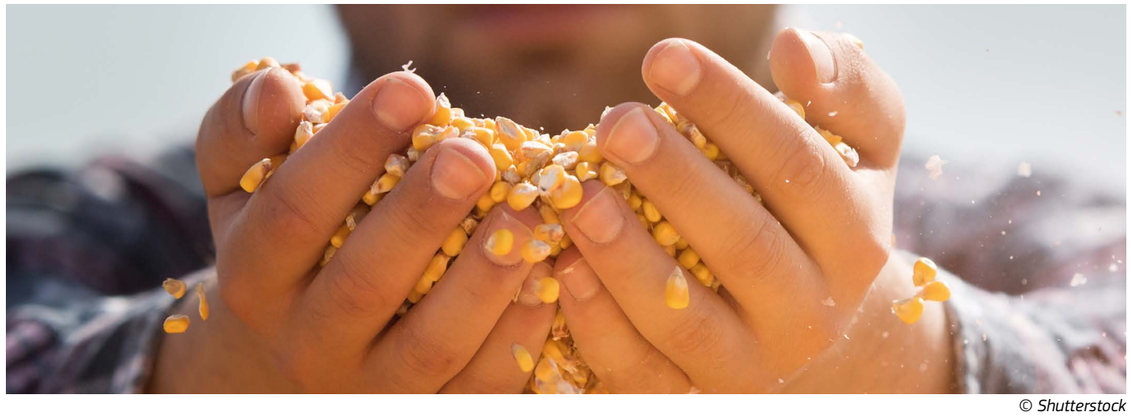

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Illustration 11. Comparing employment in sub-chains, example of an aquaculture value chain

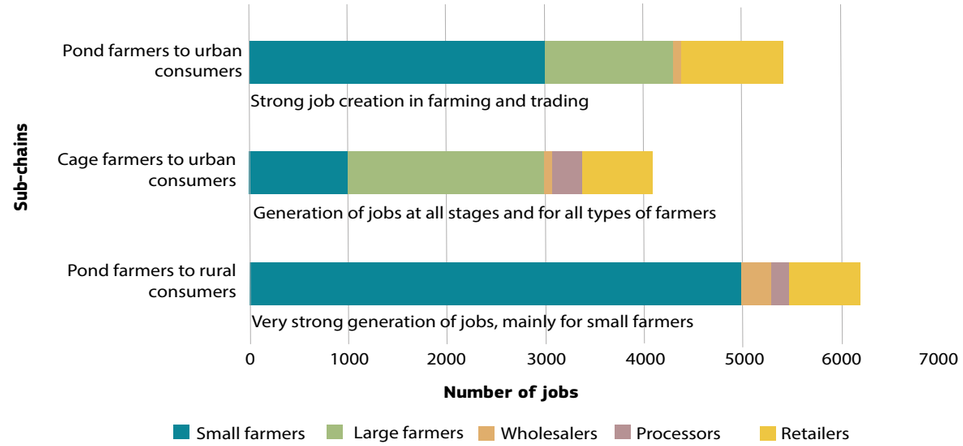

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Table 9. Core Questions and Indicators for the analysis of inclusiveness

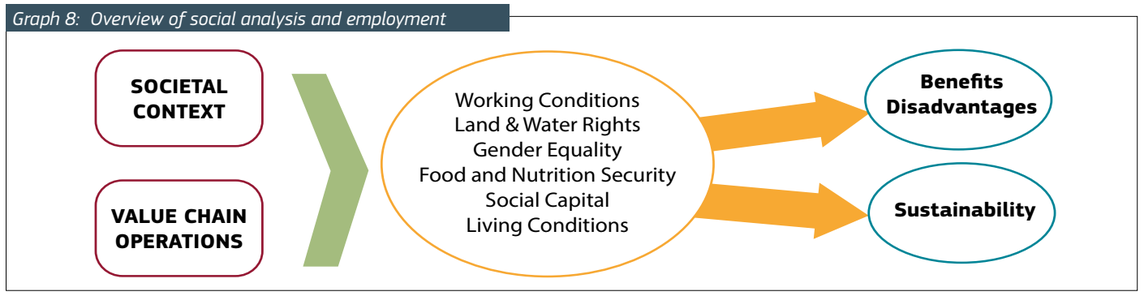
Framing Question 2: Is this economic growth inclusive? *(Particular attention must be paid to the calculations of the indicators in bold)*	
CQ2.1	**How is income distributed across actors of the VC?** *Indicators*: **Disaggregated Value Added; Total Farm Income; Total wages and salaries** (at every stage, all activities – absolute and %); Value of social benefits; Comparison of sub-chains' income distribution; **Total income accruing to marginalized and vulnerable groups.**
CQ2.2	**What is the impact of the governance systems on income distribution?** *Indicators*: **Income distribution among actors; Share of farm gate price in the final price (%)**; Income Gini Index.
CQ2.3	**How is employment distributed across the VC?** *Indicators*: **Number of jobs** (family, self- and formal employment) **at different VC stages** (permanent/ temporary, skilled/unskilled…); **Employment of women**; Employment of marginalized and vulnerable groups.

05

Is the value chain socially sustainable? (FQ3)

The analysis of social sustainability focuses on assessing established and potential consequences of the VC operations in an array of six domains of importance for decision makers because they convey key concerns of development: **Working Conditions**, **Land and Water Rights**, **Gender Equality**, **Food and Nutrition Security**, **Social Capital**, and **Living Conditions**. To capture this impact, it is necessary to understand how the societal context sets the conditions of the **VC operations** through the cultural and regulatory organisation and existing physical means (infrastructures, facilities…) (Graph 8).

Graph 8: Overview of social analysis and employment



5.1 SIX KEY DOMAINS TO INVESTIGATE

Social sustainability can be examined by looking at people's lives and livelihoods through many different lenses. The proposed framework captures the main outcomes of VC activities through **six Core Questions** referring to six "domains". Every domain assembles several themes (Tables 10 and 11); these "sub-domains" can be seen as the building blocks of the social analysis.

For every sub-domain, **a list of questions helps guide the analytical process**. The list is part of the Social Profile tool (see below). These questions reflect **development concerns** that may apply when appraising VC operations. They ensure that no important wide-ranging concern is left aside. They target particular social impacts of the VC activities.

In order to appraise the actual impact of the VC activities, **the interactions between the actors of the VC and the general environment must be understood**. It is often a tricky, and sometimes sensitive, issue to discern the main factors at work and whether the outcomes arise from VC operations or from the context. This can sometimes be clarified by comparing with another situation where the farm, the business or the zone is not involved in the VC activities. As a matter of fact, situations are typically complex, especially when actors are engaged in several VCs. In any case, the social experts have to incorporate the VCA4D Social Profile and its questions within their own working practices in order to assess these six domains.

The analysis should inform on how the interaction between the VC actors and the general environment contributes to **improving or degrading the situation of the various social groups and types of actors** (e.g. concerning access to facilities, social capital, equality…).

- *Whenever relevant, the common typology agreed upon (see Functional Analysis) should serve as a reference for organising the investigative work and for presenting conclusions. Nevertheless, some types of actors may be disaggregated or aggregated if appropriate, particularly for benchmarking.*

Table 10. Domains and thematic sub-domains for the social analysis

1. WORKING CONDITIONS	4. FOOD & NUTRITION SECURITY
1.1 Respect of labour rights	4.1 Availability of food
1.2 Child labour	4.2 Accessibility of food
1.3 Job safety	4.3 Utilisation and nutritional adequacy
1.4 Attractiveness	4.4 Stability
2. LAND & WATER RIGHTS	5. SOCIAL CAPITAL
2.1 Adherence to VGGT*	5.1 Strength of producer organisations
2.2 Transparency, participation and consultation	5.2 Information and confidence
2.3 Equity, compensation and justice	5.3 Social investments
3. GENDER EQUALITY	6. LIVING CONDITIONS
3.1 Economic activities	6.1 Health services
3.2 Access to resources and services	6.2 Housing
3.3 Decision making	6.3 Education and training
3.4 Leadership and empowerment	
3.5 Hardship and division of labour	

*VGGT = Voluntary Guidelines on the responsible Governance of Tenure land, fisheries and forests

Eventually, the team's expertise is called to outline and appraise the key **benefits** and **disadvantages** and the social **sustainability** of the VC operations. The background of their judgement is based on the actual national situation and strategies and on the widely shared international development standards (such as the guidelines on land tenure or SDGs).

Investigation is fed by common data collection tools (statistics, surveys, focus groups, interviews, secondary sources…). In some cases, conclusions may point to areas requiring more information or in-depth study.

- ***Health hazards.*** *The social expert must inquire about the working conditions in the VC, which encompass job safety and the exposure of children to unsafe practices. As the environmental expert is also in charge of looking after the overall human health impacts of the VC, they both share the responsibility of detecting health risks through their visits and data collection (interviews, surveys, secondary documents…). Adverse exposure may happen at all steps of the VC, but frequently in some agricultural activities (chemical use with poor body protection…) or processing facilities (insane atmosphere, harmful manoeuvres…). The social and environmental experts thus present their findings together when tackling the "Working Conditions" domain of the Social Profile and the Human Health impacts section of the FQ on environmental sustainability.*

5.2 USING THE SOCIAL PROFILE

The Social Profile tool assists the expert in reflecting on important issues to elaborate his/her understanding of the situation.

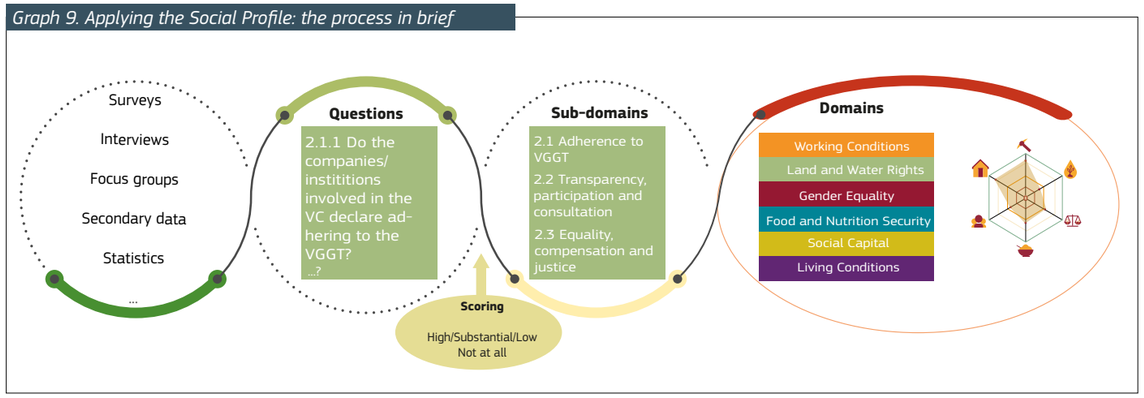
The Social Profile tool

The Social Profile is a tool built by INTPA on a spreadsheet. It includes a series of straightforward questions for each of the 6 domains to help the data collection and the analysis of the situation. This tool is provided to the social expert.

The Social Profile is based on a process of simple scoring that facilitates the expert's judgement. It produces a graphic representation in the form of a "Radar chart" which sums up the diversity of information and scores in order to enhance the communication towards decision makers. Moreover, it showcases clearly the evolution when a new study of the same VC is done.

The series of questions provides a guideline (Graph 9). It is meant to help the analytical process, not to limit the investigation to one-off answers. It aims at supporting the expert in collecting relevant information, and pointing out critical points to clarify and take into account in the overall social analysis.

Graph 9. Applying the Social Profile: the process in brief



The scoring of questions intends to facilitate the expert's abridged judgement and to deliver a synthetic graph that shows the diversity of perspectives (Illustration 12). The simple scoring scale is made of four levels of outcome: from a **"High"** to a **"Substantial"**, **"Low"** or **"Not at all"** positive situation.

In practice, to select the score, **the social expert uses her/his judgement from different perspectives**:

- appraising how the VC activities contribute to changing the observed background situation and their influence on the VC actors;
- using different sets of reference:
  - in relative terms by comparing with other activities in the country (other VCs or sectors), e.g. consistency with national social conditions;
  - in absolute terms, e.g. for estimating the level of food security or access to services;
  - benchmarking with international norms, e.g. ILO labour conventions or VGGT.

On the whole, the expert's work encompasses four areas:

- **Addressing the questions of the Social Profile**. Depending on the setting, some questions might not be relevant and can be overlooked, while the social expert may emphasize other decisive ones.
- **Collecting data and information**. The expert uses the sources and apply the methods s/he considers appropriate.
- **Scoring the questions** in order to weigh up the judgement and build a global picture with the Social Profile Radar Chart.
- **Summarising the findings** per domains and altogether, to deliver a comprehensive and explanatory presentation of the social benefits and sustainability.

- *The report should broadly review every domain rather than lengthily answer every question. In each domain it should emphasize the critical points that require attention.*

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Illustration 12. The Social Profile radar, example of a mango value chain

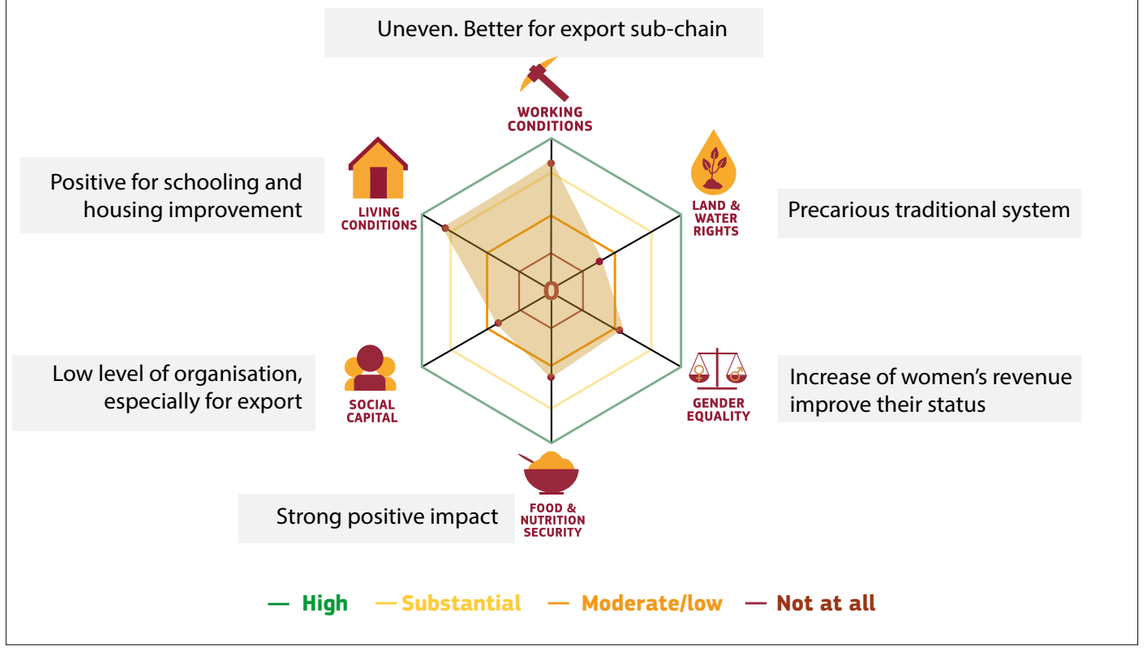


Table 11. Core Questions and main Themes for the social analysis

Framing Question 3: Is the VC socially sustainable?	
CQ3.1	**Are working conditions throughout the VC socially acceptable and sustainable? Do VC operations contribute to improving them?** *Main themes*: Respect of international norms; Respect of contracts; Risk of discrimination and forced labour; Job Safety; Attractiveness; Child labour and education…
CQ3.2	**Are the land and water rights implemented throughout the VC socially acceptable and sustainable?** *Main themes*: Adherence to and application of VGGT; Equity and security of access to land/water resources; Transparency of procedures; Consultation; Arbitration procedures; Compensation procedures…
CQ3.3	**Throughout the VC, do actors foster and put into practice gender equality?** *Main themes*: Inclusion/Exclusion of women/vulnerable groups in certain activities; Access to resources, goods and services (land, credit, extension services, inputs…); Participation in decision-making (on activities, organisation, income…); Responsibility and empowerment in collective processes; Arduous working conditions…
CQ3.4	**Do VC activities contribute to upgrading and securing the food and nutrition conditions?** *Main themes*: Contribution of the VC to the availability, accessibility and stability of food resources; Food diversification; Nutritional quality; Price instability…
CQ3.5	**Is social capital enhanced by VC operations and equitably distributed throughout the VC?** *Main themes*: Strength and representativeness of producers' organisations; Information sharing; Level of trust among actors; Participation in decisions and community activities; taking traditional practices into account…
CQ3.6	**Do the VC activities contribute to improving the living conditions of the households through acceptable facilities and services?** *Main themes*: Access to facilities and services: health, education, training, housing, water and sanitation; Quality of these infrastructures…

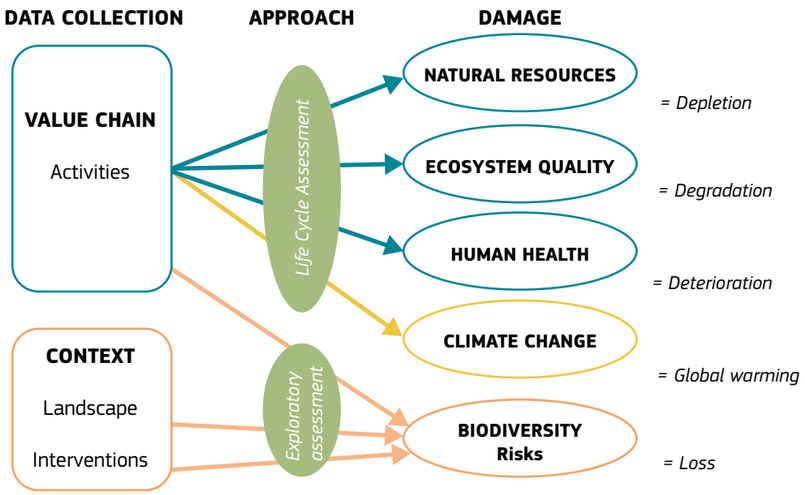
06

Is the value chain environmentally sustainable? (FQ4)

To answer this question, the environmental expert takes stock of the damage entailed by the VC operations on **Resource depletion**, **Ecosystem quality** and **Human health**, and of their contribution to **Climate Change**, while paying attention to the risks on **Biodiversity**. By combining data and findings on these various areas of concern s/he draws up a quantitative and qualitative appraisal of the environmental sustainability of the value chain.

The approach to evaluate the environmental sustainability of the value chain is twofold, based on the quantitative **Life Cycle Assessment (LCA)** accompanied by an **exploratory assessment of biodiversity risks** (Graph 10).

Graph 10. Overview of the environmental analysis



6.1 RESOURCES, ECOSYSTEM, HEALTH

The Life Cycle Assessment methodology

On the whole, LCA inventories the material and energy flows used, produced or released by the activities of the VC. Along the VC, the substances emitted or consumed to crop, manufacture, process, transport, and market all the products are recorded and measured. According to their physical, chemical and biological nature, they activate cause-and-effect chains that induce changes in the environment. These changes cause (or, on the contrary, counteract) specific environmental problems such as terrestrial acidification, freshwater deprivation or ecotoxicity. LCA measures these effects (negative or positive) using physical, chemical or biological indicators, and it refers to them as **"impacts"**. Current LCA applications take around twenty major impacts categories (the "midpoints" level) into account in the existing scientific models. In turn, the consequences of these impacts on Natural Resources, Ecosystem Quality and Human Health are identified (Tables 12 and 13), and referred to as **"damage"**. These 3 domains of environmental concerns are named "areas of protection" (the "endpoints" level).

The upper level reference for the LCA method is established by two ISO norms (ISO 14040:2006 and ISO 14044:2006). To link impact categories (midpoints) to damage realms (endpoints), the ReCiPe2016 method is often applied.

Main steps of a LCA are:

- selection of the functional unit(s) to be used, i.e. the reference unit serving as a basis for all calculations. It may arise from the product (usually in volume or weight, e.g. liter or kg) or the land area (e.g. ha);
- inventory of resources used and of emissions produced during the VC operations;
- data management and processing using "characterisation factors" issued from scientific international databases and impact assessment models;
- interpretation and analysis of environmental impacts and damage at midpoint and endpoint levels;
- conclusion on how the areas of protection are affected and identification of critical points (hotspots);
- possibly, analysis of variability (with sensitivity analysis or probabilistic methods such as the Monte-Carlo method to explore uncertainty).

- *The analysis provides information on the environmental impacts and damage due to activities inside the country. In case the investigation encompasses activities beyond the national border, the experts must present the results regarding the domestic activities separately.*

LCA software for environmental analysis

Life Cycle Assessment is done by using specific software. The SimaPro software appears to be both convenient and largely shared among the community of LCA analysts in the tropical agriculture sector. It has thus been selected for use by the VCA4D teams but other software may be utilised if compatible with the information system that will store data and results in a standardised way for future reference and comparison.

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Table 12. Domains of environmental concerns: three areas of protection

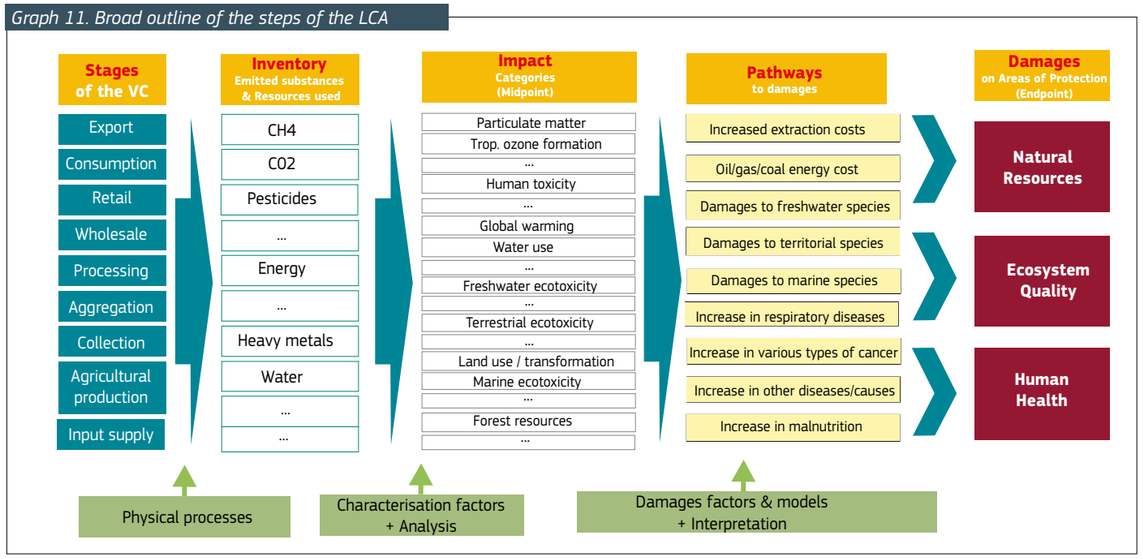
Damage* to	Aim at capturing	Usual indicator **
Natural Resources	Depletion of resources: • Non-renewable: exhaustion of stocks • Renewable: rate of use higher than replacement	Increased cost to continue extractions *Unit= US $*
Ecosystem Quality	Impairement in the functions and structure of natural ecosystems through a variety of damage to all kinds of local wildlife species leading to loss integrated over time	Potentially Disappeared Fraction of species (PDF) during one year *Unit = species.yr*
Human Health	Negative effects on: • quality of life (morbidity) • life expectancy (mortality)	Disability Adjusted Loss of Life Years (DALY) *Unit = DALY****

* If the situation improves, the upgrading is measured with negative damage indicators.

** These indicators are proxy variables reckoned by using the latest specific research models of damage pathways (as in the ReCiPe2016 methodology).

*** Reduction of the potential number of healthy life years due to premature morbidity or mortality.

Graph 11. Broad outline of the steps of the LCA



Inquiring on specific hazards

Whenever appropriate, LCA may be supplemented for any of the three areas of protection, by empirical *in situ* observations and examination of the consequences of practices at any stage of the VC.

In practice, it is on Human Health that several risks are more likely to exist and remain unveiled. Two VC steps deserve more careful attention:

- **agriculture**: the way chemicals are used in the field is a customary example of practices that may have a strong impact on health of the workers and country-dwellers whereas utilisation of body protections and enforcement of safety rules during treatments are not always strictly followed. These occurrences may be ignored even with the sole systematic recording of quantity of chemicals sprayed;
- **processing**: many tasks require the use of hazardous products or expose to harmful conditions, e.g. confinement in stuffy premises.

- *Both the environmental and social experts share the responsibility of detecting risks to health through visits and data collection (interviews, surveys, secondary documents…). The former collects information on practices as much as on molecules and quantities used. The latter inquires on the working conditions (Social Profile, see Chapter 5) which include job safety, the workers' protection and particularly the exposure of children to unsafe practices.*

Presenting the results

Presenting results in an understandable way is as important as conducting the investigations. Analysing the sources of damage (so-called "contribution analysis") is key intelligence for actors and decision makers. It allows for the identification of the activities that have the strongest influence, thus where progress should primarily be sought and to pinpoint the sub-chains and actors to focus on.

LCA resorts to scientific modelling in different fields and its results cannot be easily taken in absolute terms. They are used for **ranking and comparing** the intensity of damage entailed by the VC steps, the sub-chains and the whole VC operations for a given functional unit. Analysis should focus on activities generating the highest consequences.

Results are usually displayed in **proportion (%) of the worst situation** so as to highlight disparities. Thus, they do not inform directly on the magnitude of the damage produced nor compare it between areas of protection. So, for instance, damage on Human Health may be very low while damage on Resources is high. Whenever possible, a practical description of the main potential consequences (on Resources, Ecosystems and Human Health) should provide a sense of the importance of the damage.

- *LCA reports presents standard graphics that require explanation to non-specialists. The meaning of significant indicators and the consequences on the three areas of protection must always be clearly stated with simple words with a view to help understand the environmental impact at stake.*

In order to help decision makers, the analysis should emphasise comparing the environmental outcomes of the different sub-chains, production techniques and/or VC steps so as **to shed light on which are the "least environmentally harmful" ways of operating**.

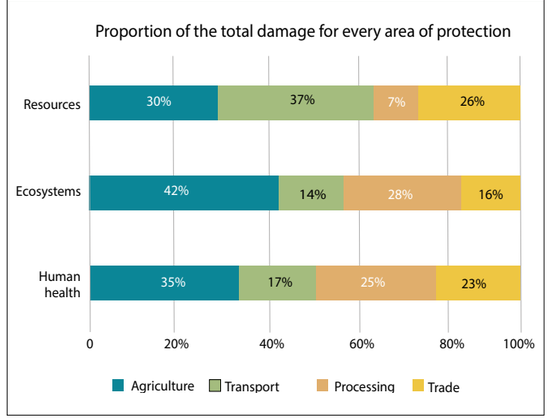
Results can be presented under various layouts in order to adapt to the specific findings and local issues. In some instances, isolating the VC activities (of various sub-chains) located in a particular region will also respond to the concerns of local authorities.

- *Whenever possible benchmarking with similar value chains in other countries may display weak points and threats, therefore pointing to improvement to undertake for specific steps of the VC.*

a) Relative contribution of each VC step

The relative importance of the steps is given in proportion of the total damage calculated for each area of protection (Resources, Ecosystems, Human Health). This perspective gives a synthetic view of where detrimental events occur (Illustration 13).

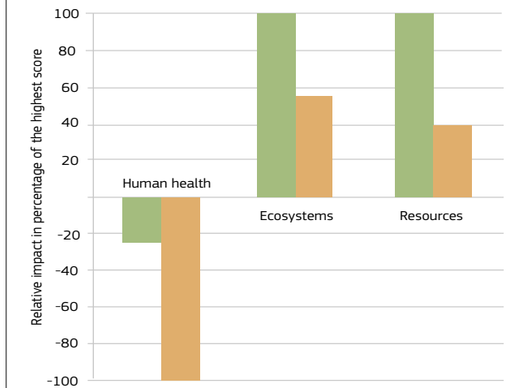
IIIllustration 13. Relative contribution of the value chain steps to damage, example of a coffee value chain



b) Comparison of sub-chains

Sub-chains can be compared according to the damage they generate in the three areas of protection (Illustration 14). This highlights the gaps between them and helps determine actions for environmental improvements.

Illustration 14. Damage generated by sub-chains, example of a cashew value chain



c) Identification of main factors

Environmental outcomes can be further understood and detailed by pinpointing the main factors at work for every problem (midpoint level). This perspective refers to the **processes at work**. Linking them with the practices of the actors helps in finding bearings for improvements. It reveals which technical activity (or practice) is at the root of the negative impact. Examples are given by the use of agricultural inputs (such as nitrogen and phosphorus) entailing freshwater eutrophication, or the use of fuel for transport of inputs and outputs that often accounts for a major source of environmental damage as it leads to fine particulate matter emission, ozone formation, terrestrial acidification and most of all fossil resource depletion.

Although most results are normally presented and analysed according to the three areas of protection (Resources, Ecosystems, Human Health), a single score synthetising the 3 types of damage may be calculated. This will help identify which inventory items are dominating sources of impacts and damage. It may be relevant to present it according to sub-chains (Illustration 15) or to technical steps.

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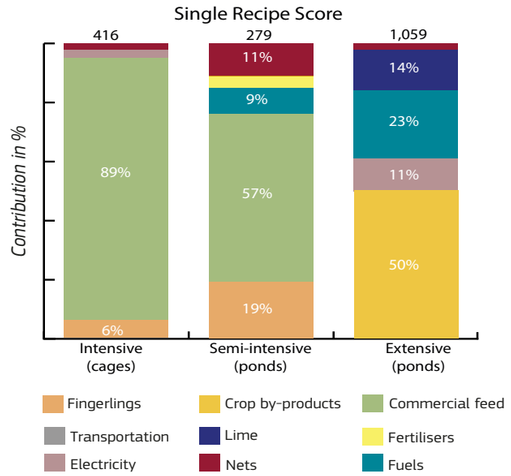
Illustration 15. Main factors at work, example of an aquaculture value chain



Furthermore, **hotspots** should be identified. A "hotspot" is an activity or process which produces critical environmental impact and damage. It points out the VC steps and technical practices that are generating the worst damage, thus where developing better practices is decisive to reduce this damage (Illustration 16).

Illustration 16. Hotspots and mitigation points, example of a banana value chain

Cultivation
- Fertilisation: promote the use of ground-cover plants
- Irrigation: prefer pressurised irrigation

Packaging
- Cardboard boxes: substitute with reusable and washable boxes

Export to Europe
- Cooling system: replace containers with refrigerating chambers
- Maritime transport: reduce speed, use energy efficient engines, optimise the boats' occupancy rate

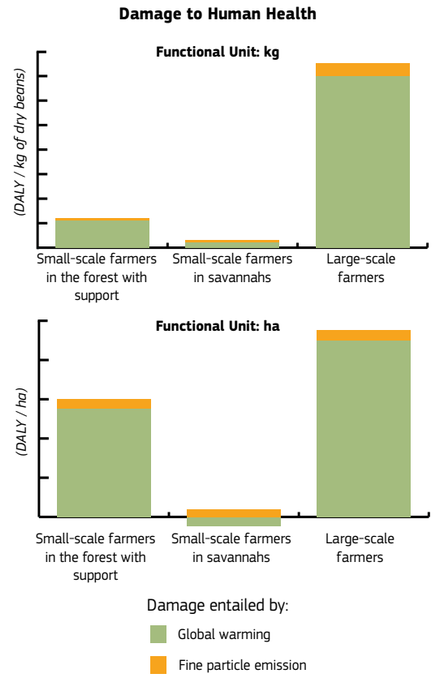
d) Production and space-based approaches

All LCA results (at midpoint and endpoint, at sub-chain or step level) dealt with above are broken down into a meaningful unit, the "functional unit". All computations are related to this unit which points at a specific function of the VC. Dealing with agri-based VCs, a dual perspective exists for analysing the environmental damage:

- using the standard functional unit of LCA based on production, i.e. 1 unit of "final product" (e.g. 1 kg of raw product at the port for export, 1 l of processed juice on the domestic consumer table);
- relating the whole VC outcomes to the utilisation of agricultural land, i.e. 1 unit of farmed area (for example ha).

These two complementary perspectives allow decision makers to appraise the VC activities according to their main concerns (production, land use, regional emissions, local utilisation of resources…) when comparing sub-chains and steps (Illustration 17).

Illustration 17. Damage from production and land area viewpoints, example of a cocoa value chain



- Production activities of the "Small-scale farmers in savannahs" have a positive effect on human health.
- Production activities of the "Large scale farmers" cause the highest level of damage.
- Potential damage of the activities of "Small-scale farmers in the forest, with support" entailed by their impact on global warming appear substantial when looking at the functional unit per ha, but of minor importance in the functional unit per kg. This is due to the high yields of these farmers.
- The main cause of damage is due to the global warming action and, to a lesser extent, to the fine particulate emissions. NB: Six other categories of impact were calculated (ozone, water, etc.) but are negligible.

e) Supplementary observations

Some detrimental effects of production practices detected empirically (see above section on "Inquiring on specific hazards") may not be reflected in the LCA calculations and results. In such a case, this potential damage must supplement customary LCA graphs.

Of primary importance are the health consequences of unsafe practices observed at any step of the VC during field inquiry or documented in secondary information collection.

Illustration 18. Health hazards in cropping practices, example of a tomato value chain

Although farmers are aware of the potentially harmful nature of agricultural chemicals:
- no protective clothing were utilised in the tomato cooperatives visited or by the farmers interviewed. Obvious hazards visually detected in fungicide-sprayed fields;
- no protective equipment on sale in agro-input shops and no evidence of safety awareness among the salesmen;
- chemical application and activities in sprayed fields are tasks realized by hired male workers.

Observation of a high level of skin contamination of a worker's legs by a carcinogenic fungicide in a tomato field:

© Claudine-Basset-Mens

- *As cropping systems are complex (multiple roles, products, technologies) with a large diversity of sophisticated practices (e.g. intercropping or agroforestry schemes) they embed a series of agronomic processes that LCA cannot grasp easily. In addition, some of the environmental damage foreseen imply (long term) consequences for the cropping systems, for instance on soil fertility or pest development.*
  This is due to complex cycles (e.g. Carbon, Nitrogen, etc.) and interactions (Soil X Biodiversity X Climate X Practices). They may be out of reach in the environmental expert' work but a thorough agronomic diagnosis would trace them. In both cases, when important agronomic outcomes that would broaden the direct LCA results are suspected, the environmental expert may recommend specific studies.

Table 13. Core Questions and Indicators for the life cycle analysis

Framing Question 4: Is the VC environmentally sustainable? *(Particular attention must be paid to the calculations of the indicators in bold)*	
CQ4.1	**What is the potential damage of the VC on resource depletion?** *Indicators:* Resource uses (water, fuel…); Mineral extraction; Energy cost; **Increased extraction cost**; Hotspots identification.
CQ4.2	**What is the potential damage of the VC on ecosystem quality?** *Indicators:* Emissions of substance (CO2, NH3…); Resource use; Potential deterioration of land quality; Damage to terrestrial, freshwater and marine species; **Potentially Disappeared Fraction of species (PDF)**; Hotspots identification.
CQ4.3	**What is the potential damage of the VC on human health?** *Indicators:* Emissions of harmful substance; Potential deterioration of safety (potable water, working conditions, etc.); Potential increase in diseases; **Disability Adjusted Loss of Life Years (DALY)**; Hotspots identification.

6.2 CLIMATE CHANGE

LCA midpoints include a “Global Warming” category. The release of greenhouse gas (GHG), by VC activities intensifies the concentration of GHG in the atmosphere, leading to an increase in the global mean temperature over time. Emissions of all kinds of GHG and their translation into CO2 equivalent are calculated via the LCA inventory of flows and using specific characterisation factors provided by the latest scientific information (IPCC reports, models…).

The contribution of the VC to climate change can therefore be measured by a **carbon footprint** translating all the GHG emissions into a quantity of released CO2 that would have the equivalent effect (Illustration 19). It allows to evaluate the comparative impact of the sub-chains and/or of the VC steps on climate change.

Illustration 19. Comparing carbon footprints of sub-chains at all steps, example of a rice value chain

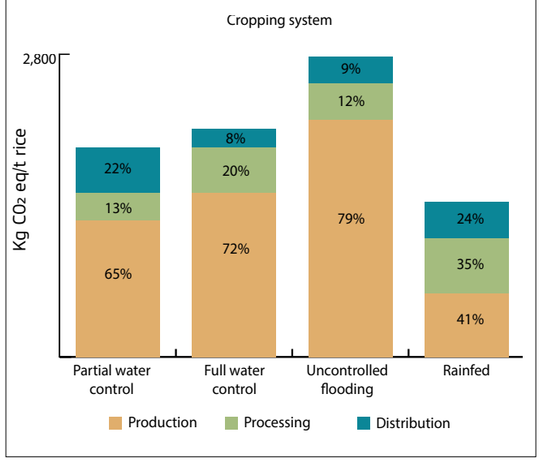


Table 14. Core Question and Indicators for the analysis of Climate Change

Framing Question 4: Is the VC environmentally sustainable? *(Particular attention must be paid to the calculations of the indicators in bold)*	
CQ4.4	**What is the potential impact of the VC on climate change?** *Indicators:* Emission of greenhouse gases (CO2, N2O, CH4, CFC…); **Carbon footprint (kg of CO2eq.)**; Hotspots identification.

6.3 BIODIVERSITY

The aim of this work is to warn against potential risks to biodiversity, which may lead to the recommendation of performing an in-depth assessment of the impact of the VC.

Biodiversity is a major concern for sustainability, particularly relevant for VCs with an important agricultural, livestock or fisheries component, because it makes the ecosystems services on which crops, pastures and fishery resources depend possible.

The reasoning is fuelled by three steps:

- examining the **spatial organisation**, and fish stocks, related to the activities of the VC, for a first identification of the risk situations;
- searching for the **practices** and **perceptions** that could threaten biodiversity;
- taking stock of the **actions** and **policies** promoting the preservation of biodiversity in the territories concerned.

The study of spatial organisation

This review focuses only on the areas involved in the VC. In the case of fishery VCs, it also encompasses the examination of fish stocks.

This work is based on specialised national or global (FAO, IUCN, etc.) databases. It consists of identifying the extent to which the VC agricultural production areas encroach on areas important for the preservation of biodiversity and thus may contribute to altering ecosystem functions. Examples are: new cultivations within protected areas or areas known for their vulnerability, exclusive single-crop farming on agricultural land, cut-off of connectivity between sites of high conservation value (due to infrastructures related to the VC), toxic discharge of effluents from processing workshops and factories (tanneries…). As for aquaculture and fishery, attention mainly focusses on water quality exiting from aquaculture units and the state of fish stocks in relation to the intensity of catches (overfishing and decline of species).

The expert essentially performs a **cartographic analysis** and makes use of the specific indicators available for the regions concerned. S/he is to cross-check this data with VC activities. Indicators such as those selected in Table 15 are of particular interest to inform on biodiversity risks in the areas of the VC operations. Some may be informed by the Joint Research Centre (JRC) using its Digital Observatory for Protected Areas (DOPA). Other available and relevant indicators (Local Biodiversity Intactness Index…) and websites (PREDICT database…) may be used to complement.

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Table 15. Biodiversity Indicators

	INDICATOR
Threatened species	• Number of threatened species.
Land	• Terrestrial Protected Area • Marine Protected Areas • Proportion of the KBA* under protection • Area affected by land degredation • Area of protected connected lands
Forests	• Forest Area Net Change rate • Forest Area under sustainable • management
Water	• Change of permanent surface water bodies • Total freshwater utilised • Wastewater undergoing treatment
Other services	• Total carbon stock in the soil • Population living around protected areas

** KBA: Key Biodiversity Areas are sites contributing significantly to the global persistence of biodiversity, in terrestrial, freshwater and marine ecosystems.*

- *In practice, for each value chain study, the JRC will provide the following information:*
  - *an extraction and processing of existing data, especially to scale them to the relevant area for the CV;*
  - *a cartographic synthesis.*
- *This work will be carried out within the framework of the DOPA (Digital Observatory for Protected Areas) and will be completed according to specific questions raised by the team of experts.*

Identification of practices and perceptions

This work will focus only on the main actors of the VC. It is carried out by gathering information collected in a scattered way or purposely by the experts or drawn from existing studies.

- Technical practices. In addition to the flows analysed by LCA, **agricultural practices that pose a risk** to biodiversity should be identified using a simple description of "impact pathways" (cause-and-effect chains).
  This information can thus bring attention to potential risks: rehearsal of monocultures, sequence of crop rotations, reduction of agrobiodiversity due to the standardisation of cultivated varieties or cattle breeds, types of pest control, surpassing livestock carrying capacities, discharge of harmful effluents by processing companies, etc.
- Perception. This involves assessing the **sensitivity of producers** to biodiversity issues, on the basis of the producers’ own observations on ongoing changes and developments and on the difficulties they declare to encounter in their farms (pests, crop auxiliaries, etc.) and more generally, in the regions.

In practice, the expert learns directly either from representative actors or from actors whose experience as perpetrators, victims or witnesses, informs on these practices and on the level of awareness on risks to biodiversity.

Inventory of actions and policies

The purpose is to identify the extent and the content of **public and private interventions** in favour of the maintenance of biodiversity (protection, prevention, information, repair of damage …) carried out in the territories concerned by the VC. The existence of institutions in charge of biodiversity and of targeted policies makes it possible to appraise the possible evolutions (importance of training, priority for conservation, territorial actions, etc.).

It is also necessary to establish, for the areas and activities involved in the studied VC, the list of development projects and investment programs based on the principles of ecosystem management and/or development of sustainable agricultural and processing practices.

Table 16. Core Question and Indicators for the exploratory analysis of biodiversity

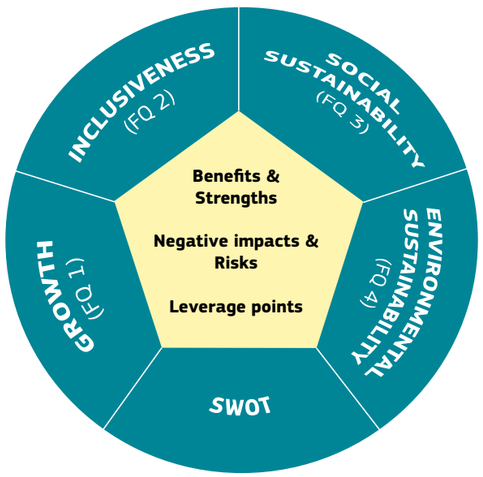
Framing Question 4: Is the VC environmentally sustainable? *(Particular attention must be paid to the calculations of the indicators in bold)*	
CQ4.5	**Does the potential impact of the VC on biodiversity deserves specific studies?** *Indicators and main themes:* Potentially Disappeared Fraction of species; Carrying capacity; Compliance to area protection; **Existence of Key Biodiversity Areas**; Connectivity of terrestrial protected areas; Endangered, Threatened or Protected species; Water stress; Crop diversification, rotations and intercropping; Crop varietal diversity; Livestock breeds diversity; Area affected by land degradation; Soil conservation; **Presence of targeted projects**.

07

Synthesis & recommendations

The synthesis of a VC analysis must **deliver a clear picture of the operation of the VC**, highlighting the main results and critical points. It encompasses answering the **four Framing Questions**, pointing at the **risks**, to inform on growth, inclusiveness and sustainability of the VC, summing up the main **benefits and strengths**, and identifying the main **leverage points** for possible action (Graph 12).

Graph 12. Overview of the synthesis



Throughout the study, the exchanges within the team around the four Framing Questions create an overall understanding of the VC system. The experts collectively elaborate an assessment of the dynamics of the VC, laying the foundations of a broad risk analysis. This allows for a formal synthesis of the study, which should be complemented by **recommendations**.

- *Conclusions must be clearly outlined and written in accessible language, so as to be understood by all stakeholders and easily used by decision makers.*
- *Full reports and informative public briefs are made widely available.*

7.1 ANSWERING THE FRAMING QUESTIONS

The team's task is to **highlight the main results and conclusions** reached for every Framing Question. Experts give their appreciation on the situation (and the evolution when updating a VC study) from an integrated perspective.

Key indicators, listed with the Core Questions, show in a systematic way the performance of the VC in various fields. Presenting the range of situations and **showcasing disparities between types of actors and sub-chains** therefore informs decision makers more efficiently than a global average. It opens the reflection on the variability of impacts and on appropriate targeted measures.

- *Appraising impacts requires consideration of their relative importance for actors and at a more aggregate level (regional, national…). For instance, the benefits or costs associated with a minor crop in the household or regional economy do not entail the same consequences as if they would apply to dominant activities.*

- *Experts are invited to appraise the availability and quality of the main data sets upon which the main conclusions were built. They can communicate accordingly on the level of confidence attributable to their conclusions by reflecting on the following criteria:*
  - *representativeness: related to diversity (technologies, spatial distribution);*
  - *time period;*
  - *completeness;*
  - *reliability.*

NB: Data collected during a VCA4D study is to be compliant with the General Data Protection Regulation (no 2016/679) of the European Union so as to allow for the publication of the reports and to share information with the stakeholders.

7.2 THE RISK ANALYSIS

The Risk Analysis explores how future unfavourable events could negatively affect the situation as observed by the team, looking particularly at their consequence on growth, inclusiveness and sustainability.

All kinds of critical events can be taken into account, created by the VC actors' conduct or stemming from the occurrence of adverse circumstances. Frequent risks in agri-based VCs arise from price trends, price volatility, logistics, infrastructures, policies, business environment, social relations, labour market, food safety, (phyto-)sanitary issues, weather and climate change, natural resources, etc.

The process of risk analysis encompasses three steps:

- **Identifying and characterising the main risks:** the kind of risk (environmental events, economic shocks…), the factors at work and their corresponding relevant indicators, and the VC step and actors affected;
- **Ascertaining the capacity to manage** consequences: instruments to mobilize (e.g. insurance schemes), responsibility (who is in charge), actual feasibility (resulting from availability, accessibility and affordability);
- **Appraising the "Risk level"** (from Low to Extreme) combining the assessments of the probability of event (from Nil to Certain) and of the severity of damage (from Negligible to Critical).

The goal is not to develop well-defined storylines of the mechanisms at work but to assess roughly to which extent the risk could disrupt growth, inclusiveness and sustainability.

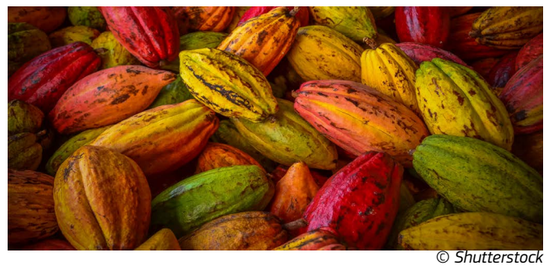


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Illustration 20. Risk analysis, example of a mango value chain

Risk description	Growth	Inclusiveness	Social sustainability	Environmental sutainability
Decrease of international prices with the entry of new suppliers	Extreme	High	High	High
New high quality norms on international markets (carbide use)	Extreme	High	Extreme	Low
Packaging material shortage	Extreme	Moderate	Moderate	Low
Unresolved and deteriorating conflicts over land	High	High	Extreme	Low

Low | Moderate | High | Extreme

Table 17. Core Question and Indicators for the risk analysis

Addressing the 4 Framing Questions	
Cross-cutting CQ	**Which risks may affect the performance of the VC?** *Indicators*: Risk factors; Probability; Severity of damage; Actors affected.

7.3 SUMMING UP BENEFITS AND NEGATIVE IMPACTS

To be easily captured by decision makers, economic, social and environmental benefits must be clearly stated. This wrapping up relies on the expertise and collective decisions of the team. It is primarily shaped by the functional analysis, then by the answers to the Framing Questions and finally completed by the subsequent analyses, particularly on risks.

Emphasis is put on the **important benefits and negative impacts**. Consequences for each of the type of actors (farmers, workers, businesses…) must particularly be underscored and exposed, based on indicators and evidence-based results. Shedding light on the disparities of impacts between types of actors (e.g. using the common typology) can highlight a **variety of situations** and the need or potential for change.

This also applies at a more aggregate level when comparing sub-chains. Relevant cross-cutting perspectives, e.g. on technology, geographic features or social organisation, can also unveil gaps, pointing to areas that need to be improved or secured.

7.4 RECOMMENDATIONS

The knowledge built on the VC enables the team of experts to elaborate recommendations for future action.

Ideas for improvement stem from the potential, drawbacks and constraints revealed throughout the investigations as well as through comparisons. They may encompass changes in institutional rules, technological innovations (known or to be developed), specific supports through information systems, etc. Taking into account the whole VC, they arise from combining the main findings of the SWOT analysis and of the economic, social and environmental analyses.

Recommendations may stress actions internal to the VC (e.g. organisation or technological improvement) or within a wider scope (e.g. fiscal policy or infrastructure works). They may aim at **developing favourable factors or countering unfavourable ones**, taking advantage of key drivers.

Ascertaining the **strengths** to enhance requires the understanding of pathways that enable actors to deliver positive outcomes. They fall under all sorts of assets and skills that craft the capacity to increase benefits, reduce drawbacks and/or overcome risk effects.

Furthermore, to increase effectiveness, it is advisable to identify **leverage points**, i.e. situations where the change to bring in (investment, organisational change, subsidy, etc.) will spread in a rapid and sizeable transmission and/or a multiplication of the sought effects. Ideally, they allow a limited intervention to produce important changes on a large number of actors.

Suggestions for improvement should be concisely introduced. They are not expected to be detailed as in project identification. They may encompass suggesting particular studies, e.g. proposing a technological or management diagnosis at a specific stage of the chain, or a biodiversity impact evaluation.

Altogether, recommendations intend to:

- Enhance the development of the VC as a whole (pointing to specific potential to foster, or at drawbacks and shortcomings to control);
- Bolster the contribution of the VC to growth, and improve its performance regarding inclusiveness and sustainability (economic, social and environmental);
- Prevent or manage major risks;
- Deepen the knowledge on the VC to fill in critical information gaps;
- Advise potential follow-up work within the framework of the INTPA -Agrinatura partnership.

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Annex

A special look at Fair and Ethical Trade and other Social and Environmental Voluntary standards

In some Value Chains, the existence of "Fair and Ethical Trade or other social and environmental voluntary standards" certifications, such as Fair Trade, Rain Forest Alliance* or organic, may substantiate the identification of a specific segment or sub-chain to be analysed (in the 4 types of analyses). This may result either from the importance of the volumes dealt with or because of particular impact in one or more of the analytical domains; it may also stem from a specific demand of the EC or other actors.

The certified sub-chain should be analysed using the overall methodological framework as any other sub-chain. The economic, social and environmental results can then be aggregated to the overall indicators of the whole chain. This allows the team to respond more completely to the 4 framing questions for the entire VC and more specifically for this sub-chain. Beyond the specific contextual questions, the team should bear in mind the following issues:

1. How should the various certification schemes be taken into account for establishing the typology of actors and sub-chains? Selection criteria should take into account the type of contractual arrangements and the identification of the practices involved that may generate differential effects on the indicators, particularly those related to inclusiveness.
2. Are the productivity and technical performance of the certified farmers significantly different?
3. What are the supplementary costs and how much do they amount to (value, workload…)?
4. What are the actual individual, collective and territorial benefits drawn from being certified? Specifically, what differences does it make on the producers' direct income?
5. To which extent are all these performances and impacts really attributable to the certification system? Beware that a "bias" may be induced by the "selection process" of becoming a member, leading for instance the certified farmers to be among the most entrepreneurial, endowed or dynamic or advantageously geographically situated ones.
6. Are there particular risks entailed by adhering to the certification system? (e.g. vulnerability resulting from a unique crop-specialisation).

* UTZ merged with Rainforest Allaince in 2018.

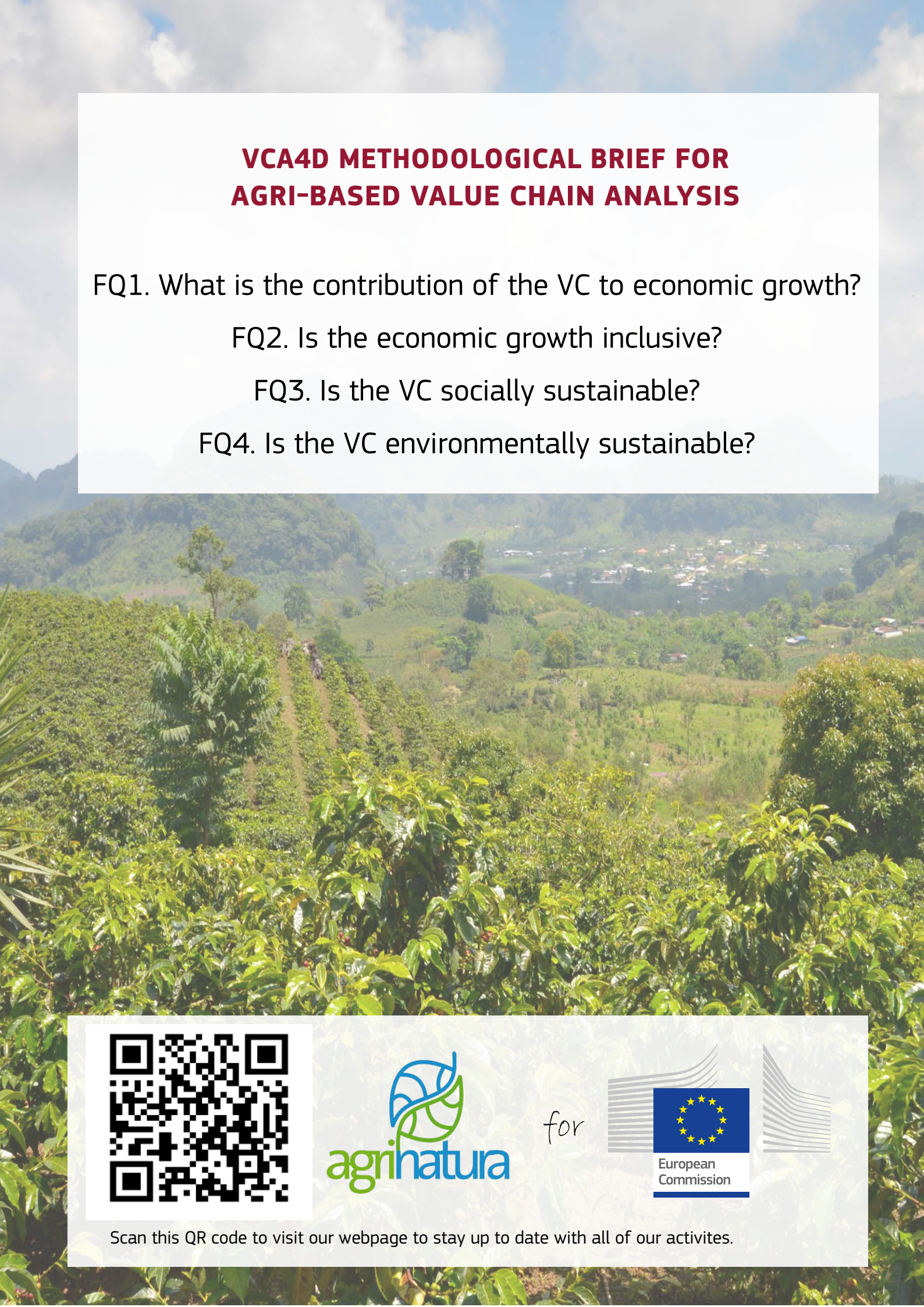
VCA4D METHODOLOGICAL BRIEF FOR AGRI-BASED VALUE CHAIN ANALYSIS

FQ1. What is the contribution of the VC to economic growth?

FQ2. Is the economic growth inclusive?

FQ3. Is the VC socially sustainable?

FQ4. Is the VC environmentally sustainable?



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