# Bridging research and policy: evidence based indicators on agricultural value chains to inform decision-makers on inclusiveness and sustainability

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**Abstract**

Authors showed that multiple factors have to be gathered for research to be able to serve development through policy decision. An effective way to bridge applied research and policy in order to maximize mutual benefits is to build a sound and early partnership based on a clear framework so that research can provide relevant "understandable and usable" information to decision-makers.

This is the basis on which the Value Chain Analysis for Development (VCA4D) project (2016-2022) was established. VCA4D is a partnership between the European Commission and Agrinatura, the alliance of European universities working together for agricultural research and education for development. This initiative intends to provide evidence-based knowledge to analyse development impacts of the value chains operations so as to help decision for investment projects in agriculture and to facilitate sectorial policy dialogue. Policy makers consider value chains as strategic elements for their policies. In order to achieve the overarching goal of inclusive and sustainable growth, support to value chains demands for the social, economic and environmental dimensions are thoroughly considered.

The objective of this paper is to show how VCA4D applied sustainable development concept for value chain analysis to establish a manageable set of criteria allowing to provide quantitative information, which is desperately lacking in many situations in developing economies, usable by decision makers and in line with policymakers concerns and strategies (the "international development agenda"). The use of researchers to perform the analysis, contributes to the reinforcement of the linkages and mutual understanding between researchers and policy makers.

Key words: Value chain, Research, Policy, Sustainability, Inclusiveness

## 1. Introduction

Research pursues its own objectives of generating knowledge (validated as scientific through the peer reviewing process). It can also contributes to development by producing rigorous evidence to inform policy stakeholders on how to strengthen economic growth, reduce poverty, protect natural resources, and improve living conditions. However, researchers and politicians appear to live in separate worlds, which are not always connected. On the one hand, researchers do not always understand the resistance to their proposed policy changes despite clear and convincing results. On the other hand, policy makers and other stakeholders, are often not aware of the complex multi-faceted consequences of their decisions overtime and do not know how to translate the research results they happen to read into practice according to their own particular context. Furthermore, they bemoan the inability of researchers to make their findings accessible, understandable and available in time for policy decisions (Court and Young, 2006).

Authors showed that multiple factors have to be gathered for research to be able to serve policy decision (Lindquist 2001; Carden, 2009, Gilbert and Henry, 2012; Neveu, 2015; Colinet et al., 2017). Kingdon (1984) points out three conditions that have to be gathered in order to open a "window of opportunity" in which research can influence policy: growing societal issues (*problem stream*), availability of solutions for public action (*policy stream*), consideration given by the politicians e.g. related to changes in government and public opinion (*political stream*).

It is argued in this paper that an effective way to bridge applied research and policy in order to maximize mutual benefits is to build a sound and early partnership based on a clear framework so that research can provide relevant "understandable and usable" information to decision-makers. In the 2014-2020 cycle of the European Commission (EC), agriculture appeared to be the main "sector of concentration" of European cooperation for development. Therefore, the EC Directorate General for International Cooperation and Development (DEVCO) deemed necessary to create an analytical tool to guide its decisions on investment and help the policy dialogue it develops with the governments of the partner countries. This is the basis on which the Value Chain Analysis for Development (VCA4D) project (2016-2022) was established.

VCA4D is a partnership between the EC and Agrinatura, the alliance of European universities and research centres working together for agricultural research and education for development. This initiative intends to provide evidence-based knowledge to analyze development impacts of the value chains (VCs) operations to help decision for investment projects in agriculture and to facilitate sectorial policy dialogue.

The second feature of VCA4D lies in the importance given to VCs as "devices" for economic development (Raikes et al., 2000; Rich, 2004; Dorward et al., 2006; Temple et al., 2009; Dabat et al., 2010). Analyzing VCs allows shedding light on how their various activities (at different stages of the chain) give rise to aggregated collective impacts (although actors have their individual particular objectives). This is why policy makers consider them as strategic elements for their policies.

The sustainable development concept is grounded in the now well-known three combined economic, social and environmental pillars (United Nations, 1991) that the United Nations Organisation detailed in 17 Sustainable Development Goals in 2015 (UNGA, 2015). The objective of this paper is to show how VCA4D applied the sustainable development concept for VC analysis to establish a manageable set of criteria useable by decision makers and in line with policymakers concerns and strategies (the "international development agenda"). These analytical criteria (introduced by "core questions") were specified by selecting, or building, indicators allowing to provide quantitative information, which is desperately lacking in many situations in developing economies. By being systematically applicable in all situations, this allows these quantitative and systematic indicators to become more easily understandable by decision makers. It gives them an "evidence based status", that allows for comparisons and benchmarking, so as to catch the relative efficiencies or disadvantages of the VC operations across VCs, sectors and countries.

## 2. Aiming at sustainable and inclusive development

*Value chains and sustainability*

Firstly, past development operations in agriculture have mainly focused on increasing agricultural production, whilst often ignoring the market and livelihood drivers involved. However, 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. VCs are considered here as a sequence of production and income generation processes from the initial primary production to its end use and as a system of actors orientated towards the market. They are a major channel for agricultural development due to their capacity to create economic value and employment.

VCs are an operational framework for fostering agricultural-based activities engaging farmers and businesses through investment and policies.

Secondly, public and private development interventions in agriculture in developing countries to date have paid little attention to the related environmental and social outcomes, looking above all at the productive and economic dimensions despite the fact that VC activities are taking place in a wider context that must be considered. The production of agricultural products is essential to provide incomes and jobs but unavoidably consumes natural resources and energy and causes pollution, producing externalities and unsustainability. It also generates positive or, on the contrary, undesirable social effects.

Accordingly, the literature and the available evaluation tools for VC analysis in developing countries mainly focused on economic and market aspects (Fabre, 1994; Kaplinsky and Morris, 2001; Van den Berg et al., 2006). Some authors integrated social aspects as poverty reduction (Lundy et al., 2004) or impacts on smallholders (Bourgeois and Herrera, 2001; Bienabe et al., 2004) or community and gender issues (Ferris et al., 2006) or environmental aspects (mainly energy use).

There is a need to assess in the most relevant way these environmental and social consequences of VCs activities in order to mitigate their impacts on natural resources and ecosystems and improve their social effects. To support agri-based VCs, decision makers need to thoroughly consider social, economic and environmental dimensions. By crossing VC analysis methods with sustainability analytical tools and setting out the many effects of the VCs operations, the likelihood of unintended consequences will be reduced.

The VCA4D toolkit proposes to analyze the performance of agricultural VCs in developing countries, according to a multidisciplinary methodology, looking at all the three pillars of sustainability.

*Value chain and inclusiveness*

Inclusiveness of VCs is generally understood as VCs able to mobilize "the poorest actors" and provide them with economic, social and environmental benefits. According to a review of literature in Shepherd (2016), SNV and WBCSD (2010) define an inclusive business as a socially responsible entrepreneurial initiative, which integrates low-income communities in its VC for the mutual benefit of both the company and the community. This involves the expectation that large buyers will relate with farmers in an equitable manner (GIZ, 2012).

Haggblade et al. (2012) see actions to promote inclusiveness as a response to changes to production and marketing systems that have opened up opportunities for some rural suppliers to access new markets but have exposed others to new threats as a result of quantity and quality requirements of the markets. They argue that agribusiness investments are not inherently pro-poor and that the move towards stressing 'inclusiveness' responds to this, by promoting interventions that benefit the poor. Desired outcomes of such an approach include higher income for the poor as well as greater participation of women and youth in VCs (Vermeulen and al., 2008). This approach raises the question of whether VCs more inclusive for poor farmers would hamper competitiveness. Harper, Belt and Roy (2015) show that it is possible and profitable for businesses to build and maintain such VCs, without subsidies or other non-

commercial assistance. They consider 'inclusive' VCs to be those that include and substantially benefit large numbers of poor people.

However, although "inclusiveness" tends to emphasise the position of farmers within a chain, the strength of the VC analytical approach is that it moves development efforts away from being farmer-centred to considering the entire chain from producer to consumer (Shepherd, 2016).

VC analysis within the VCA4D methodological frame is intended to help the EC to support actions which benefit the poor (small farmers, women, youth, etc.) by taking advantage of the opportunities offered by local and global markets to create decent jobs and incomes making sure they are associated with social benefits and reduced environmental damages.

## 3. The VCA4D methodological framework

The methodological framework of VCA4D is structured around the need for policy makers to understand, monitor and demonstrate the impacts and results of their policy interventions on VCs in terms of sustainability and inclusiveness. This tool is all the most relevant for the current international cooperation and development paradigm that seeks for an increased involvement of the private sector in investments, wherever in line with the policy objectives of sustainable development (e.g. European Commission, 2014). This framework, by being elaborated jointly by researchers and policy makers, and by being implemented by scientists within the time-schedules of policy makers, enables to track and measure how development actions contribute to sustainable development goals and, in particular to the European Union's cooperation objectives. This also allows for research to be better oriented towards development issues and scientists to understand better the types of information decision-makers can use.

To respond to the concerns on sustainability and inclusiveness, the analytical work is framed around four framing questions that provide policy makers with easy-to-catch elements of information:

- What is the contribution of the VC to economic growth?
- Is this economic growth inclusive?
- Is the VC socially sustainable?
- Is the VC environmentally sustainable?

The answer to the framing questions is provided through a four-step analytical process (functional, economic, social and environmental analysis), using evidenced-based indicators by domain, either measured quantitatively or based on explicit expert assessment and scoring. It mobilizes four scientists (experts in economics, environmental issues, social matters and a national expert of the VC) in using existing information, providing primary data (through surveys and usual data gathering tools) and processing the data.

The functional analysis is their common starting point and place where disciplinary approaches meet. It gives an overall understanding of how the VC is organized and how it operates in terms of governance and technical features. In particular, it collates information on products, actors, flows, technical aspects, governance, policies, dynamic of the markets, etc. It also allows the discussion between disciplinary experts to identify the typologies of actors and systems serving as a common basis to be used throughout the disciplinary analyses.

*What is the contribution of the value chain to economic growth?*

Responding to this framing question comes from the economic analysis. The economic analysis encompasses three areas of work, detailed in a number of core questions and indicators that guide the economists in their analytical process (see Table 1):

1. Looking at the financial viability and profitability for every type of actors along the VC.
2. Assessing the overall effect of the VC in the national economy.
3. Analysing the sustainability and viability of the VC within the international economy.

**Table 1: Core questions and indicators relative to the Framing question: What is the contribution of the VC to economic growth?**

| Core questions | Main Indicators and Themes |
|---|---|
| Are the VC activities profitable for the entities involved? | Net Income by type of actors; Return on turnover; Comparing farmers' net income with minimum wage, livelihood needs and/or wage opportunities |
| What is the contribution of the VC to the GDP? | Total Value Added (direct and indirect through backwards linkages); Value Added share of the GDP; Rate of Integration into the Economy (total VA/consolidated VC production) |
| What is the contribution of the VC to the agricultural sector GDP? | Value Added share of the Agriculture sector GDP |
| What is the contribution of the VC to the public finances? | Public Funds Balance |
| What is the contribution of the VC to the balance of trade? | VC Balance of Trade; Total Imports/VC production |
| Is the VC viable in the international economy? | Nominal Protection Coefficient (NPC); Domestic Resource Cost Ratio (DRC) [1] |

*Is this economic growth inclusive?*

The economist and the social expert mainly focus here on how the value added is distributed as incomes to different population groups, businesses and institutions, on indicators on jobs and on insights on the VC governance and how it involves marginalized groups (see Table 2).

**Table 2: Core questions and indicators relative to the Framing question: Is the economic growth inclusive?**

| Core questions | Main Indicators and Themes |
|---|---|
| How is income distributed across actors of the VC? | Total Farm Income; Share (%) of final price at farm gate; Total Wages |
| What is the impact of the governance systems on income distribution? | Income distribution |
| How is employment distributed across the VC? | Number of jobs and self-employment at different stages (different types) |

[1] It is interesting to notice that the Domestic Cost Ratio is computed in a simple way using international prices for tradeable goods and eliminating domestic transfers, therefore avoiding complex shadow pricing methods that would not allow for easy understanding and cross country comparisons.

*Is the value chain socially sustainable?*

Six domains that are recurrent in the policy debates and strategies are considered: Working conditions, Land and Water Rights, Gender equality, Food and nutrition security, Social capital, Living conditions (see Table 3).

The purpose of this analysis is to inform on the opportunities and constraints, the effects or the risks linked to the VC from a social point of view. This is done qualitatively, with an expert-based scoring system (called 'Social Profile') that helps the social expert through a list of over sixty questions tackling the main concerns of policymakers. It must be noticed that it is often rather difficult to separate a specific impact of the VC from the general country context; some direct causal effects may sometimes be identified (e.g. food security through incomes distributed during the lean season) but this analysis often points at the general conditions that apply on a territorial level to all VCs.

Due to the vast scope of the social analysis, this is also expected to warn on little known elements and risks that should be examined more carefully.

**Table 3: Core questions and indicators relative to the Framing question: Is the VC socially sustainable?**

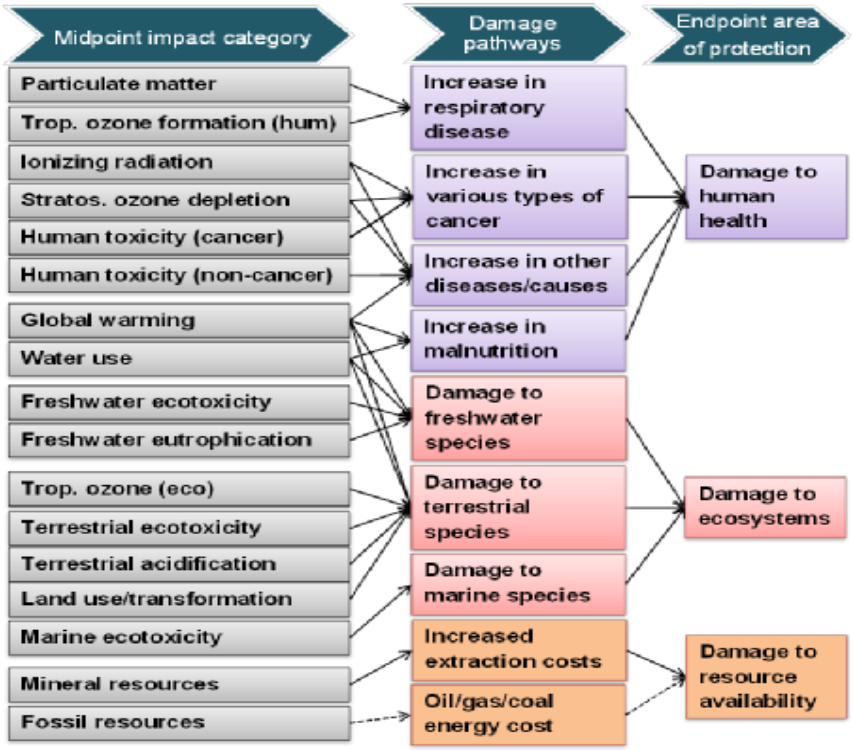
| Core questions | Main Indicators and Themes |
|---|---|
| Are working conditions throughout the VC socially acceptable and sustainable? | Respect of international norms; Respect of contracts; Risk of discrimination and forced labour; Job Safety; Attractiveness; Child labour and education… |
| Are land and water rights socially acceptable and sustainable? | Adherence to and application of VGGT; Equity and security of access to land/water resources; Transparency of procedures; Consultation; Arbitration procedures; Compensation procedures… |
| Is gender equality throughout the VC acknowledged, accepted and enhanced? | Inclusion/Exclusion of women 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… |
| Are food and nutrition conditions acceptable and secure? | Contribution of the VC to the availability, accessibility and stability of food resources; Food diversification; Nutritional quality; Price instability… |
| Is social capital enhanced and equitably distributed throughout the VC? | Strength and representativeness of producers' organisations; Information sharing; Level of trust among actors; Participation in decisions and community activities; taking traditional practices into account… |
| To what extent are major social infrastructures and services acceptable? Do the VC operations contribute to their improvement? | Access to infrastructures and services: health, education, training, housing, water and sanitation; Quality of these infrastructures and services… |

*Is the value chain environmentally sustainable?*

The environmental sustainability is assessed through the Life Cycle Assessment (LCA) method, as this fits coherently within a VC approach. The inventory and measurement of resources used and substances emitted by the VC operations at the different VC steps is processed by the environmental expert using impact factors on different environmental categories.

The analysis informs on potential damages, risks or benefits for three areas of concern: Resource depletion, Ecosystem quality, and Human health (see Figure 1 and Table 4).

**Figure 1: Overview of the LCA structure**




Source: https://www.pre-sustainability.com/recipe

**Table 4: Core questions and indicators relative to the Framing question: Is the VC environmentally sustainable?**

| Core questions | Main Indicators and Themes |
|---|---|
| What is the potential impact of the VC on resources depletion? | Resources uses (water, fuel…), absolute and comparing systems |
| What is the potential impact of the VC on ecosystem quality? | Sizeable emissions of substance (CO2, NH3…), absolute and comparing systems; Significant Resource use; Potential deterioration of land quality, of biodiversity, etc. |
| What is the potential impact of the VC on human health? | Sizeable emissions of harmful substance, absolute and comparing systems; Potential deterioration of safety (potable water, working conditions, etc.). |

*Overall analysis*

The disciplinary analyses inform on the core questions that shed light on actual nature and dimensions of impact and provide evidence and expert advice to respond to the four framing

questions. For each core question, indicators are defined to inform decision-makers. A deliberate choice was made not to aggregate the knowledge elements into one global appraisal or a single indicator. Informing decision makers on each of the four framing questions allows them to make their own judgement. They have to weigh the various elements according to the context and their own strategies. It is intended to help them reflect, not to substitute to their decision. In addition, the team should deliver its experts' views and recommendations, building on these elements with a comprehensive and systemic perspective of the VC. This is facilitated by providing a risk analysis of the VC based on the 4 disciplinary analyses.

## 4. Conclusion and perspectives

VCA4D attempts to build an integrated framework to analyse the agri-based VCs' sustainability and inclusiveness, linking the operations of all the actors to the national scale, and including farming and up- and down-stream activities.

To respond to the concerns on sustainability and inclusiveness, the analytical work is framed around four framing questions responding to policy makers' concerns:

- What is the contribution of the VC to economic growth?
- Is this economic growth inclusive?
- Is the VC socially sustainable?
- Is the VC environmentally sustainable?

A limited number of selected indicators at the economic, social and environmental levels, have been defined, measured and are reported in a comprehensive way as to serve as a bridge between research and policies to be used for decision making of stakeholders and policymakers. Sustainability and inclusiveness are addressed in an integrated multidisciplinary perspective.

The methodological framework does not aggregate the knowledge elements into one global appraisal or a single indicator. It is intended to help understand the main impacts of the VCs' operations and how usually separated domains are interconnected, not to benchmark or rank performance. Informing decision-makers on each of the four framing questions, allows them to make their own judgement. The four framing questions reveal the present priorities in the global agenda of development. Nevertheless, this conceptual framework has to be improved, particularly to shed light on how the various dimensions interact and how indicators are articulated. The partnership between research and the "users of produced knowledge" will then be important to tailor future evolution.

Since the beginning of the project, the VCA4D methodology was applied to around twenty VC analyses in developing countries in Africa, Asia, Latin America and the Caribbean (see Table 5).

**Table 5: Value chain analysis completed or in advanced process**

| | | Aquaculture | Banana | Beef | Cashew | Cassava | Cocoa | Coffee | Egg | Green beans | Lime | Mango | Palm Oil |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Africa | Burkina Faso | | | | | | | | | | | X | |
| | Guinea Bissau | | | | | | | | | | X | X | |
| | Ivory Coast | | | | | X | | | | | | | |
| | Kenya | | | | | | | | | X | | | |
| | Sao Tome | | | | | | X | | | | | | |
| | Sierra Leone | | | | X | | | | | | | | X |
| | Swaziland | | | X | | | | | | | | | |
| | Tanzania | | | | | | | X | | | | | |
| | Zambia | X | | | | | | | X | | | | |
| | Zimbabwe | | | X | | | | | | | | | |
| Asia | Cambodia | X | | | | | | | | | | | |
| | Papua New Guinea | | | | | | X | | | | | | |
| LA and the Caribbean | Dominican Republic | | X | | | | | | | | | | |
| | Honduras | | | | | | | X | | | | | |

VCAs provide with a detailed picture and overview of the VC's operations and their impact on the main pillars of sustainable development. Another thirty analyses are being planned and some updates will be carried out two or three years later in order to analyze the main evolutions.

Annex 1 proposes a sample of information produced by VCA4D for the three pillars of sustainable development for three VCA studies as examples: Mango Burkina Faso, Green Beans Kenya and Aquaculture Zambia.

An information system, based on the indicators, will be developed and will provide research and decision-makers with a wealth of information contributing to fill the general data gap existing on these activities in most developing economies. Taking stock of many VC analyses across the world (different countries, different products, different situations) will especially allow to learn lessons on how producing systematized information can help contribute to the strategic reflection of policy-makers and stakeholders.

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## 6. Annex: Sample of information produced by VCA4D for the three pillars of sustainable development

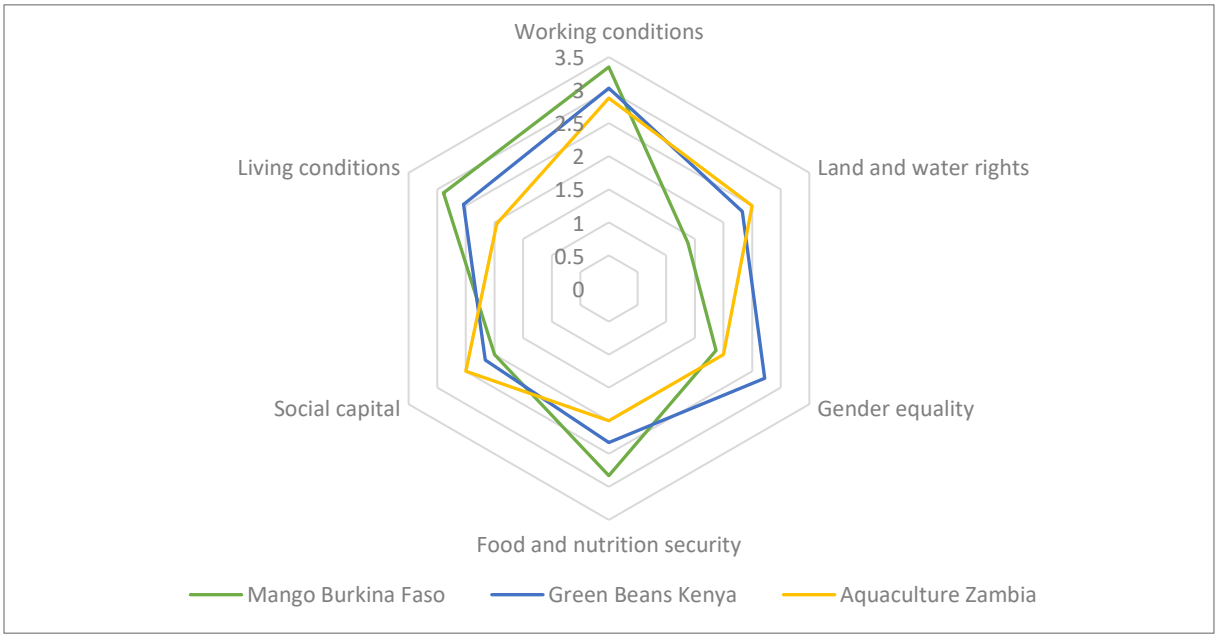
### Economic analysis – Contribution to economic growth (2016)

| Indicators | Mango<br>Burkina Faso VC | Green Beans<br>Kenya VC | Aquaculture<br>Zambia VC |
|---|---|---|---|
| Total value added (VA) (€) | 46 million | 68 million | 59 million |
| Contribution of the VA to the agricultural GDP | 2.9% | 0.3% | 6.1% |
| Rate of integration into the economy (Total VA/VC production) | Between 70% and 97% depending on the sub-chains | 83% | 65% |
| Contribution to the public funds balance (€) | +2.4 million | +4 million | +7.2 million |
| Contribution to the balance of trade (€) | 0.6% total exports | +62 million<br>1.5% total exports | -27 million |
| Domestic Resource Cost (DRC) | DRC = 0.2 | DRC = 0.4 | DRC = 1.2 |

### Economic & social analysis – Growth inclusiveness (2016)

| Indicators | Mango<br>Burkina Faso VC | Green Beans<br>Kenya VC | Aquaculture<br>Zambia VC |
|---|---|---|---|
| Share final price at farm gate | Export chain 50%<br>Local chain 4% | Export fresh beans 74%<br>Export canned beans 26% | Rural area 100%<br>Urban area :<br>fresh, frozen 67%<br>fillet, smoked 25% |
| Share farm incomes and wages/ VA | Farm incomes 54%<br>Wages 4% | Farm incomes 14%<br>Wages 29% | Farm incomes <5%<br>Wages 17% |
| Number of jobs | 27,800 (21,200 direct jobs, 6,600 indirect jobs) | 40-70,000 hired workers<br>52,000 smallholder farmers | 20,000 (including part-time employment and self-employment) |

## Social sustainability by comparison of results of the Social Profiles (2016)




High/positive : >3.5;  Not at all/Negative: <1.5

## Environmental sustainability (2016)

| | Mango Burkina Faso | Green Beans Kenya | Aquaculture Zambia |
|---|---|---|---|
| Farming systems | Few impacts (traditional systems, extensive orchards) | Higher impacts for the large farms and the scattered SH (fresh beans) and SH contracted (canned beans) due to different uses of fertilizer, water, energy (for irrigation) and land | Higher impacts for SH semi-subsistence (lower yields, type of management)<br>Less impacts for SH commercial than all other systems<br>Less impacts for large cage than large pond (feed conversion ratio, polluted water treatment) |
| Areas of protection (FOB gate) | Similar level of impact for the 3 areas of protection | Resources and human health : canned beans have a much higher impact<br>Ecosystem quality : the impact are nearly similar for all the systems with more impacts for canned SH contracted and fresh SH scattered | Human health : impact due to feed (climate change due to fuel use for commercial feed and emissions due to agriculture by-products)<br>Ecosystem quality : impact due to soil and water degradation (agriculture, water use = consumption and pollution)<br>Resource depletion : impact due to feed, fuels… Water = key limiting factor |

| | | | |
|---|---|---|---|
| Stages of the VC (in the country) | Fresh exported mango : the transport from orchards to the packaging unit has the greatest impact followed by the packaging itself<br>Dried mango : high level of impact (concentration of the product), different impact according to the drying technology used | Fresh beans : limited impacts at the stages occurring within Kenya (compared to the transport to Europe).<br>Canned beans : most of the overall damages inside the country (due to canning factory) | Main impact at the production stage |
| Sub-value chains | Less impacts for the sub-chain of the fresh mango consumed locally (impacts proportional to the distance mango is transported) | Fresh beans VC has less impact at FOB gate (within Kenya) and twice higher impact than canned beans at UK gate (air-freight transport) | No sub-chains distinguished |

Impact measured for 1 kg of product / SH : Small-Holders