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An innovative integrated frame to deliver knowledge to policy-makers on inclusiveness and sustainability of agricultural value chains

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Les quelques parties qui restent en français dans le texte seront traduites en anglais dans le texte définitif.

Abstract

Sustainability and inclusiveness are on the top the international political agendas, and policy makers are asked to report progress against such priorities. This is also the case for the support to agricultural value chains, where the attention to the increase of agricultural production has now been coupled with a stronger focus on social and environmental aspects.

Such a shift brought to a reflection on the pertinence of the diffused methodologies on value chain analysis to respond to the needs to measure not only economic, but also social and environmental indicators, and to therefore shed light on sustainability and inclusiveness more broadly. 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.

The objective of this paper is to demonstrate how VCA4D provides an innovative integrated frame to deliver knowledge to policy makers on sustainability and inclusiveness by (i) structuring a scientific methodological framework starting from the perspective of policy makers and based on existing methods or new and more appropriate home-made tools and by

(ii) integrating the economic, environmental and social aspects into a comprehensive yet manageable set of indicators. Lastly, it provides first results of the implementation of this methodology in several VCA across the world and limitations of the approach that has to be improved.

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

1. Introduction

Value chain concept and value chain analysis

Il existe un grand nombre de définitions de la filière/chaîne de valeur (VC) que nous ne discuterons pas ici. Donnons simplement une définition pour éviter de ne pas définir l'objet que l'on cherche à analyser. The (agricultural) value chain is a system of actors orientated towards the market involved at different steps of technical production and income generation processes from the initial primary production to its end use. This system is relevant for fostering agricultural-based activities engaging farmers and businesses through investment and policies.

The concept of *filière* a d'abord été formalisé par les chercheurs de l'économie industrielle dans les années 1930 pour faire référence à un ensemble d'activités reliant des agents d'amont en aval dans un processus de production-transformation-distribution de biens ou de services, dans des systèmes économiques en croissance. Historiquement la filière est promue par les pouvoirs publics pour définir leurs modes d'intervention. Il a par la suite connu plusieurs évolutions ayant abouti à un foisonnement sémantique, paradigmatique et instrumental¹.

Notre propos n'est pas de discuter sémantique à partir des référentiels théoriques, analytiques ou contextuels². Ces différentes conceptualisations se distinguent surtout par l'entrée qui est privilégiée pour analyser les interdépendances qui sont au coeur de la VC, certaines mettent l'accent sur les interdépendances fonctionnelles en termes d'input/output et de gestion de flux, d'autres sont plutôt axées sur les formes de coordination entre les acteurs. Ces distinctions relèvent des enjeux auxquels répondent ces cadres analytiques, de l'échelle et du périmètre de l'analyse et des rôles et des formes assignées aux politiques publiques pour répondre à ces enjeux (Temple et al., 2016). Notre acception de la "value chain" se rapproche du concept français de "filière" en conformité avec la définition proposée plus haut.

Le foisonnement évoqué ci-dessus a conduit à une absence de méthode d'analyse de filière unifiée et reconnue dans le monde académique (Rastoin et Ghersi, 2010). Il existe une diversité de méthodes d'analyses des filières avec des objectifs propres pour des utilisations différentes. Certaines renvoient à des référentiels théoriques, d'autres à des finalités plus pragmatiques ou opérationnelles³.

Cependant, les approches par filière ayant servi à structurer des dynamiques productives d'intensification et de spécialisation agricole dont les effets environnementaux et sociaux sont

1 Analyse structurelle ou financière, approche concurrentielle et stratégique, approche institutionnaliste, concept de chaîne globale de valeur, etc.

2 Ces référentiels peuvent différencier les value chain, les supply chain, les global commodity chain ou les global value chain (voir à ce sujet Raikes et Ponte, 2000; Temple et al., 2011).

controversés, font l'objet de critiques du point de vue de la durabilité des processus de production qu'elles génèrent. Les analyses de CV ont longtemps traité que partiellement des impacts des activités de ces CV sur la pauvreté, les inégalités, les questions de genre, la sécurité alimentaire et l'environnement (Bolwig et al., 2010). Elles sont limitées généralement à l'analyse des opportunités de revenu sans prendre en considération l'exposition aux risques des populations pauvres et les menaces sur le capital naturel.

Aiming at sustainable development as a new goal in the political agenda

Decision-makers, 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.

Inclusiveness as a long-term objective in the policies

Inclusiveness is still a target of many policies as the issues of poverty and food insecurity remains very relevant in developing countries. 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

3 A titre d'exemples, citons quelques évolutions ayant fait progresser les cadres d'analyse : l'appropriation du concept par les chercheurs de l'économie agricole et du développement (Hugon, 1988 ; Griffon, 1989) ; le couplage des approches socio-politiques de la production et des marchés avec la dimension géostratégique de la mondialisation et l'internationalisation des activités des entreprises (Gereffi et Korzeniewicz, 1994 ; Gereffi et al, 2005 ; Palpacuer 2005) ; la compréhension du contrôle des entreprises sur les filières via le rôle des normes de qualité (Ponte et Gibbon, 2005).

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).

The Value Chain Analysis for Development project (VCA4D)

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.

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.

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.

Ainsi ce projet est le résultat d'un double diagnostic: (i) les approches traditionnelles monodisciplinaires d'analyse des filières montrent de plus en plus leurs limites, (ii) en même temps la libéralisation en faisant la promotion du désengagement des Etats a appauvri les dispositifs publics d'information sur l'agriculture dans les pays en développement.

The objective of this paper is to demonstrate how VCA4D provides and for an innovative integrated frame to deliver knowledge to policy makers on sustainability and inclusiveness by (i) structuring a scientific methodological framework starting from the perspective of policy makers and based on existing methods or new and more appropriate home-made tools and by (ii) integrating the economic, environmental and social aspects into a comprehensive yet manageable set of indicators. Lastly, the paper provides first results of the implementation of this methodology in several VCA across the world and limitations of the approach that have to be improved.

2. Conceptual and methodological background involved in VCA4D

VCA4D a l'ambition de proposer un cadre analytique qui intègre les dimensions économique, sociale et environnementale du développement durable et inclusif, et développe la complémentarité entre les différentes approches. L'approche mobilise plusieurs des cadres méthodologiques et conceptuels classiques en exploitant leur synergie pour donner des éclairages spécifiques sur une même réalité qu'est la filière analysée.

Les référentiels qui soutiennent la méthodologie VC4D sont aussi bien inspirés de l'analyse des filières que de l'analyse des interventions dans le développement (projets et politiques). Nous présentons ici ces référentiels ainsi que la façon dont nous les utilisons dans notre méthode :

- (i) L'analyse de la viabilité des acteurs et des effets de la chaîne de valeur dans l'économie nationale dans la méthodologie VCA4D est inspirée par « la méthode des effets » (ME) développée et utilisée entre les années 1970 et la fin des années 1990 pour l'évaluation économique des projets d'investissement productifs dans les pays en développement au service des agences de coopération et des ministères de la Planification (Prou et Chervel, 1970 ; Chervel et le Gall, 1976 ; Chervel, 1987 ; Bridier et Michaïlof, 1995, Fabre, 1997 ; Chervel et all, 1997). Cette méthode fait apparaître la contribution des projets à la croissance économique, la distribution de revenus et l'impact sur les finances publiques et sur la balance commerciale par rapport à une situation de référence et pour une demande donnée. Elle a été largement utilisée par la Banque Mondiale, la FAO et l'ONUDI. Moins utilisée pendant les années de libéralisation et de désengagement de l'Etat dans les filières agricoles, cette

méthode et notamment son utilisation en analyse de filière suscite à nouveau de l'intérêt. Sur un plan méthodologique, la ME calcule la production et les consommations intermédiaires (CI) associées aux activités des CV aux prix réels et en déduit la valeur ajoutée directe (et ses composantes et en particulier les revenus d'exploitation) pour chaque type d'agents de la CV en élaborant leurs comptes de production-exploitation (CPE), consolide le operating account de la CV à partir des relations input-output du produit en filière, calcule les effets d'entraînement (primaires) c'est-à-dire cumule aux effets directs la valeur ajoutée indirecte et les importations indirectes liées aux CI des agents, calcule la contribution à la croissance économique du projet/ de la filière et à divers agrégats macroéconomiques.

La méthodologie VCA4D se limite volontairement à calculer les effets indirects liés aux principales consommations intermédiaires et non à leur totalité. Elle ne calcule pas non plus la totalité de la VA et des importations incluses qui supposerait d'effectuer plusieurs itérations de remontée de chaînes de production. Etre exhaustif en la matière ne changerait pas l'ordre de grandeur des résultats dont ont besoin les utilisateurs de ces informations. Cette approche permet de connaître, dans le temps imparti pour l'étude et avec une marge d'erreur acceptable, la distribution de revenus que la CV génère (revenus d'exploitation qui rémunère le capital et le travail familial, salaires, taxes, frais financiers, revenus fonciers), le niveau d'intégration de la CV dans l'économie nationale, ses effets sur la balance commerciale et sur les comptes publics.

- (ii) L'analyse de la durabilité et de la viabilité de la CV dans l'économie globale dans le cadre méthodologique VCA4D est inspirée par l'analyse de filière aux prix économique ou de référence et notamment la méthodologie de la Matrice d'Analyse des Politiques (MAP) liée à l'émergence des enjeux de la concurrence internationale qui ont aussi influencé la formulation des politiques agricoles. La méthodologie de la MAP correspond à une approche initialement développée par Balassa (1970) autour des concepts des coefficients de protection, nominale et effective, ainsi que de ceux de subvention effective et de coût économique réel (Garrabé, 2012). L'approche requiert l'identification des prix locaux ainsi que le calcul de prix de référence, des inputs, facteurs et outputs d'un projet/ d'une filière et propose un certain nombre d'indicateurs originaux permettant de rendre compte du rôle de l'intervention publique sur la rentabilité des activités. La MAP constitue une application des travaux de Balassa à l'étude de secteurs ou de filières productifs lorsque ceux-ci font l'objet de l'encadrement d'une politique économique. On peut de cette manière étudier et comparer les caractéristiques de rentabilité financière et économique d'une ou plusieurs filières productives, les classer en fonction de leur degré de protection et de leur efficacité et ainsi, prendre les décisions d'encourager ou non, telle activité, ou telle modalité productive. On peut ainsi comparer l'efficacité de mesures de protection, concernant la production, la commercialisation ou la transformation d'un même produit, à travers des filières différentes (Allaya, 1990). Une telle méthodologie procure un cadre pour mesurer les effets des politiques publiques et permet d'évaluer les écarts de rentabilité dus à l'intervention. Plus récemment Monke et Pearson (1994) ont relancé et développé les travaux sur la MAP pour analyser la compétitivité des CV.

Dans le cadre de VCA4D, les prix économiques utilisés pour calculer le Nominal Protection Coefficient (NPC) et le Domestic Resource Cost Ratio (DRC) sont mesurés de façon simplifiée afin de favoriser la compréhension des résultats et s'assurer de la viabilité des comparaisons entre CV analysées par des équipes différentes: élimination des transferts (taxes, subsides and financial flows), utilisation d'international parity prices pour évaluer les biens échangeables (la production et les consommations intermédiaires), utilisation de prix de marché (financiers) pour les autres flux (pas de prix de référence utilisés pour les salaires, la terre et le taux de change).

Ces deux premiers référentiels ont vocation à influencer la formulation des politiques publiques et restent pertinents à mobiliser dans cette optique. L'innovation consiste à utiliser conjointement ces deux référentiels pour informer de façon plus complète le décideur (Commission Européenne, 1997 ; Garrabé, 2012). La ME permet d'évaluer les effets de redistribution des revenus et des emplois et une grande partie des effets d'entraînement dans l'économie nationale. Tandis que le calcul des indicateurs de la MAP permet de mesurer the balance of the goods and services produced and consumed by the VC using relevant international prices (parity prices) and gives an indication of the overall gain or loss for the national economy.

- (iii) L'outil choisi par VCA4D pour analyser la durabilité environnementale des CV est le Life-Cycle Assessment (LCA). C'est une méthode d'évaluation normalisée (ISO 14040 et ISO 14044) permettant de réaliser un bilan environnemental multicritère aux différentes étapes d'une CV sur l'ensemble de son cycle de vie. Son but est de connaître et pouvoir comparer les impacts environnementaux d'un système tout au long de son cycle de vie, de l'extraction des matières premières nécessaires à sa fabrication à son traitement en fin de vie (mise en décharge, recyclage...) en passant par ses phases d'usage, d'entretien, et de transports. L'ACV permet ainsi de quantifier les contributions aux impacts environnementaux d'un système (par étape de cycle de vie / par sous-système (composants, matériaux utilisés, procédés) afin d'en dégager des pistes d'éco-conception ou d'amélioration du bilan environnemental du système et de comparer du point de vue environnemental deux systèmes ayant la même fonction, à quantité de service rendu égale (cf notion d'unité fonctionnelle). La méthode ACV permet de comprendre les mécanismes des impacts pour les mesurer (Boustead, 1996 ; Bessou, 2016). L'ACV s'accorde bien avec l'analyse économique des CV dans le sens où elle privilégie une approche par les fonctions techniques et la mesure de flux (de matières dans ce cas, monétaires pour l'analyse économique).

Dans le cadre de VCA4D, il convient d'adapter l'utilisation de cet outil aux conditions de faible disponibilité des informations nécessaires. Also and unlike many LCA practices, the VCA4D analysis should provide information on the impact linked to activities inside the borders of the country, that is the more relevant framework to give insights to the policy dialogue and for EC investments. Enfin, VCA4D attache une attention particulière au besoin d'amélioration de la communication des résultats à un public de non-initiés (policymakers).

L'innovation est en devenir en matière d'analyse environnementale des VC car malgré le développement rapide de l'utilisation de cette méthode dans plusieurs arènes (JRC,

etc.), l'ACV s'avère intéressante mais insuffisante pour prendre en compte l'ensemble des impacts environnementaux qui peuvent être associés aux activités des CV (par exemple biodiversité) et apporter des réponses à toutes les questions que se posent les policymakers comme démontré dans plusieurs des études réalisées (Cambodia Aquaculture, Zimbabwe Beef, Swaziland Beef, etc.).

- (iv) Autant les référentiels existant ont pu inspirer les outils utilisés dans la méthodologie VCA4D pour l'analyse économique et l'analyse environnementale, autant les méthodes d'analyse sociale disponibles ou en cours de constitution, comme la CSR ou l'ACV sociale par exemple (Seuring, 2012 ; Feschet, 2014 ; Macombe et Loeillet, 2014), n'ont pas été retenues par VCA4D pour un déploiement simple et rapide et fournir des informations suffisamment diversifiées et ciblées par rapport aux préoccupations et standards des décideurs (food and nutrition security, land and water rights, working conditions, gender, risques réputationnels, etc.).

L'innovation a consisté à élaborer une grille d'analyse « sur mesure » au sein de VCA4D conformément à une diversité d'objectifs stratégiques des décideurs dans plusieurs domaines et permettant de dresser le profil social d'une CV et de faciliter la prise de conscience des risques liés aux opérations d'investissement.

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.

A) 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) ⁴

B) Is this economic growth inclusive?

4 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.

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)

C) 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	Contribution of the VC to the availability, accessibility

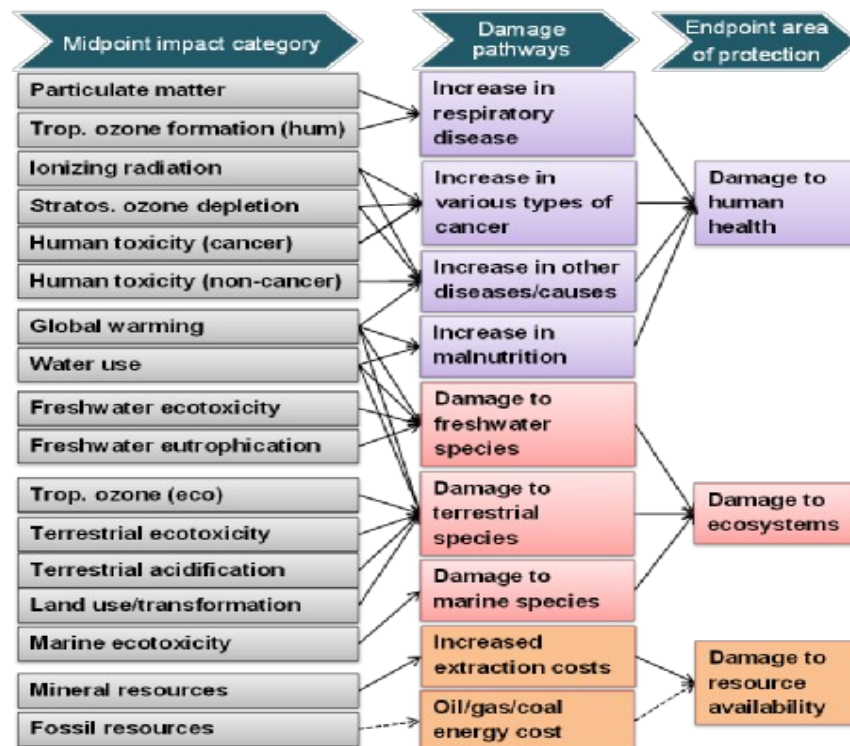
acceptable and secure?	and stability of food resources; Food diversification; Nutritional quality; Price instability...
Is social capital enhanced and equitably distributed throughout the VC?	Strength and representativeness of producers' organisations; Information sharing; Level of trust among actors; 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...

D) *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	Resources uses (water, fuel...), absolute and comparing

the VC on resources depletion?	systems
What is the potential impact of the VC on ecosystem quality?	Sizeable emissions of substance (CO ₂ , NH ₃ ...), 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.).

E) 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. First synthesis on some results

Cette partie est en cours d'écriture (inédite). Nous sommes en train de capitaliser à partir des études sur 2 ou 3 exemples qui montrent l'intérêt d'avoir mobilisé ce cadre d'analyse intégré et donnent des informations pour l'action beaucoup plus riches (analyse économique et sociale / quantitative et qualitative se renforçant sur inclusiveness, analyse environnementale et économique pouvant donner des signaux différents aux décideurs sur la durabilité des systems de production agricole et engageant le dialogue politique, comparaison contextualisées de filières, etc.).

5. Limitations and some lessons learned

The methodological features of VCA4D bring along certain limitations. In the present chapter, such features, the emerged limitations and their contextualization are discussed. Furthermore, based on the experience of the first two years of implementation of the project, the authors will provide insights on the shortcomings and areas of further work that can already be identified.

Features and limitations

- 1) VCA4D fosters a value chain approach. This can be limiting versus other types of analysis, such as territorial, spatial and livelihood approaches. Nevertheless, the value chain approach was considered as the most pertinent to foster investments in

agriculture and policy making interventions, aligning with the current international cooperation trends of strengthening links with the private sector.

VCA4D is a valuable tool to appraise the performance of investments against the sustainable and inclusiveness development political goals. VCA4D, nevertheless, does not exclude that other approaches and tools can complement it and bring new elements of understanding. Interconnections with such approaches shall be further investigated.

- 2) The VCA4D methodology provides a holistic picture of the status of sustainability of a value chain at a given moment in time. This allows focusing on a limited number of 'basic', measurable indicators that can be monitored by policy makers over time, providing information on which they can act upon.

This quantitative, evidence based approach is therefore a reality check on the status of the value chains. It does not include on the other side, an analysis on the dynamics of the value chain and of the markets, as well as specific projections of the trends and performances. Such analysis can be done in complement of VCA4D.

The fact that VCA4D analyses are meant to be updated every two or three years, can nevertheless also provide relevant information on dynamics and trends, although in a different timeframe than other methods; and does not make this as its primary objective.

- 3) VCA4D analyses are limited at the country's border, not looking at the global value chains. This criticism is particularly relevant for export products or commodities. This choice was driven by the fact that most of the EU development and cooperation funds are channeled through National Indicative Programs negotiated directly with the partner countries. Therefore, the EU funds for value chains development are quasi-totally spent at the national level, which becomes the relevant framework to make change at the policy and project levels.
- 4) Another feature of the VCA4D approach is the attempt of providing evidence-based, reliable scientific information in a timing that is compatible with the decision-taking processes. This means that VCAs are based on scientific evidence, but are not research studies that can take several years and extensive data collection campaigns. Orders of magnitude are, in practice, what is needed for policy makers in order to take decisions. This means that for VCA4D timeliness is very important and computation of results can be continued through research work, out of the framework of the project.

Shortcomings and areas for further work

The VCA4D project has been active for almost two years, with around 10 studies being completed and another 10 at different stages of implementation. Some considerations on difficulties and shortcomings of the methodology can therefore be done, and completed with some suggestions about future areas of work to improve the quality and pertinence of the analyses.

The first finding is about the environmental analysis, and in particular about the Life Cycle Assessment (LCA) method. Despite its pertinence and compatibility with a value chain approach, two main problems with its use subsist: (i) a difficulty by non-scientists and policy makers to understand the results and its implications, which translates into a difficulty of transposing them into practice; (ii) some elements that are critical for policy makers are not sufficiently taken into account by the LCA, as for example the adaptation that climate change imposes on value chains, or the impacts of value chains on biodiversity. This brings to the necessity of fostering reflections on how to complement the LCA with other instruments and

how to facilitate the communication of its results, in order to better respond to such shortcomings.

A second finding relates to the difficulty in interconnecting results from the three analyses into common conclusions. Despite the fact that the team is working in a cooperative manner and sharing the drafting of the functional analysis, the writing of the economic, social and environmental analysis is done separately. Conclusions often report on the separate results, not attempting at making inter-connections between the different dimensions. Interdisciplinary workshops are on the planning, in order to advance on methodological discussions across the different disciplines.

6. Conclusions 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. This framework of analysis was built by mobilizing, rehabilitating or combining existing standards and methods, but also by creating new tools to stay close to the needs of decision-makers.

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					

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.

VCA provides 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.

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

Economic analysis – Contribution to economic growth (2016)

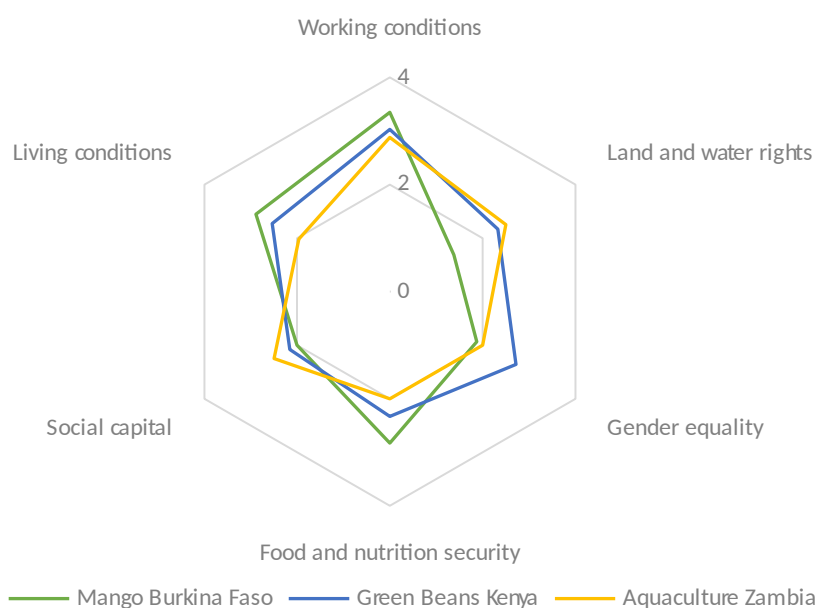
Indicators	Mango Burkina Faso VC	Green Beans Kenya VC	Aquaculture Zambia VC
Total value added (VA) (€)	46 million	68 million	59 million
Contribution of the VA to the agricultural GDP	2.9%	0.3%	6.1%
Rate of integration into the economy (Total VA/VC production)	Between 70% and 97% depending on the sub-chains	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 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 Burkina Faso VC	Green Beans Kenya VC	Aquaculture Zambia VC
Share final price at farm gate	Export chain 50% Local chain 4%	Export fresh beans 74% Export canned beans 26%	Rural area 100% Urban area : fresh, frozen 67% fillet, smoked 25%
Share farm incomes and wages/ VA	Farm incomes 54% Wages 4%	Farm incomes 14% Wages 29%	Farm incomes <5% Wages 17%
Number of jobs	27,800 (21,200 direct jobs, 6,600 indirect jobs)	40-70,000 hired workers 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	Higher impacts for SH semi-subsistence (lower yields, type of

		beans) and SH contracted (canned beans) due to different uses of fertilizer, water, energy (for irrigation) and land	management) Less impacts for SH commercial than all other systems 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 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) Ecosystem quality : impact due to soil and water degradation (agriculture, water use = consumption and pollution) 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 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). 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