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Through *Perspective*, CIRAD provides an opportunity to explore new avenues for discussion and action based on research.

The challenges of agricultural value chain assessment and governance – The example of mangoes in Burkina Faso

Laurent Parrot – Yannick Biard – Dieuwke Klaver – Edit Kabré – Henri Vannière

The integrated assessment of agricultural value chains through economic, social and environmental analyses is aimed at providing the necessary and sufficient information to guide or support investment decisions in the context of sustainable development. These assessments are based on data collection and analyses of the organisation of these value chains, as well as on their stakeholders' strategies. Access to information, the reliability of this information, and the general context in which these value chains evolve are key dimensions. The context can be an obstacle to investment decisions

and the implementation of sectoral agricultural policies. Indeed, investing requires confidence in the future, since it implies debt, and therefore risk-taking and accountability. In order to mitigate this risk, investors require information and must be able to access it. In low-income countries, difficulties in applying regulatory texts and the lack of reliable information hamper the development of sustainable agricultural value chains, as well as the processes to assess them. We show how mango value chains in Burkina Faso are concerned.

For the agri-food sector, we use the term “value chain” according to the definition given by the EU project Value Chain Analysis for Development (VCA4D). A value chain refers to the sequence of production processes, from primary production to end uses and consumption, organised by a set of very diverse market-oriented stakeholders (farmers, collectors, processors, wholesalers, retailers, etc.). A value chain takes into account all the stages and all the forms through which an agricultural product passes “from farm to fork”. It is in the context of the

VCA4D project that we have studied mango value chains in Burkina Faso ([see box opposite](#)).

Burkina Faso, situated in a zone of regional conflict, is one of the ten poorest countries in the world. Support is sought for the development of all value chains that sustain household living conditions, while reducing environmental impacts.

In this country, the mango sector covers half of all fruit production. It encompasses five value chains: fresh mangoes consumed within the country; fresh mangoes exported within the region (continental Africa); fresh mangoes exported to Europe (by sea or air); processing into juice (puree, nectar) consumed within the country; and dried mangoes exported to Europe.

Value chain analysis method

The EU project Value Chain Analysis for Development (VCA4D, <https://capacity4dev.europa.eu/projects/value-chain-analysis-for-development-vca4d>) uses a specific methodological framework to assess the sustainability of value chains. It involves a quantitative analysis aimed at answering the following questions: how does the value chain contribute to economic growth? Is this growth inclusive? Is the value chain socially sustainable? Is the value chain environmentally sustainable?

This assessment is preceded by a functional analysis, which provides a general description of the value chain, a technical analysis of its different stages and an analysis of its governance and its power structure.

For the assessment of mangoes in Burkina Faso, the data collected are those for the year 2016. The economic, social and environmental information was obtained through interviews, and cross-checked with a literature review.

How can mango production be estimated?

The calculation of national agricultural production is based on area and yield declarations, but there is a lack of reliable statistics, meaning assumptions must be made. Orchard area estimations vary considerably, from 33 000 to 80 000 hectares in Burkina Faso, depending on the different sources. Yields vary from two to seven tonnes of mangoes per hectare per year, and gross national production is thus between 60 000 and 560 000 tonnes per year, depending on the data selected.

To reduce this uncertainty, one solution is to establish an order of magnitude. We have used marketed production rather than gross production, especially as pre-harvest field losses can be as much as 75%, in particular due to damage caused by the oriental fruit fly *Bactrocera dorsalis*. Production for export

can be estimated using customs data. For the rest of national production, there are no reliable statistics on gross production, own consumption and sales on markets.

We began with production marketed for export registered by customs, at 50 000 tonnes. We chose to allocate a similar output of 50 000 tonnes to undeclared marketed production, which corresponds to national consumption. This is a low assumption, if we consider orchard areas of 33 000 hectares with an average yield of five tonnes (total: 150 000 tonnes, of which 50 000 for export), but it enables extrapolations since orchard yields are in any case highly variable from one year to another. We have thus assumed a total marketed production of 100 000 tonnes.

Some figures for the mango sector in Burkina Faso

The economic dimension - The five value chains conform to regulations that are essentially competitive (local and sub-regional markets, fresh exports), but also monopolistic (fruit juice factory), captive (dried mango exports subsidised by international aid), and even contractual ("trackers", in other words, intermediaries between producers and processors, exporters, etc.). Directly or indirectly, the whole sector accounts for 2.9% of the gross domestic product of the agricultural sector, and for 0.6% of the country's FOB (free on board) exports. These value chains contribute significantly to the local economy (see figure below) and to employment for the population.

The value chains for fresh mangoes and juice consumed within the country are not subject to certification by international standards (for example on health quality and working conditions). The other value chains are certified and declared to customs, which enables the state to ensure the traceability of information.

The mango sector employs almost 28 000 people. Three quarters of them are self-employed (farmers, trackers, retailers, etc.). A quarter (around 6 600 jobs) are indirect salaried jobs, of which only around 350 (or around 1% of all jobs) are permanent and declared (linked to exports), while all the others are

seasonal. These salaried jobs, most of which are undeclared, total 1.2 billion CFA francs in wages.

Fresh exports to the European Union employ a seasonal workforce for three or four months, paid 1 000 CFA francs per day (or around 1.64 US dollars): this concerns around 4 000 people according to our estimations, especially women.

Sales of fresh mangoes on the national market provide a livelihood for almost 10 000 retailers, mostly women. These retailers may also employ sorters, which creates jobs, albeit undeclared.

In 2016, all of the value chains were profitable and sustainable, knowing that some dried mango processing companies are dependent on international aid to sell their goods on European markets.

The social and health dimension - Mangoes play an important role in food and nutrition security at the national level. The monetary resources derived from mangoes also contribute to purchasing food, especially during the lean season (the transition between the depletion of stocks and the new harvest of grain, the staple of the diet), to health and education costs, and to the construction of housing (this is observed in the quality of houses in the main mango production areas).

Fresh mango value chains (domestic market and export) employ a majority of women, and thereby illustrate their inclusive nature for vulnerable and marginalised groups.

Access to land is difficult, especially for young people, women and migrants wanting to start up an orchard. The Land Law (n° 034-2012/AN of 02 July 2012, providing for equitable access to rural land) is poorly implemented and the state services are neither in place nor accessible. Customary law (which is relatively unfavourable to women) is the most commonly practiced, and the land transactions that exist do not always refer to the latter or to the Land Law. The increase in land disputes is a reality.

The future for farmers' groups and cooperatives in the value chains linked to export is uncertain. The circulation of information is limited, for example farmers are not necessarily aware of export prices. More transparency could improve trust between operators, and even between producers belonging to a same organisation.

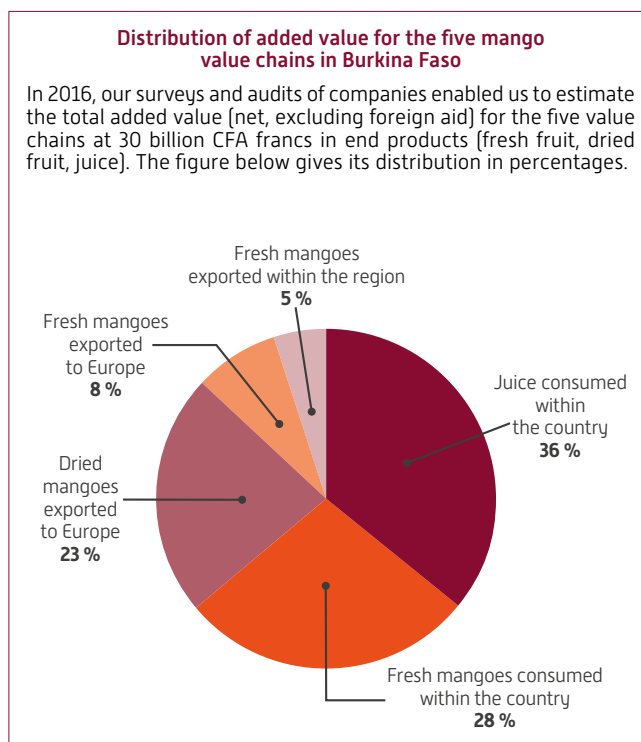
The environmental dimension - The environmental assessment through life cycle analysis takes account of harm to human health, ecosystem quality and the depletion of non-renewable resources. Fresh mangoes consumed within the country is the value chain with the fewest adverse impacts of all the impacts assessed. These are proportional to the distance of transportation, since the producers use very few inputs in their orchards.

For fresh mango exports, up to their exit from the packaging station, it is transport from the orchards to the station that has the most adverse impacts, then packaging itself. For the export phase, air transport has the most adverse impacts (35 times more than those occurring before the exit from the packaging station), with shipping having far fewer negative impacts.

For dried mangoes, the adverse impacts per kilogramme of end product are very high due to the heavy use of fossil gas for drying and the large quantity of fresh mangoes required (around 22 kilogrammes of fresh mangoes for one kilogramme of dried mangoes).

The context: risk-taking at all levels for stakeholders

The context of these agricultural value chains undermines the living and working conditions of their stakeholders and puts them in situations of risk. Yet the perception of risk determines



decisions on whether or not to invest. By investment, we mean productive investment in the broad sense, providing jobs: physical investment in capital goods (irrigation, cold rooms, drying units, etc.) and intangible investment, such as training, the acquisition of knowledge and skills, or new practices.

The precarious individual context - In total, 99% of stakeholders in mango value chains, and their families, do not benefit from any social protection mechanisms (health, unemployment, pensions, etc.). Moreover, their working conditions are not always in line with international standards.

The lack of equipment, services and infrastructure - Spare parts are lacking and there is little technical expertise available (maintenance of equipment, monitoring of agricultural plots). The long transport distances for fresh mangoes (outdated and poorly maintained trucks) and technology (cold rooms, ovens, packaging, etc.) are also key factors in adverse environmental impacts. In terms of infrastructure, roads are often in poor condition (resulting in losses, since fresh mangoes are fragile), and access to water and energy (gas, electricity) is complicated. What is the point of investing in a cold room or a drying machine if there are constant power cuts, if gas is in short supply or if there are not enough qualified maintenance workers? The absence or weakness of reliable infrastructure, public quality control structures and technical support have consequences for the functioning of value chains and their environmental impacts.

The lack of information - The lack of reliable data and access to data is structural. However, without transparent information, local companies will be unable to invest in the long term, but will instead be obliged to spend, and not invest, in the short term.

The weakness of the legal dimension - This echoes the lack of public resources and policies. The mango sector is essentially driven by the informal sector. Applying the legal framework (labour law, safety regulations, etc.) is complicated by the fact that the majority of stakeholders (especially producers and the local informal sector) have no employment contract. The Land Law is poorly implemented, and technical controls are insufficient due to a lack of state services.

Implications and issues concerning the difficulty of applying regulatory texts

Agricultural value chains built largely on informal activities constitute an outlet for mass unemployment by creating a multitude of precarious seasonal jobs. They help a vulnerable or marginal population to earn a living, especially women. They ensure social and economic resilience that states do not offer.

For the stakeholders, this can provide them with a paid job in the short term, and therefore an income, or enable them to increase their income through savings made on income taxes. The state services and stakeholders are less inclined to finance infrastructure and equipment complying with quality and safety standards (roads, access to energy, storage facilities, gas-fired drying ovens, etc.). Similarly, the poor implementation of the Land Law maintains the status quo on access to land.

The analysis of mango value chains in Burkina Faso addresses development issues illustrated by the coexistence of an informal system (mainly mangoes consumed within the country) and a formal system (mainly mango exports). The public policy challenge here would be to focus on inclusiveness, rather than on sanctions for illegal activities of all kinds, in other words giving these local intermediaries the means to gradually formalise their activities so as to derive greater benefits from them, and to simultaneously enable and receive appropriate support from the state. What can be done to improve and enhance initiatives concerning mangoes?

Investment between a rock and a hard place

The Burkina Faso Institut National de la Statistique et de la Démographie (National Institute for Statistics and Demography, INSD) revealed that in 2015, *“95.5% of people employed carry out their main activity in the informal sector, with this being more pronounced in rural areas (99.3%) than in urban areas (81.2%)”*. The legal minimum wage has been set by decree since 1986 at 30 684 CFA francs (around 51 US dollars), which is below the international poverty line (2 dollars per day, or 1 215 CFA francs). But one kilogramme of mangoes costs between 30 and 250 CFA francs on local markets, or 3 to 25% of the daily minimum wage.

The avenues for improvement linked to individuals, to technical problems, to infrastructures and to policies are the responsibility of both the stakeholders in a value chain and the state.

The stakeholders who carry out all or some of their activities in the informal sector adopt avoidance strategies (taxes, social contributions, labour standards, administrative procedures), and the financial capacities of the state services are consequently undermined. Moreover, the lack of official data makes it difficult to estimate the production of goods and services, and therefore to make investment choices.

On the other hand, if states cannot or will not ensure social protection, technical support and reliable public infrastructure (such as roads, energy and water services, regulatory mechanisms, or development and land-use plans), then how can economic actors and banks be encouraged to take risks and to invest?

In the case of mangoes, productive investments come from development assistance and ad hoc initiatives, such as foreign companies that invest and internalise all functions, from the orchard to the packaging station and export activities. They thus secure their investments.

Investment is therefore constrained by a lack of resources and security for small producers and small companies, and by poor law enforcement. Regional conflicts further aggravate this situation.

A different perspective provided by research and public policy

The challenges of the integrated assessment of agricultural value chains are those of investment. This implies three considerations for research and public policy:

- > recognising and characterising the importance of the contexts in which investments are implemented, as these contexts determine situations of insecurity and vulnerability;
- > contributing to national and international data collection surveys by ensuring the transparency of assumptions and calculation methods and adapting data collection and checking methods. The methods used in life cycle analysis to assess the quality and relevance of data are appropriate, especially to calculate agri-food production;
- > questioning economic development processes, whose widely recognised form consists in shifting from a so-called “traditional” society to a so-called “modern” society. The analysis provided here shows how it is essential to understand informal processes, since they provide information about the relations between the public authorities and civil society, and therefore about value chains. An assessment of value chains that considers the different individual and collective contexts calls for thinking on individual and collective responsibility and, ultimately, on the ethics of development. ■

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Quelques mots sur...

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Some links

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