

Analysis of the cowpea value chain in Niger

Value chain analyses assist in informing policy dialogue and investment operations. They help the understanding of how agricultural, aquaculture and fisheries development fits within market dynamics. They permit an assessment of the value chains' impact on smallholders, businesses, society, and environment.

The European Commission has developed a standardised methodological framework for analysis (https://capacity4dev.europa.eu/projects/value-chain-analysis-for-development-vca4d_en) It aims to understand to what extent the value chain allows for inclusive economic growth and whether it is both socially and environmentally sustainable.

Context of the value chain

Cowpea is part of family farming in Niger and is often grown in association with other crops (millet, sorghum, groundnuts). From an agronomic point of view, it adapts well to the arid soils of Sahelian regions, fixes nitrogen, enriches the soil and provides quality fodder from the tops.

Cowpea is the most widely consumed legume in Niger, especially by middle and upper-income households. It contributes to food

and nutritional security thanks to its high protein content, and improves household incomes. Production is mainly concentrated in the regions of Maradi and Zinder, followed by Dosso, Tillabéry and Tahoua, although there are risks. Around 30% of production is exported, mainly to Nigeria. Cowpea is the main source of income for most of the 2 million small-scale producers who grow it, with a higher remunerative price than millet and sorghum. However, the cowpea value chain (VC) faces a number of difficulties including storage losses, low incomes for producers, underdeveloped local processing, a lack of dissemination and promotion of climate-smart practices (agroecology, legume crop combinations, use of manure, zero tillage, etc.) and security problems affecting the integration of young people into agricultural production.

Intervention by the European Union

As part of the 2021/2027 National Indicative Programme (NIP), the European Union (EU) has identified green economic growth as one of its priority areas. Within this framework, a project to support the development of plant protein VCs (cowpea and groundnuts) in the Great Green Wall (GGW) regions of Agadez and Maradi has been formulated, in line with the joint African Union-EU nutrition initiative. In Niger,

if the political situation allows, this project will pay particular attention to the sustainable and resilient development of these VCs, and in particular to nutrition and soil restoration.

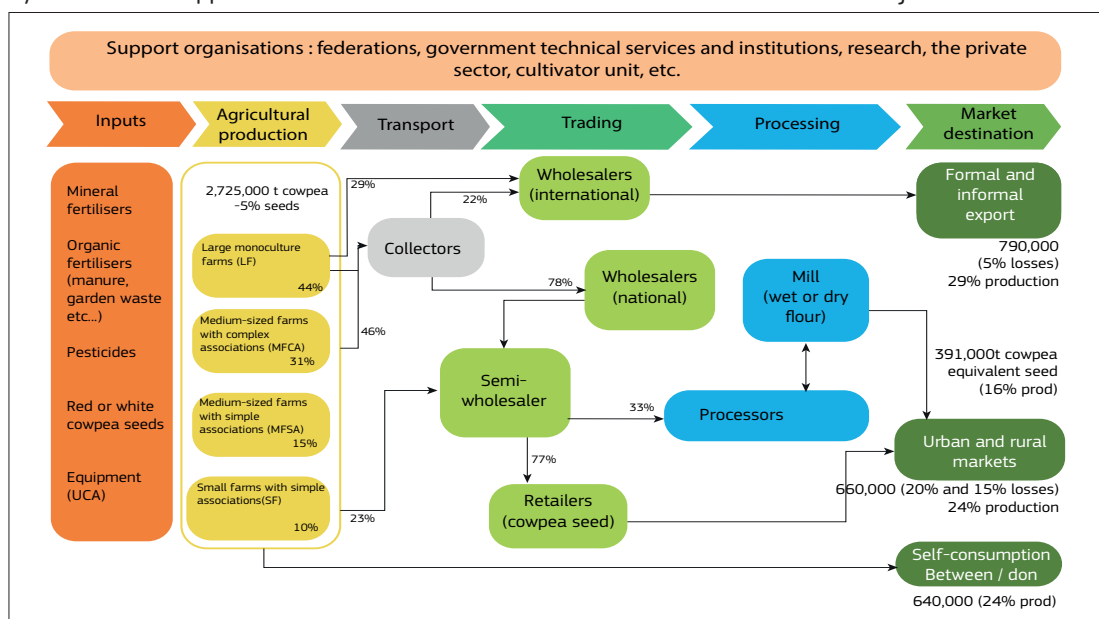


Figure 1 : Flow chart of the cowpea VC in Niger

Functional analysis

Production

In 2022, national production amounted to 2,725,000 t of cowpea seed cultivated across an area of 5.8 million hectares. Cropping systems in Niger consist mainly of millet and/or sorghum combined with cowpea and/or groundnuts. The typology of producers was based on the following criteria: cultivated area, type of crop association, cultivation practices, level of equipment and type of storage. Four types of producer were identified (Figure 2). Small farms (SF) are characterized by simple associations (44% of producers) and cultivate small plots with low inputs in ecosystems with rainfall of less than 400 mm/year. Medium-sized farms with simple associations (MFSA) are complex, such as in the case of millet-cowpea-sorghum while medium-sized farms with complex associations (MFCA) include groundnut alongside these three crops. MFCA have a high level of agroforestry (number of trees per ha) and achieve high yields thanks to better soil fertility management with organic matter. Phytosanitary treatments are carried out in reduced doses in MFCA. Large farms (LF) cultivate cowpeas either on part of the area alone, or on the whole plot in rotation with other species. These farms have access to improved seeds and 80% of their production is exported.

	Small farms simple associations (SF)	Medium-sized farms simple associations (MFSA)	Medium-sized farms complex associations (MFCA)	Large farms cowpea pure – monoculture (LF)
Utilised agricultural area (UAA) (ha)	2	5	5	13
Area for cowpea (ha)	0,5	1,7	1,1	6,2
Cowpea yield (kg/ha)	250	420	390	750
% of national production	10%	15%	31%	44%
Share in number of producers (%)	44%	11%	40%	5%
Type of association	Millet-Cowpea	Millet-Cowpea-Sorghum	Millet-Cowpea-Sorghum-Groundnut	-
Number of trees/ha	50	24	80	38
Origin of seeds	Local	Local	Local + purchased	Local + purchased
Seed quantity (kg/ha)	25	25	20	20
Type of storage	Roof	Attic/Roof	Attic/Roof	Attic + Polyethylene bags

Figure 2: Cowpea production systems in Niger

Seasonality and storage

Cowpea is highly seasonal, with harvests between September and November. From March to September, stocks and market availability of cowpea decline, reaching a peak in July and August (hunger season). Prices vary from season to season (from 120 FCFA/kg at harvest time to 350 FCFA/kg 3 months after harvest), but also according to the availability of the product, its shelf life and the place of purchase.

Price variability is also due to shortcomings in cowpea storage. Without appropriate treatment, insects can totally destroy production in a short space of time. The main methods used to preserve the seeds are drying, triple bagging and the use of phytosanitary products, which is still the most widespread technique.

Processing and trading

Cowpea is eaten mainly as a grain, with only 15% of production being processed. The main processed products are bérroua (cowpea couscous), doughnut and Dan Waké (cooked cowpea dumplings). 70% of processed cowpea volume comes from individual artisanal processing units, 29.5% from collective artisanal units and 0.5% from semi-industrial processing units in Niamey.

Cowpea is sold as grain, per tia (2.5 kg) or in bags of 20 to 40 tias. The main actors in trading are collectors, wholesalers, semi-wholesalers and retailers. Collectors are financed by traders to centralise production during the 4-month harvest. Semi-wholesalers are mainly linked to the local domestic market, while wholesalers are present on the domestic and export market to Nigeria, Ghana and Burkina Faso.

Governance of the VC

Governance of the cowpea VC in Niger is decentralised and informal. Transactions are based on a highly structured informal system. There is little government support at municipality or regional council level for advising rural producers of winter crops, including cowpea. Support from partners is mostly geared towards promoting irrigated horticulture crops, which means that these development projects do not support the cultivation of rainfed cowpea which is a major crop.



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

Effects on the national economy

For the reference year 2022, the VC created a direct value added (VA) of FCFA 854 billion (€1.3 billion). This direct VA is made up mainly of Net Operating Profit (NOP) (53%) and salaries (44%) (Figure 3). Indirect VA generated by suppliers outside the VC is FCFA 365 billion (€557 million). With a total VA of 1219 billion FCFA (€1.8 billion), the cowpea VC contributes 15% to the country's GDP. The direct VA of cowpea producers accounts for 14% of the agricultural GDP.

The rate of integration into the national economy is 64%, which means that the VC production is heavily dependent on imported inputs (36% of the value of production). The contribution to the balance of trade is negative, given that the value of imports of chemicals and packaging materials is high (€800 million), while the value of the VC exports is low (€380 million). As the government does not provide any subsidies, the impact of the VC on public finances amounts to FCFA 107 billion (€165 million) in taxes collected.

Viability of the value chain activities

VC activities are profitable for all actors as they have positive Net Operating Profit (NOP) (Figure 4). The SFs have a higher return on turnover (ROT) than all the actors, given the low cost of inputs (organic matter being the main input). For MFSA and MFCA, the main costs are fertilisers and phytosanitary products. The LF's have a higher ROT because of their cash capacity, which gives them access to improved seeds enabling them to obtain high yields. Downstream actors, in particular bérroua processors, have higher incomes given the low cost of processing compared with the high market price of couscous. Trading cowpea remains attractive but relatively less profitable for urban retailers and collectors.

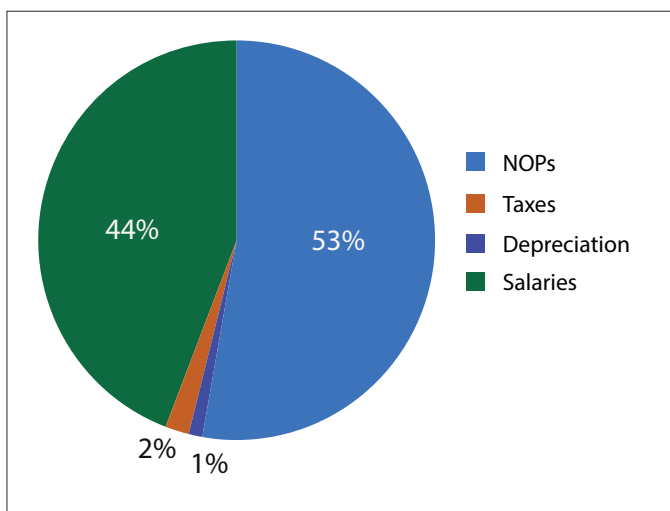


Figure 3: Distribution of direct VA and its components

Actors	Annual net operating profit (NOP)	Return on turnover* (ROT) (%)
PEAS	25,000 FCFA (€38)	47
MEAS	19,280 FCFA (€29)	6
MEAC	7,130 FCFA (€10)	4
GE	321,150 FCFA (€490)	17
Doughnut processor	327,000 FCFA (€500)	3
Bérroua processor	999,360 FCFA (€1523)	31
Collector	110,507 FCFA (€170)	2
Wholesaler	26,965,000 FCFA (€41,100)	10
Export wholesaler	73,000,000 FCFA (€111,200)	18
Semi-wholesaler	17,200,000 FCFA (€26,100 €)	18
Urban retailer	112,100 FCFA (€170)	3
Rural retailer	418,100 FCFA (€ 640)	19

Figure 4: Profitability for actors in the cowpea VC
 *Net operating profit (NOP) : Net income from the business (depreciation, amortisation and provisions).
 **Return on turnover (ROT): Net operating profit/ Production value

Viability in the international economy

The Nominal Protection Coefficient (NPC) compares the domestic and international price of the VC product. It is equal to 1, which means that the domestic value of the product is the same as it would be if the international parity price were applied.

With a Domestic Resource Cost Ratio (DRC) of 0.5 (less than 1), the VC is viable in the international economy, as the value of the domestic resources used is less than the economic wealth they produce.

Comparing sub-chains

Of the four sub-chains analysed (rural domestic market, urban domestic market, processing into flour, export), the processing sub-chain generates much higher direct VA (€1462/t of raw cowpea), followed by the domestic sub-chains (€670/t of raw cowpea).

The cowpea value chain in Niger generates significant income for those involved in production, processing and trading. It is a driver of economic growth, contributing 15% to GDP. However, dependence on certain imported intermediate inputs (chemical inputs, packaging products, bags, etc.) is creating a deficit in the balance of trade.

Is this economic growth inclusive?

Income distribution and governance

All the actors in the VC have a positive NOP. Doughnut processors, LFs and MFCA's make a significant contribution to the creation of the direct VA, but 54% of the profit generated by the VC goes to wholesalers, semi-wholesalers and LFs alone. Producers have no power to influence prices.

Jobs

Temporary and seasonal jobs are generated at different stages of the VC and generate income for poor and vulnerable

households. Small and medium-sized farms use family and day labour at harvest time, while large farms use only paid labour. The VC provides 750,000 full-time equivalent (FTE) jobs, 53% of which are held by men and 47% by women. Women are active from harvesting to processing (working independently with small-scale equipment). They are present throughout the country, and more specifically in Maradi and Zinder for the processing of flour.

The cowpea value chain in Niger provides income and employment for vulnerable actors such as women and young people, especially through small and medium-sized farms and processors. However, traders have a strong influence on local markets.

Is the value chain socially sustainable?

Figure 5 and the following table give a picture of the main social consequences of the VC activities in six strategic areas. The social profile scores indicate the expert's assessment of the level of consequence in each of the six domains, ranging from 'very high' to 'not at all'.

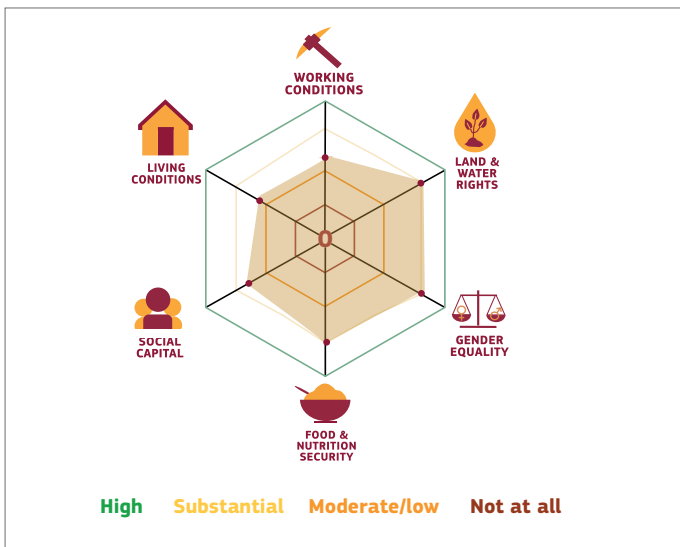


Figure 5: Social profile

The cowpea value chain contributes to social sustainability, in particular through food and nutrition security and its contribution to household income. Working conditions are unfavourable and access to land is problematic for women and young people due to a legal framework that has not yet been appropriated by stakeholders. Social capital is weak and the value chain is partly unsupported due to this lack of organisation. Access to basic social services (housing, transport, access to water, electricity, health services and education) for rural farms also needs to be improved.

Working conditions	<ul style="list-style-type: none"> Lack of formal contracts and compliance with labour standards.
Land and water rights	<ul style="list-style-type: none"> Lack of effective land tenure security for rural stakeholders, particularly young people and women. Inadequate water management, leading to risks of drought or flooding for rainfed crops, including cowpeas.
Gender equality	<ul style="list-style-type: none"> Non-uniform access to land due to the various traditional, Muslim and positive law rights applied to different social strata, including women. Strong involvement of women in production (harvesting and shelling) and processing. Little involvement in trading.
Food and nutrition security	<ul style="list-style-type: none"> Crucial role of cowpea in the dietary habits of Nigerien people and in the fight against malnutrition. Cowpea's contribution to livestock feed through its tops and pods.
Social capital	<ul style="list-style-type: none"> Weakness of formal and informal organisations. Lack of effective information flow and guidance for actors, particularly producers.
Living conditions	<ul style="list-style-type: none"> Roads in poor conditions and difficulties to access electricity, which also affect VC activities (especially trading).

Is the value chain environmentally sustainable?

The environmental impacts of the VC are measured using a life cycle assessment (LCA) that takes into account three areas of protection: resource depletion, ecosystem quality and human health. The LCA results also show the impact of the VC on climate change. The risks to biodiversity were also assessed using an exploratory analysis.

Impact on three areas of protection

For the cowpea VC in Niger, the damage to **human health** comes mainly from the production stage (82%) due to emissions that contribute to the formation of fine particles and greenhouse gases (GHGs) during the manufacture and use of compost (Figure 7). The use of soil for cultivation is the main source (89%) of damage to **ecosystem quality**. Finally, the impact on the **depletion of resources** comes essentially from the trading stage (56%) through the use of fuel during transport, followed by production (37%) through the manufacture and use mineral fertilisers. Storage losses have a major impact, particularly on human health and ecosystem quality.

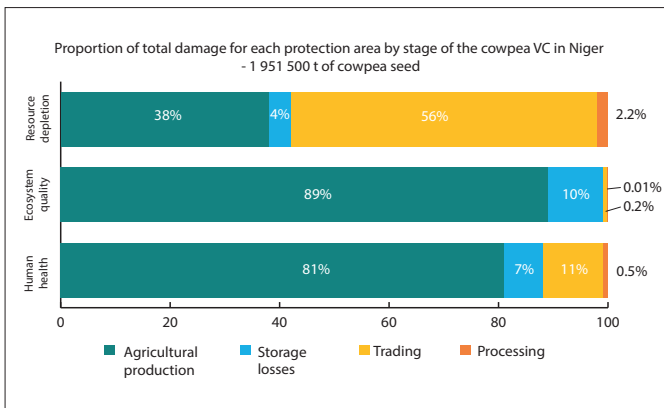


Figure 7 : Environmental damage to the areas of protection

Impact per functional unit tonne and hectare

Environmental damage can be expressed per tonne (t) or per hectare (ha) (Figure 8). Farms with high yields generally have better efficiency per t of product, but this is not the case for cowpea, since in both cases the LFs have the highest impacts, except for ecosystem quality per t. Farms with cropping

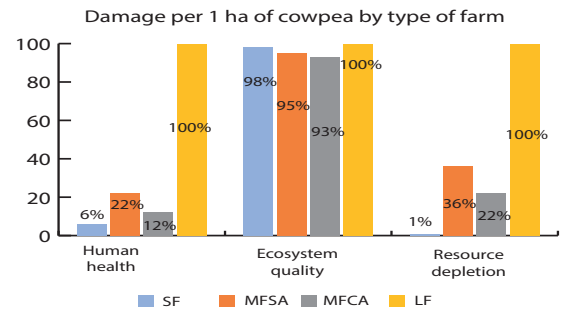
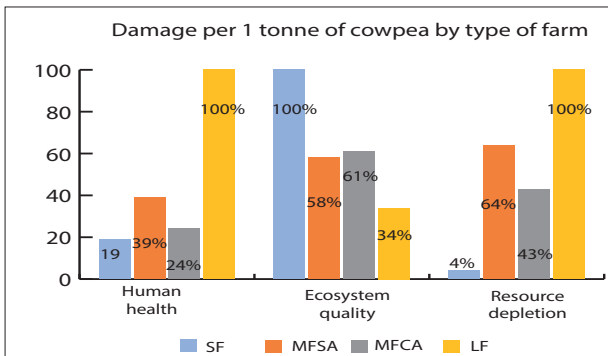


Figure 8 : Damage by functional unit by t and ha

The cowpea value chain in Niger creates limited environmental damage thanks to widespread intercropping practices and low use of inputs at all stages of the value chain. Improvements in yields on farms should be considered from the perspective of the overall functioning of the farming system and not independently for each crop.

associations show the highest environmental efficiency (per t and per ha) despite their relatively low yields.

Impact per sub-chain

For 1 t of cowpea seed, the damage to human health and resource depletion is highest for the export sub-chain, where trading, particularly transport, is the main source of damage (Figure 9). The domestic sub-chains show greater damage to ecosystem quality because of the relatively low yields and therefore extensive use of land by the small and medium-sized farms that supply these markets.

Impact on climate change

80% of the VC's GHG emissions come from farm activities (compost manufacture and use) and, to a lesser extent, from the manufacture of chemical inputs (pesticides and mineral fertilisers). Agroforestry and assisted natural regeneration practices (minimising the need to plough or turn over plots) could make it possible to offset GHG emissions by storing carbon in the soil over the long term.

Biodiversity

The risks to biodiversity are linked to the agricultural system as a whole and are not specific to cowpea cultivation. The expansion of the agricultural border is a major threat that requires action to be taken on all agricultural systems, not just on one crop at a time.

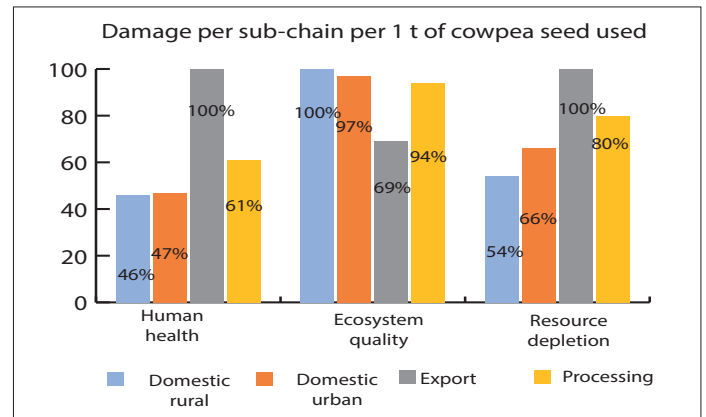


Figure 9 : Damage by sub-chain for 1 t of cowpea seed

Main findings

SWOT Matrix

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> • Good knowledge of cowpea production by farmers • Good organoleptic quality of cowpea • Existence of productive varieties adapted to different agro-climatic conditions and to the various needs of processors and consumers • Active rural youth 	<ul style="list-style-type: none"> • High cost and poor availability of improved seeds, difficulties in accessing productive varieties • Low yields on large farms • Lack of control over the use of pesticides in production and storage (farmers and wholesalers) • Non-uniformity of seed batches (mixtures of varieties in the same packaging) • Lack of processing units and health regulations in place • Inadequate coordination and synergies of interventions to support VC • Problems in accessing credit for producers, processors and other small VC actors
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • Reform of the quality fertiliser supply system • Existence of policies and institutions to secure land tenure from national to local level • Strong and growing domestic (local) and export demand • Several research institutions working on cowpeas 	<ul style="list-style-type: none"> • Lack of traceability of Nigerien cowpeas re-exported to other countries under different names • Irregular rainfall and dry spells in winter intensifying pest attack

Recommendations

At the farm level

- Promoting and disseminating agro-ecological practices: agro-forestry, crop associations, use of organic matter, use of fertilisers for all crops, taking into account the trend towards reducing the amount of land per farm and the low fertility of soils for farms with simple associations
- Improving composting practices to minimise fine particle emissions and increase soil's carbon storage capacity
- Strengthening and developing the variety selection programme to meet grain productivity requirements considering adaptation to soil type and water availability

- Promoting new processing practices: introducing cassava flour (rich in carbohydrates) and baobab powder (vitamins A and C) into the processing processes, integrating women into the processing of doughnuts, diversifying processed products (pasta/spaghetti) by targeting women's processing associations operating near urban centres where demand is high

At the VC level

- Promoting organisations to develop social capital and improve the VC governance

At the trading and processing level

- Developing a storage strategy to minimize the risk of losses and the impact of preserved products on human health (access to triple bagging, drying practices).

Value Chain Analysis for Development (VCA4D) is a tool funded by the European Commission / INTPA and is implemented in partnership with Agrinatura. Agrinatura (<http://agrinatura-eu.eu>) is the European Alliance of Universities and Research Centers involved in agricultural research and capacity building for development. The information and knowledge produced through the value chain studies are intended to support the Delegations of the European Union and their partners in improving policy dialogue, investing in value chains and better understanding the changes linked to their actions. VCA4D uses a systematic methodological framework for analysing value chains in agriculture, livestock, fishery, aquaculture and agroforestry. More information including reports and communication material can be found at: https://capacity4dev.europa.eu/projects/value-chain-analysis-for-development-vca4d/info_en

This document is based on the report Value Chain Analysis of cowpea in Niger by Andres, L., Acosta Alba I., Bodé, S., Habonimana B., Kassoum Biri B., 2023. for the European Union, DG-INTPA Value Chain Analysis for Development Project (VCA4D CTR 2018/392-416). Only the original report binds the authors.

