



Value chain analysis of food flour in Chad

Value chain analyses assist in informing policy dialogue and investment operations. They help the understanding of how agricultural 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://europa.eu/capacity4dev/valuechain-analysis-for-development-vca4d-/documents/methodological-brief-eng>). It aims to understand to what extent the value chain allows for inclusive economic growth and whether it is both socially and environmentally sustainable.

The value chain context

A landlocked Sahelian country in Central Africa with a narrow productive base, Chad continues to face significant development challenges despite the start of oil production in 2003 and its considerable agricultural potential. The country is confronted with security pressures stemming from conflicts in neighbouring states, intercommunal tensions, and the growing impacts of climate change and rapid population growth. As a

result, the Chadian economy remains highly dependent on oil production and exports.

Poverty and vulnerability are at high levels, with 39.5 per cent of the population living on USD 3 or less per day. Food and nutritional insecurity have been rising sharply since 2020. Yet agriculture is the most important source of income in Chad. It accounts for nearly a quarter of GDP and employs around 80 per cent of the working population. It thus makes a vital contribution to the country's economic development. Agricultural production is mainly food-based, largely rain-fed and subsistence-oriented, with a very limited level of technological development and industrialisation. In Chad, agricultural value chains (VCs) remain underdeveloped.

The European Union intervention

The European Union (EU) is funding the Agri-Food Entrepreneurship Support Programme (PEA, €42 million) and the Programme to Strengthen the Resilience of Food Systems (P2RSA, €54 million); two programmes that include support for the local production and marketing of food flours (including fortified infant flours), made from various products sourced from Chadian agriculture. In this context, the EU Delegation commissioned a study on local

food flours to understand the complexity of these highly unstructured value chains. The VCA4D study focuses on the downstream part of the value chain: the processing of cereal, oilseed and protein crop products



Figure 1 : Overall organisation of the value chain for cereals, flours and porridges

Functional analysis

The starting point of this study is the processing and value addition of agricultural raw materials into ready-to-consume agri-food products, specifically cereal flours and porridges. The analysis covers several production processes and product categories: (1) simple cereal flours (millet, maize, sorghum, or rice); (2) enriched or fortified flours for infant porridges (made from combinations of maize, groundnut, cowpea, sorghum, rice, and pearl millet); and (3) ready-to-eat porridges based on rice and groundnut. These products are derived from the maize, rice, sorghum, pearl millet, groundnut, and cowpea value chains and are produced at varying levels of industrialisation. The value chains examined serve distinct consumer segments: plain flours and everyday porridges are consumed widely across the Chadian population, whereas enriched and fortified infant porridge flours are specifically intended for pregnant and breastfeeding women, as well as children aged 6 to 24 months, with the objective of preventing malnutrition and improving nutritional outcomes.

Marketing

Producers, mainly based in the south of the country, sell their products in the fields and/or at weekly markets. They are supplied by wholesalers via a network of collectors, who transport the products to secondary towns (e.g. Pala, Kelo), where they are consolidated in basic stores, then repackaged and dispatched to N'Djamena. Wholesalers pre-finance the collection and supply, and the most influential among them – particularly those with shops in N'Djamena – control the flow of goods and can speculate on prices thanks to their storage capacity.

In N'Djamena and other secondary towns, sales to consumers are made by the sack or at retail. Retailers, the majority of whom are women, have little capital and often buy on credit from semi-wholesalers, whom they repay after resale, making a small profit on the difference between the sack price and the retail price.

Processing

Neighbourhood mills play a central role in the processing of cereals into plain flour, operating primarily as service providers. Consumers bring their grain to the mills for grinding on a daily basis, while cleaning, winnowing, and, where required, soaking are typically carried out by women—whether retailers, consumers, or producers associated with the mill. In addition, some semi-industrial units producing infant cereal flours also manufacture packaged plain flour. Although this flour is generally of higher quality due to improved processing and packaging standards, it is sold at a higher price than flour produced by neighbourhood mills.

Another common product is ready-to-eat porridge made from cereals and groundnuts, sold daily on the streets and in markets by female vendors.

Finally, a small proportion of the cereals and groundnuts is destined for semi-industrial units producing enriched or fortified infant cereals, often supported by projects (including those funded by the EU). These units target institutional and commercial markets, but are constrained by insufficient access to capital and difficulties in business development, which currently makes their business model unprofitable, particularly when they do not diversify their product range.

Governance

In Chad, there is no specific policy to support the processing and marketing of plain flour and the porridge consumed on a daily basis. This sector, which is essential to the population's diet, falls outside the radar of policymakers and development actors, and is only taken into account indirectly, notably through entrepreneurship amongst young people and women. Dominated by women working in the informal sector, it is characterised by low volumes, limited capital and basic equipment. This situation stems from the difficulty of organising a highly fragmented and informal sector, but also from its perception as a domestic activity carried out by women, and therefore not widely regarded as an economic activity, despite its importance for food security and income.

Generally speaking, the cereal and simple flour value chains are very poorly organised, with little or no coordination between the various links and virtually no inter-professional structures, apart from ad hoc arrangements linked to specific projects.



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

Sustainability of stakeholder

The activities are profitable for all stakeholders except for semi-industrial units producing infant cereals for fortified porridge, which face significant operating costs (energy). The largest share of value added (VA) is generated at the producer level (Figure 2), which is not surprising for a minimally processed product produced in systems that use few inputs. Marketing stakeholders generate 19% of the VA, whilst those involved in flour processing or manufacturing account for 13%.

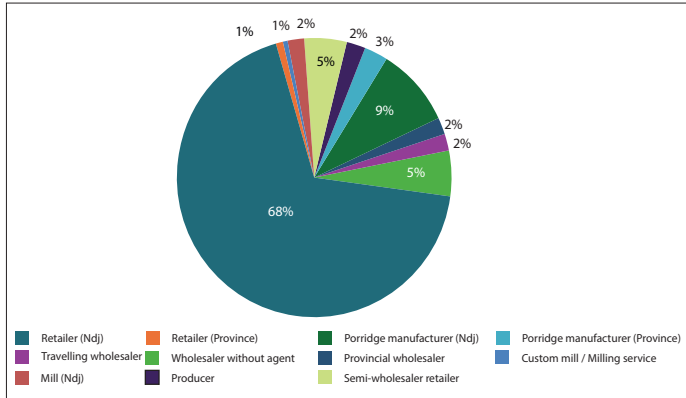


Figure 2 - Breakdown of VA

For the reference year 2024, the sector's total output amounts to 1,533.5 billion CFA francs (equivalent to 2.34 billion euros). VA accounts for 78 per cent of this output, whilst intermediate consumption accounts for 28 per cent (Figure 3).

A closer examination of processed products reveals that porridge production is a highly profitable activity, generating substantial value added that is almost entirely converted into income. This is largely due to its self-employment nature, with very limited operating costs beyond intermediate consumption. Infant flour production units generate more value added than actors involved in marketing and distribution; however, their

net operating income remains constrained by the population's limited purchasing power.

The economic analysis has shown that the value chain for infant porridge flours (enriched and fortified), plain flours (single-cereal products) and everyday porridges is economically viable. It accounts for 12 per cent of Chad's GDP and offers significant income-generating opportunities to stakeholders at all stages of the value chain. The sector relies on agriculture as the core driver of value creation and employment. Trade and processing primarily play a role (albeit an indispensable one) in the distribution of products and in making foodstuffs (such as retail grain or flours) available to consumers at relatively affordable prices. The VC is highly integrated into the Chadian economy, with an integration rate of 89 per cent, meaning that the vast majority of the VC's wealth is created in Chad.

The VC is structurally competitive at the international level. It has an Domestic Resource Cost Ratio (DRC) of 0.62, indicating significant economic efficiency and an ability to generate profits without requiring excessive protection to survive. However, it benefits from a Nominal Protection Coefficient (NPC) of 1.534, which keeps domestic prices approximately 53% above international reference prices through customs duties and a reduced VAT rate, thereby effectively protecting local producers and flour manufacturers. Despite this internal efficiency, the VC's overall competitiveness suffers from a weak multiplier effect and major structural disadvantages, notably the severe deterioration of road and energy infrastructure, as well as a lack of access to finance, which limits capacity for investment, technological renewal and equipment maintenance. Furthermore, producers of high-quality flour on an industrial scale are at a market disadvantage due to the lack of enforcement of norms and standards for all flours.

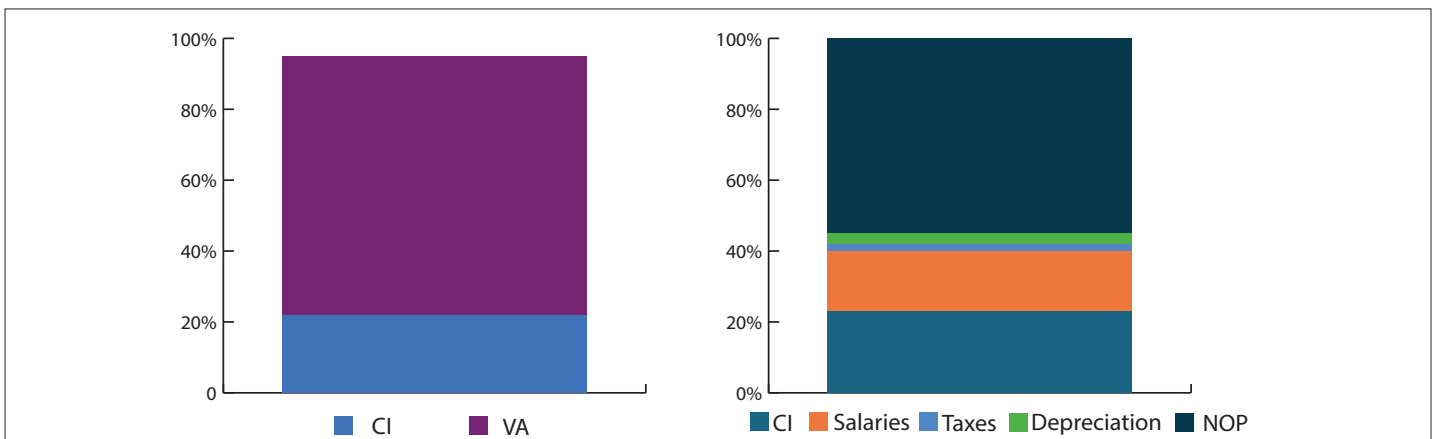


Figure 3 - Composition of production in the value chain for cereals, flours and porridges

In summary, the value chain is structurally competitive but, due to its low multiplier effect, it plays a limited role as a driver for the economy as a whole, despite its potential. It creates significant domestic value added, but remains focused on primary production.

Is the economic growth inclusive?

Income distribution and governance

Agricultural production is highly fragmented and value chains are poorly integrated, both horizontally and vertically. Wholesalers play a central role in governance, providing pre-financing, collection and transport, whilst influencing the prices and volumes brought to market.

The value chain as a whole operates mainly in the informal sector and generates significant employment and income. Women are heavily involved, particularly in processing, but rarely hold decision-making positions and have limited access to capital, land and other factors of production.

This value chain contributes significantly to household food security through self-consumption and is characterised by its inclusive nature (Gini index of 0.2). However, its functioning relies heavily on labour provided by women, marked by

strong family dependence, an excessive domestic workload and inequalities in living conditions, which are not taken into account by the Gini index.

Employment

The VC sector involves around 1,090,000 people, 96% of whom are producers, and generates nearly 890,000 full-time equivalent (FTE) jobs, the majority of which are temporary. Only 1,500 permanent skilled jobs have been recorded. Agricultural production accounts for 92% of jobs, relying heavily on family and seasonal labour. Downstream, small-scale processing creates 4.1 million working days, to which handling jobs must be added. Employment, however, remains characterised by significant gender segregation: men occupy the vast majority of skilled and permanent posts (mill operators, wholesalers), whilst women are confined to agricultural activities or the cleaning and preparation of grains.

Is the value chain socially sustainable?

The table and Figure 4 below provide an overview of the main social impacts of the value chain's activities across six strategic domains.

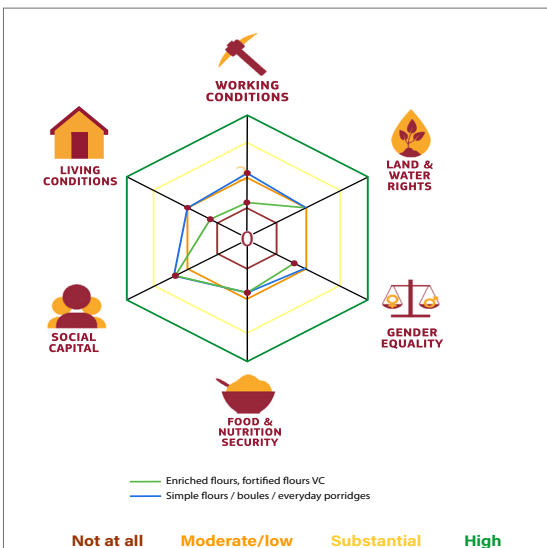


Figure 4: Social profiles of the sub-value chains

Working conditions differ between semi-industrial units and independent processors. Flour retailers and porridge makers face a heavy workload combining production and domestic duties, limiting their access to training. Semi-industrial units offer seasonal employment (around 45 hours per week during the production period) but struggle to ensure their economic viability. This depends on product diversification (including single-ingredient flours), developments in infant formula, or a combination of these strategies. Despite these constraints, enriched and fortified flours meet a national need, whilst plain flours and porridges provide daily sustenance and a subsistence income for many women, who underpin the social sustainability of the sector.

Working conditions	<ul style="list-style-type: none"> Administrative opacity for entrepreneurs (lack of formalisation) Absence of employment contracts and protection for workers. Excessively long working days and precarious working conditions for dockers, cleaners and porridge preparers, due to low margins on the retail sale of flour and porridge.
Land and water rights	<ul style="list-style-type: none"> Limited access for women who are employed or members of groups and production units to ownership of premises and land. Compounding inequalities in access to land, linked to gender and social status, for the key female actors in the value chain.
Gender equality	<ul style="list-style-type: none"> Women make a significant contribution to processing, but have limited access to high value-added activities, capital and profits. Devaluation of the production of plain flour, everyday porridge and retail sales, perceived as 'mums' work' and largely ignored by public policy. The invisibility of processing activities and the domestic overwork of women and girls, limiting access to rights, healthcare and education.
Food and nutrition security	<ul style="list-style-type: none"> Poor nutritional quality and inadequate hygiene controls. Standards that are difficult to access and structural constraints (shortfall in cereal production, low vertical integration, predominantly artisanal processing), limiting the development of semi-industrial and industrial flours. Risk of confusion between fortified infant flours and industrial desserts, due to a lack of standards governing identification, presentation and sale. Lack of a public policy strategy promoting high-quality staple foods.
Social capital	<ul style="list-style-type: none"> High concentration of social capital and market power amongst large cereal traders. Emergence of a few female entrepreneurs in the fortified porridge sector, without challenging the central role of artisanal systems in feeding the population. Limited autonomy of semi-industrial flour-milling units and the absence of an inter-professional organisation.
Living conditions	<ul style="list-style-type: none"> Low levels of school enrolment and healthcare coverage. Reliance on family and local networks as substitutes for social protection, without reducing inequalities for processors, sifter operators and preparers.

Is the value chain environmentally sustainable?

Overall impact on conservation areas

The environmental analysis reveals that the most significant impacts on resource depletion are mainly linked to the high consumption of fuelwood for traditional cooking (porridge, roasting), as well as the extensive cultivation of crops such as maize, groundnuts and sorghum. These crops occupy large areas of agricultural land and gradually degrade soil quality. This continued use of fertile land, combined with low agricultural yields, also contributes to the degradation of ecosystems.

Furthermore, wood-fired cooking is responsible for emissions of fine particulate matter and air pollutants that have harmful effects on human health. Other factors exacerbate these health risks: the inadequate storage of cereals, which encourages the development of aflatoxins (carcinogenic substances), as well as the uncontrolled use of insecticides.

Finally, climate change is primarily fuelled by wood combustion – which alone accounts for 33 per cent of the carbon footprint of porridge – by road freight transport, and by emissions linked to the production of chemical fertilisers for maize.

Impacts by sub-chains and by stage

Environmental impacts vary according to the stages of the value chain. The cultivation phase is a particular area of concern for ecosystems: low agricultural productivity leads to intensive land use and a gradual deterioration in soil quality. Furthermore, the production and application of NPK fertilisers for maize generate direct greenhouse gas (GHG) emissions.

Long-distance road transport by lorry to N'Djamena is a major contributor to the supply chain's final carbon footprint, as well as to the depletion of fossil fuel resources. The processing stage (milling and roasting) is particularly energy-intensive: wood-fired roasting is an environmental hotspot in terms of both human health and the climate, whilst diesel-powered mills emit air pollutants, notably fine particulate matter, which may affect the health of local populations.

In summary, the main environmental hotspots of the value chain are wood combustion, extensive land use, road transport, and the use of diesel as an energy source for processing activities.

Biodiversity

Biodiversity is under direct pressure from land use. To cope with climatic uncertainties and compensate for low agricultural productivity, cultivated areas are continually being expanded at the expense of forests and other vegetated areas, thereby exacerbating the loss and fragmentation of natural habitats. Ecosystems also suffer from the repeated use of monocultures, the absence of diversified crop rotations, traditional practices such as slash-and-burn, and the use of unauthorised herbicides, which deplete agricultural biodiversity and undermine soil resilience.

Conservation frameworks have nevertheless been put in place, notably the National Biodiversity Strategy (SPANB 2025–2030), which aims to protect 30 per cent of the national territory and halve agriculture-driven deforestation. To mitigate these impacts, the government, technical and financial partners, and sector-specific NGOs are promoting approaches that incorporate traditional knowledge, diversified crop rotations and the principles of agroecology.

However, the lack of monitoring infrastructure, the shortage of reliable data and poor coordination between stakeholders severely limit the roll-out and impact of these initiatives on a large scale.

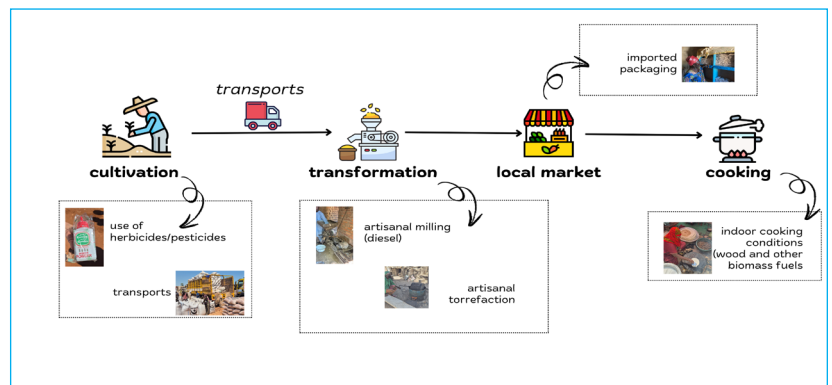


Figure 5. Flow chart of the environmental part

The value chain generates significant environmental impacts: the burning of wood for cooking, extensive land use and road transport are the main climate and health hotspots. Low agricultural productivity, monocultures and unsuitable farming techniques degrade soils and fragment natural habitats, threatening biodiversity. Despite the existence of regulatory frameworks such as the SPANB 2025–2030, their implementation remains limited by a lack of data, coordination and scale of application.

Main findings and recommendations

Policies and aid programmes aimed at improving food security should explicitly target and empower women, not only as beneficiaries but also as key economic actors whose work underpins the food security of households and the country. It is with this focus on effectiveness in mind that gender-sensitive considerations are incorporated into the operational recommendations.

Continue and strengthen support for agricultural production: The study clearly highlights that agricultural production is indeed the main driver of the sector. Domestic production does not meet the population's needs, and producers derive limited income from their crops. It is therefore necessary to continue supporting production, focusing in particular on agroecological intensification, access to inputs, the establishment of financing mechanisms for agricultural activities, advisory services, and monitoring and evaluation (with a focus on disaggregating data by sex).

Strengthen the organisation within the value chains by establishing forums for dialogue to facilitate the development of a shared vision and the development of commercial partnerships between infant formula production units and producers. This also involves creating targeted funding and training mechanisms to help stakeholders – and women in particular – become active participants in the value chain.

Develop downstream activities and processing to improve the availability of high-quality foods: This could notably involve supporting the production of single-ingredient flours by infant formula production units. Developing this type of product will require investment in understanding demand and consumption patterns. The issue of the selling price will also be crucial: it will be necessary to strike the right balance between a price that stimulates the market and appeals to the target population, and between a niche market for a very high-quality but expensive flour and a market for a flour of 'sufficient' quality that is accessible to a wider audience. It

is this kind of thinking that must guide the decision on which product and which process to implement, rather than starting with the production facility and technical capabilities and only then considering the economic fit between the product and demand. This could also involve work on improving the quality of everyday porridges (in terms of both hygiene and nutrition).

Building the profitability and sustainability of infant cereal production units by working on the selling price, considering consumer-level subsidy mechanisms rather than a fixed price, and supporting the units to position themselves in both institutional and commercial markets. Strategies to diversify the activities of infant cereal production units also appear relevant and deserve to be strengthened.



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://europa.eu/capacity4dev/value-chain-analysis-for-development-vca4d->

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