

Analysis of the cassava value chain in the Democratic Republic of Congo

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/value-chain-analysis-for-development-vca4d/wiki/1-vca4d-methodology>). It aims to understand to what extent the value chain allows for inclusive growth and whether it is both socially and environmentally sustainable.

Value chain context

The Democratic Republic of Congo (DRC), one of Africa's largest countries, had an estimated population of 103 million in 2022, with nearly a quarter of its population facing food insecurity. Cassava, one of the country's main food crops, particularly in the Kinshasa production basin, plays a vital role in food security and the economic well-being of many communities

Cultivated for its starch-rich roots, manioc is found to varying degrees in every province of DRC. Its leaves are consumed as a vegetable, while its roots are eaten in various forms (boiled, fried, made into flour or fufou). Industrially, cassava is used as a thickener (in sauces and instant noodles, for example) and in the production of biodegradable plastics. It can also be used as a partial substitute for wheat in bread-making.

EU Intervention

To support the cassava value chain (VC) in DRC, the EU has supported the "ProManioc" initiative, implemented by the World Food Programme (WFP). It is planning new investments in the VC as part of a programme to support priority chains, targeting the fight against food insecurity and the promotion of the green economy, in particular through the development of cassava processing. These projects are part of the "landscape approach" being promoted in DRC, which focuses on protecting biodiversity and reducing poverty through access to renewable energy and greater inclusion in the VCs.

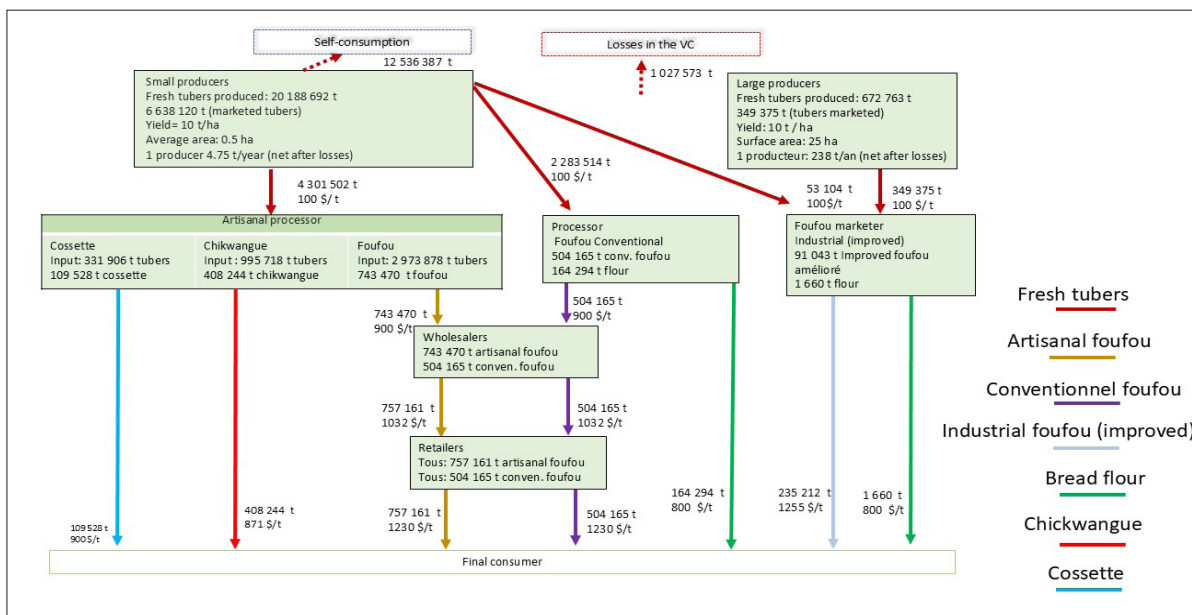


Figure 1: Flow chart for cassava VC in the Kinshasa production basin

Functional analysis

Production

In 2024, cassava production in the Kinshasa production basin (DRC's main cassava production and consumption area, covering some 720,000 km²) exceeded **20.5 million tonnes** (Figure 1). The other production basins (Tshopo, South Kivu, Kasai) are relatively isolated, with few trade links to Kinshasa.

National production by farming households generally meets overall food needs, but is constrained by several factors, including droughts and climate variability, soil degradation, diseases (such as cassava mosaic disease, CMD), and pests.

Two types of producer characterise this VC (Figure 1):

- **Small-scale producer** (around 4 million) produce on average areas of 0.5 ha. They use external labour for ploughing, weeding and stump removal. Farmers with areas ≥ 5 ha sometimes use private service providers equipped with tractors.
- **Large-scale producers** (around 1,500 growers) are generally companies farming more than 10 ha (average of 25 ha in the Kinshasa basin) with tractors acquired either through self-financing or public subsidies. They produce 2% of the cassava roots in the Kinshasa basin.

Cassava is grown in a variety of systems:

- **Inter-cropping** (mainly by small-scale producers): with vegetable crops (aubergine, okra, tomato) for leaf production, or legumes (beans, groundnuts) and cereals (maize, sorghum) to harvest the root.
- **Pure or intensive cultivation:** cassava grown alone, often as a varietal mix, especially by large-scale producers.
- **Agroforestry system:** very suitable for cassava, offering better yields than monoculture, but still not widely used despite over 40 years of positive results.

Processing and marketing

Cassava is processed into various forms: simple flour, porridge, fufu (a dough made from fermented flour), chikwangue (a cooked and fermented dough), cossettes (dried slices grated to make fufu), bread flour and semolina.

Artisanal processing (with manual grating, no mechanical pressing and solar drying) is used to produce artisanal fufu, cossettes and chikwangue. **Conventional processing** (with mechanical graters, manual pressing and solar drying) and **industrial or improved processing** (with mechanical graters, mechanical pressing and instant or flash drying) are used to produce fufu and bread flour, mainly in the Kinshasa production basin.

Transporting cuttings and roots, often from remote areas, represents a major logistical challenge. Traders play a central role in the marketing of leaves, roots, pods and chikwangue.

Wholesalers specialise in distributing fufu through a network of retailers, while artisanal processors market their products directly. Processors, for their part, are integrated into more structured distribution channels.

Gouvernance of the VC

Governance of the VC remains largely informal, with no real structure or dialogue between players. The disconnection between production basins means that markets are fragmented, often organised around urban centres. Formal marketing suffers from a low level of competitiveness, in a business environment that offers few incentives and is characterised by poorly enforced and unpredictable commercial law.

The government supports cassava research; however, the uptake of results remains constrained by the limited effectiveness of the extension system. It also promotes the use of locally produced bread flour, though output remains low and quality is sometimes inferior to imported alternatives. Despite these constraints, the substitution of wheat flour in breadmaking is gradually increasing year on year. This trend is nevertheless hindered by the transfer pricing practices of large flour mills and industrial bakeries, which often favour the import of higher-priced wheat flour.

Horizontal coordination among actors performing the same function remains limited. Vertically, a number of initiatives have sought to improve product quality and efficiency for urban consumers in the Kinshasa production basin. However, the sustainability of these efforts is uncertain, as the integrated formal sector struggles to compete with a largely dominant informal market.



How does the value chain contribute to economic growth?

Impact on the national economy

For the reference year 2024, the cassava VC in the Kinshasa Basin (~65% of the country's production) generated direct value added (VA) of \$2.9 billion (€2.7 billion), and indirect VA of \$206 million (€190 million) produced by indirect players (suppliers of fuel and packaging products, transporters, etc.). Total VA therefore amounted to **\$3.2 billion (€2.9 billion) in 2024**, or 4.9% of the country's GDP. The **rate of integration into the national economy is 94%**, reflecting low dependence on imports, which account for just 6% of the value of production. The direct VA generated by agricultural producers alone represents 28% of agricultural GDP.

Total VA is generated mainly by small-scale producers (60%) and artisanal processors (16%) (Figure 2).

The balance for public finances is positive, amounting to \$171m (€158m). Some subsidies for mechanisation, particularly in the form of tractor donations, have revealed inequities and a lack of transparency in their allocation. In addition, because of the sector's high level of informality, parallel taxes ("tracasseries") persist and can represent up to 40% of the value of production in the most isolated areas. These levies represent a major risk for small producers, who ultimately bear the cost through a reduction in their selling price.

The **balance of trade shows a deficit of €177 million**, due to: i) the use of imported fuel oil for drying in the processing industry and for transport, ii) the deteriorated state of national roads and farm tracks, as well as the ageing of the vehicle fleet, which adversely affect the energy efficiency of the transport sector and lead to high consumption of spare parts, most of which are imported.

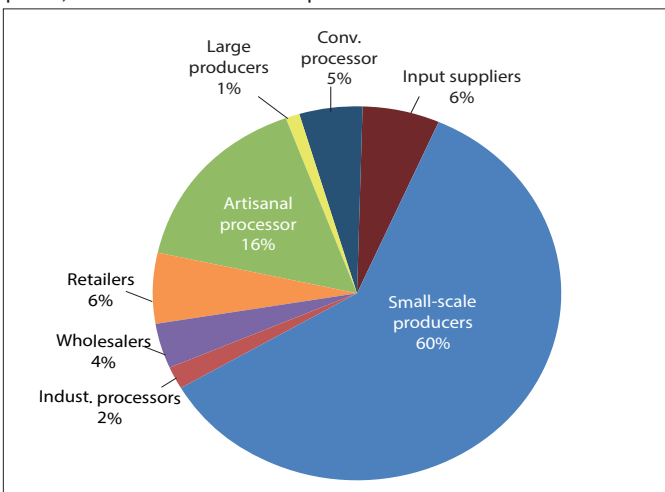


Figure 2: Contribution of stakeholders to income generation (total VA)

Viability of actors

All VC players reported positive net operating income (Table 1), confirming the overall profitability of the activity. However, despite a **high return on turnover (ROT) (76%)**, smallholders remain below the poverty line due to low yields associated with traditional farming techniques and small farm size. Large-scale producers also suffer from low yields, due to a lack of knowledge of the extreme ecological conditions in which cassava grows (marginal and poorly fertile land), a lack of adequate fertilisation (organic or mineral), and losses due to disease and pests.

Artisanal processing is not very profitable because of the considerable physical labour involved, unlike mechanical processing. For traders, cassava contributes to their income, but they also sell other agricultural and household products.

| Type of actor | Annual net operating profit* (NOP) | Return on sales* (ROS) (%) |
|--------------------------|------------------------------------|----------------------------|
| Small producer | 359 \$ (331 €) | 76% |
| Large producer | 11 700 \$ (10 817 €) | 49% |
| Small-scale processor | 3707 \$ (3420 €) | 16% |
| Conventional transformer | 34 302 \$ (31 715 €) | 22% |
| Industrial transformer | 88 060 \$ (81 420 €) | 44% |
| Wholesaler | 25 175 \$ (23 280 €) | 9% |
| Retailer | 534 \$ (494 €) | 13% |

Table 1: Profitability by individual player in cassava VC
*NRE: Net income of the operator less depreciation
** RCA: Net operating profit/value of production

Viability in the international economy

The Nominal Protection Coefficient (NPC) of 1 shows that the **VC is globally competitive**. The Domestic Resource Cost Ratio (DRC) of 0.04 indicates an efficient use of domestic resources, revealing a **comparative advantage** and confirming the international economic viability of the VC.

The cassava value chain in DRC generates income for all players, but small-scale producers are poorly remunerated, mainly because of low yields and isolation, which increase certain costs (transport, bureaucracy). Despite its significant contribution to national and agricultural GDP, the sector suffers from a deficit in the balance of trade, due to its dependence on imports, particularly of fuel and spare parts for old vehicles, which are damaged by the poor state of the roads.

Is this economic growth inclusive?

Income distribution

The bargaining power of the stakeholders is embedded within governance systems based on local customs, traditions and practices. These systems are founded on clan-based family ties, governed by strong rules of customary solidarity, and regulate issues relating to income and credit through urban trading networks.

Total VA is made up mainly of the NOP of direct VC players (70%) and workers' wages (18%) (Figure 3). Small producers (45%) and artisanal processors (12%) account for a large proportion of the VC's NOP. However, the average NOP per small producer remains low (€331/year), due to the large number of players involved (4 million), who share this value.

Jobs

More than 5.4 million people are employed in the cassava VC in DRC which generates around 785,100 jobs (in the 2024 reference year), over 60% of which were for women. This

high level of female participation in cassava VC operations illustrates the empowerment of women, who are active in terms of quality, decision-making and control of household income as well as their own.

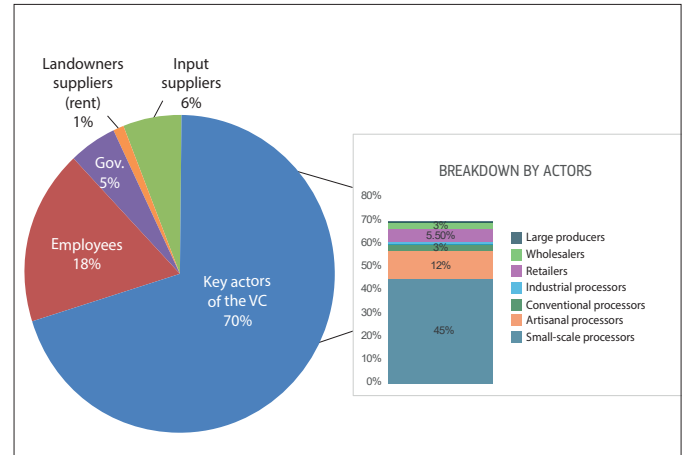


Figure 3 : Distribution of income (total VA) between players in the cassava VC

The cassava value chain in DRC is inclusive for women, offering them access to income and processed products in a context of fragile food security. However, the incomes of small-scale producers remain insufficient, with their annual income still below the poverty line.

Is the value chain socially sustainable?

Figure 4 and Table 2 give a picture of the main social consequences of VC activities in six strategic areas.

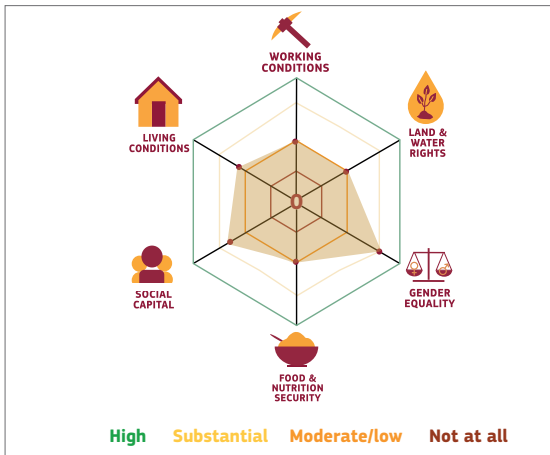


Figure 4: Social profile.

Although the cassava value chain in DRC empowers women, it remains socially vulnerable, with insecure employment, uncertain access to land for women, fragile food security despite the strong contribution of cassava, difficult living conditions and weak collective structures. The arduous nature of the work and the low incomes and wages discourage young people, compromising the future of cassava production.

| | |
|-----------------------------|---|
| Working conditions | <ul style="list-style-type: none"> Weak application of social legislation in production and processing (little security, no formal wages) Involvement of children in certain tasks as family labour, but with risk of exposure to dangerous work Cassava production not very attractive to young people |
| Land and water rights | <ul style="list-style-type: none"> Rights guaranteed by law and local practices Risk of exclusion of women, as inheritance remains the main method of access to land |
| Gender equality | <ul style="list-style-type: none"> Strong presence of women in all VC segments, with a key role in product quality and household income Risk of sexual exploitation of women in exchange for arduous farm work carried out by men in a context of social and geographical isolation Women's very limited access to financial resources |
| Food and nutrition security | <ul style="list-style-type: none"> Availability and accessibility of cassava and its derivatives for consumers, self-consumption by small-scale producers contributing to food security Lack of plant and animal proteins for poor households, especially in remote areas |
| Social capital | <ul style="list-style-type: none"> Dominance of informal relationships, limiting the effectiveness of professional associations and organisations Producers have poor access to extension services and price data Local communities rarely consulted in decision-making |
| Living conditions | <ul style="list-style-type: none"> Low impact of VC on living conditions, particularly in remote areas (lack of drinking water, sanitation and health services) Lack of vocational training for VC operators |

Is the value chain environmentally sustainable?

The environmental impacts of the VC were measured using a Life Cycle Assessment (LCA), covering three areas of protection – resource depletion, ecosystem quality and human health – as well as one impact indicator: climate change. An exploratory analysis was also carried out to identify the risks to biodiversity. The aim is to identify the critical stages in improving the environmental efficiency of the VC.

Damage linked to the agricultural production stage

Cassava production in DRC generates little environmental damage, as current farming practices use few inputs (fertilisers, pesticides) compared with intensive farming systems in other countries. However, **low yields are leading to increased pressure on land, increasing the risk of deforestation and loss of biodiversity**. In particular, cassava contributes, along with other crops, to deforestation in the ‘forest’ subsistence cluster (i.e. northern DRC), where slash-and-burn agriculture of primary forest is accelerating with population growth. On a VC scale, this deforestation accounts for around 35% of total cassava production. In the Kinshasa basin (65% of production), deforestation is caused by charcoal production rather than agricultural production.

Damage by sub-chain

An assessment of the environmental impacts of the four sub-chains modelled in Kinshasa, Madimba, Matadi and Plateau shows that **cassava processing is the main source of environmental impacts in the value chain**, due to the consumption of fossil fuels and electricity. The Matadi sub-chain has impacts that are 70 to 75% lower than the other

three, thanks to a processing system that is less mechanised and less energy-intensive (Figure 5). Energy consumption is directly proportional to the level of technology, but it also offers greater processing efficiency, both in terms of production capacity and the quality of finished products.

Climate change

The cassava VC in DRC emits fewer greenhouse gases (GHGs) than in other producing countries, with the exception of **GHGs linked to deforestation, which add to the VC’s carbon footprint**. This is due to low-intensity farming practices and processing methods based on conventional, energy-efficient technologies. For example, the GHG emissions linked to the agricultural production stage of 1 tonne of fufou are estimated to be five times lower than those of 1 tonne of starch produced by intensive farming using nitrogen fertilisers in Thailand.

Biodiversity

Cassava cultivation affects biodiversity through the use of agricultural inputs (herbicides and pesticides) and deforestation. In DRC, deforestation dominates, destroying ecosystems and causing the disappearance of species. **The future expansion of cultivated areas could exacerbate these pressures, particularly on protected areas in the ‘forests’ livelihood cluster**. In the meantime, efforts to increase yields per unit area through the use of better agronomic practices (agroecology) could limit the impact on biodiversity.

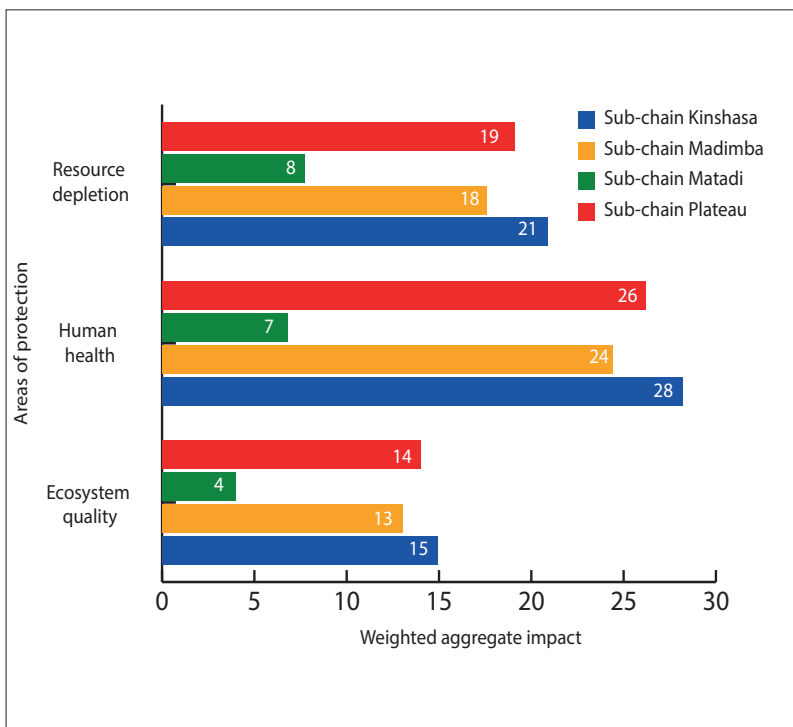


Figure 5: Damage per sub-chain for 1 t of fufu

The cassava value chain in DRC generates relatively little environmental damage compared with other producing countries, due to low-intensity farming and moderate energy consumption during processing. However, deforestation appears to be a priority for public agricultural development policies. To meet the needs of a growing population, priority should be given to the development of agroforestry or combined cropping systems to replace slash-and-burn agriculture, while avoiding the use of intensive agriculture. A rational increase in the use of fertilisers, giving priority to those of organic origin (compost, agricultural residues), can help to improve yields per hectare while limiting deforestation. In terms of processing, the introduction of high-performance technologies (grinders, dryers), using renewable energy or biomass, with low energy consumption and minimal losses, will be essential to contain the increase in environmental impact.

Main findings and recommendations

Strengths and weaknesses of the cassava VC in the DRC

| STRENGTHS | WEAKNESSES |
|--|--|
| <ul style="list-style-type: none"> • Favourable climate and vast agro-ecological potential, tested and adapted agro-forestry systems • Contribution of cassava to food security • Research institutions and development agencies (IITA, IFA, INERA, CIFOR, ENABEL) supporting producers • Growing demand for quality flour • Dynamic manufacturers of processing equipment in the west of the country • Access to alternative energy sources: solar electricity and biomass • Presence of a young working population capable of doing the work • Various forms of local association (tontines, women's mutual societies, youth associations, religious associations, etc.) | <ul style="list-style-type: none"> • Limited knowledge of good farming practices: slash-and-burn farming and long fallow periods, leading to a gradual deterioration in soil fertility • Limited access to improved varieties and poor mechanisation • Lack of storage facilities on farms and in processing units • High dependence on fossil fuels in small processing units • isolated production areas due to the poor condition of farm access roads • High tax pressure, both formal and informal “tracasseries” • Lack of support and interest (motivation) among young people in cassava VC • Low mobilisation capacity of local associations in cassava VC. |

Conclusions

The cassava VC in DRC is profitable and sustainable for most players, despite low incomes for small-scale producers. It promotes the inclusion of women and makes a significant contribution to economic growth, with 94% of the production value remaining in the national economy. However, challenges remain, such as informal taxation and the state of infrastructure.

Socially, cassava is an essential food product, but also a vector of socio-economic opportunities for local communities. However, working conditions, land rights and social capital are based on informal relationships, potentially limiting the effectiveness of solid institutional structures.

The VC currently has a low environmental impact, but this environmental sustainability could be compromised by the expansion of agricultural land and deforestation, the intensification of farming practices and the widespread use of more energy-intensive technologies to meet the demands of a rapidly growing population. The expansion of agricultural land should be curbed through the use of agronomic practices that increase yields per unit area, which would reduce the level of pressure on new land to produce sufficient volumes of cassava to cover felt needs.

Recommendations for making the VC more sustainable

- Improve transport infrastructure to open up production areas and better include small producers in the VC.
- Reduce “tracasseries” linked to informal taxation.
- Invest in the maintenance of agricultural equipment, the production of improved varieties and the creation of collection and storage centres close to cultivation areas.
- Disseminate the results of agronomic research beyond specialised centres in order to promote good practice and improve yields at farm level.
- Identify effective practices to ensure sufficient volumes and stable quality of cassava flour in order to strengthen the substitution of wheat flour in the long term.
- Prevent a rise in environmental impact by: using agroecology or agroforestry as an alternative to intensive farming; optimising energy-efficient drying technologies; using renewable energy boilers (biomass or biogas) to replace diesel.
- Establish a structured institutional framework, both horizontal (organisation of producers) and vertical (inter-professional dialogue), for better governance and fair sharing of added value, in particular by ensuring fair prices for small producers.

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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