



THE PEOPLE'S BANK
Banki yacu, Hafi yacu.

From	Agri Knowledge Centre
To	EMT Members, Agri Commercial Officers (ACO's)
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Subject	Sector Document for the Cassava 2012 – Final
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1. Summary – Quick Guide Cassava Sector

Value chain:

- Production cost RWF 40-50/kg or RWF 120-700,000/ha (depending on fertiliser use, land rental and labour costs).
- Yield of 7-15MT/ha. Production potential is as high as 30 MT/ha.
- Market value relatively stable RWF 50/kg for raw tubers or RWF 300-500/kg for cassava flour.
- Cost competitive with neighbouring countries.

The value chain of cassava has a loose structure as about 85% of the cassava production is consumed locally and is not commercialised! The cooperatives mainly play a role in the collection and processing of cassava as farmers buy little or no planting material and fertilisers for this crop.

Main risks:

- Crop sensitive to viral diseases
- Mostly consumed locally, limited commercialisation
- Market prices are relatively stable but very dependent on quality
- Very small individual plots, usually not best farming land
- Crop can be stored on the field (before harvest) but must be consumed or processed soon after harvest.

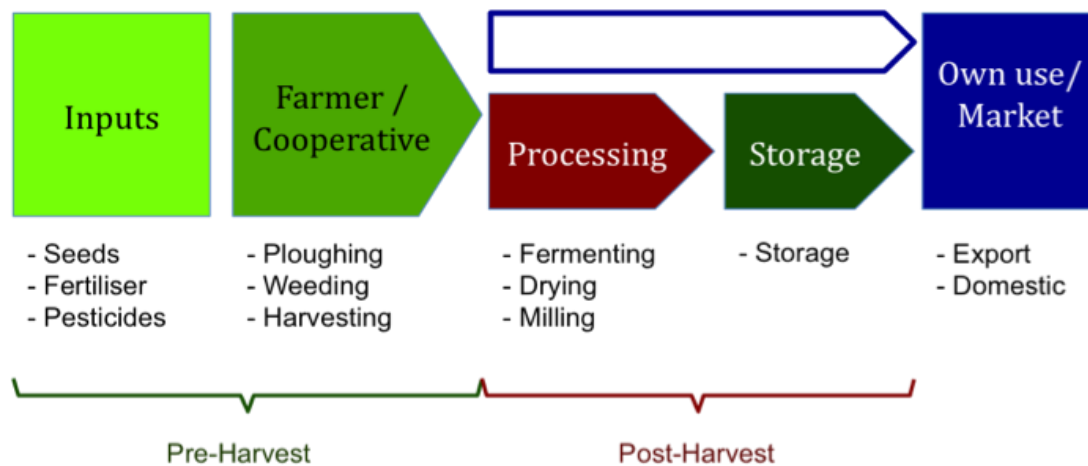
Most of the above risks can be mitigated through adequate farmer and/or cooperative selection, processor evaluation and market price monitoring.

Financing opportunities:

- Post-harvest raw material collection finance for processing plants (cooperatives or private) is the main financing opportunity in cassava. Requires:
 - o Adequate processing facility (at cooperative or private factory level)
 - o Off-take contract for processed products with acceptable counterpart
 - o Tri-partite agreement between cooperative, off-taker and BPR

- Financing strictly limited to agreed % of market value of final product
- Asset finance may be used for equipment of processing plant (buildings, machinery or transport).

2. Value chain



When considering financing the cassava sector, it is essential to understand the value chain structure and its related risks.

Cassava is popular because of its high productivity, ease of cultivation and because it can be harvested over an extended period of time without significant loss of quality or quantity. Furthermore cassava leaves can also be consumed and the stalks are used as planting material.

Cassava or manioc is a plant grown for its tubers (roots) rich in hydrocarbons and starch. The crop was introduced in Rwanda in the 1930's, but it was only in the 1970's that research was undertaken to introduce more suitable varieties.

Cassava production has been relatively stable in Rwanda during the past 10 years, with an area under cassava representing about 10% of the country's arable surface (according to MINAGRI).

Cassava production became affected by a (mosaic) virus that started in the mid 2000's and eventually affected most of the cassava crop in Rwanda with devastating effects for the crop and a shortage of planting material. In 2006 mosaic resistant varieties were introduced and allowed the production to redevelop in the country to a current area of about 90-100,000 hectares. The newly introduced varieties have also enabled cassava yields to increase from an average of 6-8 MT/ha to 10-12MT/ha in the last few years.

New viral diseases, such as the "brown streak", are appearing in Rwanda, requiring new resistant varieties to be developed and disseminated to avoid the production declines as were experienced in the mid 2000's.

While cassava does not require highly fertile soils, the high yield production is limited by temperature and rainfall to some regions of Rwanda, mainly Imbo (along the shores of lake Kivu in the Rusizi and Nyamasheke districts), and Mayaga and Bugesera (southern part of Rwanda in the Kamonyi, Ruhango, Nyanza, Gisagara, Bugesera and part of the Ngoma districts). Some smaller

The production cost for cassava is relatively low ranging from RWF 100 to 120,000 per hectare (without use of fertilisers). With an average sale's price of RWF 50/kg of fresh cassava tubers the production of cassava will yield revenues of RWF 300 to 700,000 per hectare and is therefore quite profitable. The higher yields are, however, only achieved in fertile soils or with the use of adequate quantities of organic matter (with a significant increase of production costs).

Between 80 and 85% of the cassava production is consumed directly by the (small) producers and/or their family and only 15 to 20% of the overall production is commercialised. The value chain of cassava has a loose structure and the cooperatives mainly play a role in the collection and processing of cassava.

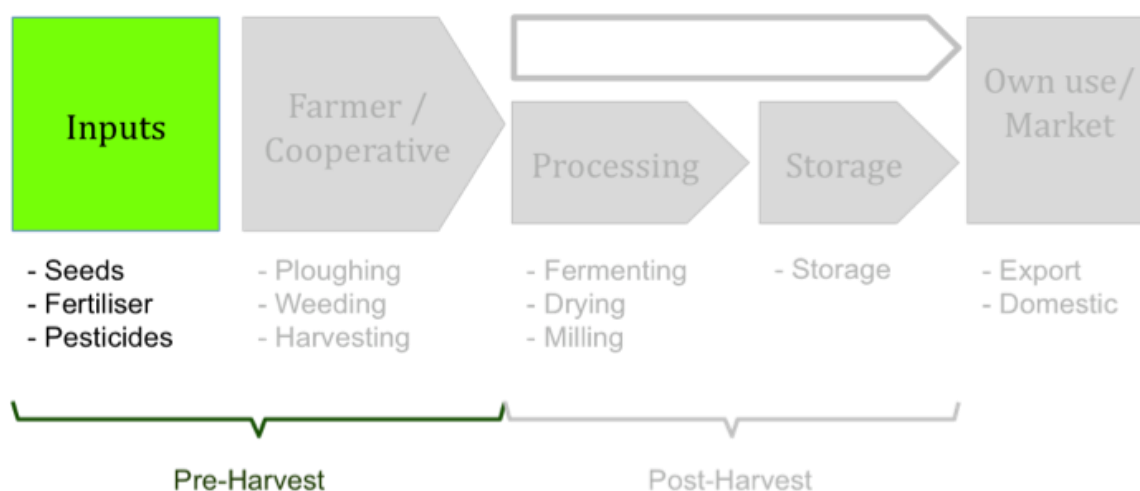
Cassava tubers cannot be stored for more than a few days after harvesting because they will quickly start to rot, therefore roots are usually consumed locally immediately after harvest or processed to allow for storage. There are two main products resulting from processing, dried cassava chips or cassava flour:

- Dried cassava chips (corresponding to about 25% of fresh tubers in weight), sell for about RWF 150 to 250/kg depending on their quality. These are generally produced by the farmers themselves and need to be processed into flour before consumption.
- Cassava flour, produced by milling dried cassava chips, will sell for RWF 300 to 500/kg depending on the quality. While farmers will produce small quantities of cassava flour for their own consumption, commercialised flour is mostly produced by cooperatives or private processing companies.

Most of the commercialised cassava products (chips and flour) are sold in the urban areas of the country or exported.

There is not really a growing season for cassava, as this crop can resist quite well to drought once it is established. However, because the cassava tubers must be processed and dried relatively quickly after harvesting, most of the cassava is harvested during the dry season, when it is easier to dry the cassava chips in the open. Only processing plants equipped with covered drying spaces will operate throughout the rain season without quality consequences for the product.

a) Inputs



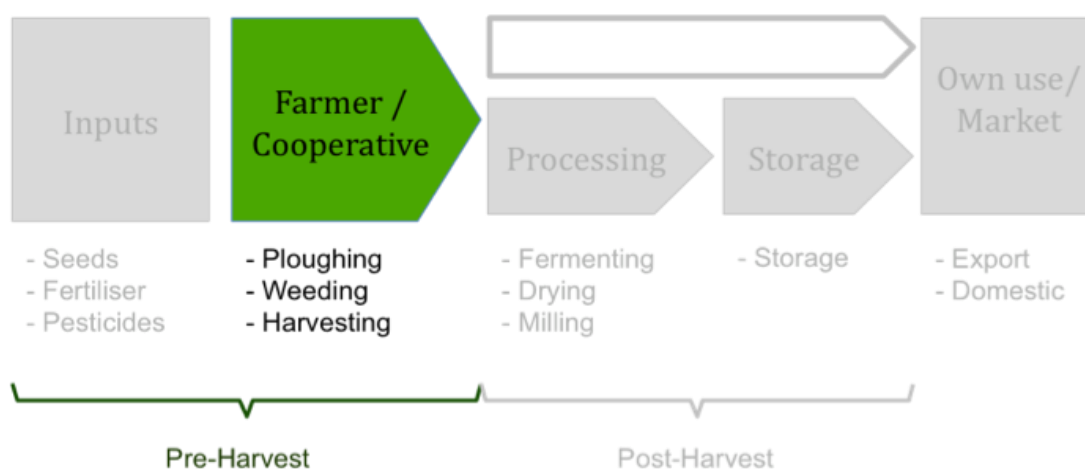
Cassava is a relatively resistant crop that can be grown on less fertile to marginal soils, however yields will significantly improve if cropped in good soils with adequate fertilisation and care.

In Rwanda the use of purchased planting material or fertilisers is very limited in cassava and it does not require the use of any pesticides. Opportunities for input finance is therefore very limited for this crop.

Key issues for inputs:

- Purchase of planting material
- Use of fertilisers

b) Farmer / Cooperative



The crop is attractive for farmers as it requires relatively little attention, is quite resistant to droughts and can be harvested over an extended

period of time, which makes it a suitable crop for marginal parts of the farm land.

The planting material (stalks of about 20-30cm taken from adult plants) is generally kept from one crop to another by the farmer or sourced from vigorous plants in the neighbourhood. With the spread of viral diseases such as mosaic and brown streak, it has been necessary for farmers to use cassava varieties selected for their disease resistance (and higher yields). These selected cassava varieties have also been distributed free of charge to farmers around the country.

The production cycle of cassava is relatively long with a land occupation of about 12 months. Land preparation is minimal, but requiring weeding several times before harvest. Most farmers in Rwanda use little or no artificial fertilisers on cassava, but will apply organic matter when available.

Tubers (roots) will continue to grow if the plants are left in the field for longer periods, however the increased size (which can result in tubers of up to 2m) is offset by a high fibre content and poor taste, making it unattractive to extend the production cycle beyond 12 months.

Fresh cassava has a very limited storage time, generally no more than 3-4 days after harvest in a cool and shaded area and must therefore be consumed or processed soon after harvest. Cassava however has the advantage of being relatively insensitive in yield and quality to the harvest time, which can be spread over several months with no or little loss of production. The long harvest period allows the farmer to spread his/her production according to needs, weather conditions and/or processing or market opportunities.

Unless the production is for own use, the harvested roots will generally have to be transported to a location where these can be processed (fermentation and drying). Transport is however limited as the tubers will quickly start to rot when bruised or exposed to warm temperatures.

The field production techniques are the same for bitter and mild cassava varieties and, including harvest, cost between RWF 120,000 and 700,000 per hectare, depending on production techniques, cost of labour and land rental. Small farmers tend to use only superficial land preparation and harvest the crop gradually to meet their needs, with no or little value allocated to manpower.

Table 1: Illustration of cassava production cost calculation (please note calculation is based on yield of 13.400 kg / ha)

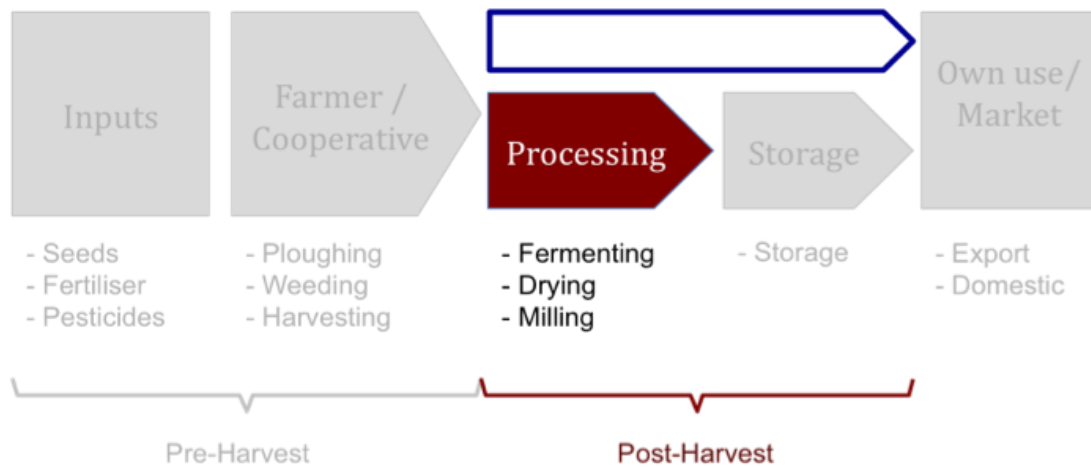
	Unit	Value
Average yield	kg/ha	13.400
Average production cost	Rwf/kg	44
Land renting	Rwf/kg	4,71
Manpower 1st and 2 nd ploughing	Rwf/kg	15,03
Organic fertilizer	Rwf/kg	0,26
Seeds	Rwf/kg	0,51
Small tools (buckets, bowl, basket, bag...)	Rwf/kg	0,80
Manpower Seedling	Rwf/kg	1,51
Fertilizers (NPK, DAP, Urea)	Rwf/kg	0,00
Manpower 1st and 2 nd weeding	Rwf/kg	6,83
Manpower Harvest and transportation	Rwf/kg	7,74
Manpower treatment after harvest	Rwf/kg	1,69
Depreciation of tools (hoe, pump, watering can...)	Rwf/kg	0,19
Others: guarding.....	Rwf/kg	0,15

Source: FIDA - Minagri

Key issues for farmer / cooperative:

- Timing of the year
- Disease resistance
- Yield per hectare
- Cost and distance for transport to a processing plant

c) Processing



(Bitter) cassava is a crop where processing is essential to make it suitable for (human) consumption and storage.

There are a number of processing methods including aerobic and anaerobic fermentation, which aim to reduce the toxic cyanide contained in the tubers (roots).

Mild cassava may also be processed, however in this case processing is essentially done for a purpose of marketing and storage as the peeled tubers may be consumed without fermentation. For all types of cassava the peel must be removed as even sweet cassava contains toxins in its peel.

In Rwanda (bitter) cassava is mostly processed using the anaerobic or wet method. This consists of peeling and seeping the diced tubers (roots) in water for 2-3 days. The fermented cassava tubers or chips are subsequently rinsed, (pressed,) and dried for storage and/or milling.

1kg of fresh tubers will produce about 0.25 to 0.3kg of dried cassava chips or flour. About 80-85% of the produced cassava is retained for local consumption, however the quality of the chips and/or flour by the farmer can be very variable depending on the quality of the water used and the fermentation and rinsing process.

As a by-product of the cassava chips or flour, in processing plants it is also possible to extract starch from the water pressed out of the fermented cassava. Starch represents about 1% of the processed quantity, but attracts a good price of about RWF 2,500 per kg.

Drying capacity is one of the main limiting factors in cassava processing and storage. As a result the largest quantity of cassava is harvested during the dry season(s).

The cost of processing¹ ranges between RWF 280-300 per kg, including raw material costs and excluding amortisations.

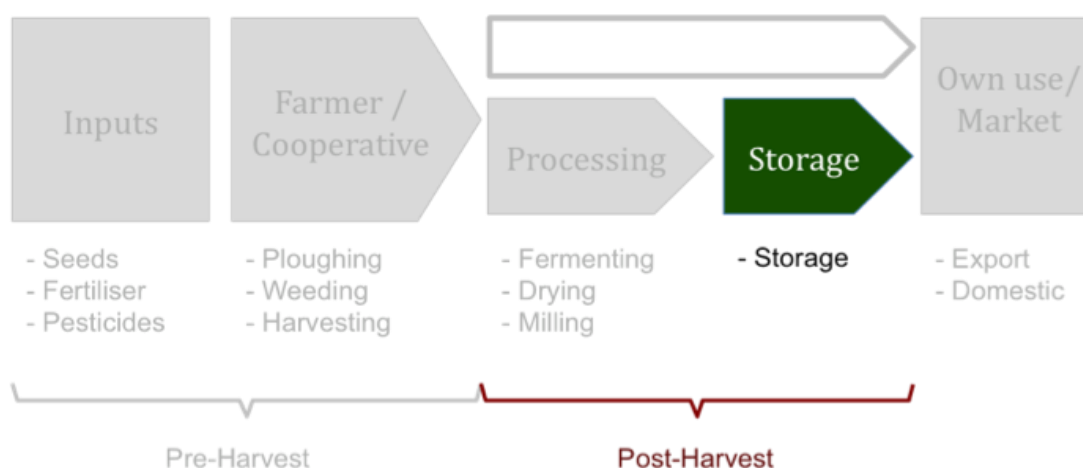
Cassava is milled into flour through a variety of methods ranging from small quantity milling of chips by the farmer him/herself for own consumption to commercial milling with mills with a capacity of 45MT of flour/day such as the one recently completed in Kinazi, Ruhango district.

Commercial milling plants provide a constant and higher quality flour, that is mainly targeted at urban markets and export.

Key issues in processing:

- Availability of raw material at a close distance from processing
- Capacity (essentially limited by the drying capacity)
- Quality of production
- Cost of production
- Quality of dried chips used
- Cost of packaging

d) Storage



Cassava is a unique crop due to several factors: (i) there is no specific harvest time, which can be spread over a period of several months without significant loss of production or quality. It can therefore be “stored” in the field until harvest time for processing or consumption; (ii) the harvested tubers (roots) can only be kept for a short period of time and must be processed or consumed within a few days of harvesting; (iii) most varieties of cassava tubers have to be fermented prior to human consumption; (iv) only dried cassava chips or flour can be stored for a reasonable period of time.

¹ Processing cost includes raw materials, fermenting, drying, milling and packaging

Locally processed cassava will generally be stored in the form of dried cassava chips. The storage is generally done by the farmer in bags or baskets, with a rapid deterioration of the quality due to moisture and pests. Unless cassava chips are dried to less than 13% moisture, fumigated and stored in sealed containers, losses can be as high as 25% after two months of storage.

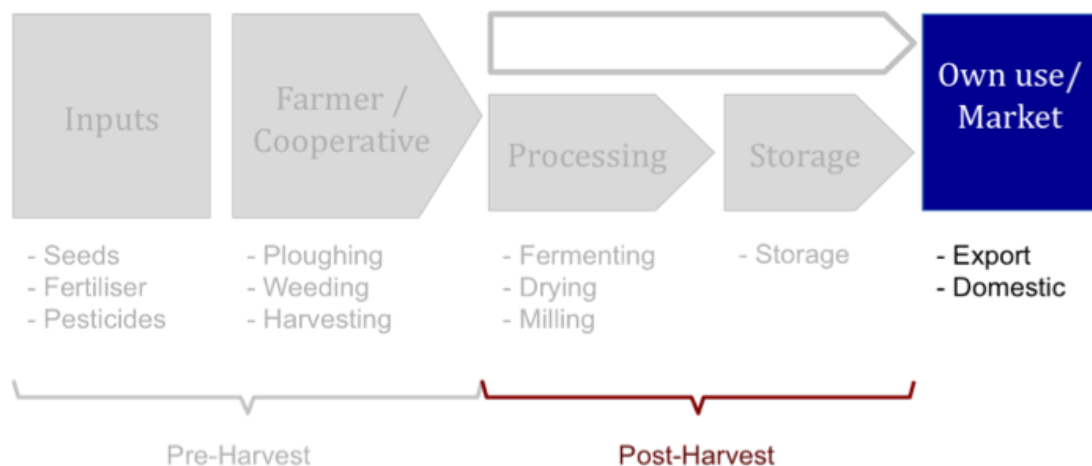
Storing dried cassava chips entails relatively high risks because of: (i) the potential losses due to pests and moisture, which are costly to control; (ii) market prices have limited seasonality (prices can be relatively higher during the rain season, when less cassava is harvested because of the lack of natural drying possibilities, but there is no guarantee that the margin will be sufficient to cover the storage, handling and financing costs) and degradation risks are highest when storage is done during rain season; and (iii) cassava is harvested almost all year round, resulting in unpredictability of price movements.

The dried cassava chips are either milled as and when required for consumption or sold to traders or middle-men.

Key issues in storage:

- Fresh storage in the field
- Type of drying and storage

e) Use / Market



The market for cassava chips or flour in Rwanda's urban areas is estimated to be in the region of 70,000 MT/year, which represents about 15% of the total cassava production.

Cassava producers close to the Kivu lake also sell a significant portion of their production to neighbouring DRC. Furthermore, small quantities are exported for the needs of expatriate communities abroad, including Europe.

Prices for fresh cassava tubers are relatively stable at about RWF 50/kg (2012), however as cassava is very bulky and cannot be stored, these prices are generally only applicable at the farm level and immediate surroundings.

Dried cassava chips sell for RWF 150-250/kg depending on their quality and cassava flour costs between RWF 300 and 500/kg depending on quality.

Demand for cassava currently exceeds production, according to market players, however as cassava is considered a cheap bulk food with limited nutritious value, it tends to be replaced by other products such as bananas, rice and potatoes when not available. Cassava flour prices are therefore relatively stable, although displaying a wide range depending on the flour quality.

Cassava leaves are rich in proteins and may be harvested from the plant to be consumed as vegetables or used as animal feed. In most cases the consumption of leaves does not represent a significant economic component in cassava production as it is for own use.

In Rwanda current cassava production exceeds 2 million MT of fresh tubers (roots), of which about 15% is commercialised in the urban areas of the country.

Key issues in Market:

- Price of products (very sensitive to quality)
- Distance to market
- Competition with other carbohydrates

3. Financing needs

	Input finance	Raw material collection finance	Inventory finance	Asset Finance
Farmers				
Cooperatives		X		X
Processors				X

Any financing opportunity in the cassava business should be considered on the basis of the cash flow that will be generated and how secure this cash flow is. Because cassava is mainly grown in Rwanda for domestic consumption as a source hydrocarbons and that only about 15% of the cassava is commercialised, the financing opportunities for this crop are limited.

a) Farming inputs

The needs for farming inputs in cassava production are limited due to the reuse of own planting material, no or little fertiliser applications and high level of own consumption. The performance risk (crop failure) is relatively low as cassava has a long production cycle and is relatively drought resistant, however very significant yield differences can be expected depending on the farmer skills.

The introduction of new resistant varieties have also improved the yield performance of the crop, even though significant improvements are possible with the adequate use of fertilisers. Financing cassava farming inputs is currently only conceivable for commercial farmers or those operating multipliers of improved planting material for RAB.

b) Asset finance

As the vast majority of cassava tubers must be processed (fermented, dried and milled), financing opportunities exist with cooperatives and/or private processing plants in asset finance.

(Ref. Asset finance product description for further details)

c) Raw Material Collection finance

There is a strong market for cassava in Rwanda as commercial production fails to meet demand. The recent completion of a new large processing plant may help meet some of the demand, however key in the success of this or other processing plants will be their ability to source the necessary raw materials from neighbouring producers. Because farmers have traditionally processed their cassava production to meet their own needs, supplying processing plants with fresh tubers will only be attractive if this can be done against immediate payment.

Financing availability at the plant or cooperative level enables collection finance to be realised to ensure a continuous supply of raw material. Such financing is however only conceivable with the backing of an adequate off-take arrangement for the end-product or an established market position. Although cassava is harvested during most of the year and processing could therefore be relatively continuous, the delay between receiving fresh tubers and sale of finished products may justify the need of financing.

d) Inventory finance

Even dried, cassava chips or flour only has a limited shelf life and is very sensitive to pests. Storage of dried cassava chips should therefore only be considered for relatively short periods of time (maximum 6 months) when the stored cassava chips quality (moisture content, pest infestation, etc.) can be adequately monitored and controlled. Contrary to other commodities where it may be justified to store commodities because of seasonal cycle of the crop prices, in case of dried cassava chips there is no such advantage. One opportunity that could be of interest is financing inventories of cassava chips of cooperatives or processors to be sold to cassava mills or that have already been bought by cassava mills to secure supplies. With reference to our comments above, one of the key conditions is that the quality can be adequately monitored and controlled.

4. SWOT Analysis

The SWOT (strengths, weaknesses, opportunities and threats) analysis of the cassava value chain is summarised below

<u>Strengths</u> <ul style="list-style-type: none">- Suitable soil & climate for cassava- All-year harvest on marginal land- Drought resistant- High yields and low production costs- Stable market demand- Cost competitive	<u>Weaknesses</u> <ul style="list-style-type: none">- Low nutritional value- Long production cycle- Requires processing for storage- Degrades soils- Not very tasty- Toxic if not processed adequately
<u>Opportunities</u> <ul style="list-style-type: none">- Improve nutrition value of the flour by adding proteins such as soja flour or by growing improved varieties- Export potential to African diaspora in Europe and Americas- High yield potential with adequate use of fertilisers	<u>Threats</u> <ul style="list-style-type: none">- Viral diseases development or loss of genetic resistance- Slow distribution of improved (disease resistant) varieties

5. Risks

Key risks	Mitigants
Crop disease	Using selected planting material and good cropping techniques
Theft	Plant bitter varieties (less attractive for theft)
Majority of production is not commercialised (no cash revenues)	Financing through cooperative only based on track record
Price risk	Financing amount based on market prices
Quality of end product	Working with certified processors only

The table below summarises the main risks and mitigants with regard to different financing opportunities in the cassava sector:

a) Raw Material Collection Finance

Financing solution for cooperatives with processing plant to enable cassava aggregation. This financing structure can be implemented with any cooperative that has a trade relationship with a reputable off-taker.

Risk	Description	Mitigant
Usage	Risk that financing is used for other purposes than cassava purchase for aggregation	Disbursement of finance facility subject to raw material collection receipts
Performance	Risk that the cooperative fails to meet its obligations in processing and quality	(i) Cooperative must have adequate processing facility available and assets must be adequately insured; (ii) Processing facility is inspected and certified by RAB; and (iii) Maximum needs should be based on processing bottleneck (usually drying capacity)
Market	Risk that the cooperative is unable to sell the produces (cassava chips or flour)	(i) Purchases should be backed by an off-take ² contract from a reputable party at an agreed quality-related price (ii) Advance rate of X% of market value to mitigate market risk in case of default of off-

² See Off-take Risk

		taker
Price	Risk that the price of cassava chips or cassava flour drops significantly after financing is disbursed	(i) Disbursements are made only on the back of off-take contracts with agreed price; and (ii) Financing is only granted for part of (X%) of the market value (not the off-take price)
Off-take	Risk that the off-take defaults	Agreement should be with reputable counterpart
Payment	Risk that off-taker fails to pay or payment is not used to repay financing	Payment must be made against delivery through cooperative account with BPR (tri partite agreement between cooperative, off-taker and BPR)

b) Inventory finance (Warrantage or WHR)

Financing of stocks of dried cassava chips or flour is not a recommended form of financing because: (i) cassava chips and - even more important - flour can only be stored in very strict conditions (moisture, pest control) to avoid losses; (ii) cassava can be harvested all year and therefore cooperatives and cassava mills do not require significant stocks; and (iii) there is no or very little seasonality in cassava prices that would justify storage. One opportunity that could be considered is financing stocks of cassava chips of either cooperatives that supply a cassava mill or the cassava mill itself that wishes to secure adequate supplies for instance in the rainy season. One key condition is adequate storage to maintain the quality of the cassava chips.

c) Asset finance

Financing of assets for a cassava-processing unit of a cooperative or private company should be considered. Such assets will typically include buildings to accommodate the reception of tubers, peeling, dicing, fermenting, pressing, drying and milling equipment. In addition transport vehicles to collect the tubers from the field and/or delivering the finished products to the urban markets may also be considered.