



# MAFAP SPAANA

Monitoring African Food and Agricultural Policies  
Suivi des politiques agricoles et alimentaires en Afrique

## **ANALYSIS OF INCENTIVES AND DISINCENTIVES FOR CASSAVA IN MOZAMBIQUE**

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OCTOBER 2012



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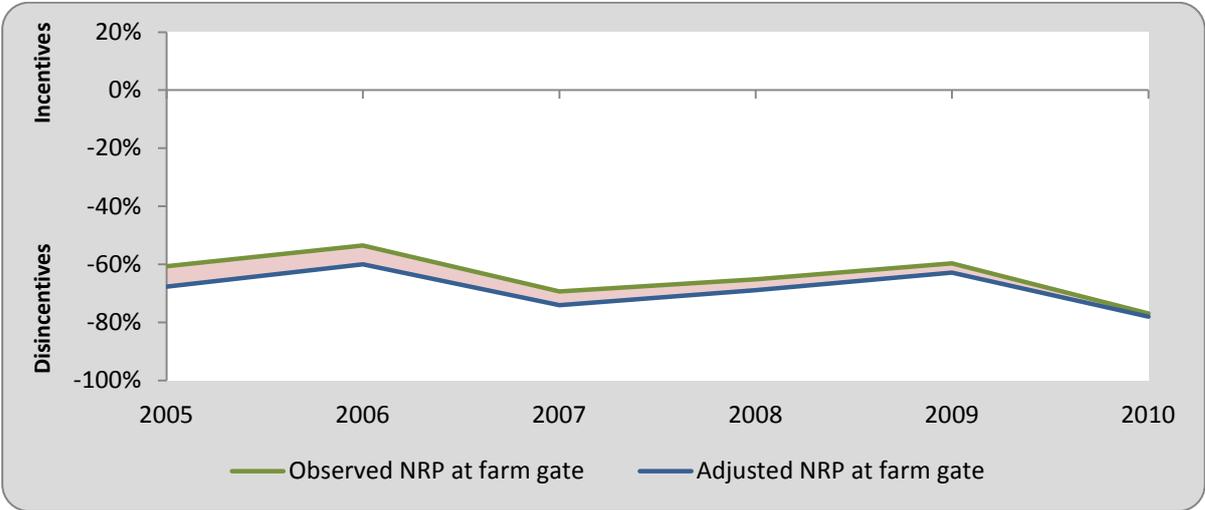
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## SUMMARY OF THE NOTE

Product: Cassava  
 Period analyzed: 2005 – 2010  
 Trade status: Export in all years (mainly to South Africa)

- Cassava is the most important staple food in Mozambique, along with maize, rice, beans and millet. Its production is mainly concentrated in four provinces in central and northern Mozambique (Zambezia, Nampula, Cabo Delgado and Niassa), altogether accounting for over 85 percent of the county’s cassava production in the years 2005 and 2008;
- Production was relatively volatile over the period of analysis, reaching its maximum of 6,7 million tonnes in 2006 compared to 4,1 million tonnes in 2008. Yields followed the same pattern of volatility and reached the maximum of 7,7 tonnes/ha in 2008 compared to 4,3 tonnes/ha in 2005, which is however still below the average of the African countries (9,3 tonnes/ha).



Overall our indicators (observed) show that government policy and regulation throughout the period in analysis did not provide incentives (protection) for cassava producers in Mozambique. This is largely because there are no specific government regulations and policies targeting the cassava sub-sector. The analysis suggests that cassava producers could have received higher prices if there were government policies/intervention targeting the cassava sub-sector.

Disincentives at farm gate have largely been due to: i) low level of farm gate price; ii) asymmetrical distribution of market power between traders and farmers; iii) excessive transport cost; and iv) weak infrastructure.

Actions to be taken to reduce disincentives could include: 1) adoption of specific policies targeting cassava producers, this would contribute to increase the price paid to farmers and reduce the gaps; and 2) investments in modernization of the infrastructure (such as roads) in order to reduce the transport costs, this will contribute to increase the incentives at farm level.

# CONTENTS

- SUMMARY OF THE NOTE.....3
- 1. PURPOSE OF THE NOTE .....5
- 2. COMMODITY CONTEXT .....6
  - PRODUCTION.....6
  - CONSUMPTION/UTILIZATION .....8
  - MARKETING AND TRADE .....10
  - DESCRIPTION OF THE VALUE CHAIN AND PROCESSING.....12
  - POLICY DECISIONS AND MEASURES .....13
- 3. DATA REQUIREMENTS, DESCRIPTION AND CALCULATION OF INDICATORS.....15
  - TRADE STATUS OF THE PRODUCTS .....15
  - BENCHMARK PRICES.....15
  - DOMESTIC PRICES .....16
  - EXCHANGE RATES.....16
  - ACCESS COSTS .....17
  - EXTERNALITIES .....18
  - BUDGET AND OTHER TRANSFERS .....18
  - QUALITY AND QUANTITY ADJUSTMENTS.....19
  - DATA OVERVIEW .....19
  - CALCULATION OF INDICATORS.....21
- 4. INTERPRETATION OF THE INDICATORS .....23
- 5. PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS .....25
  - MAIN MESSAGE.....25
  - PRELIMINARY RECOMMENDATIONS.....25
  - LIMITATIONS .....25
  - FURTHER INVESTIGATION AND RESEARCH .....25
- BIBLIOGRAPHY.....26
- ANNEX I: Methodology Used.....27
- ANNEX II: Data and calculations used in the analysis .....28

## **1. PURPOSE OF THE NOTE**

This technical note aims to describe the market incentives and disincentives for cassava in Mozambique. The note is a technical document and serves as input for the MAFAP Country Report.

For this purpose, yearly averages of farm gate and wholesale prices are compared with reference prices calculated on the basis of the price of the commodity in the international market. The price gaps between the reference prices and the prices along the value chain indicate to which extent incentives (positive gaps) or disincentives (negative gaps) are present at farm gate and wholesale level. In relative terms, the price gaps are expressed as Nominal Rates of Protection. These key indicators are used by MAFAP to highlight the effects of policy and market development gaps on prices.

The note starts with a brief review of the production, consumption, trade and policies affecting the commodity and then provides a detailed description of how the key components of the price analysis have been obtained. The MAFAP indicators are then calculated with these data and interpreted in the light of existing policies and market characteristics. The analysis that has been carried out is commodity and country specific and covers the period 2005-2010. The indicators have been calculated using available data from different sources for this period and are described in Chapter 3.

The outcomes of this analysis can be used by those stakeholders involved in policy-making for the food and agricultural sector. They can also serve as input for evidence-based policy dialogue at country or regional level.

This technical note is not to be interpreted as an analysis of the value chain or detailed description of production, consumption or trade patterns. All information related to these areas is presented merely to provide background on the commodity under review, help understand major trends and facilitate the interpretation of the indicators.

All information is preliminary and still subject to review and validation.

## 2. COMMODITY CONTEXT

Cassava is the most important staple food in Mozambique (notably in central and northern regions), along with maize, rice, beans and millet. Unlike other staple crops, cassava does not require costly inputs (such as fertilizer or agrochemicals) since it can easily adapt to poor soils on which many other crops fail or grow with difficulty (MIC, 2007). Small-scale farming is the dominant mode of cassava production (Table 1); roughly 61 percent of all small-scale farmers are engaged in production of cassava (TIA<sup>1</sup>, 2008).

Cassava is almost exclusively produced for human consumption (more than 90 percent in 2007, see Table 2), evidencing significant importance for food security of the large majority of poor households in the central and north regions of the country where the majority of the population live.

In this respect, increasing cassava production would not only contribute to reducing poverty and hunger in the rural areas; it would also contribute towards reducing the country's food import bill and consequently reducing the trade deficit – one of the biggest problems affecting the Mozambican economy.

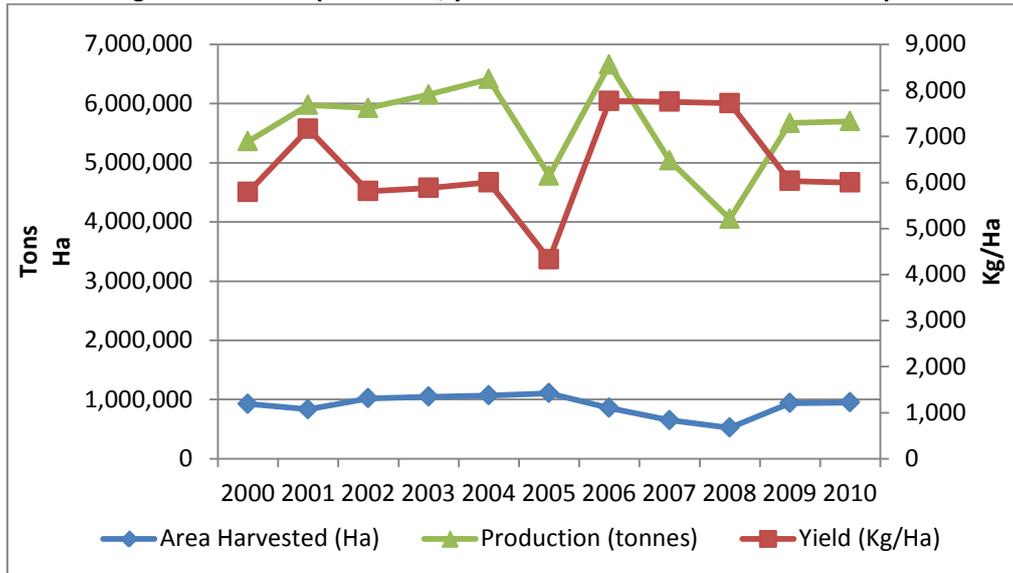
### PRODUCTION

As shown in the Figure 1, cassava production was volatile over the period under review, reaching its maximum of 6,7 million tonnes in 2006 compared to 5,7 million tonnes in 2010. Yields followed the same pattern of volatility and reached the maximum of 7,770 kg/ha in 2006 compared to 6 000 kg/ha in 2010. From 2006, production of cassava reduced significantly reaching its minimum of 4,05 million in 2008 - period of international economic crisis. Several reasons are attributed to this reduction in production: i) bad weather conditions (drought followed by heavy floods) which affected the production areas in the central and north regions of the country (IOF & TIA, 2008); ii) high prices in 2008, which could have influenced cassava producers to engage in production of other cash crops (crop substitution), taking advantage of the increase of prices in the local and international markets; and iii) the international economic crisis which forced the government to reallocate resources to support immediate short term initiatives to buffer the effects of high food prices and price volatility on the poor populations.

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<sup>1</sup> Agricultural Survey (Trabalho de Inquérito Agrícola).

**Figure 1: Cassava production, yields and area harvested in Mozambique**



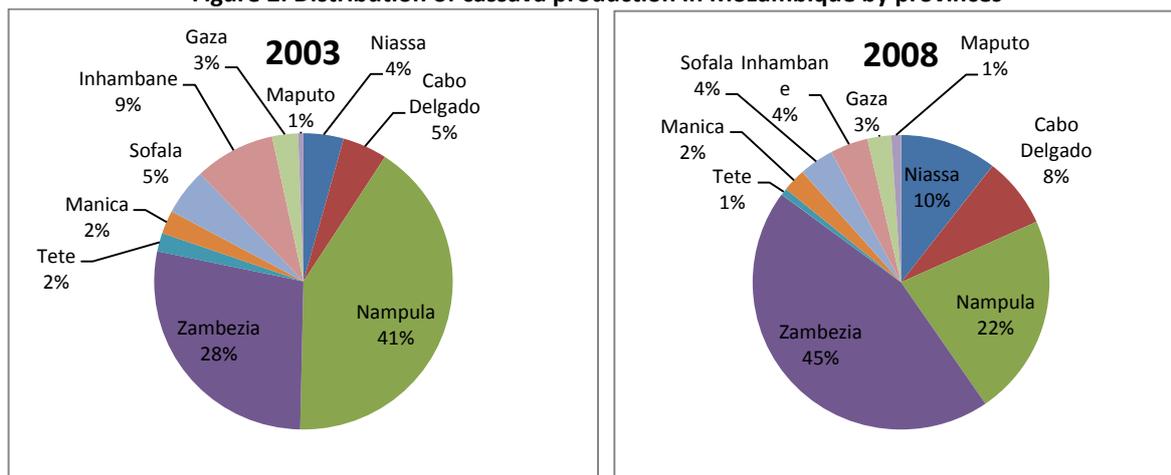
Source: FAOSTAT

As illustrated in Figure 2, production of cassava is mainly concentrated in four provinces in central and northern Mozambique (Zambezia, Nampula, Cabo Delgado and Niassa), altogether accounting for over 85 percent of the county’s cassava production in the years 2005 and 2008. Figure 2 below also shows minimal shifts in the distribution of cassava production between 2005 and 2008. For instance, the share of total cassava production in Nampula decreased by 19 percent between 2005 and 2008. Unlike Nampula, Zambezia’s share of total cassava production increased by 17 percent in the same period of analysis, while Cabo Delgado and Niassa’s share increased significantly. The relatively high increase in production of cassava in the Zambezia province is partly attributed to the increase in cultivated area resulting from the return of people to rural areas (i.e. return to agricultural activities) after the peace agreement in 1992.

Historically, northern Mozambique, especially Zambezia and Nampula province, have always been the most important cassava production regions, contributing with high cultivated area and volume of production.

During the civil war, Zambezia was heavily affected by the civil war, as a consequence, the majority of populations were forced to abandon the rural areas and move to the urban areas in search of security. After the civil war, the government introduced a strategic action plan aiming to incentivize the population to return to the rural areas and engage in agricultural production - Zambezia province benefited from this government plan due to its potential on agricultural production and population dimension. While the decrease of production of cassava in the Nampula province can also be partly attributed to the rising importance of the other sectors (such as mining sector, commerce and construction), which could likely have influenced farmers to abandon agriculture and seek employment opportunities in the sectors above mentioned (attracted by high salaries).

**Figure 2: Distribution of cassava production in Mozambique by provinces**



Source: IAF (2003/2008)

As shown in Table 1, cassava is entirely dependent on smallholder farming; its production is mainly based on *hand hoe and rainfed* agriculture with limited access to inputs and technology (TIA 2008). Crop portfolio diversification (intercrop and crop rotation system) is an effective on-farm strategy adopted by farmers for coping with production risks. Generally, the prevalence of intercropping and the type of crops intercropped with cassava varies by countries and regions. In Mozambique, maize is the most common crop intercropped with cassava, together with banana, rice, yam or sweet potato.

**Table 1: Cassava production by SME<sup>2</sup>**

Production sector	SME
Niassa	43%
Cabo Delgado	78%
Nampula	88%
Zambezia	79%
Tete	8%
Manica	20%
Sofala	32%
Inhambane	78%
Gaza	53%
Maputo	50%

Source TIA, 2008

## CONSUMPTION/UTILIZATION

Estimates from the latest FAO food balance sheet for Mozambique indicate that over 80 percent of cassava is consumed as food, with a remaining small percentage used for feed or industrial materials. In terms of regional distribution of consumption, cassava is the major food staple in central and northern Mozambique, and it is mainly consumed as a staple food in the form of flour - mixed with water to make nutritious porridge (more than 80 percent of total cassava consumed), and also roasted. Fried or boiled fresh cassava roots constitute almost 12 percent of total cassava consumed in the Southern region. In some cases, consumers combine maize and cassava flour together to

<sup>2</sup> SME – Small and medium enterprises.

make porridge (notably in the central region), this depends mostly on the seasonal availability of staple food. Poor households adjust the mixture to accommodate available budgets and taste preferences, because of seasonal variation of the price of maize (Donovan et al. 2011). Also in the southern region, almost 19 percent of cassava is consumed in the form of “*rale*<sup>3</sup>” – at national level it corresponds to 1 percent of total cassava consumed.

Cassava leaves are also consumed in Mozambique, and their consumption varies according to the dietary characteristics of the region. In many cases, they are combined with coconut oil (notably in Zambezia province) or groundnuts (notably in south region) and onions to prepare sauce to eat with cassava or maize porridge, as well as with rice. According to Donovan et al. (2011), depending on the location, cassava leaves account for 3 to 6 percent of food expenditures among low-income households in northern Mozambique.

**Table 2: Trends in cassava consumption and supply quantities in Mozambique**

year	2000	2001	2002	2003	2004	2005	2006	2007
Domestic supply quantity (1 000 tonnes)	5,362	5,975	5,925	6,150	6,413	6,500	6,659	5,039
Food (% of total supply quantity)	77%	72%	76%	74%	70%	73%	72%	94%
Feed (% of total supply quantity)	14%	18%	14%	17%	20%	17%	18%	4%
Other (% of total supply quantity)	9%	10%	10%	10%	10%	10%	11%	2%
Food supply quantity (kg/capita/yr)	225	228	233	229	222	228	224	216
Food supply (kcal/capita/day)	672	680	694	682	659	679	668	628
Protein supply quantity (g/capita/day)	5.5	5.6	5.7	5.6	5.4	5.6	5.5	5.2
Fat supply quantity (g/capita/day)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6

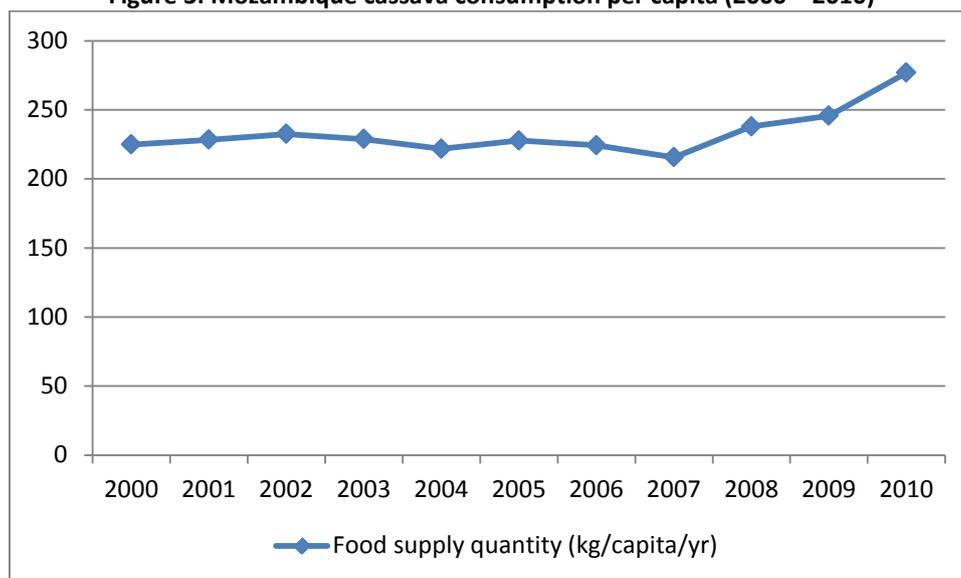
Source: FAOSTAT food balance sheets (2012)

In recent years, the Mozambican Government, in collaboration with local research institutes has been promoting the production of composite flour breads by mixing together wheat and cassava flours. This is part of the government strategy to reduce the price of bread through the substitution of the imported wheat with domestic cassava flour in the production of bread, in order to reduce the import bill and consequently reduce the trade deficit. The industrial processing of cassava is a recent activity in Mozambique, consisting of production of cassava-based clear beer.

One of the most important Mozambican beer industries (*Cervejas de Moçambique*) is testing cassava beer production in Nampula province, and in December 2011 launched *Impala Beer* for the northern market (Donovan et al. 2011). The industrial processing of cassava involves also cassava based-ethanol production, which is in experimental phase in the central region of Mozambique. The increase of cassava production would also contribute to reduce the trade deficit – though the reduction of fuel import bill if there is an increase in the consumption of cassava-based ethanol (for home fuel use). Figure 3 below shows the average annual consumption per capita of cassava between 2000 and 2010. The figure shows a relative stability of per capita cassava consumption from 2000 to 2007. From 2007 (period of international food price crises), per capita consumption of cassava increased slightly, partly influenced by two factors i) the increase in the price of other staples (i.e. maize and rice) in the local market, and ii) the substitution of the expensive staples with the more affordable ones by the poor households (for example maize with cassava).

<sup>3</sup> Roasted cassava roots flour (i.e. cassava is grated, fermented and then roasted to produce flour – typical from the South Region, notably in Inhambane province).

**Figure 3: Mozambique cassava consumption per capita (2000 – 2010)**



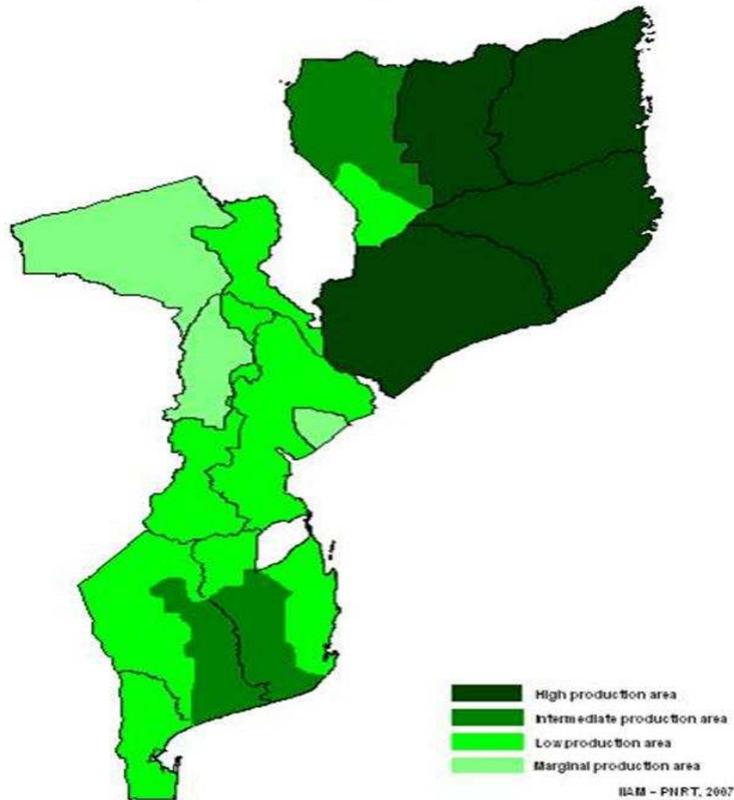
Source: FAOSTAT Food Balance Sheets

## MARKETING AND TRADE

During the colonial period, the Mozambican economy was structured mainly as a service economy for neighbouring states, and integrated into a region dominated by South African industrial capital mainly through the provision of transport services and mining labor. Geographical and historical factors between the regions also contributed to the large differences in cassava production and trade in Mozambique. In terms of regional distribution of economic activities, the country was divided into two regions: the southern region was specialized in providing labor to the mining industry in South Africa, while central and northern regions were dedicated to agriculture. This economic structure still exists, but with some changes due to foreign direct investment in a number of large industrial projects (the so-called “mega-projects”) in the central and southern regions. The production map of cassava in Figure 4 below – the northern region is the major production/surplus areas (green/dark areas in the map).

**Figure 4: Map of production of cassava in Mozambique**

*Potential production Areas of Cassava in Mozambique*



Source: IIAM – MINAG

There is very little international trade in cassava among the majority of producing countries in Africa. Cassava is mostly marketed domestically. In the particular case of Mozambique, it is mainly marketed at national level. Farmers in the northern region (surplus areas) produce cassava for self consumption and the remaining part is sold in the local market. Donovan et al. (2011) argue that northern farmers sell 13 percent of their cassava production compared to only 3 to 4 percent marketed by farmers in central and southern Mozambique. Despite the non-tradability status of cassava in Mozambique, the Mozambican National Institute of Statistics, FAOSAT and UN COMTRADE registered small export quantities of cassava - mainly to South Africa for the period 2005 – 2009, indicating that international trade of cassava in Mozambique is taking place and is expected to continue increasing in the coming years.

Also, there might be significant informal cross border trade on dried cassava in the central and northern regions (notably exports to Malawi in the high crop season), which follows the same pathway of market flow map on maize (see technical note on maize in Mozambique). For the purpose of this study, we selected our segment value chain from the point of competition to the border (i.e. Nampula – Ressano Garcia/South African border), taking into consideration the export data mentioned above.

Another important constraint related to marketing of cassava, is related to the fact that cassava when harvested (fresh) is mainly composed of water (almost 70 percent), which is heavy and difficult to transport over long distances.

In addition, high transportation costs due to the long distance between the production regions (north Mozambique) and deficit areas (central and southern regions) exist and constitute a barrier to transport and distribute cassava (notably fresh) between Mozambican regions. The quality of fresh cassava deteriorates very quickly, and needs to be stored in refrigerators. However, the majority of cassava farmers have no access to electricity and refrigerators – as a consequence - fresh cassava is mostly sold in the markets close to the producing areas. Dried cassava on the other hand can be stored for a long time and it is easier to transport, hence farmers often dry cassava in order to store before eating or selling. This also explains the high share of consumption of dried cassava (notably flour) compared to fresh cassava.

**Table 3: Cassava<sup>4</sup> production and marketing by region in 2008**

Regions	Production	Sales	Production	Sales
	Quantity (1 000 tonnes)		Percentage	
<b>North</b>	1,208	141	85%	93%
<b>Center</b>	100	3	7%	2%
<b>South</b>	110	7	8%	5%
<b>Total National</b>	1,418	151	100%	100%

Source: Donovan et al. (2011)

Table 3 above shows that farmers in northern region account for 93 percent of marketed volumes of cassava in 2008, evidencing the relevance of cassava commercialization in the region. In this respect, we selected Nampula as the point of competition, because it is where the majority of producers are located as well as the most important market of cassava in the country. The analyzed flows are further explained in the chapter on Data Requirements and Calculation of Indicators.

**DESCRIPTION OF THE VALUE CHAIN AND PROCESSING**

As previously mentioned, cassava production and commercialization in northern Mozambique differs from the central and southern regions. Table 3 above shows that volumes marketed in the north are higher compared to central and southern Mozambique.

After harvesting, significant part of cassava undergoes processing (on-farm processing) as it can degrade immediately after harvest and cannot be stored for very long. Depending on the region, cassava is consumed fresh or dry (semi-processed into grated flour to make porridge). When it is not consumed fresh, cassava is processed using different technologies such as the use of simple tools (traditional way of on-farm processing) or mechanical equipments in specialized industries. Because the quality of fresh cassava deteriorates very quickly, farmers keep small quantities of fresh cassava for self consumption and to sell immediately in the nearby market (village market), while the rest of the production (the largest quantity), is peeled and dried by farmers themselves and stored in traditional silos.

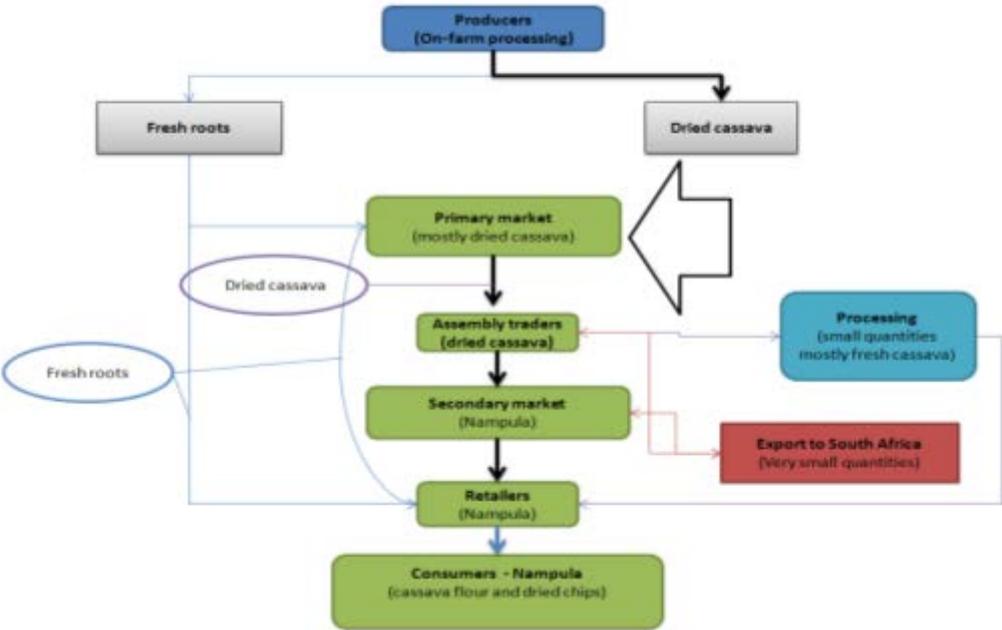
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<sup>4</sup> Quantities given in dry weigh

This study we will focus on price incentives and disincentives for *dry cassava roots*, as it accounts for more than 80 percent of total cassava consumption and is the most marketed cassava product in Nampula market.

As mentioned before, farmers sell dry cassava directly in the nearby market or to the small-skill traders who transport by trucks to the biggest market in the village (primary market). Assembly traders purchase big quantities of cassava in the village markets and transport it by road to the wholesalers in Nampula. Regarding the cross-border trade, cassava is mostly bought by local or foreign traders who sell it directly to retailers or wholesalers in the neighbouring countries (notably in Malawi). Only commercial farmers or traders who have access to storage facilities and financial capacities to support high transportation costs to ship the cassava from producers to the markets are able to take advantages of these market opportunities.

**Figure 5: Simplified marketing chain for cassava in Mozambique**



Source: Authors

**POLICY DECISIONS AND MEASURES**

**International and Regional Trade Policy Measures**

In the last two decades, trade reforms such as the elimination of *exchange controls* and *quantitative restriction on imports and exports* have been implemented by the Mozambican Government in compliance with the *Washington consensus* which was based on market liberalization, fiscal discipline and privatization. Under these reforms, the prices of agricultural commodities and services were liberalized. However there are exceptions – the government fixes the minimum prices for sugar, cotton and petroleum products (MozSAKSS, 2012 and IAM, 2012).

At the international level, Mozambique is a member of the World Trade Organization (WTO) and the African Caribbean and Pacific Group of States (ACP), with preferential trade agreements with member countries.

At the regional level, Mozambique is a member of the Southern African Development Community (SADC) and the Common Market for East and Southern Africa (COMESA) which commits its members to the removal of trade barriers. This should also include the elimination of the application of VAT (value-added tax) on cross-border trade among the SADC countries.

### **Agriculture Inputs Measure/Subsidies**

Mozambique has a wide set of policies targeting the agricultural sector. Unlike in other African countries, cassava is among the main staple crops in Mozambique and the country however does not have a specific policy for the production and marketing of cassava - all policy decisions and measures undertaken by the government aim to improve the agricultural sector as a whole. It is important to note that, despite the absence of a specific policy for cassava, the sector may likely have benefitted indirectly from other policies targeting the agriculture sector as whole.

From the government perspective, cassava remains one of the most important food security crops. In this respect, the government, through the Ministry of Commerce has promoted various studies aimed at exploring prospects for cassava commercialization. In 2004, the Ministry of Commerce initiated a task force to explore regional export market for Mozambican cassava to be used in South African starch plants (Donovan et al. 2011). In 2006 and 2007, the ministry commissioned a strategic cassava subsector review aimed at identifying prospects for commercial development of cassava-based products. This government effort raised awareness of the potential of cassava commercialization in prepared foods, feeds and in starch and biofuel industries (Donovan et al. 2011). The difficulty to access data on a specific amount of subsidies received by cassava farmers hampers the identification of the real impact of agricultural policy on cassava producers and to determine the exact level of budgetary transfers to cassava farmers that were realized. This problem can be solved by public expenditure analysis, which is expected to take place under MAFAP in the future.

### 3. DATA REQUIREMENTS, DESCRIPTION AND CALCULATION OF INDICATORS

To calculate the indicators to estimate incentives or disincentives to production (NRP)<sup>5</sup> as well as the Market Development Gaps (MDGs), several types of data are required. These data were collected and are presented and explained hereafter.

#### TRADE STATUS OF THE PRODUCTS

Cassava is considered as a non-tradable crop at international level and it is only marketed at national level. Farmers in the northern region (surplus areas) produce cassava for self consumption and the remaining part is sold in the local market (fresh and dry cassava). Despite the non-tradability status of cassava in Mozambique, the UN COMTRADE registered small export quantities of cassava - mainly to South Africa, indicating that international trade of cassava in Mozambique is taking place and is expected to continue increasing in the coming years. For the purpose of this study, the trade status of the country is *export* for all years.

#### BENCHMARK PRICES

##### Observed

Calculating a reference parity price to determine whether Mozambique cassava farmers receive market incentives or disincentives requires establishing a benchmark border price. Since cassava is considered an export commodity in Mozambique, a FOB price was calculated based on the unit value using data from UN COMTRADE. The unit value of export obtained from the UN COMTRADE is an annual average for 2006 and is more consistent with the import prices of South Africa from the rest of the World (reported by the Global Trade Atlas), except in 2008 which we consider as an outlier (Table 4). The benchmark price for 2005 and 2007-2010 was estimated by adjusting the value of 2006 with the consumer price index as shown in Table 4 below.

**Table 4: Estimating the benchmark price of cassava with unit value of Mozambican exports to South Africa (USD/tonne)**

	2005	2006	2007	2008	2009	2010
<b>FOB price (Export to SA)</b>	<b>408</b>	<b>462</b>	<b>499</b>	<b>551</b>	<b>569</b>	<b>641</b>
CIF price (SA imports from the World)	454	129	747	2,003	524	809

Source: UN COMTRADE and Global Trade Atlas

It is important to note that, FAOSTAT reports data on export of dried cassava from Mozambique to South Africa for the period 2005-2009, but the unit value calculated using this data is very high and is out of range compared to the value obtained from the UN COMTRADE and the import price of South Africa from the rest of the World. Since the value and quantity of exports (FAOSTAT) are the same (USD 2 000 and 1 tonne, respectively) for the period 2005-2009, there is a probability that this data is referred to a specific year and was replicated to the other years without taking into account the inflection and the volatility of exchange rate in the same period. Efforts are being made with country partners to obtain accrued information on international trade of cassava in Mozambique.

<sup>5</sup> Nominal Rate of Protection (NRP).

## Adjusted

No adjustments to the benchmark price have been made.

## DOMESTIC PRICES

In order to determine the domestic prices it is important to define the *point of competition* where the domestic cassava competes with the international production. Since cassava is exported directly by local or foreign traders, the wholesale market where the domestic cassava competes with the international production will be at the Ressano Garcia border (Mozambique/South Africa border). At the domestic level, *Nampula* is selected as the point of competition as is it the main domestic market of cassava. In this respect, the wholesale/retail price is the price of Nampula (Table 5). The farm gate price is the average of the farm gate prices from the main producing areas in the northern Mozambique (Table 5).

**Table 5: Producer/retail prices of dried cassava (USD/tonne)**

Prices	2005	2006	2007	2008	2009	2010	2011
Producer price (average north region)	2,224	3,503	2,532	3,078	4,432	3,930	3,789
Retail price (Nampula)	4,969	5,627	6,086	6,715	6,933	7,314	6,718
<b>Adjusted wholesale price (Nampula)</b>	<b>4,472</b>	<b>5,064</b>	<b>5,478</b>	<b>6,043</b>	<b>6,240</b>	<b>6,582</b>	<b>6,046</b>

Source: SIMA

It is important to note that, for this study, the wholesale price was calculated by reducing 10 percent of profit margin from the retail price of cassava in Nampula. This choice is made due to the unavailability of the wholesale price for cassava in Nampula.

The data source for the retail and farm gate prices is the SIMA (Market Information System – Ministry of Agriculture, Mozambique). The SIMA collects data on retail prices, farm gate prices and transport costs on a weekly basis for a range of core agricultural products (notably cassava, maize, rice and beans) in 25 urban markets (cities and towns) covering all provinces in Mozambique (Third National Poverty Assessment, 2010).

## Adjusted

No adjustment to the domestic prices has been made.

## EXCHANGE RATES

### Observed

The exchange rate between the Mozambican Metical and the United States Dollar has been taken from the IMF database on exchange rates. The average of the exchange rate for each year has been calculated from the monthly data reported in that database.

**Table 6: Nominal exchange rate MT/USD**

Year	2005	2006	2007	2008	2009	2010
Nominal Exchange Rate	23.06	25.40	25.84	24.30	27.52	33.96

Source: IMF

As shown in the table 6, from 2006 to 2008 the nominal exchange rate was stable, with slight reduction in 2008. The stability of Metical against the dollar (from 2006 to 2008) was due to the good performance of the Mozambican economy as well as the results of monetary reforms introduced by the Central Bank of Mozambique during this period. From 2008, the nominal exchange rate increased slightly reaching its maximum of 33.96 MT/USD in 2010 compared to 23.06 MT/USD in 2005. This was driven largely by the discovery of new vast reserves of coal and natural gas in 2008/2009, which prompted several billion dollar investments by the world's largest mining and oil companies, contributing to real exchange rate appreciation, with negative impact on the real economy (notably export sector). Official projection indicates that the nominal exchange rate is expected to continue appreciating as FDI (as well as foreign aid) rise.

### **Adjusted**

As there is no explicit exchange rate policy nor foreign currency controls there is no justification to considered an adjusted exchange rate.

## **ACCESS COSTS**

Access cost are calculated for two different segments of the cassava value chain, namely: i) the access cost from the farm gate (different villages in northern Mozambique) to the point of competition (Nampula); and ii) from South African border to Nampula. In both routes, cassava is shipped through road transport (SIMA).

According to the agricultural markets information system (SIMA), the transportation cost is the main component determining the access cost of transporting cassava to the point of competition; while all other components of access cost (such as processing storage and handling) are basically incorporated into the transport cost. Also, there is no distinction between the transport costs of the different commodities analyzed by SIMA (cassava, maize, rice and beans), as the unit of measure used by SIMA is MT/distance/tonne. This is also confirmed in the World Bank study on the maize value chain (2004), that the transport cost is one of the main components of access cost in the value chain of maize in Mozambique.

### **Observed**

#### ✓ Farm gate to wholesale

The distance between production villages and the wholesale/retail market (Nampula) is approximately 220 km. All producing villages and the main cassava market (Nampula) are located in northern Mozambique. The total observed access cost from the farm gate to Nampula market ranges from 595 in 2005 to 892 MT/tonnes in 2010 as shown in Table 6 below. The transport cost is the main component of the access cost in this segment of cassava value chain, the other component of access cost is 5 percent trader's profit margins as shown in the Table 6 below.

#### ✓ Border to wholesale

The observed access cost from the border (South Africa) to Nampula was estimated using the average price per tonne/km using the SIMA data. Cassava is mainly transported by road, the distance between Nampula to Ressano Garcia (South African border) is 2 115 km. The transport cost is the main component of the access cost in this segment of cassava value chain; it ranges from 3,153 MT/tonne in 2005 to 3,873 MT/tonne in 2008, as shown in Table 6 below. The other components of access cost are 10 percent profit margins and customs brokers (both estimated) as shown in Table 6 below.

**Table 6: Observed access cost from farm gate – Nampula/market – Ressano Garcia/border (MT/tonne)**

Access cost (MT/tonne)	2005	2006	2007	2008	2009	2010
<b>Farm gate - Nampula</b>						
Estimated average distance (farmers - Market)	Operating within the distance of 220 km					
Transport cost	484	617	632	698	774	696
Profit margins (5 % of producer price)	111	175	127	154	222	196
<b>Total</b>	<b>595</b>	<b>792</b>	<b>758</b>	<b>852</b>	<b>995</b>	<b>892</b>
<b>Nampula - Ressano Garcia (South African border)</b>						
Distance (Nampula – Ressano Garcia)	2,115 km					
Transport cost (Nampula - Maputo)	2,332	2,448	2,801	2,529	2,424	2,469
Transport cost (Maputo - Border)	143	178	196	203	238	331
Profit margins (10 % of wholesale price)	488	553	626	691	713	761
Customs brokers (0.30% to 0.50% of wholesale price)	195	221	250	276	285	304
<b>Total</b>	<b>3,158</b>	<b>3,400</b>	<b>3,873</b>	<b>3,700</b>	<b>3,660</b>	<b>3,864</b>

Source: SIMA and own calculations

### Adjusted

We adjusted the access cost in the segments of the cassava value chain (Nampula – border) by taking out the customs brokers from access cost, in order to see the effect of customs brokering in this segment of the value chain.

Overall, we have not encountered strong evidence of excessive costs that justify substantial/additional adjustments to the observed market access costs in the segments of the cassava value chain (farm gate – wholesale). As a result, the difference between the observed and adjusted access cost (at farm gate) is small, as shown in **Error! Reference source not found.**

## EXTERNALITIES

No externalities have been taken into account in the analysis.

## BUDGET AND OTHER TRANSFERS

Although we are aware of the existence of some specific budget transfer to producers of cassava as a result of subsidies on agricultural inputs to cassava farmers, no specific data on the expenditures targeted towards cassava production are currently available. As consequence we will only calculate NRPs and not NRAs at this stage.

## QUALITY AND QUANTITY ADJUSTMENTS

For this study, producer price is only for dried cassava, as it accounts for more than 80 percent of total cassava consumption and is the most marketed cassava product in Nampula. Given these factors, no quality or quantity adjustments have been applied in this analysis.

It is important to note that, Donovan et al. (2011) consider a quantity conversion factor of 0.35 to convert fresh cassava to dry. A quantity adjustment is justified as the fresh cassava after harvesting is dried (i.e., 1 kg of fresh cassava is equal to 0.35 kg of dry). This conversion factor was not taken into account in our analysis because we are only considering dried cassava processed at farm level (on-farm processing).

Following the discussions above here is a summary of the main sources and methodological decisions taken for the analysis of price incentives and disincentives for cassava in Mozambique.

## DATA OVERVIEW

Following the discussions above here is a summary of the main sources and methodological decisions taken for the analysis of price incentives and disincentives for cassava in Mozambique.

**Table 8: Sources of data used in the calculations of indicators**

Concept	Description		
	Observed	Adjusted	
Benchmark price	FOB price calculated as unit value from export data reported in UN COMTRADE (see Table 4).	N.A.	
Domestic price at point of competition	Constructed by reducing 10 percent of profit margin from the retail price of cassava in Nampula. The data source is the Market Information System – Ministry of Agriculture, Mozambique (see <b>Error! Reference source not found.</b> ).	N.A.	
Domestic price at farm gate	Annual average of the farm gate price in the main producing villages in northern Mozambique as reported by the Market Information System – Ministry of Agriculture, Mozambique (see <b>Error! Reference source not found.</b> ).	N.A.	
Exchange rate	Annual average of exchange rate as reported by IMF (see <b>Error! Reference source not found.</b> ).	N.A.	
Access cost to point of competition	Customs brokers; transport cost from Nampula to Ressano Garcia as reported by the SIMA and 10% margin profit (see Table 6)	Transport cost and 10% margin profit (see Table 6)	
Access costs to farm gate	Transport cost as reported by the SIMA and 5 percent margin profit (see Table 6).	N.A.	
QT adjustment	Bor-Wh	N.A.	N.A.
	Wh-FG	0.35 conversion ratio from fresh cassava to dry. But was not taken into account in our analysis.	N.A.
QL adjustment	Bor-Wh	N.A.	N.A.
	Wh-FG	N.A.	N.A.

Source: authors

The data used for this analysis is summarized below.

**Table 9: Data and values used in the calculations of indicators**

		Year	2005	2006	2007	2008	2009	2010	
DATA	Unit	trade status	x	x	x	x	x	x	
Benchmark Price		Symbol							
	Observed	USD/TONNE	Pb(int\$)	407.58	461.54	499.21	550.77	568.68	640.91
	Adjusted	USD/TONNE	Pba						
Exchange Rate									
	Observed	MT/USD	ERo	23.06	25.40	25.84	24.30	27.52	33.96
	Adjusted	MT/USD	ERa						
Access costs border - point of competition									
	Observed	MT/TONNE	ACowh	3,158.38	3,400.13	3,873.14	3,699.69	3,660.21	3,864.50
	Adjusted	MT/TONNE	ACawh	1,921.69	2,176.10	2,381.79	2,627.78	2,713.22	3,014.58
Domestic price at point of competition		MT/TONNE	Pdwh	4,472.20	5,064.26	5,477.63	6,043.35	6,239.86	6,582.24
Access costs point of competition - farm gate									
	Observed	MT/TONNE	ACofg	595.42	791.68	758.48	852.00	995.36	892.08
	Adjusted	MT/TONNE	ACafg						
Farm gate price		MT/TONNE	Pdfg	2,223.53	3,502.83	2,531.83	3,078.19	4,432.35	3,929.51
Externalities associated with production		MT/TONNE	E						
Budget and other product related transfers		MT/TONNE	BOT						
Quantity conversion factor (border - point of competition)		Fraction	QTwh						
Quality conversion factor (border - point of competition)		Fraction	QLwh						
Quantity conversion factor (point of competition - farm gate)		Fraction	QTfg						
Quality conversion factor (point of competition - farm gate)		Fraction	QLfg						

## CALCULATION OF INDICATORS

The indicators and the calculation methodology used are described in Box 1. A detailed description of the calculations and data requirements is available on the MAFAP website or by clicking [here](#).

### Box 1: MAFAP POLICY INDICATORS

MAFAP analysis uses four measures of market price incentives or disincentives. First, are the two observed nominal rates of protection one each at the wholesale and farm level. These compare observed prices to reference prices free from domestic policy interventions.

Reference prices are calculated from a benchmark price such as an import or export price expressed in local currency and brought to the wholesale and farm levels with adjustments for quality, shrinkage and loss, and market access costs.

The **Nominal Rates of Protection - observed (NRPo)** is the price gap between the domestic market price and the reference price divided by the reference price at both the farm and wholesale levels:

$$NRPo_{fg} = (P_{fg} - RPo_{fg}) / RPo_{fg}; \quad NRPo_{wh} = (P_{wh} - RPo_{wh}) / RPo_{wh};$$

The  $NRPo_{fg}$  captures all trade and domestic policies, as well as other factors which impact on the incentive or disincentive for the farmer. The  $NRPo_{wh}$  helps identify where incentives and disincentives may be distributed in the commodity market chain.

*Second* are the **Nominal Rates of Protection - adjusted (NRPa)** in which the reference prices are adjusted to eliminate distortions found in developing country market supply chains. The equations to estimate the adjusted rates of protection, however, follow the same general pattern:

$$NRPa_{fg} = (P_{fg} - RPa_{fg}) / RPa_{fg}; \quad NRPa_{wh} = (P_{wh} - RPa_{wh}) / RPa_{wh};$$

MAFAP analyzes market development gaps caused by market power, exchange rate misalignments, and excessive domestic market costs which added to the NRPo generate the NRPa indicators. Comparison of the different rates of protection identifies where market development gaps can be found and reduced.

In this analysis, only Nominal Rates of Protection were calculated and the results are presented in Tables 10 and 11 below.

**Table 7: MAFAP price gaps for cassava in Mozambique 2005-2010 (MT/tonne)**

	2005	2006	2007	2008	2009	2010
Trade status for the year	x	x	x	x	x	x
Observed price gap at wholesale	-1,769	-3,259	-3,549	-3,641	-5,749	-11,319
Adjusted price gap at wholesale	0	0	0	0	0	0
Observed price gap at farm gate	-3,422	-4,029	-5,736	-5,754	-6,561	-13,079
Adjusted price gap at farm gate	-4,659	-5,253	-7,228	-6,826	-7,508	-13,929

Source: Own calculations using data as described above

**Table 8: MAFAP nominal rates of protection (NRP) for cassava in Mozambique (2005-2010)**

	2005	2006	2007	2008	2009	2010
Trade status for the year	x	x	x	x	x	x
Observed NRP at wholesale	-28.34%	-39.16%	-39.32%	-37.60%	-47.95%	-63.23%
Adjusted NRP at wholesale	0	0	0	0	0	0
Observed NRP at farm gate	-60.61%	-53.49%	-69.38%	-65.15%	-59.68%	-76.90%
Adjusted NRP at farm gate	-67.69%	-59.99%	-74.06%	-68.92%	-62.88%	-78.00%

Source: Own calculations using data as described above

**Table 9: MAFAP Market Development Gaps for cassava in Mozambique 2005 - 2010 (MT/tonne)**

	2005	2006	2007	2008	2009	2010
Trade status for the year	x	x	x	x	x	x
International markets gap (IRG)	0	0	0	0	0	0
Exchange policy gap (ERPG)	0	0	0	0	0	0
Access costs gap to wholesale (ACGwh)	-1,237	-1,224	-1,491	-1,072	-947	-850
Access costs gap to farm gate (ACGfg)	0	0	0	0	0	0
Externality gap	0	0	0	0	0	0

Source: Own calculations using data as described above

## 4. INTERPRETATION OF THE INDICATORS

Figure 6 and Figure 7 below show price gaps and nominal rate of protection for cassava producers in northern Mozambique. The price gaps provide an absolute measure of the deviation of domestic price (farm gate and wholesale) from the comparable export price, while the nominal rate of protection is the price gap in relative terms. The market development gap measures the deviation between the observed and adjusted access costs from farm gate to wholesale, which is important to identify potential inefficiencies along the value chain.

It is important to note that, the indicators for incentives/disincentives calculated for this study represent a small part of the cassava sub-sector. At international level, the indicators cover a small quantity of cassava exports to South Africa and help to understand the potential and challenges of cassava commercialization in Mozambique.

### Wholesale indicators

The observed and adjusted price gaps at wholesale are negative and indicate a strong deviation of wholesale price from the comparable export price in all years under analysis. The price gaps (observed) range from -1,769 MT/tonnes in 2005 to -11,319 MT/tonnes in 2010. Regarding the NRP, it is negative in all years under analysis and ranges (observed) from -28 percent in 2005 to -63 percent in 2010, evidencing non protection (disincentive) of cassava wholesalers which seems to increase over the years under review (Figure 6). The non protection of cassava wholesalers is in line with the fact that among the group of most important staple crops, only cassava does not receive any support from the government (MDC, 2007).

### Farm gate indicators

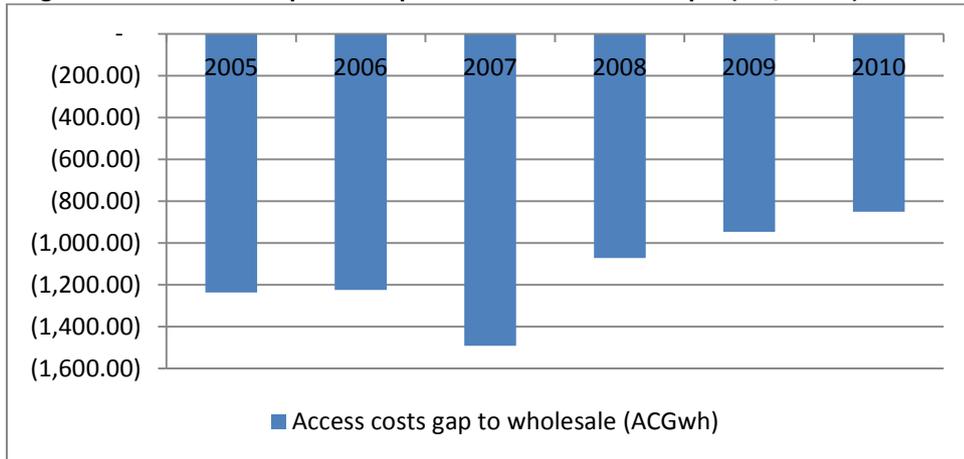
Similar to the wholesale indicators, the observed price gaps at farm gate are negative and range from -3,005 MT/tonne in 2005 to 13,079 MT/tonne in 2010, indicating a strong deviation of producer price from the comparable export price in all period under review. The observed NRP show a disincentive for cassava producers in all years under analysis and range from -61 percent in 2005 to -77 percent in 2010. The adjusted NRP follows the same trend and are relatively higher than the observed. The small difference between the observed and adjusted NRP suggests limited efficiency gains along the value chain. A better value chain functioning from the farm gate – wholesale - point of competition should address the excessive transport cost, weak infrastructure<sup>6</sup> and asymmetrical distribution of market power between traders and farmers. This difference (observed Vs. adjusted NRP) constitutes a market development gap, as shown by the negative access cost to farmers in Figure 6, which means that through investment and increased competition, the market access costs between farmers and wholesalers could be reduced by up to 1,491 MT/tonne, for example in 2007 (Figure 6).

Overall, the price gap at farm gate is higher than at wholesale, indicating that farmers are selling cassava at very low prices, likely due to unbalanced bargaining power between farmers and traders, lack of information, difficulties to access market and other inefficiencies along the cassava value chain which was not captured by the data.

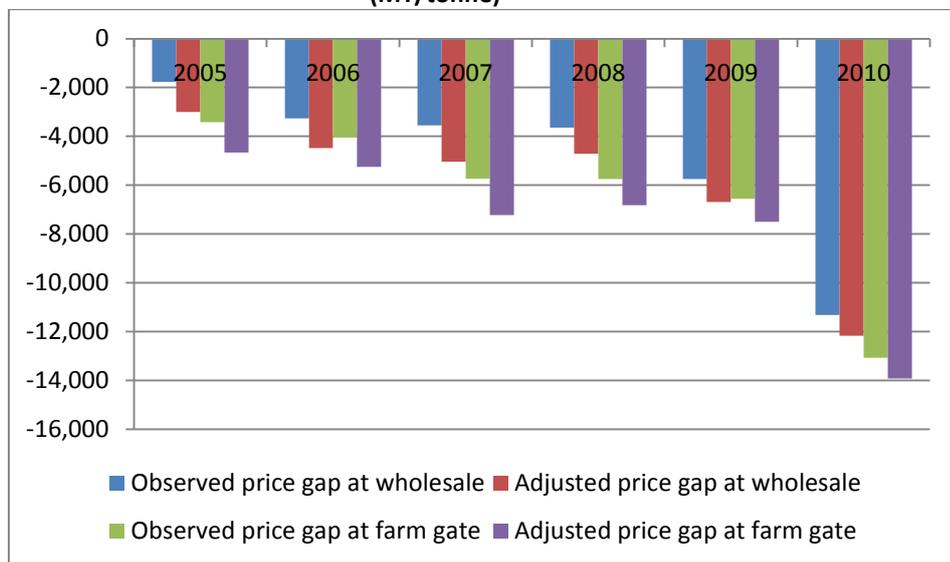
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<sup>6</sup> For example, the majority of roads in the producing villages (farm gate - Market) are not paved and it is difficult to circulate in the rainy season.

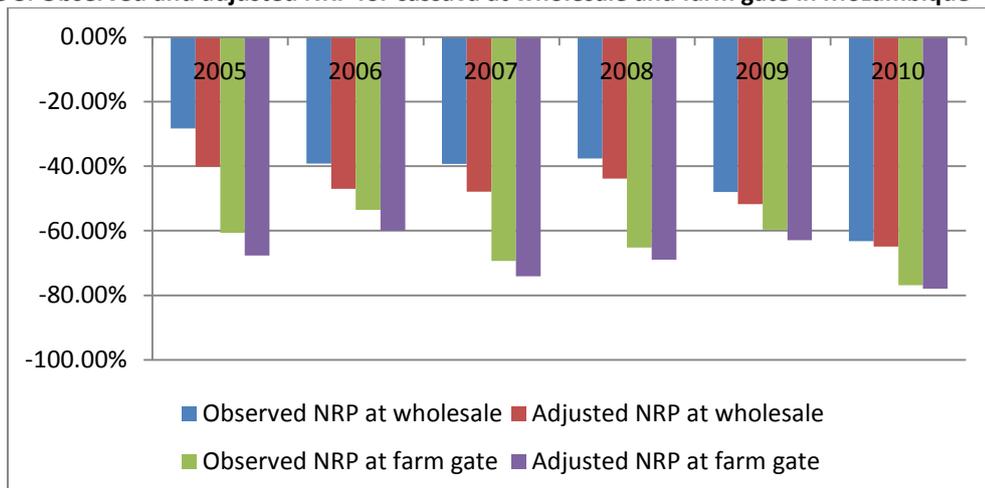
**Figure 6: Market Development Gap for cassava in Mozambique (MT/tonne)**



**Figure 7: Observed and adjusted price gaps for cassava at wholesale and farm gate in Mozambique (MT/tonne)**



**Figure 8: Observed and adjusted NRP for cassava at wholesale and farm gate in Mozambique**



## **5. PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS**

### **MAIN MESSAGE**

Despite the non-tradable status of cassava in Mozambique and the calculation of indicators based on a small volume of international trade of cassava reported by the UN COMTRADE, the estimated indicators show a disincentive (non protection) at both farm gate and wholesale levels in the whole period under review, indicating that cassava producers could receive higher prices than they are receiving if there were government policies/intervention targeting the cassava sub-sector.

At present, Mozambique does not have a specific policy targeting the cassava sub-sector; however recent government efforts have focused on research and studies to explore prospects for cassava commercialization. It is hoped that this analysis, which contributes to a better understanding of disincentives (challenges) faced by cassava producers in the northern Mozambique, provides a framework to potentially influence the government to develop policies for the cassava sub-sector such as removing the inefficiencies along the cassava value chain.

### **PRELIMINARY RECOMMENDATIONS**

Given the recent emergence and growth of the cassava processing industry in Mozambique, there is a need to adopt/develop specific policies targeting cassava producers and wholesalers. This would contribute to increase the price paid to farmers and reduce the gaps above mentioned. This will also contribute to attract farmers to engage more in cassava production and will contribute to increase the competitiveness in the sector.

### **LIMITATIONS**

The major limitation is the unavailability of data on international trade of cassava. Our benchmark price was calculated based only on the export unit value of cassava of 2006. Efforts should be made to sensitize policy makers and all stakeholders of the importance and need for reliable data to calculate the indicators. Also, the collection of data on informal cross-border trade is important on calculation of indicators.

### **FURTHER INVESTIGATION AND RESEARCH**

Our analysis has focused mainly on exports to South Africa due to the unavailability of data on export/import to other neighboring countries. As the main producing area and the main point of competition is located in northern Mozambique (notably Nampula), this analysis would benefit from further market analysis considering Nampula as point of competition and Milange as the border where cassava is exported to Malawi. A comparison with the analysis of incentives and disincentives for cassava producers in Malawi would probably provide interesting additional insights.

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## **ANNEX I: Methodology Used**

A guide to the methodology used by MAFAP can be downloaded from the MAFAP website or by clicking [here](#).

## ANNEX II: Data and calculations used in the analysis

Name of product		Cassava								
International currency		US Dollars (USD)		Local currency		Meticals (MT)				
DATA		Unit	Symbol	Year	2005	2006	2007	2008	2009	2010
			trade status		x	x	x	x	x	x
<b>Benchmark Price</b>										
	Observed	USD/TONNE	$P_{b(int\$)}$		407.58	461.54	499.21	550.77	568.68	640.91
	Adjusted	USD/TONNE	$P_{ba}$							
<b>Exchange Rate</b>										
	Observed	MT/USD	$ER_c$		23.06	25.40	25.84	24.30	27.52	33.96
	Adjusted	MT/USD	$ER_a$							
<b>Access costs border - point of competition</b>										
	Observed	MT/TONNE	$ACo_{wh}$		3,158.38	3,400.13	3,873.14	3,699.69	3,660.21	3,864.50
	Adjusted	MT/TONNE	$ACa_{wh}$		1,921.69	2,176.10	2,381.79	2,627.78	2,713.22	3,014.58
<b>Domestic price at point of competition</b>										
	Observed	MT/TONNE	$P_{dwh}$		4,472.20	5,064.26	5,477.63	6,043.35	6,239.86	6,582.24
<b>Access costs point of competition - farm gate</b>										
	Observed	MT/TONNE	$ACo_{fg}$		595.42	791.68	758.48	852.00	995.36	892.08
	Adjusted	MT/TONNE	$ACa_{fg}$							
<b>Farm gate price</b>										
	Observed	MT/TONNE	$P_{dfg}$		2,223.53	3,502.83	2,531.83	3,078.19	4,432.35	3,929.51
	Adjusted	MT/TONNE	$E$							
	Externalities associated with production	MT/TONNE	$E$							
	Budget and other product related transfers	MT/TONNE	$BOT$							
	Quantity conversion factor (border - point of competition)	Fraction	$QT_{wh}$							
	Quantity conversion factor (border - point of competition)	Fraction	$QL_{wh}$							
	Quantity conversion factor (point of competition - farm gate)	Fraction	$QT_{fg}$							
	Quantity conversion factor (point of competition - farm gate)	Fraction	$QL_{fg}$							
CALCULATED PRICES		Unit	Symbol		2005	2006	2007	2008	2009	2010
<b>Benchmark price in local currency</b>										
	Observed	MT/TONNE	$P_{b(loc\$)}$		9,399.19	11,723.44	12,899.80	13,384.05	15,649.07	21,765.30
	Adjusted	MT/TONNE	$P_{b(loc\$)_a}$		9,399.19	11,723.44	12,899.80	13,384.05	15,649.07	21,765.30
<b>Reference Price at point of competition</b>										
	Observed	MT/TONNE	$RPO_{wh}$		6,240.81	8,323.30	9,026.66	9,684.37	11,988.86	17,900.80
	Adjusted	MT/TONNE	$RPA_{wh}$		7,477.50	9,547.34	10,518.02	10,756.27	12,935.85	18,750.72
<b>Reference Price at Farm Gate</b>										
	Observed	MT/TONNE	$RPO_{fg}$		5,645.39	7,531.63	8,268.18	8,832.36	10,993.50	17,008.72
	Adjusted	MT/TONNE	$RPA_{fg}$		6,882.08	8,755.66	9,759.54	9,904.27	11,940.49	17,858.63
INDICATORS		Unit	Symbol		2005	2006	2007	2008	2009	2010
<b>Price gap at point of competition</b>										
	Observed	MT/TONNE	$PGO_{wh}$		(1,768.61)	(3,259.05)	(3,549.03)	(3,641.02)	(5,749.00)	(11,318.56)
	Adjusted	MT/TONNE	$PGA_{wh}$		(3,005.30)	(4,483.08)	(5,040.38)	(4,712.92)	(6,695.99)	(12,168.48)
<b>Price gap at farm gate</b>										
	Observed	MT/TONNE	$PGO_{fg}$		(3,421.86)	(4,028.80)	(5,736.36)	(5,754.18)	(6,561.15)	(13,079.21)
	Adjusted	MT/TONNE	$PGA_{fg}$		(4,658.55)	(5,252.84)	(7,227.71)	(6,826.09)	(7,508.14)	(13,929.13)
<b>Nominal rate of protection at point of competition</b>										
	Observed	%	$NRPO_{wh}$		-28.3%	-39.2%	-39.3%	-37.6%	-48.0%	-63.2%
	Adjusted	%	$NRPA_{wh}$		-40.2%	-47.0%	-47.9%	-43.8%	-51.8%	-64.9%
<b>Nominal rate of protection at farm gate</b>										
	Observed	%	$NRPO_{fg}$		-60.6%	-53.5%	-69.4%	-65.1%	-59.7%	-76.9%
	Adjusted	%	$NRPA_{fg}$		-67.7%	-60.0%	-74.1%	-68.9%	-62.9%	-78.0%
<b>Nominal rate of assistance</b>										
	Observed	%	$NRA_o$		-60.6%	-53.5%	-69.4%	-65.1%	-59.7%	-76.9%
	Adjusted	%	$NRA_a$		-67.7%	-60.0%	-74.1%	-68.9%	-62.9%	-78.0%



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