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Cassava Commercialization in Malawi

by

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by

Emma Kambewa

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EXECUTIVE SUMMARY

Malawi continues to rely on maize for household food security. Policies to enhance food security continue to target maize production. Traditionally production and use of cassava was localized in lakeshore areas until the past two decades when maize production was increasingly affected by rainfall variability. Cassava as an alternate food crop has rapidly gained popularity and commercialization of the cassava sector is steadily taking off. Policy and institutional support to diversify the food security basket and promote the diversified applications of cassava in non-food sector has propelled cassava production in nontraditional growing areas. Production has more than quadrupled over the last decade with production of sweet cassava rapidly expanding in nontraditional areas.

The main cassava production and marketing season occur concurrently between October and February. Farmers harvest cassava just before and during the rains in order to replant without losing seed. Farmers in the north tend to have a late peak season than in the southern and central regions where the rains start. The major market centers, where cassava converges from various supply zones, tend to experience extended cassava season than in the individual supply zones.

Increasingly more enterprises and companies are getting involved in the cassava value chain. There are more than five active large farms producing cassava targeting industrial users. Four biscuit manufactures, over 10 large-scale bakeries and over 15 small-scale enterprises are substituting cassava flour for wheat flour in their businesses. The biscuit manufacturers substitute up to 10% wheat flour in the low budget biscuits. They increase the rate of substitution when high quality cassava flour is available. The packaging industry – the largest starch users – strives to substitute all the 450 tons of imported cornstarch with cassava starch. Currently they only get less than 1% locally. It is estimated that over 8,000 tons of cassava flour and chips are absorbed in the food-processing sector with over 500 tons in the non-food sector. Over 80,000 tons of dried cassava chips are sold in the informal markets for food security.

In the informal sector, traders operating at wholesale and retail levels dominate the fresh cassava value chain. Over 4,500 traders operate in the major markets i.e., Mzuzu, Lilongwe, Blantyre, Zomba, and Kasungu and the assembly markets such as Mpamba, Namwera, and Bunda turn off. Between 25-40% of these are women who operate mainly during peak season selling boiled cassava strategically targeting schools, workplaces, and hospitals.

The highest cassava/maize substitution for food security occurs in drought years. In good maize years, double as much cassava flour is sold to make up for the deficiency in maize flour between December and February. During drought years, sales volumes for cassava flour for food security increases between 7-11times depending on the scarcity of maize. During such years, consumers use up to 50-100% cassava flour in making a traditional dish – *nsima*.

Cassava prices increase by 10 to 20% during lean maize period (December to February) when demand for cassava increases. In drought years, prices for cassava flour more than doubles depending on the scarcity of maize on the market.

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ACRONYMS

ADD	Agricultural Development Division
ADMARC	Agricultural Development and Marketing Corporation
ADP	Area Development Program
CATISA	Cassava Transformation in Southern Africa
C: AVA	Cassava: Adding Value for Africa
CMRTA	Chinangwa and Mbatata Roots and Tubers Association
FAO	Food and Agricultural Organization
GISAMA	Guiding Investments in Sustainable Agricultural Markets in Africa
GoM	Government of Malawi
Ha	Hectare
HQCF	High Quality Cassava Flour
IITA	International Institute for Tropical Agriculture
ILRI	International Livestock Research Institute
IPMS	Improving Productivity and Market of Ethiopia Farmers Project
Kg	Kilogram
Km	Kilometer
MEDI	Malawi Entrepreneur Development Institute
MCI	Millennium Cities Initiatives
MK	Malawi Kwacha
MoAFS	Ministry of Agriculture and Food Security
MSU	Michigan State University
NGO	Non-Governmental Organization
NORAD	Norwegian Agency for Development Co-operation
PIM	Packaging Industries Malawi Limited
RAIPLY	Raiply Malawi, Ltd.
SARRNET	Southern African Root Research Network
USD	United States Dollar
VCC	Vale Columbia Center

1. INTRODUCTION

Malawi continues to rely on maize for household food security. Policies to enhance food security continue to target maize production. Since the 1999/00 season the Government of Malawi (GoM) has implemented the starter pack, targeted input and input subsidy programs primarily to boost the production of maize for food security through seed and fertilizer subsidy.

Historically, cassava production and consumption as a staple food has been localized along lakeshore districts such as Nkhata Bay, Nkhota Kota, Salima, and Mulanje. Cassava was considered a food supplement to maize based traditional dishes as early as 1930's (Sauti, Davies, and Chaponda 1981). With maize production facing challenges due to increasing rainfall variability, cassava is rapidly gaining popularity as a food security crop. Over the past decade, cassava production has spread across nearly all districts and production is steadily increasing. Enabling policy and institutional support to diversify the food security basket and promote the diversified uses and applications of cassava for non-food uses has facilitated the uptake of cassava production in nontraditional cassava growing areas.

This study builds on previous studies done by Kambewa and Mahungu (2007), and Kambewa and Nyembe (2008) to understand the commercialization of cassava in Malawi. The study focuses on the following:

(a) Geographical dispersion of cassava production, supply, and consumption zones;
(b) Substitution of cassava for maize and/or wheat products;
(c) Price seasonality in relation to maize harvests and price, and wheat price;
(d) Perceptions on how cassava volumes and timing of cassava sales change, if at all, during years of maize shortages and of maize surpluses;
(e) Gender roles in the cassava value chain in order to understand roughly the role of men and women;
(f) Seasonality of cassava marketing to understand when cassava products are in plenty or scarce supply; and
(g) The emerging large-scale cassava sector, markets they target, and the trend.

The analysis is based on interviews conducted in July 2010 in Blantyre, Lilongwe, and Mzuzu as major markets, and Lilongwe, Nkhata Bay, Zomba, and Kasungu as major supply areas. Key informants, farmers, extension workers, traders, processors, and industrial users (wood industries, bakeries, packaging industries, and livestock producers) were interviewed. Data from the Ministry of Agriculture and Food Security (MoAFS) were used in trend analysis.

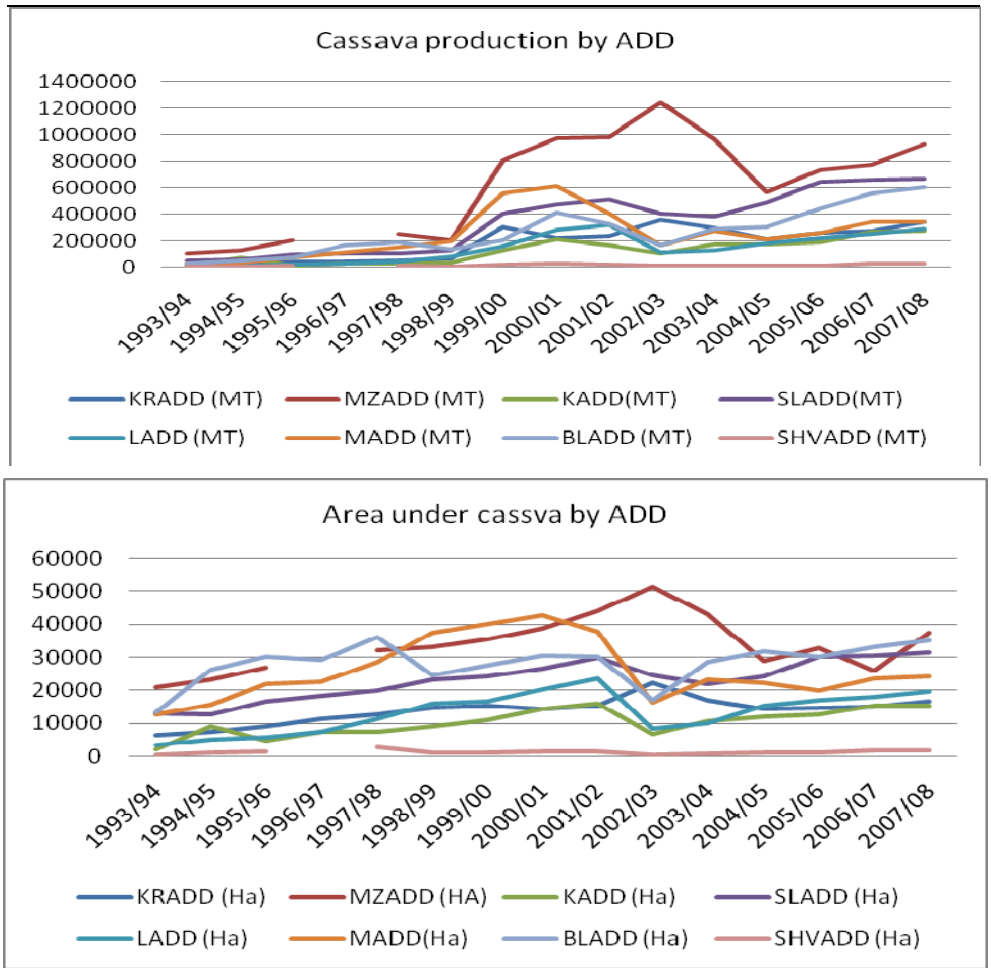
2. GEOGRAPHICAL DISPERSION OF CASSAVA PRODUCTION

Malawi is divided into eight Agricultural Development Divisions (ADDs) based on agro-ecological zones. Although the ADDs share names with one of the districts, they cover more districts. For example, Mzuzu ADD covers Rumphi, Nkhata Bay, Likoma, and Mzimba Districts. Salima ADD covers Salima and Nkhotakota Districts. Blantyre ADD covers Blantyre, Thyolo, Phalombe, Chiradzulu, and Mulanje Districts. Kasungu ADD covers Kasungu, Ntchisi, and Mchinji Districts. Lilongwe ADD covers Lilongwe, Dedza, Dowa, and Ntcheu Districts. Machniga ADD covers Machinga, Zomba, Balaka, and Mangochi.

Mzuzu ADD (MZADD) and Salima ADD (SLADD) are the major cassava production zones in the country (Figure 1). Blantyre ADD (BLADD) is the third largest producer of cassava.

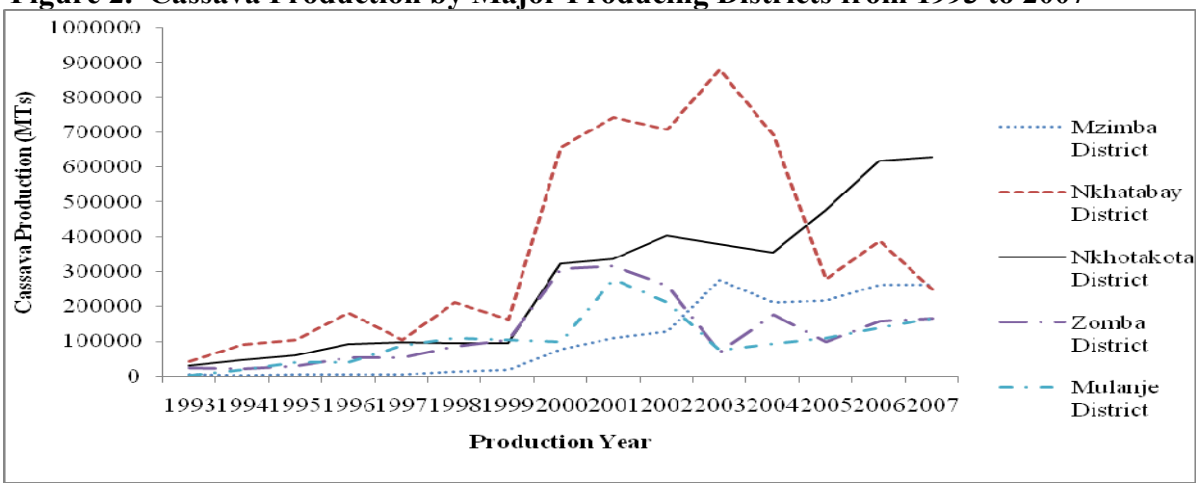
Mzuzu ADD has the largest area under cassava production followed by SLADD then BLADD. Nkhata-Bay leads in cassava production followed by Nkhotakota (Figure 2).

Figure 1. Production and Area under Cassava by ADDS from 1993-2007



Source: Government of Malawi: MoAFS Planning Department
Legend for ADD: KRADD = Karonga; MZADD = Mzuzu; KADD = Kasungu; SLADD = Salima; LADD = Lilongwe; MADD = Machinga; BLADD = Blantyre; SHVADD = Shire Valley.

Figure 2. Cassava Production by Major Producing Districts from 1993 to 2007



As noted by Kambewa and Nyembe (2008), over 90% of households in Nkhata Bay districts eat cassava as staple food. Nkhotakota district is the major cassava producer in SLADD. Between 75 to 89% of the households grow cassava as staple food in Nkhotakota. Shire Valley is the least cassava producing ADD.

2.1. Production Trends

Based on production data obtained from the Ministry of Agriculture, Figure 3 shows the area and production trend for cassava relative to maize and sweet potato from 1986 to 2010. Area under maize is more than six times that of cassava.

Cassava production started to increase in 1999 and reached its peak in the 2001 - 2002 season. Estimated cassava production for 2010 is 3.9 million metric tons[1] surpassing the 3.2 million metric tons estimated for maize production. The increasing trend in cassava production may be explained by increasing area under cassava, reliance on cassava for food security especially in maize deficit (drought) years, and increased institutional support such as research and extension on development of high yielding varieties and management practices (Rusike et al. 2010). Production of sweet potato and area under production are increasing in tandem with cassava.

Increasing area under cassava could mean that more farmers are planting cassava on new land or on land withdrawn from other crops (not necessarily maize). A discussion with farmers revealed that area allocated to cassava range from 0.1 to 2 hectare (ha). Farmers in Nkhata Bay allocate most land to cassava while in Zomba farmers reported allocating from 0.1 to 1.8 ha. In this district, cassava is sometimes intercropped with maize, pigeon peas, and other crops. In Lilongwe farmers interviewed reported to allocate about 0.3 ha and 1.4 ha to cassava. Farmers estimated that they produce anywhere from 600 – 5,000 kg per year. Using local measurements some famers reported that they produce about five (50 kg) bags

[1] Note that the production of cassava is measured in wet weight while maize is measured in dry weight. Hence 3.9 million tons of cassava is equal, in calorie-equivalent terms, to between 1.2 and 1.3 tons of maize.

Figure 3A. Annual Maize, Cassava, and Sweet Potato Production 1986 to 2010

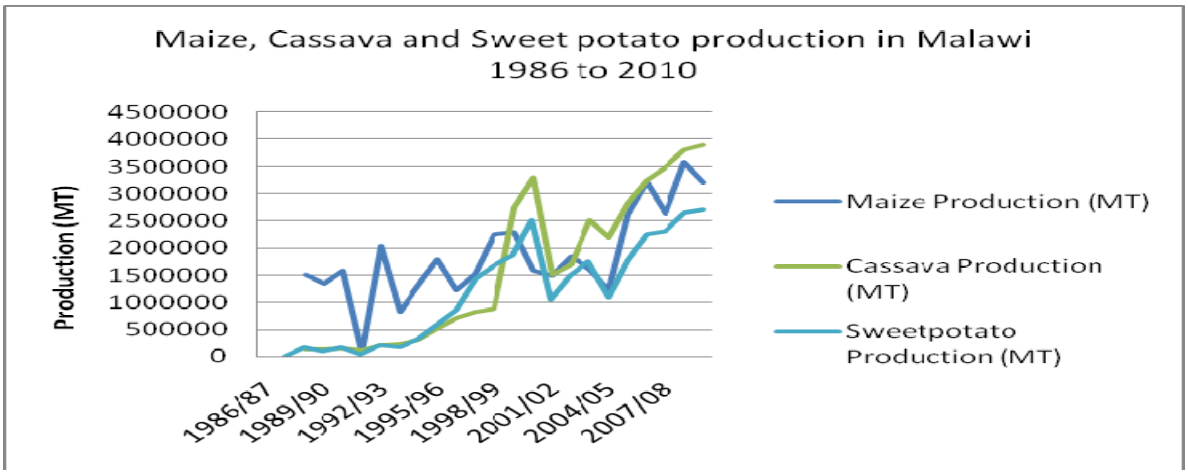
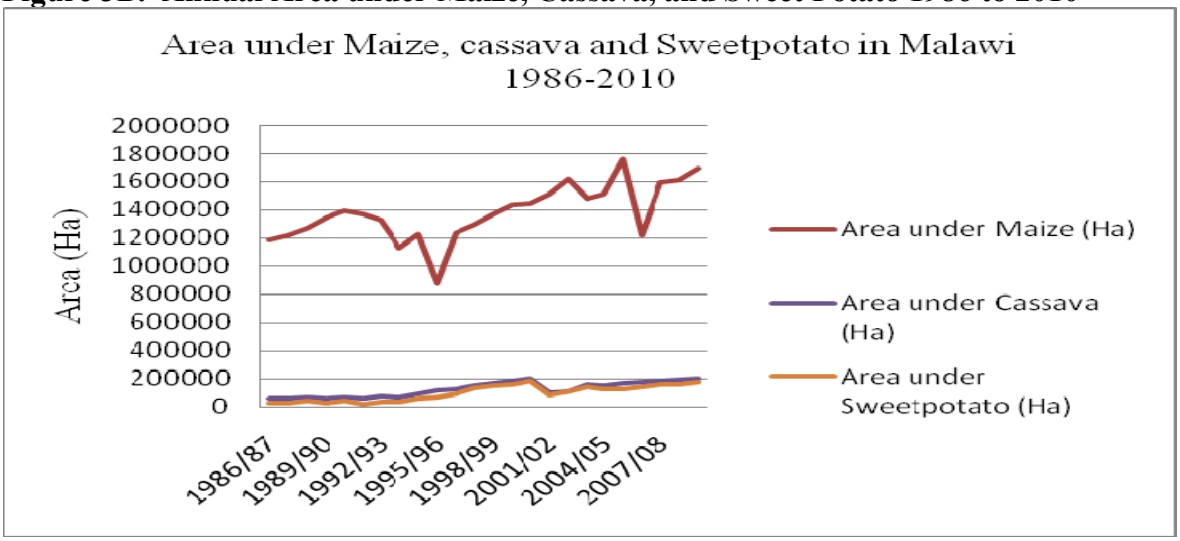


Figure 3B. Annual Area under Maize, Cassava, and Sweet Potato 1986 to 2010



Source: MoAFS Planning Department

(equivalent of 350 kg) while others harvest about 10 (90 kg bags)[2] (equivalent of 1,300 kg) to about 2.5 to 4.2 tons. Kambewa and Mahungu (2007) estimated an average production of 4.46 tons of cassava per year per household.

2.2. Production Seasonality

Farmers' experiences on cassava production (Table 1) indicate that October to January is the peak production period. Most cassava is planted around the same period as when it is harvested.

Cassava takes about 10-12 months to mature but farmers sometimes harvest earlier depending on the livelihood pressures and market conditions. Farmers may also harvest 2-4 years after planting especially for bitter varieties. The longer farmers take to harvest, the bigger the roots, which is good for food security. Where cassava is a staple food, production (and harvesting) is a year round activity. Households harvest small quantities at a time for household consumption. However, most of the cassava is planted during the rainy season i.e.,

[2] A 50 kg bag is standard bag for weighing maize. When packed with fresh cassava it weighs about 70 kg. A 90 kg bag of fresh cassava weighs about 130 kgs. These are standard conversion factors obtained from IITA.

Table 1. Farmers' Perception of Seasonality of Cassava Production and Sales

	Months											
	J	F	M	A	M	J	J	A	S	O	N	D
Production volumes	+						~	~	~	+	+	+
Sales volumes	+	+	~	~						+	+	+

Source: Farmer Interviews
+ large volumes, ~ negligible volumes

November to March. Early planting of cassava is common in Nkhata-Bay and Mulanje districts due to winter showers from June to August. As will be illustrated in the next section, central and southern regions have an earlier season than in the northern region.

2.3. Farm Sales

The peak harvest period is the same for marketing because of the perishability of the fresh cassava roots. A number of factors dictate when farmers harvest their cassava. Farmers view delayed harvesting as the only and better way of storing cassava roots for future use while at the same time keeping the stems viable for planting during the rainy season. Freshly cut stems are more productive because they sprout faster than stored stems. Cassava prices tend to be relatively high during the lean maize and sweet potato season enticing farmers to sell at that time for better prices. Some farmers, especially those who intercrop cassava with maize (common in the southern region), start to harvest from July to August in order to start preparing their gardens for the next crop. Other farmers sell their cassava before the rain season because they use the money to buy inputs, especially maize seed and fertilizer. Cassava that is harvested later in the season often has bigger root sizes that fetch relatively higher prices.

Farmers usually sell cassava fresh at harvesting time, which explains the concurrence of peak production and marketing seasons. Growers experience seasonal variation in cassava sales with peak volumes in October to February. During the cassava lean months (March to June), some farmers do not sell cassava at all, especially in non-cassava consuming districts. In Nkhata-Bay, Nkhotakota, and Mulanje, households usually store dried chips for home consumption which is sold or milled into flour and sold to help households meet other needs.

Peak period cassava sales vary slightly across regions. In the southern and central regions rains start around October/November. Before this period the cassava season activity starts to increase as farmers harvest to prepare for the next season. In the northern region, rains normally start around November/December which is the same period farmers harvest cassava to replant the fields.

The proportion of cassava that farmers sell varies with the least proportion of about 30% reported in Nkhata-Bay. In Lilongwe, Kasungu, and Zomba Districts farmers reported that they sell almost all their cassava except for a very small proportion (less than 10%) for household consumption. Traders often buy the entire cassava field and meet the costs for harvesting and transportation. Whatever traders leave behind either due to small sizes or damages during harvesting is used for household consumption either in fresh form, chips, or flour. The proportion of cassava that farmers sell also varies with amount of maize in the market. In times of lean maize production, some farmers sell more cassava to benefit from good market prices and buy maize (if available) while others sell less cassava to keep some for household consumption.

3. CASSAVA COMMERCIALIZATION

3.1. Key Players

The number of players actively engaged in the cassava sector is growing with the increasing awareness of the importance of cassava. Cassava products are marketed through an intricate network of producers, traders, and consumers. Traders operate at wholesale or retail levels and tend to be linked to consumers and companies for industrial uses. This section outlines the key players and how they are linked in the value chain.

3.1.1. Producers (Farmers)

Cassava production in Malawi is largely done by smallholder farmers and a few emerging large-scale farmers. The exact number of farmers who grow cassava for commercial and their own consumption is unknown. The International Institute for Tropical Agriculture/Southern African Root Research Network (IITA/SARRNET) (2006) estimated that about 379,057 farmers produce cassava for commercial purposes. These farmers are estimated to grow cassava on about 191,000 ha. The number of farmers who produce cassava for food and sale is also not known. The farmers interviewed had grown cassava for 10 to 50 years. It was reported that about 70% of commercial smallholder cassava farmers are men except in Nkhata Bay where cassava production is done by both men and women equally. Deciding when and how to sell cassava was also reported to be mostly done by men. This may not be surprising given the historic dominance of men in commercial agriculture in developing countries.

There are a few emerging large farms growing cassava. The Ministry of Agriculture and Food Security estimates that 2,456 ha are under cassava production by estates producing about 50,000 tons. IITA reports indicate that Press Agriculture, Chitipi Farms, Natures Gift, Njewa, Kakuyu, Gada, Tukombo, and Katete Farms are among the active large cassava producers who together grow over 347 ha[3]. Among these, Press Agriculture is the largest with 107 ha under cassava. These estates grow cassava mainly to sell as planting material or process into chips for sale to industrial users

3.1.2. Wholesale Traders

Traders at Mpamba packing fresh cassava for dispatch to Mzuzu city markets

Intermediate traders buy cassava from farmers. A common practice is developing whereby traders buy the whole cassava field and harvest it on their own. They are charged either per plant, per ridge, or per unit area. Traders take over responsibility for harvesting, packing, and transportation of the cassava. Long distance traders (often based in city/urban markets) fetch cassava from production zones or assembly points and transport it on trucks. Such traders source cassava from farmers or short distance traders who buy from farmers in smaller quantities and sell at nearby assembly markets. Short distance traders often use bicycles to ferry cassava from field to markets or assembly points (e.g., picture insert at Mpamba)..

The long distance traders based at Mzuzu city market arrange with local assemblers at

[3] Data from the Ministry of agriculture do not indicate the exact estates and their area under cassava.

Mpamba to buy and send the cassava to Mzuzu market. Specification on quantity, quality, and price is done through mobile phones. The assemblers buy and send cassava unaccompanied through specialized transporters. Either of the traders periodically travels to collect the money. At the time of the interviews, traders reported that about 60% of the cassava is sent unaccompanied which minimizes transport costs. The short distance traders sometimes buy from farmers or localized traders (assemblers) who bring cassava to assembly markets e.g., at Mpamba. These assemblers use bicycles or oxcarts to ferry cassava from farmers to an assembly market. It is also common practice that short distance traders hire localized traders to harvest and transport cassava from the field that has already been paid for. In that way the localized traders are paid for their labor and not for the sale of cassava. Localized, short, and long distance traders are predominantly men. Women avoid this trade because it is cumbersome to carry fresh cassava from one place to another.

Truck traders (i.e., those who use trucks to transport cassava) operate during peak seasons. The bicycle is the most common means to transport cassava especially by small-scale traders. Most of such traders use their own bicycles and trade in relatively small volumes. Bicycle traders buy cassava from major assembly markets or farmers in the outskirts of the city covering up to a 20-30 km radius and transport it to major assembly and consumer markets. City traders buy from major city markets and sell to suburb markets within the cities.

A bicycle trader at Bunda turn off roadside market, Lilongwe

3.1.3. Retail Traders

Retail traders sell in small quantities to consumers. Fresh cassava retailers sell either in heaps or individual tubers (e.g., picture insert at Kachere roadside market in Blantyre). Although both male and female retail traders are common in the fresh cassava value chain, female retail traders predominantly sell fresh boiled cassava and cassava flour, as men consider selling these products to be more feminine. In Mzuzu's main market, nine women were selling both cassava flour and maize flour, however, they all had more cassava flour. They reported that maize flour requires more capital than cassava flour. They also indicated that people buy more cassava flour compared to the maize flour, which they make in their homes. The women also reported that consumers combine cassava and maize flour when making final products especially nsima.

Retail cassava trader at Kachere roadside market, Blantyre

3.1.4. Small-scale Processors

There are a number of small-scale cassava processors such as Alongelele Enterprises, Mbabvala, Old Maula, and Malaza Associations, Chiwamba Cassava Production and Processing Association, Mthyoka Cassava Processing Center, Chisemphere Cassava Processing Center, Chinangwa and Mbatata Roots and Tubers Association (CMRTA) and Mbwandimbwandi Gardens.

These groups trained farmers in various skills such as making good quality cassava chips, flour, and starch, and in baking bread, doughnuts, mandazi, and other products, which are sold to both small and large buyers. For example, the CMRTA is an association based at

Domasi in Zomba. It produces fresh cassava, chips, and flour, which it sells to Alongolere Enterprises,. CMRTA has 2,500 cassava farmers as members of the clubs that form the CMRTA. CMRTA has a mill and a drier that was being installed at Domasi at the time of the study. The drier will enable the group to dry cassava even during the rainy season, which has been a major problem.

3.1.5. Industrial Producers and Users

There is considerable interest in Malawi to add value to cassava especially through production of native starch for use in the packaging and food industries, high quality cassava flour (HQCF) for use in the bakeries and other sectors. There are a number of key large-scale industrial producers and users of cassava based products including Universal Industries, Rab Processors Ltd, Bakeries, Packaging Industries Malawi Ltd. (PIM) and Raiply Malawi Ltd. (RAIPLY).

Universal Industries is Malawi's biggest biscuit manufacturer and a major producer of snacks and confectioneries. Universal buys traditionally dried cassava chips, which it mills into flour that is used in manufacturing its cheaper brands of biscuits. Universal developed a simple starch factory to convert traditional cassava flour into native starch that can be used in the packaging industries. In addition, Universal is developing a business concept to invest in a bigger factory to manufacture cassava starch for regional markets. It envisages that such a venture requires proper analysis of risks and opportunities such as comparative/competitive advantage within the regional markets and securing a sufficient year round supply of raw material. Of immediate consideration is a flash dryer to facilitate production of HQCF that can be used in high budget biscuits.

Rab Processors is a large-scale food ingredient manufacturer and distributor including blending of traditional cassava flour with wheat flour for baking. It distributes much of the wheat flour to the rural markets. Rab Processors has previously exported cassava flour to regional markets. Currently they have shown interest in the production of HQCF.

Press Agriculture is part of the old Press Group of companies whose shares are held by Press Trust. Press Agriculture has over 65,000 ha of land of which about 30,000 ha is arable. Of these, only about 15% is utilized. Since 2007, Press agriculture started to grow cassava on some of its land, especially in the northern region where it now has over 100 ha put to cassava. It is considering investing in the production of HQCF and a starch factory. It has previously produced and supplied cassava chips to Universal Industries and RAIPLY. Press's land endowment can easily be put to cassava production to supply its own plants and it is seriously considering on investing in a flash dryer in either Mzimba or Mwanza districts.

Bakers' Holdings: One of the country's largest bakery companies may consider establishing a HQCF factory as part of its strategy to diversify its operations. It recognizes that if it successfully established a factory, its own bakeries would be a ready market. However, it does recognize the need to have a study to ascertain the feasibility of the project.

Private Investors: There have been private investors showing interest in the cassava industry. Nature Gift was interested in investing in production of starch. However, their interest waned when the macro-economic environment seemed too risky for an investment. The cassava previously grown for starch making (see Kambewa and Mahungu 2007) was thus sold fresh to traders. Now Natures Gift has about 20 ha of cassava under contract production with IITA/SARRNET for seed.

The PIM uses starch-based adhesives. The source of starch is normally from corn or cassava. The initiative to try and use locally produced starch started in the mid-1990s with research by the University of Malawi and some test runs at PIM. The results prompted IITA/SARRNET to support a local farmers' cooperative i.e., Masinda Cooperative in Nkhota Kota between 2005 and 2007, to produce starch. PIM was involved in the work at Masinda as a major buyer.

The wood industry is another key actor in the cassava value chain especially for cassava chips that is converted into glue. RAIPLY Malawi started using cassava flour for making glue in 1999 after having problems in sourcing wheat flour. They make glue from cassava flour, which they use in making block boards and plywood. RAIPLY buys cassava chips mainly from farmers in Nkhata Bay and Embangweni area in Mzimba and Press Agriculture (in 2009). They buy chips from July to October and buy enough for at least six months to minimize supply outage during the rainy season (November to March) when farmers are not able to adequately dry cassava. RAIPLY mills the chips with their own mill.

3.2. Key Products and Final Markets

A number of products from cassava are used both in the food and non-food industry which define the major value chains arising from cassava (Figure 4). In the food sector, cassava is consumed in different forms and the most common products include nsima, raw or boiled cassava, and leaves. In the non-food sector the major products are starch and glue and a much lesser extent livestock feed. This section briefly describes some of the major final cassava products and their estimated volumes.

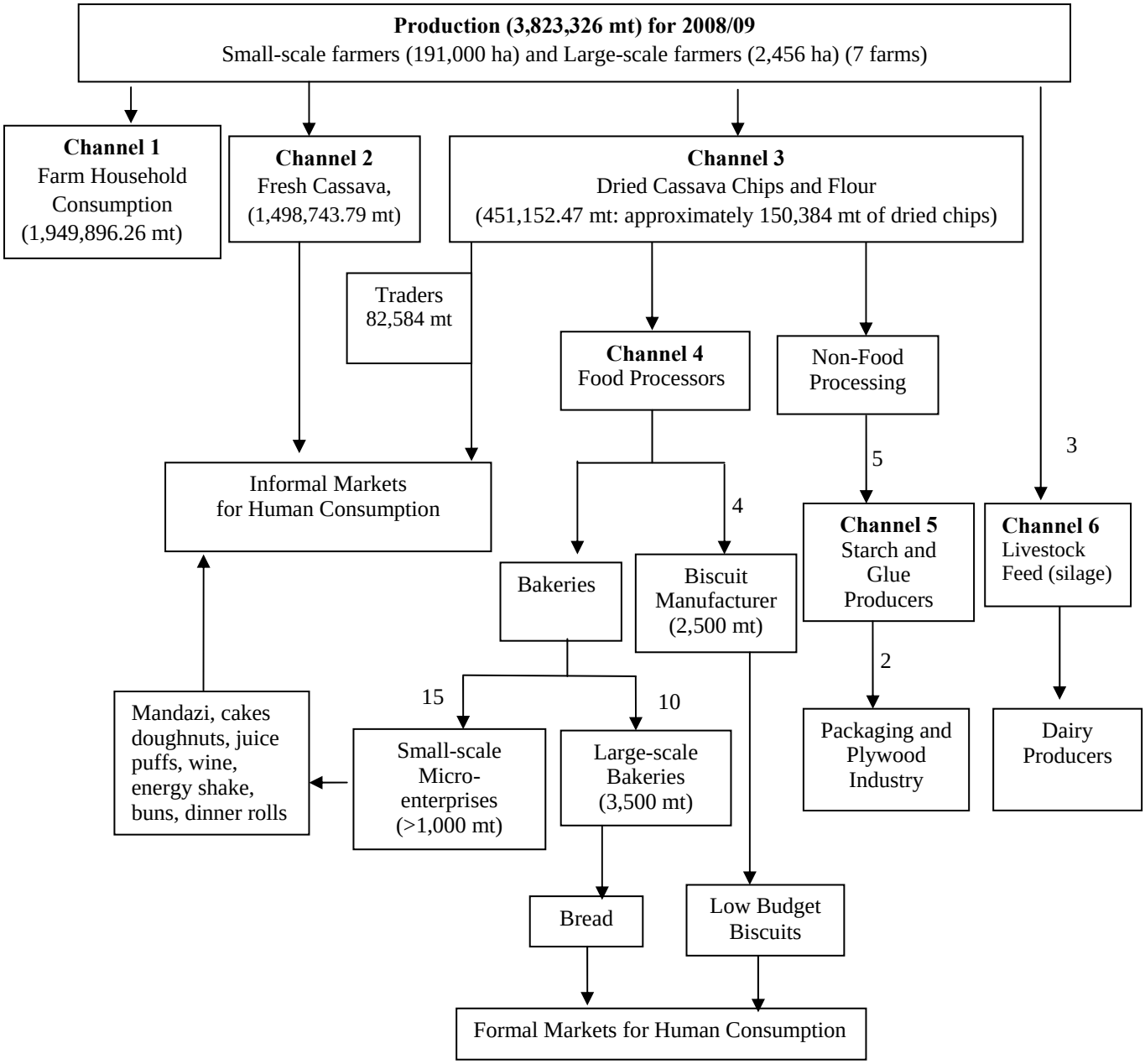
3.2.1. Farm Household Consumption (Channel 1)

IITA/SARRNET (2006) estimated that on average farm households consume about 73.6% of the total cassava produced and sell about 26.4%. Preliminary results for an impact assessment for IITA/SARRNET estimated that households sell 49% of the cassava produced (Kambewa 2010). Using the 2008/09 production estimates, this translates to a total of 1,873,429.74 tons sold and 1,949,896.26 tons consumed by farm households. In the cassava consuming districts, as much as 90% of cassava produced is consumed at household level. In other districts, however, the opposite is true.

Cassava is consumed in the form of the traditional dish of nsima, fresh boiled cassava, chewed raw, and roasted. In Lakeshore districts, namely NkhataBay, Nhotakota, Karonga, and Rumphi, cassava is grown as a staple food crop, mainly bitter varieties. In these areas, cassava is processed into fermented cassava flour *kondowole*.

Cassava is also processed into non-fermented cassava flour called *makaka*. Both kondowole and unfermented cassava flour are used to prepare nsima. Cassava flour is either used in its pure form or blended with maize flour. In the non-traditional cassava growing districts, cassava, especially sweet varieties, is grown mainly as a cash crop.

Figure 4. Major Cassava Value Chains



Note: There is no conclusive estimate on the proportion of total cassava production that is sold. IITA/SARRNET using data from their impact sites in 2006 estimated that 26.6% of the total production is sold of which 80% is sold as fresh cassava. Kambewa and Nyembe (2008) used the same formula. Preliminary results for a just ended impact assessment for IITA/SARRNET (Kambewa 2010) on impact of cassava production on rural livelihoods have found that households sell 49% of the cassava produced. We combine these figures to estimate the proportions of cassava in the different channel in this report using production data for 2008/09 season.

3.2.2. Fresh-marketed Cassava (Channel 2)

Fresh-marketed cassava is probably the largest channel through which cassava is sold. According to IITA/SARRNET (2006), about 80% of the marketed cassava is sold as fresh and only 20% is processed. Using the 2008/09 production, a total of 1,498,743.79 mt was

sold as fresh cassava and about 451,152.47 mt was processed. Fresh cassava is predominantly sold in the informal markets in which sweet potato is to some extent a major competitor. Sweet potato substitutes for bread for breakfast as well as morning or afternoon snacks. The major difference is that very limited amount of sweet potato is consumed raw. The different peak season also reduces competition between the two commodities. Unlike the cassava season that runs from August to February, the sweet potato season runs from March to July. The fresh cassava value chain may have limited growth potential because the additional demand would only be limited to population growth rather than new consumers. Currently, the country is relatively well served by the informal cassava markets.

3.2.3. Dried Cassava Chips and Flour (Channel 3)

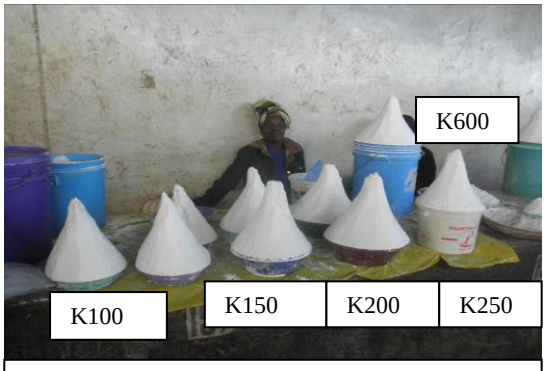
A cassava soaking tank and a mat for removing excess water

Drying cassava chip after soaking

Two methods are used to produce cassava chips and flour. In the fermentation process fresh roots are peeled, washed, and soaked in water for three to five days, depending on the season. In the hot season the cassava is soaked for fewer days (see picture insert for soaking tank and drying mat). Thereafter, it is washed again, crushed into small pieces (chips) and sun dried. The dried chips are then milled into flour traditionally known as kondowole. This way of making cassava flour is common in the Karonga, Nkhata Bay, and Rumphi in northern Malawi and Nkhota Kota in the central region.

The second method is where fresh cassava roots are peeled, cut into smaller pieces, and sun dried into chips known as makaka. The unfermented cassava chips are milled into flour similarly known as makaka or *mtandaza*. Both kondowole and makaka substitute for corn and wheat based products in the food and non-food manufacturing sector. In the food sector, kondowole and makaka are blended with wheat flour. Rab Processors Ltd. blends cassava and maize flours and sells them through supermarkets or exports them to regional markets especially in South Africa.

One of the large-scale processors is Press Agriculture, which in 2008/09 produced over 170 mt of dried unfermented cassava chips. Press sold the chips to RAIPLY (over 80 mt) and Universal Industries (over 90 mt). Volumes produced or traded by small-scale processors could not be ascertained during the study, as most of them were not producing while others could not be easily reached for interviews.



Cassava flour traders at Mzuzu main markets

In the informal market, kondowole and Makaka substitute for wheat and maize flours. Female traders interviewed in the Mzuzu main market have been selling cassava flour for about 8 to 10 years in the same market. They get cassava chips from Nkhata Bay especially from farmers. The traders mill the chips in Mzuzu and sell the flour at the main market (picture insert). The traders occasionally get buyers from as far as Lilongwe. On average the traders sell 55 kg[4] of flour per day

[4]Traders reported that they see a 50 kg bag of flour per day. IITA estimates that a 50 kg volume takes 2.5 pails that weigh 22 kgs each. This translates into 55 kgs of cassava flour

during the maize sufficient months which increases to 165 kg (three bags) per day during maize deficit months. During maize deficit months, about 20 traders sell cassava flour and approximately 9-15 people operate during the maize sufficient months. If we take three maize deficit months i.e., December to February as peak cassava flour market season when 20 traders operate, and nine maize sufficient months when about 12 traders operate, a total of 247.5 mt of cassava flour is sold in Mzuzu main market annually. The traders interviewed reported that they do not sell much maize flour because it requires more capital to buy and process maize than cassava chips. In addition, most households make maize flour on their own. During lean maize months, prices for cassava flour increase on average by 20-30% but depending on the demand, prices sometimes increase by 50%.

3.2.4. Cassava-based Prepared Foods (Channel 4)

A number of food products are made from cassava at household level and industrial level. Fresh cassava is often consumed raw, boiled, and fried. Fresh tubers are peeled, washed, and chewed directly as a snack. In many cases, peeled fresh roots are cut into smaller pieces and boiled also for a snack or substitute for bread for breakfast. The major demand for boiled cassava is in schools, work places, hospitals, and market places where women retailers often target. During hungry season, boiled cassava can be eaten as a meal. Peeled fresh cassava is also cut or sliced into small pieces and deep-fried just like French fries (picture insert). This is becoming common in market places.

Selling deep-fried cassava-Mpamba,

Cassava flour is used as a substitute for wheat flour by the biscuit and bread making companies. The major biscuit manufacturers in Malawi are Universal Industries, Cresta, and Bakeman's Confectionery Ltd. The companies produce a wide range of biscuits and market different brands. They all use some low quality cassava flour in their cheapest biscuits because it is a cheaper alternative than wheat flour considering the value of the biscuits. During an interview, Universal Industries reported that it uses over 9,000 mt of both wheat and cassava flour in biscuit making. Universal reported that it uses about 2.5 mt of cassava chips per day, which translates into about 1,040 mt of cassava chips annually. The cassava flour, which Universal mills into flour, replaces about 10% of cassava flour for wheat flour. They source cassava chips from Press Agriculture, MEDI supported farmer groups, and from vendors who normally buy from Mulanje and Mozambique. The other large bakeries use about 4,500 mt of flour per year. The total flour usage by the biscuit manufacturers is estimated at about 12,500 mt/year of which 2,000 – 2,500 mt is traditional cassava flour. Universal Industries estimates that it is possible to substitute about 25-35% of wheat flour with cassava flour in biscuit production provided it be of good quality. This would translate into a potential demand of about 2,500 - 3,500 mt of cassava flour.

A wide range of bakeries ranging from large companies own a number of factories, e.g., Bakers Holdings, Mothers Holdings, and Royal Products, Kachere, Master Blue Ribbon Supa Bake, Oats, and Seven Eleven bakeries. In discussions with some of the bakeries and staff from IITA/SARRNET, which has been supporting the bakeries with technical knowledge, it was learned that large bakeries use about 35,000 mt of wheat flour each year. Currently, they substitute up to 5-10% of the wheat flour with cassava flour in bread making which translates to 1,750-3,500 mt of cassava flour. There are also a number of micro-enterprises that use cassava flour in making a range of simple snacks such as scones, buns, doughnuts, and

mandazi (fritter[5]). The exceptional case was reported by Alongolele Enterprises, which replaces up to 20-50% of wheat flour in their products. Alongolele Enterprises is the only micro-enterprise that produces relatively large number of snacks including cakes, doughnuts, juice, puffs, wine, energy shake, buns, and dinner rolls. The Enterprises makes cakes from pure cassava flour but mixes cassava flour with wheat flour in other products. In 2007, the enterprise sourced from CMRTA and supplied to bakeries and biscuit making companies about 160 mt of chips and flour, and sold 10 mt of flour through supermarkets. Alongolele Enterprises makes on average 1,000 cakes per year, which sells for Malawi Kwacha (MK)5 each. At the time of the interview, the enterprise had produced no products for a month because they were renovating the processing facilities. The enterprise currently uses about 1,000 mt of cassava chips and flour annually.

Cassava based products are however not yet common in the informal markets. Women traders found at Mpamba reported that there is poor acceptability of cassava-based mandazi among consumers. Some traders in Nkhata Bay, for example, reported that mandazi from cassava flour tend to have limited shelf life as it usually spoils overnight. This is reportedly not the case for mandazi made from wheat flour. Researchers involved in promoting use of cassava for making mandazi confirmed the problems of its use, especially when the proportion of cassava flour to wheat flour increases. Extension workers interviewed in Kasungu noted that despite the efforts to train the communities in the making various products from cassava, there is not much adoption which was also attributed to low acceptability and hence low demand in the rural communities.

3.2.5. Industrial Products (Starch and Glue) (Channel 5)

PIM is the biggest user of starch in Malawi; its annual usage is estimated at 450t. Other starch using companies collectively use about 200 to 300t. Different reports estimate different size of starch market in Malawi ranging from 750-780t/year[6] to about 3,000 tons[7]. PIM utilizes most of cassava starch as a substitute for cornstarch. They started using cassava starch in 2000 after carrying out successful trials showing that cassava starch gave the best bonding characteristics in making cartons and other packaging material. Masinda cassava starch factory in Nkhotakota is their major local supplier. However, they only source 4mt[8] per year which is just 1% of their total annual demand. Previously PIM could source up to 16 -20tons from Masinda starch factory in Nkhotakota. Since the factory was sold to a private owner, the supply of starch to PIM has been more unstable.

PIM also sources starch from Universal Industries and MEDI farmers but the suppliers fail to meet supply quality as required by PIM. Currently they are importing 99% of the starch they want from South Africa, which is mainly cornstarch. Strategically, PIM wishes to source locally produced starch to take advantage of the price difference and help create employment in the cassava production and processing sectors. Further, PIM indicated that good quality cassava based starch has better bonding characteristics compared to cornstarch (see Kambewa and Mahungu 2007). PIM pays about MK145,000/mt for cornstarch imported from South Africa compared to about MK110,000 when sourced locally. If a vibrant local starch industry could meet all the supply requirements for PIM, it could save the country MK102 million (USD635,000) annually and it would save the company MK24.5 million

[5]Mandazi are made by mixing flour, baking powder, eggs, sugar, and milk and deep fried in oil.
[6] Based on interviews at PIM.
[7] Some reports estimate starch market in Malawi to be about 3000tons (Nakagawa et al 2009) while IITA (2003) estimated about 1,114 tons of starch. Formal import statistics from the Ministry of Trade and Commerce show starch imports ranging between 300 and 600 tons annually.
[8] On the basis of starch extraction rate at Masinda of 16%, 4t of starch requires 25t of fresh cassava which translates into 8.3ton of chips (1kg of dried chips requires 3kgs of fresh cassava)

(USD153,000). During the interviews PIM noted that the starch obtained from some local producers in Lilongwe melted or corroded the machines. Despite these problems, PIM is still supporting local producers to improve quality and increase production.

In addition to starch, cassava dried chips are also used by Raiply Malawi Ltd., which uses over 500 mt per year to manufacture glue for making block boards and plywood.

3.2.6. Livestock Feeds (Channel 6)

Livestock feed is another channel where cassava is utilized. Though not fully developed a few dairy farmers were trained and tried to use cassava for making cassava silage for dairy cattle. These include the Katete dairy farm and other dairy farmers in the Mzuzu and Lilongwe milk shade areas. Cassava leaves and roots are used to make silage for dairy cows. At one time Katete farm had 10 ha of cassava for making cassava silage, which they are no longer make because it was labor intensive. Three farmer groups with a total of 176 farmers (109 men and 67 women) were making silage. They also stopped because it was labor intensive.

3.3. Actors in the Cassava Value Chains and Women Participation

The exact number of actors in each of the value chains is not known. However, we approximate the number of actors and enterprises on the basis reports from IITA and field interviews. For example, during the field visits, 42 traders were trading in the fresh cassava market and of these 11 were women. According to these traders, the number of women participating in the fresh cassava trade varies between 25-40% with the proportion increasing during peak season. Previously IITA (e.g., IITA/SARRNET 2006) estimated that about 456 intermediate wholesalers and over 4,063 retailers operate in the fresh cassava markets in the major urban markets in Malawi. Other reports (e.g., Phiri 2001) and IITA/SARRNET (2003) estimated that during peak periods about 1,456 bicycle traders and 99 truck loads enter Lilongwe city markets per day. Assuming that one bicycle trader makes one trip per day, about 1,456 bicycle traders operate in the Lilongwe. None of the bicycle traders are women as they dominate in selling boiled cassava and cassava flour.

Trucks normally carry fresh cassava for a number of traders or it could be a single wholesaler who hires a truck to carry his fresh cassava. The number of truck traders cannot be estimated. However, no similar studies have been done in other cities, nor have repeat studies been done in Lilongwe to give these figures some level of accuracy.

Between 2004 and 2009, IITA/SARRNET trained 360 men and 237 women in value addition. In addition, IITA/SARRNET trained 2,679 men and 1,767 women on various aspects of cassava production. Assuming that the women who trained in value addition and production issues were a proportionate representation of women participating in the cassava sector, then about 40% of women participate in the cassava value chain. The women trained were members of the groups identified to pilot processing of cassava using improved technologies to make starch, cassava flour for food, cassava chips, and animal feed, among others. However, the exact membership of the groups is not known.

4. TRENDS IN CASSAVA COMMERCIALIZATION

As has been illustrated previously, there is significant trade in cassava although there is no reliable data to quantify the scale and volumes of the trade. There is no accurate indication of the proportion of Malawi's cassava that is traded fresh or dried, or the amount that is for *own-consumption.* This basic data on cassava production and trade is vital if Malawi is to monitor and encourage investment to add value to cassava. In absence of reliable data, unpacking trends in cassava commercialization process and its determinants (driving forces) may be difficult. It would require a better understanding of the relative importance of cassava as a commercial and subsistence crop since population growth and demographic changes, among other factors, tend to affect commercialization of subsistence agriculture (Jaleta, Gabremadhin, and Hoekstra 2009). As a starting point, this section outlines the trade flows, seasonality, and price trends.

4.1. Geographic Trade Flows and Seasonality

Population growth and urbanization influence demand for cassava products. The increasing population has to be fed at the time the main traditional food (maize) production faces climatic challenges. Most cassava and cassava products are sold in urban centers rendering Mzuzu, Lilongwe, and Blantyre as the major consumption markets. Zomba city and Kasungu district are rapidly growing into consumption markets while at the same time they serve as major supply zones to Lilongwe and Blantyre respectively. Urbanization has contributed to the increase in the one-way flow of cassava (especially fresh) from rural to urban centers. As Figure 5 shows, major flows originate from the major production zones in rural areas and towns including Rumphi, Mzimba, Nkhata-Bay, Kasungu, Nkhota-Kota, Dedza, Thyolo, Machinga, Mulanje, Chiradzulu, and the outskirts of the cities including Mitundu and Chiwamba in Lilongwe, Chingale in Zomba, Mdeka in Blantyre among others. Cassava also comes from Mozambique through Mulanje and Dedza into Malawi. In the traditional cassava consuming districts (Nkhata-Bay, Nkhotakota, Mulanje) there has been an increase in the production of sweet varieties for sale.

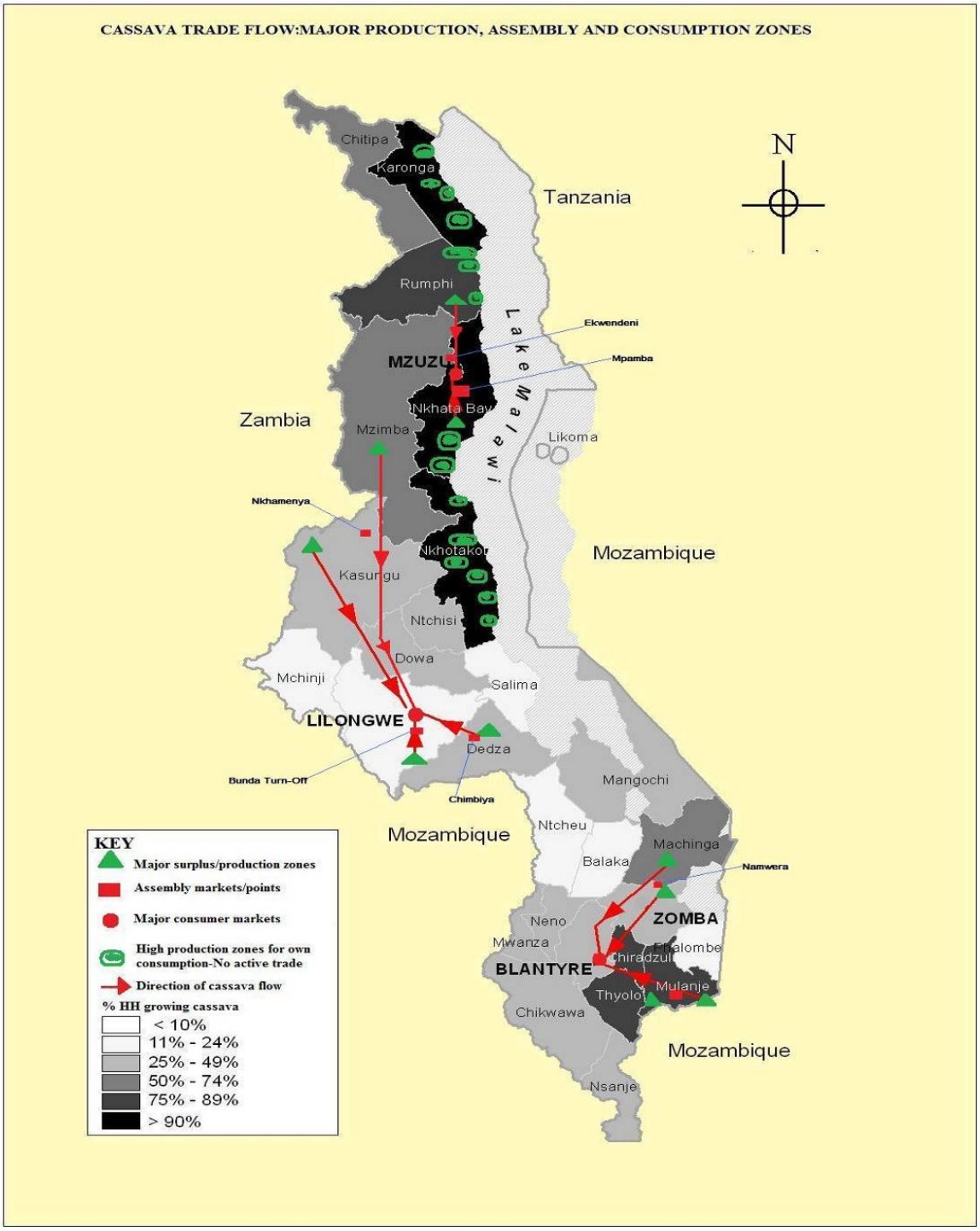
4.1.1. Blantyre City Markets

The increasing demand for cassava in the urban areas makes traders source cassava from distant places[9] including neighboring countries. It was reported that Mozambique supplies cassava to Blantyre when supply from Zomba and Machinga is decreasing, especially at the onset of the rains from November/December onward. Supply of cassava to Blantyre markets alternate among supply zones. For instance, supply from Zomba and Machinga starts early in August, reaches peak around September to October, then decreases after which most of the supply comes from Chiradzulu, Thyolo, and Mulanje.

Farmers in Zomba harvest their cassava earlier when there is not much cassava on the markets, arguably because they get better prices (interviews with farmers) and at the same time, they want to prepare land for the next season. When the rains start, cassava loses quality, which also leads farmers to harvest before the rains. Kambewa and Nyembe (2008) also noted this.

[9] For example, much of the fresh cassava sold in Blantyre city is from Zomba district, about 90 km northeast of Blantyre, Mulanje, Thyolo, and Chiradzulu districts. Some cassava also comes from Mozambique to Blantyre depending on the season in Malawi.

Figure 5. Cassava Trade Flows



Source of the base map: Kambewa and Nyembe (2008)

Apart from Blantyre, Zomba and Machinga also supply dried cassava chips to markets in Zomba, Blantyre, Balaka, and Mangochi markets. Chiwona-Karltun et al. (2005) also observed that fresh cassava from Zomba is mainly sold in Zomba and Blantyre markets while dried cassava is sold in Liwonde, Mangochi, and Balaka. There are a number of assembly markets in the southern region including but not limited to: Namwera turn off and Chinamwali in Zomba; Lunzu, and Kachere in Blantyre; Chitakale, Limbuli, and Mloza in Mulanje; Liwonde in Machinga; and Thyolo.

4.1.2. Mzuzu Consumption Market

As earlier indicated, Nkhata-Bay district, about 40 kilometers (km) to the south of Mzuzu, is major supplier of fresh cassava, dried chips, and cassava flour (kondowole) to Mzuzu city. When the supply of sweet cassava from Nkhata bay declines, traders source more cassava from Mzimba, especially Ekwendeni areas that are about 15-20 km north of Mzuzu city. Sometimes the Mzuzu city market receives cassava from Rumphi area. Mzuzu market is also known for women traders selling kondowole from Nkhata Bay. There are a few assembly markets in the north including Mpamba in Nkhata Bay, and Jenda and Embangweni in Mzimba.

4.1.3. The Lilongwe Consumption Markets

There are four main sources of fresh cassava to Lilongwe City market. Most fresh cassava is sourced from southeast of Lilongwe city (Mitundu) from August to December. When the supply from Mitundu declines, Lilongwe relies on supplies from Dedza, which runs from around October to January. Dedza borders Lilongwe about 60 km to the east. One of the production hotspots in Dedza is the Linthipe and Chimbiya areas. Cassava from these areas goes directly to Lilongwe as these areas are in the direction of Lilongwe from Dedza's town centre. The supply from Mitundu and Dedza to Lilongwe is supplemented with a supply from Kasungu, which is about 160 km to the north of Lilongwe and from Mzimba, which is about 190 km farther north.

There are a number of assembly markets in the central region including Bunda turn off and Area 25A in Lilongwe, and Chimbiya in Dedza.

4.2. Trade Seasonality

The flow of cassava to the major consumption markets shows seasonal patterns. The peak period for cassava marketing falls from November to February in Blantyre and Lilongwe markets (Table 2). This is the period when Malawi experiences lean maize supplies at the household and market levels. The season in the major market starts around September to October with small amounts that increase to moderate with peak periods in later months.

The season in the major markets is thus extended because of the overlap of the seasons in major supply zones. There is a limited amount of cassava trade from April to August, with little to no cassava in the market from May to July, which is the period when maize and sweet potato are generally plentiful.

Table 2. Traders′ Perception of Seasonality of Marketed Fresh Cassava in Urban Markets

Urban Market	Months											
	J	F	M	A	M	J	J	A	S	O	N	D
Mzuzu	+++	++	++	+	~	~	~	~	++	++	++	+++
Lilongwe	+++	+++	++	+	~	~	~	~	+	++	+++	+++
Blantyre	+++	+++	++	+	~	~	~	~	+	++	+++	+++

Source: Trader Interviews 2010. Rating: ++++ large, ++ moderate, + small, ~ negligible or least quantity traded

Traders selling cassava flour reported that dried chips and flour are sold throughout the year with more volume during the lean maize season i.e., December to March when they sometimes sell double the amount of cassava flour. It should be noted that the volume of cassava in the major markets is an accumulation of cassava from different supply zones. Hence, the season at the major markets may start earlier or end later than in the individual supply zones where farmers may be selling relatively less cassava.

4.3. Cassava Prices Seasonality

Over the years, maize and cassava prices have been increasing. Data on nominal prices obtained from the Ministry of Agriculture show that maize and cassava prices have been overlapping over the years (Figure 6).

Before 1995 ADMARC (the Agricultural Development and Marketing Corporation) was the sole buyer of maize, thus both buying and selling prices were controlled. Prices began to increase after 1995 when maize marketing opened to traders. In the era of political pluralism, the government liberalized the market and many large- and small-scale traders entered into the maize market thereby increasing competition. Although the country faced maize shortages in 1992 and 1994, ADMARC still controlled maize prices and the supply deficit could not have triggered dramatic price increases.

There was a dramatic increase in maize prices from 2001/02 before dropping in 2002/03. Prices rose again in 2005 and 2006. During these years, the country faced food shortages and increasing demand for maize could have led to price increases. However, prices have continued to increase even in years of bumper maize harvests because the government regulated prices upwards and often times the price ceiling, set by the government, has not been strictly enforced.

In order to understand price movement along the season, critical years in terms of maize deficit and over supply were identified. To analyze how maize and cassava prices move, four years were selected when the country faced either a critical maize shortage or a plentiful supply. The overriding assumption is that both maize and cassava prices increase in maize deficit years. In order to find the good and deficit maize years, we first considered years when the country produced below national requirements (2.2 million tons). During these years, the country faced drought (Figure 7)

Figure 6. Nominal Maize Grain and Cassava Root Prices

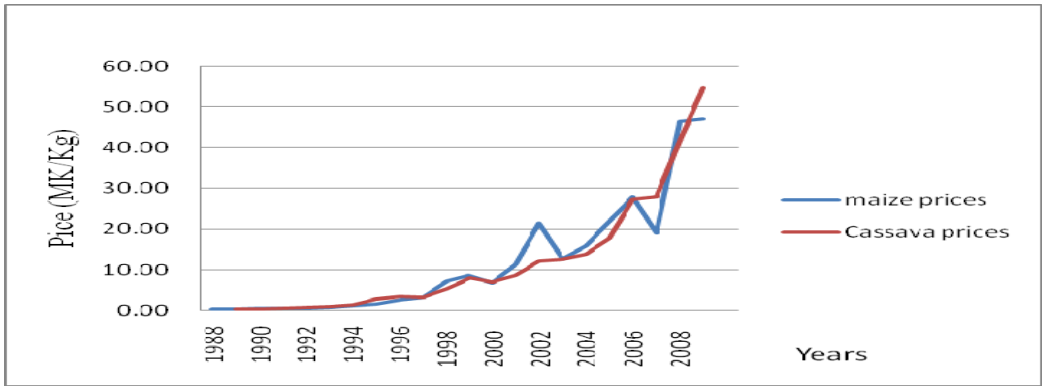
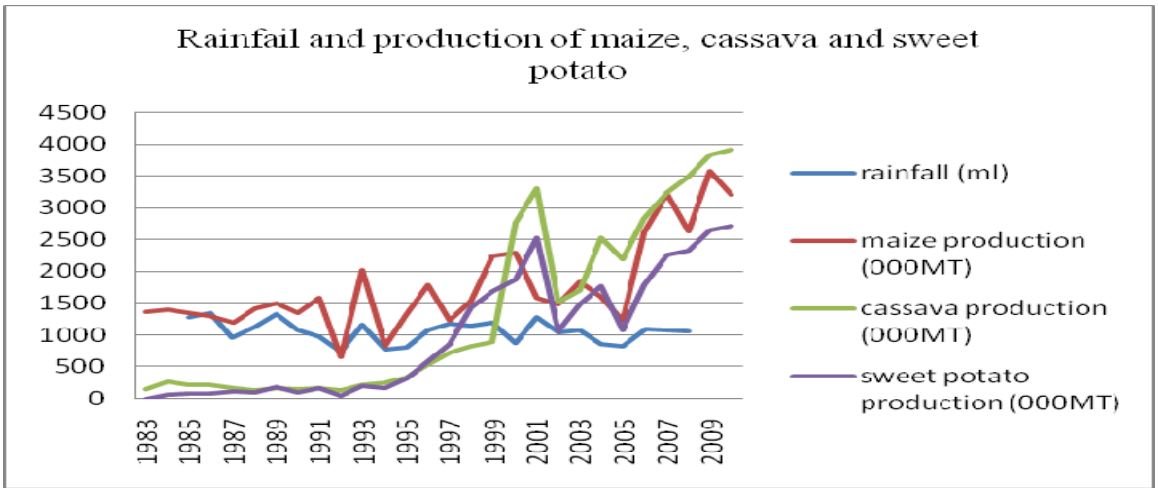


Figure 7. Production of Maize, Cassava, and Sweet Potato Relative to Rainfall



The country experienced recurrent drought in 1991/92, 1993/94, 2000/01, and 2004/05 seasons. In 1991/92 season, the country produced about 65,700 mt of maize against a national requirement of over 2 million mt. Drought struck again in 1993/94 when the country produced 818,999 mt of maize and in 2000/01 and 2001/02 when the country produced 1.6 and 1.5 million mt of maize respectively. In 2004/05, the country again produced 1.2 million mt. In all the drought years, the country faced maize deficit of over 1 million mt which had to be met through relief support and use of alternative foods sourced locally by households. Erratic rainfall and drought (less than 1,000 mls of rain) was a major factor leading to drop in maize production. For example, in the 1991/92 and 1993/94 seasons the country had about 777 ml of rainfall while in 2000/01 and 2004/05 the country had less than a 900 ml of rainfall.

There was a corresponding drop in cassava and sweet potato production in the 2002/03 season. Cassava production was almost the same as that for maize although it picked up much more in 2004 when maize production dropped again. The repercussions of the 2001/02 drought might have influenced farmers to increase cassava and sweet potato production. Similarly, non-governmental organizations (NGOs) and government agencies intensified promotion of cassava and sweet potato to avert hunger. Sweet potato has since been increasing parallel to cassava production but below maize production. In 2001/02, sweet potato production, like cassava, surpassed maize production.

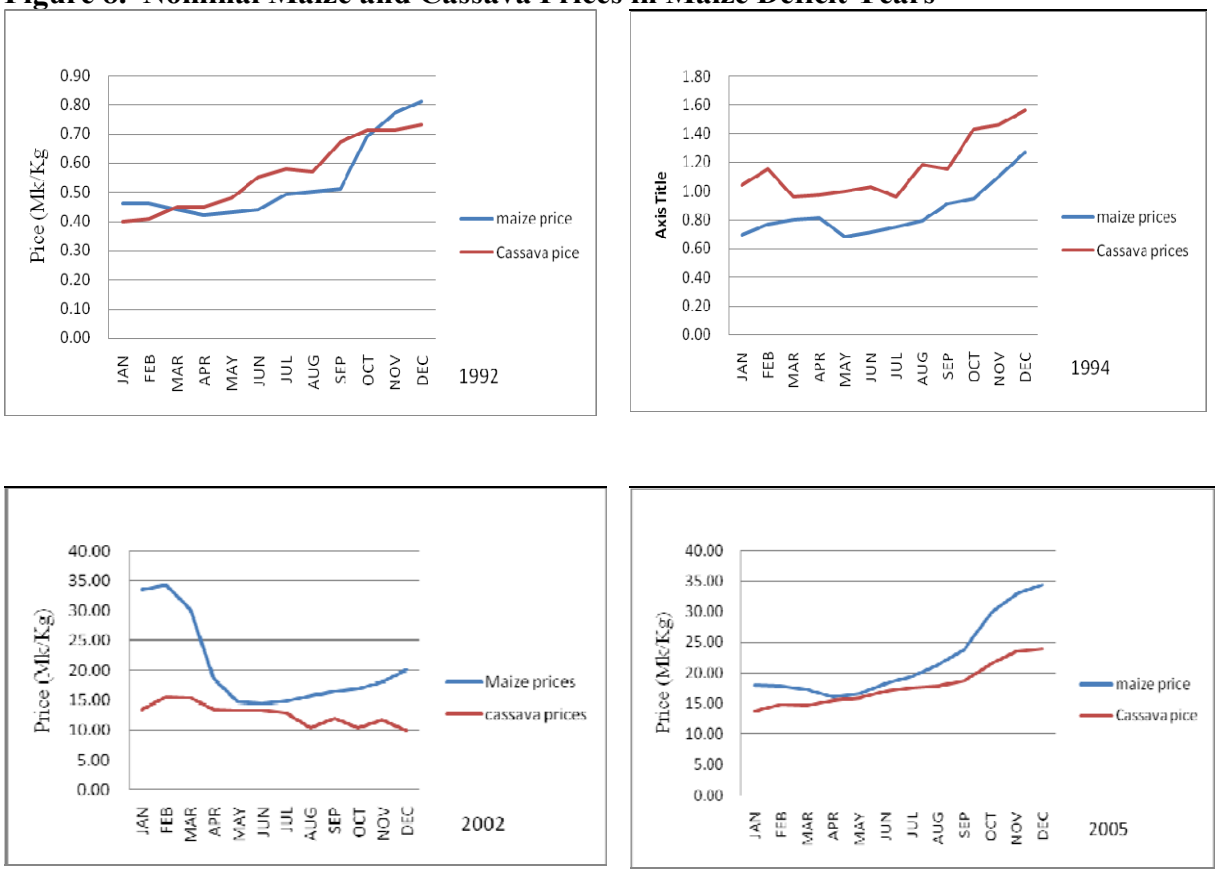
Interspaced between the maize deficit years are years of bumper maize harvest. In 1992/93, the country produced slightly over 2 million mt of maize and in 1999/2000, the country produced about 2.3 million mt before registering a record production of over 3 million mt in 2006/07 owing to good rains and the national smallholder input subsidy. In view of the varying maize production and increasing cassava substitution for food security, the maize deficit and plentiful years give a good contrast on which to understand how maize and cassava prices move.

4.3.1. Maize and Cassava Price Seasonality in Maize Deficit Years

From the preceding illustration, this section focuses on maize deficit years especially 1991/92, 2001/02, and 2004/05[10] (Figure 8). In maize deficit years, households rely on

[10] Note that price data was calculated by removing markets for which data for three or more months was not available. In markets where data was not available for one or two months, an average of the preceding and

Figure 8. Nominal Maize and Cassava Prices in Maize Deficit Years



Source: MoAFS Planning Department

alternative food including cassava, which increases demand and price for fresh cassava and cassava flour. In two of the maize deficit years selected, maize prices were relatively lower than cassava prices and the opposite happened in the other two years. In 1992, for example, maize prices were lower than cassava prices from March to October before they overlapped in November. Cassava prices were then higher than maize prices until March when they overlapped again. In 1994, maize prices were lower than maize prices throughout the year. An opposite pattern is observed in 2002 and 2005 when maize prices were higher than cassava prices except in April, May, and June when prices were almost the same (in 2002) and in May and June when maize prices were at the lowest level but slightly higher than cassava prices.

The general trend shows that maize and cassava prices move together and depending on the degree of shortage in maize supply, cassava prices may be higher than maize prices. In all the maize deficit years, both cassava and maize prices were highest in maize deficit months especially from November to February. The lower maize prices in 1992 and 1994 can be attributed to the fact that maize prices (unlike cassava prices) were controlled regardless of the supply situation. Moreover, there was not much cassava to lower prices. In 2002 and 2005 however, maize prices were higher because regulated prices were not enforced and private traders were charging much higher prices taking advantage of the increasing demand and non-availability of maize in the ADMARC markets.

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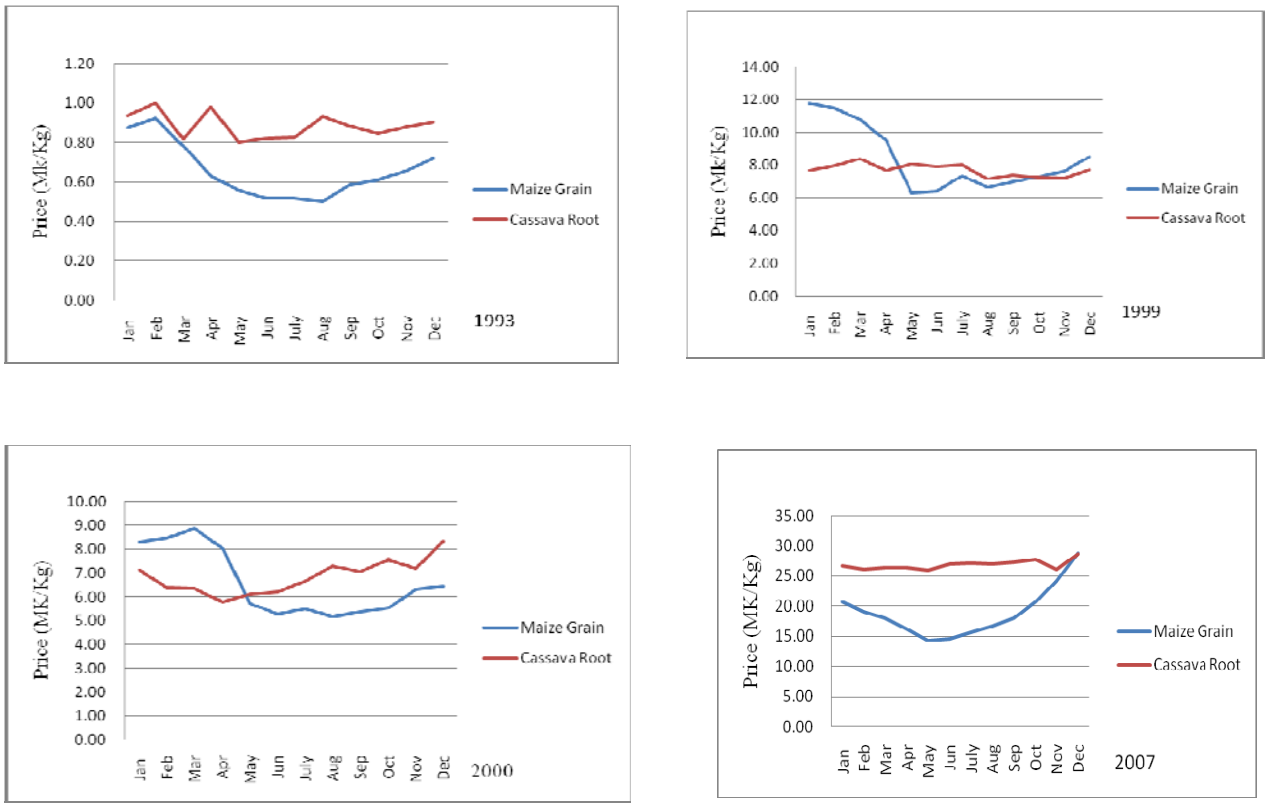
following months was used to fill the gaps. It was not possible to use data from the same markets because different markets had no data for different years. Therefore, in some years more data was used to find average price than in other years.

4.3.2. Maize and Cassava Price Seasonality in Maize Sufficient Years

This section focuses on maize sufficient years especially 1992/93, 1998/99, 1999/2000, 2005/06, and 2006/07 (Figure 9). In all the maize sufficient years, cassava prices are generally higher than maize prices and moving together. In 1993, maize and cassava prices were close to each other between January and March from which cassava prices though showing a downward movement were much higher than maize prices. Maize harvesting starts in March especially in the south and prices fall from this month onwards. When the supply of maize is plentiful, prices naturally tend to be low even when government regulates prices. At these times farmers feel compelled to sell due to financial needs, thus, selling at lower than the set price. Otherwise, they may not sell their maize. In addition, although traders have penetrated the maize marketing, maize exports are regulated to restrict traders from exporting all the maize thus creating a food insecure situation.

In 1999, maize prices were much higher than cassava prices[11] from January to May, after which cassava prices were higher until July and almost equalized with maize prices until the end of the year. Similarly, in 2000, maize prices were higher from December to April and equalized in May after which cassava prices were higher. The 2006/07 season presents an interesting case where cassava prices are much higher than maize prices until in December

Figure 9. Nominal Maize and Cassava Prices in Maize Sufficient Years



Source: MoAFS Planning Department

[11] One expects maize prices to be higher than prices for fresh cassava, which is 60% water. Note that root size is the basis for cassava prices, not nutritional value and water content. Consumers buy cassava comparatively with bread taking into account household dynamics e.g., whether bread would be as filling and as adequate for a particular household size as cassava bought at the same price as bread. Also, note that maize prices are often controlled, although enforcement may not be strict.

when they matched. Another maize sufficient year preceded the 2006/07 season. Traders who bought maize to sell in the lean months had problems because there was sufficient maize at the household level. As a result, traders put all the maize they had stored from the previous year on the market thereby creating an excess supply.

Although the cassava prices were higher than maize prices, they stagnated because there was no demand to push the prices. It is also possible that the oversupply of maize drove cassava farmers to withhold cassava (delayed harvesting), thereby, creating a temporary undersupply of cassava thus keeping prices up. Unfortunately, this cannot be verified because production data often reflect expected production rather than the actual harvested cassava. For cassava, there are no means of verifying production and sales.

4.4. Price and Profit Margins

Rough estimates of farm gate and wholesale and retail prices were obtained during the field visits. Average prices obtained (Table 3) show that farm gate process were almost a 25% of the wholesale and retail prices. Wholesale prices were on average close to average retail prices. Most of the retail traders' source of cassava was from assembly markets within the major cities. Consequently, they do not incur major costs such as transport.

Retail prices were highest in Blantyre, followed by Mzuzu, and finally Lilongwe. It was reported that prices were higher because there was not yet much cassava on the market. The wide gap between farm gate and wholesale and retail prices is due to that fact that traders often buy whole field and absorb the harvesting and transportation costs. However, whether such costs justify the high prices cannot be established in this study, as it requires a detailed analysis of costs and prices. During the field visits, prices for wheat flour were highest (MK338/kilogram (kg)), followed by maize flour (MK140/kg), and cassava flour prices were the lowest (MK100/kg)[12]. This is in line with reports that cassava is relatively cheaper than maize flour. It is understandable that wheat flour is the most expensive because almost all wheat flour is imported.

Cassava flour traders in Mzuzu market reported that prices increase during maize deficit months and years. For example, they reported that a bucket of cassava flour that normally sells at about MK500 and MK600 during maize sufficient months, sells at K800-900 in maize deficient months (between December and March). However, maize prices were normally

Table 3. Prices for Fresh Cassava in Production and Consumption Zones

Location	Price (MK/Kg) of fresh cassava		
	Farm gate	Wholesale	Retail
Nkhata-Bay	10	40	
Mzuzu		45	49.74
Lilongwe (Mitundu)	11.5	40	
Lilongwe City		40	43.33
Zomba/ Machinga	12.5		
Blantyre		56	58.50

Source: Trader Interviews 2010.

[12] Prices for cassava flour are those at Mzuzu market. In Lilongwe, cassava flour sold at one supermarket for MK135/kg. Wheat and maize flour prices are average retail prices obtained in the formal supermarkets.

Table 4. Average Market Margin for Cassava Flour at Mzuzu Market

Transport and purchasing costs	(MK/bag[13])
One bag dried cassava chips	1000
Transport cost per bag	100
Milling cost per bag	100
Transport for one person return trip	400
Total costs	1600
Selling price	
One bag produces 4 pails (about 22Kg each)	
Price of one pail	600
Total revenue from one bag (4 pails)	2400
Profit margin	800

Source: Women traders at Mzuzu main market July 2010.

higher than cassava flour regardless of whether maize is plenty or not. Table 4 outlines the average price and costs at the time of the study.

Traders reported that although cassava flour requires less capital they also complained that they make less profit especially during maize sufficient months and years. The rough estimates show that the profit margin is about 50% of the total costs.

4.5. Substitution of Cassava for Maize and Wheat Products

Substitution of cassava for maize and wheat products is evident at different levels. At the household level, fresh cassava substitutes for bread for breakfast and cassava flour substitutes for maize flour for making nsima. At the industrial level cassava starch substitutes for cornstarch in the packing industry and cassava flour substitutes for wheat flour in biscuit and bread making. The importance of substituting cassava products for corn and wheat products is becoming better known.

Malawi imports virtually all its wheat flour, paying for it in foreign currency. Being a landlocked country, the imports come into Malawi by either rail or road from Nacala or Beira in Mozambique. A network of poor internal roads contributes to high transportation costs.

Malawi has two companies that mill wheat, Bakhresa and Capital Foods. These companies together produce about 12,500 tons per month, which translates to about 150,000 tons per annum. Bakeries and biscuit making, as well as household use in making mandazi, scones, cakes, and doughnuts absorb this flour.

The two milling companies import almost all the wheat because Malawi produces a negligible amount of wheat. For example, production estimates for 2010 shows a total wheat production of 1,967 mt down from 2,500 in 2008/09 season. Malawi imports over 100,000 mt of wheat every year. The country also imports wheat flour sold in supermarkets.

It is important to note that Malawi is currently importing cornstarch from regional markets such as South Africa and Zimbabwe. The country would save foreign currency used in

[13] The exact weight of the bags is unknown. However, when processed the bag produces four pails of flour each weighing about 22 kgs. Assuming 1 kg dried chips produce 1 kg flour, then the bag is equivalent to 88 kgs.

importing wheat and corn products if either more wheat was grown or if more cassava substitute wheat and corn products.

During the interviews with traders and farmers, they revealed that companies were paying between MK20-30/per kg for dried cassava chips that they mill into flour or other products and MK40-45/kg for traditional cassava flour. This price is much lower than the prices reported by traders e.g., in Mzuzu market and prices at the supermarket in Lilongwe. Industrial users buy chips from contract traders who buy from farmers in local village markets. They often buy when cassava is plentiful and prices are low. Sometimes they have their agents buy for them during markets days. In Lilongwe there is only one supermarket selling cassava flour (kondowole) which targets a niche market. Hence, there is no competition to influence price and a single producer supplies the cassava flour. During spot checks with supermarkets, it was noted that some locally milled wheat flour was more expensive than imported wheat flour but nonetheless, higher than cassava flour. The lower cost of sourcing cassava flour explains the increasing interest in utilizing cassava in the bakeries and biscuit making. Because of the recent shortage of wheat flour due to the foreign exchange problems, bakeries and companies seem to have increased interest in using HQCF and starch if they were produced locally. Particular interest in HQCF has been generated by the C: AVA project (The Cassava: Adding Value for Africa Project) funded by the Bill and Melinda Gates Foundation and implemented by the University of Malawi. This project sponsored some companies to visit Nigeria to learn about the processes and potential economic benefits for investing in the HQCF. The lower prices offered by industrial cassava users were also reported to be very low and that is why Press Agriculture could not produce cassava chips in 2010.

Traders' perceptions and experiences on the substitution of cassava flour for maize flour for food security were evident at Mzuzu market. All the traders interviewed reported that drought years are their best years for business. They singled out 2004/05 in which they reported that it was the best year ever since they had started business. During that year, the traders reported that they could sell on average nine bags (of 50 kg) per day (range 7-11 bags) compared to one bag in maize sufficient months and three bags in food deficit months of good maize years. The traders reported that in the drought years, the lean period extends to five months from around October to February and prices more than double. The physical unavailability of maize in these months meant that nontraditional cassava consuming households were compelled to use 100% cassava flour for nsima. None of the women traders reported to have supplied the flour to industrial users.

Traders at Kachere and Mpamba as well as farmers at Mpamba and Namwera said that drought years are normally the best for them because prices and marketed volumes of fresh cassava and cassava flour increase.

5. POLICIES AFFECTING CASSAVA PRODUCTION, PROCESSING, AND TRADE

Existence of an enabling policy and institutional environment is vital for the development of any sector. A number of national, regional, and international policy and institutional frameworks broadly or specifically support cassava production and trade. The Malawi Growth and Development Strategy: From Poverty to Prosperity 2006-2011 provides the overall framework within which, among other objectives, it seeks to accelerate the growth and contribution of agro-processing through:

- increasing smallholder cooperatives supplying agro-processing industries;
- supporting commercialization of technologies in key areas including cassava;
- increasing value addition; and
- increasing commercialization of smallholder agriculture and international competitiveness.

Based on this framework, a number of research and development institutions have intensified support to cassava production and commercialization. For instance, IITA stepped up research efforts in response to the 1991/92 drought to accelerate multiplication and distribution of cassava planting materials as a drought recovery measure. Activities in cassava seed selection, multiplication, and distribution to farmers have since been widely supported by collaborative efforts among public, donor, and bilateral institutions such as IITA/SARRNET, the Food and Agriculture Organization (FAO), the Norwegian Agency for Development Cooperation (NORAD), and various NGOs such as Plan International and Total Land Care among many others. Research in value addition has targeted evaluation of different cassava varieties for food (bakeries) and non-food uses including starch production and livestock feed (silage). Over the past five years, IITA/SARRNET distributed over 2 million stems of different cassava varieties for nursery establishment, and for on-farm, and on-station evaluations. New germplasm of superior cassava varieties were introduced and evaluated on-station and on-farm for adaptability to different agronomic conditions as well as acceptability and suitability for different market needs (IITA/SARRNET 2008).

To enhance value addition, IITA/SARRNET distributed processing machines to, and in collaboration with different research institutions and development organizations (see Table 5). Labor saving technologies such as chippers, graters, leaf choppers, solar driers, pulverizers, and peelers were introduced, demonstrated, and disseminated to improve efficiency in processing value added cassava food products and non products. Over 2,910 farmers and 100 processors adopted the new technologies (IITA/SARRNET 2008).

In support of the commercialization of the sector, the Ministry of Industry and Trade offers competitive incentives such as tax exemption and duty waivers to potential investors in cassava value addition. The ministry, IITA/SARRNET, the Malawi Bureau of Standards, and other partners developed two standards namely MS 704: 2004 for Cassava and Maize starch for the textile industry and MS 349:2002 for edible cassava flour. Prerequisite standards for MS349:2002 such as MS 19 (a general standard for labeling of pre-packed foods) and MS 21 (a Code of Hygiene conditions for food and food processing units) are also in place to facilitate trade in cassava products (Kambewa and Mahungu 2007). Another newly developed standard for sampling methods for starches and starch products targets processing factories in the industry.

Table 5. Distribution of Processing Machines in Malawi

Type of machine	Beneficiary/location	Collaborating Institution	Purpose for distributing the machine
1 Engine driven grater 1 Manual chipper 1 Pressing machine	Chintheche EPA	Mzuzu ADD	Demonstrations on Processing for home consumption
Manual chipper	Mulanje	GTZ	Demonstrations on Processing for home consumption
1 Engine driven grater 1 Manual chipper	Nkhotakota	Save the Children Federation (US)	Mitigation of HIV/AIDS impact on affected communities for processing cassava for home consumption
6 Engine driven Chipping machines	Chata Area Development Program (ADP) (Chiwamba)	World Vision International	Processing for home consumption and sale to industrial markets
1 Motorized Chipper	Njuli Farm	Universal Industries	Processing cassava chips for biscuit and other confectionery manufacturing
1 Engine driven grater	Nali factory	Kay Marketing	Starch extraction
1 Engine driven slicer	Bunda College	Private processor	Processing cassava flour for making baby foods
1 Manual chipper	Area 25	Farmer (Mr. Phiri)	Processing cassava for home consumption
1 Engine driven slicer	Bvumbwe Research Station	DARTS	Demonstrations on Processing for home Consumption
1 Engine driven 1 Chipper	Embangweni	Christian Service Committee	Processing cassava chips for sale to timber industry
1 Engine driven slicer 1 Engine driven chipper 1 Engine driven grater 1 Manual chipper 1 Manual slicer	Chitedze Research Station	DARTS	For research purposes and Demonstrations on Processing for home consumption

Source IITA/SARRNET 2004

6. CONCLUDING REMARKS

This study was done to understand the commercialization of cassava in Malawi. It is increasingly evident that production and use of cassava that has traditionally been localized in lakeshore areas is rapidly increasing in other areas for commercial reasons. Propelled by uncertainties over maize production due to the increasing variability of rainfall, cassava as an alternate food crop has rapidly gained popularity and commercialization of the cassava sector has steadily taken off. Policy and institutional support to diversify the food security basket and promote the diversified applications of cassava in nonfood sector has propelled cassava production in nontraditional growing areas. Production has more than quadrupled over the last decade with production of sweet cassava rapidly expanding in nontraditional areas.

Demand by industrial users is increasingly as cassava products are slowing but upwardly substituting corn and wheat products. The bakeries have achieved 10% substitution of cassava for wheat flour and aim to achieve more. In the small-scale processing sector, they have attempted even higher substitution rates. Interest in the production of HQCF is increasing and it may be likely that in the near future investment in the sector will increase, of course, contingent on the macro-economic conditions.

In the informal sector, cassava/maize substitution is at peak in drought years when sales volumes for cassava flour, for example, increases between 7-11times depending on the scarcity of maize and consumers substitute up to 50-100% cassava flour in making the traditional dish of nsima. Even in good maize years, cassava prices increase by 10 to 20% in December to February when some households run short of maize before the next harvest. In drought years, prices for cassava flour more than doubles depending on the scarcity of maize on the market. This remains a potential threat to achieving the goal of a year round supply of cassava raw material for would-be large-scale investors in the cassava sector.

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