Tips & AusAid

SADC Trade

TRADE INFORMATION BRIEF

CASSAVA

TIPS

TRADE & INDUSTRIAL POLICY STRATEGIES

Australian Government

AusAID

Participation in international trade has become one of the most important factors in increasing the prosperity of countries. Yet for many developing countries, perhaps particularly for those in Sub-Saharan Africa (SSA), trade is viewed primarily from a defensive perspective, with a focus on the disruptive effects of imports rather than on the opportunities presented by increased access to world markets. A key reason is the existence of information market gaps that are often associated with trade facilitation and development in developing countries – information on the export performance and potential of many developing countries remains incomplete.

The TRADE INFORMATION SERVICE series of market briefs aims to contribute to bridging this information gap for existing producers in the Southern African Development Community (SADC) who may not have the financial resources to generate a fully fledged market research process. The briefs are not intended to act as the detailed export market intelligence that successful exporting requires, but rather as a basic first-cut analysis of export prospects, to allow enterprises to make the decision on whether to initiate further market research.

Each Trade Information Brief will cover a product cluster of particular interest to members of SADC. The cluster may represent an existing key set of export products with potential for expansion, or a relatively new set where there is an indication of competitive advantage for the region.

Contents

TABLES

FIGURES

1. Introduction

Cassava is known as a 'poor man's' crop. It is predominately grown by subsistence farmers as a staple crop in developing countries that have a temperate climate. This has two important market implications. The amount of cassava traded compared to global production is minuscule, and the largest exporters of cassava are not necessarily the largest producers. Trade patterns illustrate that import/export activity is concentrated between South East Asia and East Asia. If regional trade are disaggregated, it becomes apparent that China, Thailand and Viet Nam are responsible for driving world trade in cassava.

Cassava is a versatile crop. It has a multitude of applications cutting across various industries and is used in a variety of products: flour, food, animal feed, paper, textiles, sweeteners, convenience meals and bio-degradable plastics. To produce these, cassava is processed in a number of ways, the simplest being the preparation of food (such as flour) for human consumption, which involves peeling, grinding and drying cassava, and the most complicated process involving the creation of modified starches. This Trade Information Brief's (TIB's) primary focus is on 'fresh, chilled, frozen or dried cassava, whether or not in the form of pellets made either from pieces of the root or from its flour, meal or powder'. This product category falls under the Harmonised System code HS 0714.10 Manioc (cassava).

The broad categories for cassava – human consumption, animal consumption and industrial applications – have different supply- and demand-side drivers, which means developing a generic agricultural and industrial strategy for cassava products is not a useful exercise. This TIB implicitly proposes that growers should target a particular market segment, on a global basis or a particular region. Based on trade data, the market for starches seems to offer the most promising prospects as it provides the raw material base for an array of processed products. With respect to geographical markets, Africa's demand for cassava pellets to feed its livestock offers potential for intra-African trade.

The international starch market is extremely competitive and is dominated by corn, maize and potato starch products. These crops have benefited from substantial scientific research and thus have a technological advantage compared to cassava. Cassava's future prospects are rooted in improving its supply side in terms of increasing productivity by adopting improved varieties which are more resistant to pests and have higher starch content, and improving processing technologies. Developing countries' progress in reforming agricultural processes through distributing better planting material and implementing intensive production methods for small-scale farmers has been inconsistent.

References

A full set of references for this report can be accessed at www.sadctrade.org/TIB/cassava.

To address this failure and provide growers with access to bio-technology and extension services, the content of national research programmes should be revisited, but more importantly, the manner in which they feed into international and regional agricultural research programmes should be investigated.

This TIB is divided into four broad sections. The first section defines the product and establishes its market. In this section cassava's physical characteristics are discussed, which provides the knowledge to develop a series of value chains for cassava's product clusters. The second section is a market study that describes the consumption, production and trade patterns between regions and countries. This information is used to establish the market's size in terms of its value, shape and growth patterns to identify where there are prospective export opportunities for SADC's farmers. The last part of this analysis investigates price trends to gauge, at a simplistic level, whether an opportunity is economical. The final section of the report provides exporters with information about gaining market access and placing their product into a market. This section highlights important tariffs and non-tariff barriers and information about marketing and distribution channels.

2. Why cassava?

This TIB analyses cassava as a potential export crop for SADC's farmers based on the following reasons, which are explained in greater detail in the sections that follow:

- Cassava can be grown in difficult environmental conditions characterised by low or extreme rainfall and infertile, poor, sandy soil.
- Cassava is a simple crop to maintain as it has no definite maturation point and can therefore be left in the ground from seven months to two years after planting and then harvested as needed. In addition, it can recover from pest damage and diseases.
- Cassava provides an opportunity to improve rural dwellers' income by opening up marginal lands for cultivation.
- Cassava provides farmers with the flexibility to opt for more capital-intensive, efficient production processes as they develop, as production practices can be completely manual, partially mechanised or animal-powered, especially in terms of land preparation.
- Cassava is a labour-intensive crop to harvest, and as a result can provide employment to unskilled labour in rural areas.
- Cassava is a highly perishable, bulky crop and must therefore be processed before it is transported, which opens up opportunities for small-scale farmers to get involved in producing simple, value-added products.
- Cassava has a wide range of applications, ranging from food products to industrial starches. The processes required to produce these products vary in complexity, which gives different parties the flexibility to pursue markets that suit their skill and resource base.
- The hour-glass shape of cassava's supply chain makes it simple for small-scale farmers to be absorbed into the cultivation stage of cassava's value chain.

3. Product definition

Cassava is known by various names (see table 1). For the purpose of this TIB, the commodity's common name is used and trade data are discussed at the Harmonised System (HS) 6-digit level under the classification 071410, Manioc (cassava). Other trade classifications are provided in the table (but not discussed in this TIB) as a reference point to make it easier for interested parties to access leading importers' / exporters' trade data.

Table 1: Cassava's naming conventions

Description	Name
Common name	Cassava (Africa & Thailand), Manioc (Brazil), Tapioca (India), Yucca (South America) Europe & the US: Cassava (roots) and tapioca (products such as starch, pellets or dried chips)
Botanical name	Manihot Esculenta
Harmonised System classification	HS 0714.10 Fresh or dried maniocs
EU: combined nomenclature of the EU	CN 07.14-1010 Pellets of flour and meal CN 07.14-1091 Human consumption, fresh and whole or without skin and frozen, whether or not sliced and packaged CN 07.14-1099 Other
Chinese Customs	07.14-1010 Fresh manioc 07.14-1020 Dried manioc 07.14-1030 Chilled or frozen manioc

Source: International Trade Centre (ITC) (2003)

4. Cassava's characteristics

Cassava is a perennial, woody shrub that grows between one to four metres in height. The root can grow up to 15cm in diameter and reach 120cm in length to weigh between one and eight kilograms. The roots of a 1-1.5 year-old cassava plant have a starch content between 20% and 32%, which is good compared to other starch food crops. Cassava is an excellent source of carbohydrates but an inferior source of protein, fat and vitamins.

Cultivating cassava requires the following activities: select a site, prepare the land, prepare planting materials, plant, apply fertiliser, weed and cultivate, harvest, dry roots, grind roots and store. Processing a commodity to create a final product is the most complex stage in the value chain. This step is dealt with in detail in the following section, as processing activities are tied to product markets. Other stages of the value chain, such as packaging, marketing, distribution and transportation are discussed in section 14.

Cassava has been selected as a potential cash crop for SADC's farmers as the cultivation stage of its value chain is relatively simple. As a consequence these activities can be performed at the farm gate by a small-scale farmer or at the village or local level. Non-agricultural activities, so-called secondary activities, such as marketing, processing and packaging products are performed by fewer, large-scale units. The unique feature of cassava's supply chain is its hour-glass shape, which provides opportunities for numerous small-scale farmers to be involved in cultivating, harvesting and rudimentary process activities compared to other activities along the value chain.

The structure of cassava's value chain provides potential contact points for small-scale farmers to participate in a larger market. This suggests that the growth and development of cassava product markets should benefit a large number of resource-poor farmers located on poor lands and local processing units. Reaping the pro-poor benefits associated with cultivating cassava hinges on developing distributed, simple micro-technology for farmers to process cassava into a transportable product that feeds into downstream processing activities.

Cassava is propagated vegetatively from stem cuttings. This has both a positive and a negative implication. The negative implication is that the rate of multiplication of new improved varieties is slow as cuttings do not store well, and they are costly to cut and handle. The positive implication is that it is easy to share good genetic material – important as cassava's yields are slightly less than other starch crops. This is due to a dearth of research being allocated to cassava as it had the image

of being a poor man's crop in the past. However, interest in cassava has been growing as its use as a feedstock and in other industrial applications has become more widespread.

Although cassava can grow in dire circumstances, the best conditions are 150 inches of rainfall, temperatures between 25°C and 30°C, an altitude below 2,000 meters and fertile, sandy-clay soil with a 5.5-6.5 ph range. Cassava cannot survive flooding or freezing conditions. SADC has ideal climatic conditions to grow cassava, especially Mozambique, Swaziland, Lesotho, Malawi, Tanzania, Zimbabwe, Zambia, Madagascar and the Democratic Republic Congo (DRC). Furthermore, even countries that are not endowed with good arable land, such as Angola and Namibia, could replace their more 'fragile' crops with cassava.

Cassava does not have a mature stage. This allows the crop to be harvested at a farmer's discretion. A plant can be harvested when its roots are sufficiently developed to meet a consumer's requirement or delayed till the next growing season. This feature makes cassava an ideal secondary crop for small-scale SADC farmers, as they can stagger their harvesting activity to ensure that resources are not thinly stretched between crops. In addition, this feature allows farmers to influence the market's supply by delaying harvesting if the market is over-supplied and to take advantage of price swings.

Although a farmer can generally decide when she prefers to harvest a cassava crop, due to the plant's physical attributes, post-harvesting activities must follow a strict, short timeframe. Therefore a farmer's ability to devote resources to post-harvesting activities will affect when cassava should be harvested. Flexibility gained during the pre-harvesting stage should therefore be weighed up against post-harvesting activities.

Raw cassava roots comprise 70% water and are highly perishable. One to three days after harvesting the roots start to deteriorate. Therefore, if the roots do not receive special treatment, they must be processed within two or three days after they have been harvested. If a time delay between harvesting and processing the crop is unavoidable due to inadequate processing machinery at the farm gate, storing it in wooden crates, trenches or moist mulch can increase its shelf life.

The high water content of cassava's roots not only shortens its shelf life but also increases the cost of transporting the product, as it tends to be heavy and bulky. These factors suggest that transporting raw cassava over large distances is uneconomical and logistically difficult. SADC's small-scale farmers tend to be in remote rural areas, where

access to roads and infrastructure is poor – which also complicates transportation.

For cassava to be a viable, cash-earning crop, cassava's first stage of processing to create a transportable product must be simple and done at the farm gate. This opens up an opportunity for small-scale farmers to get involved in creating a value-added product, albeit a simple one, and could serve as an initial entry point for them to participate in supplying other processed products.

An issue that could potentially inhibit this step and reduce the ability of farmers to become integrated into the value chain is their limited access to infrastructure (and other technology, such as finance) which would allow them to process the cassava into a storable product. Nigerian engineers, in response to this problem, are currently trying to develop equipment that can be used by farmers in the remote areas to process cassava into an easily transportable product. SADC's engineers could potentially collaborate with their Nigerian counterparts to develop this technology, which has the additional benefit of not only creating new technology but also fostering regional co-operation.

The cost incurred to produce cassava is location specific and time bound, and thus a generic cost schedule cannot be provided. A farmer's costs are dependent on climatic factors that affect a plant's growth pattern, which is tied to the time of planting.

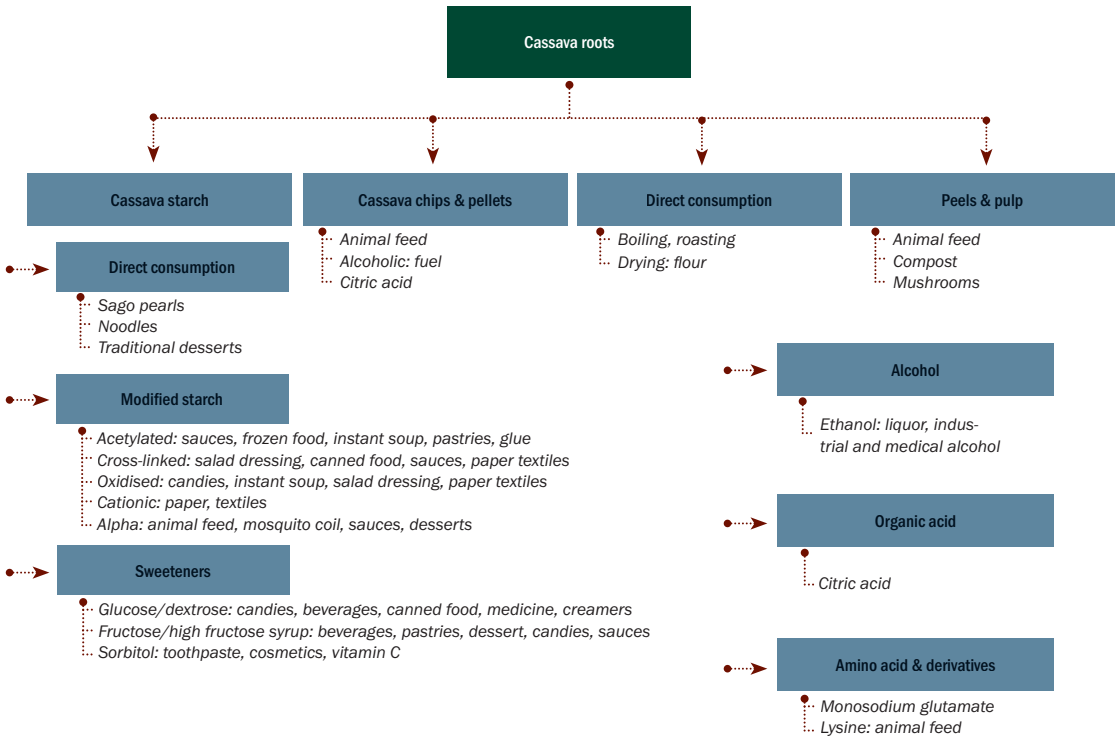
Even though farmers' cost structures are not identical, they share a similar profile. The bulk of a farmer's production costs are made up of three main components – labour, land and materials. Compared to the other regions that would be SADC's main competitors, predominately Asia and South America, SADC has something of a competitive advantage in unskilled labour and land (although in Asia, unskilled labour is abundant, whilst in South America land is abundant).

Typically, variable costs comprise 60% of total costs, while fixed costs account for the remainder. A higher ratio of variable to fixed costs can, however, make it easier for SADC's farmers to become cassava growers. First, their initial capital outlay is lower, which reduces their bank loan. The structure of the banking industry makes it difficult for SADC's small-scale farmers to raise capital from traditional financial institutions; as a result they are often forced to borrow money from micro-lenders that charge exorbitant interest rates. Secondly, lower fixed costs reduce a farmer's potential downside and thus reduce his/her risk profile. In the third place, a smaller fixed-cost ratio gives a farmer more flexibility to manage her cash flow.

5. Demand and supply-side variables

The cassava shrub contains a root and leaves, which can both be processed to make various products, although more products can be made from the root than the leaves. Products from cassava's roots also require more complex value-added activities and have a greater value. As a result, this Brief exclusively discusses these products (see figure 1). Cassava products are divided into three broad categories: food for human consumption, animal feed and industrial products. These categories are discussed individually, as the manner in which cassava is processed, distributed and marketed is different for each category.

Figure 1: Products derived from cassava's root



Source: Howeler (2003)

5.1. Human consumption

Before the root of the bitter cassava variety can be eaten it must be processed to eliminate potentially toxic concentrations of cyanogenetic glucosides. Processing can take the form of soaking the root in water, crushing or heating it. Countries have developed various traditional methods to prepare cassava, which include peeling, boiling, baking, frying and grating it to extract starch. The refined product is dried over a fire or left in the sun to dry for two to three days. It is then added to

soups and stews as a thickener, or fermented and cooked. Extracted starch can be used to make breads, crackers or pasta. The leaves of the cassava plant are edible and provide a rich source of protein and vitamins A and B. They are eaten as a green vegetable and prepared in a similar manner to spinach.

Processing cassava and selling it as a product for human consumption to developed countries' specialised food markets is a potentially lucrative market. Increased awareness of food allergies amongst consumers has created a market for a substitute product – cassava's dried roots provide an alternative source of carbohydrates for people who have wheat, corn or rice allergies. In addition, cassava products could be marketed to consumers who have a taste for exotic foods and health foods that have a lower fat and sugar content. Cassava absorbs less fat when it is fried than other starches; as a result it can be used as a healthier alternative to produce snack and convenience foods. Over the past five years, Latin America's snack and convenience food industry has created a range of cassava products and successfully marketed them in the US, European and Japanese markets.

Cassava has the potential to become a lucrative speciality food product. However turning that potential into trade flows requires substantial resources. Marketing cassava would be an expensive undertaking as one's marketing strategy would involve educating consumers about an unknown product and then creating an appetite for the product. The market's incumbents have an interest in hindering the spread of cassava products as they have invested in technology that favours potato-based products. To introduce cassava products into this type of market would require access to financial resources and a strategy that builds on present demand, explores alternative distribution channels and emphasises the health benefits of consuming cassava products compared to potato- or maize-based alternatives.

It might be argued that pursuing this market is a lengthy and expensive process, and given SADC farmers' limited resources it might not be viable. However, this market has the potential to be very profitable, so the opportunity could be marketed to venture capitalists or boutique food processors. To gain a foothold in this market, a starting point could be to target developed countries that have a large immigrant population and health food stores. In an effort to make the product more attractive to consumers, at the onset of the marketing campaign, the cassava-based product would probably be priced below the traditional alternative. In Brazil pre-cooked, deep-frozen cassava fingers are priced 10% to 15% below the price of deep-frozen potato chips. However, as the product gains popularity and consumers perceive it to be a superior product because of its health benefits, it could probably be sold at a

premium compared to maize- or potato-based products. In addition, fresh cassava's short shelf life and bulky nature complicate logistics and increase transportation costs, and thus introducing processed cassava foods into the market is a better strategy than supplying fresh cassava.

The International Trade Centre of the UNCTAD/WTO[1] publishes market wholesale import prices for cassava destined to be used for human consumption. Although these prices only cover Costa Rica's exports of cassava to the European market, they give one a sense of the market's volatility and value. This information can be found at *http://www.intracen.org/mns*.

5.2. Animal feed

Cassava animal feed is used to feed cattle, sheep and poultry. Feed is made from processing the plant's roots into either pellets or chips. Cassava's roots are an excellent source of carbohydrates but its protein and vitamin content is poor. As a result, cassava feed must be supplemented with soymeal or leaves from the cassava plant.

Cassava chips are more widely produced than pellets and are produced in Thailand, Malaysia and Nigeria. Processing cassava into chips involves slicing them into pieces not longer than 5cm to ensure they can be stored in silos, and drying them in the sun for two to three days or until their moisture content is between 13% and 15%. During the drying phase, the chips must be turned over regularly. Slicing the roots can either be performed manually or mechanically. The mechanised option is obviously more efficient (the same task that involves three days' manual labour can be completed in one day using machinery). In SADC the need for efficiency must be weighed against surplus unskilled labour and a farmer's ability to access finance.

The diesel/electric powered machine required to slice roots is not complicated or high-tech. Roots can also be trimmed, peeled and washed before processing to create a superior quality product. In general, 2kg to 2.5kg of fresh roots is required to produce 1kg of chips, which can be translated into a recovery rate of about 20% to 40%. The by-product from this process is used to make cassava meal, which is categorised as an inferior product compared to cassava chips, pellets and broken roots because of its lower starch content, higher impurity content and since it is more difficult to transport.

Producing cassava chips is a fairly simple process that does not require large capital investment. It provides farmers and small-scale business-

[1] United Nations Conference on Trade and Development / World Trade Organisation

es with an opportunity to invest in a chipping factory to gain entry into the value-added product market. As processing must be done within close proximity of the growing areas due to the perishable and bulky nature of cassava, it ensures the benefits arising from value-added activities are trapped in communities where cassava is grown.

Cassava chips are used as the starting point to produce cassava pellets. When chips are dry, they are transported to a pellet-processing factory. To make pellets, chips are mixed with palm oil, ground, steamed, dyed and cooled into a cylindrical shape. Compared to chips, cassava pellets are regarded as a superior value-added product. Pellets' product quality is more uniform and they are more compact, occupying 25% to 30% less space than chips. This reduces transportation, handling chargers for off-loading products and storage costs. Pellets are also a more stable, sturdy product and reach their destination with considerable less damage than chips. On average, one ton of fresh roots produce 450 kg of chips or 440 kg of hard pellets.

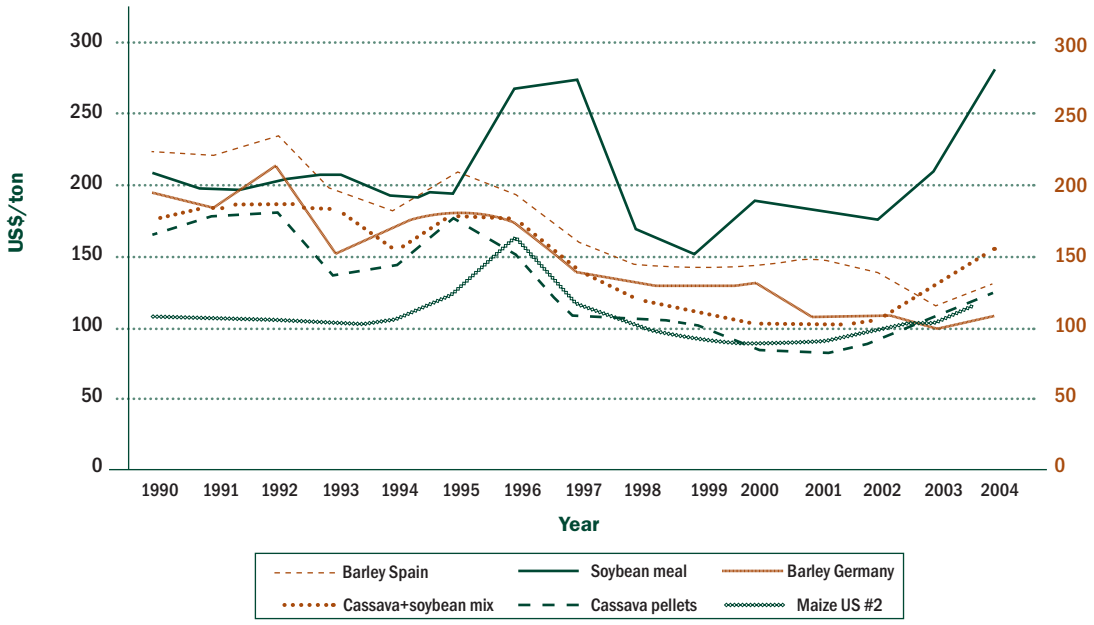
Generally, the demand for cassava chips and pellets is driven by a population's consumption of livestock products. Wealthier consumers include more complex proteins in their diet. Therefore, as a country develops, reflected in rising per capita-income levels, its population improves the quality of its diet, which means the consumption of livestock products increases. Secondly, the demand for cassava is driven by its relative price compared to substitute products. In the third place, the price of complementary products, in this case protein-rich meals, affects the demand for cassava pellets/chips. According to the ITC, the industry standard for cassava feed comprises 80% cassava pellets and 20% soybean meal. As a result, soybean meal prices affect the competitiveness and demand for cassava feed compared to its substitute products, ultimately affecting cassava's price. Indirect factors that affect the demand for cassava are exchange rates, especially the Euro/US$ exchange rate, countries' agricultural policies and climatic conditions.

Prices for animal feed are subject to fluctuations as the market is influenced by the interaction of various factors (see figure 2). The market for cassava feed is affected by countervailing forces, or the knock-on effect from movements in grain markets, and thus is relatively unstable compared to its substitute grain products. For instance, the EU's grain policy increased soymeal prices, which in turn dampened the demand for cassava feed; however the Euro's strength compared to the US dollar increased the cost of importing wheat from Eastern Europe, thereby increasing the demand for cassava feed. Given the impact of various countervailing forces, it is difficult to judge whether this market should be targeted by SADC farmers as an export product. Even though the same set of factors holds for various markets, there are slight nuisanc-

es. As a result, SADC's farmers should not base an export strategy on generalisations. For example, in the EU the demand for cassava is influenced by domestic grain prices, especially barley, and manufacturers' ability to source cheap wheat from Eastern Europe. Alternatively, in China demand is affected by the price of sweet potatoes

Based on experts' opinion, the market for cassava feed is entering into its consolidation phase, which is characterised by demand growing at a steady rate and demand-side-driven pressure to reduce supply-side costs. Since the 1980s, the demand for cassava feed has remained stable, causing trade levels to stabilise. Although Asia and Africa's demand for feed has grown, it has barely managed to offset the EU's

Figure 2: Price trends of cassava feed and other competing products



Source: Howeler (2003)

1970-1980 demand levels. It is predicted that South Korea's demand for cassava feed should decline over the medium term as the growth of its livestock industry decreases due to greater imports of livestock products. In essence, Korea is shifting its exports from feed to the finished good. The demand for cassava feed in Viet Nam, Indonesia, China and Thailand should continue to grow as their populations' per-capita income increases, stimulating the demand for livestock products. In Latin America, particularly Brazil and Columbia, the demand for cassava feed should increase. An interesting trend is emerging. Although the consumption of cassava feed should increase in Asia and Latin America, it will be met by local production; as a result, export opportunities represent a fraction of the total market.

Another factor that SADC's farmers should consider before building capacity to supply this market is its rivals, such as Thailand, Viet Nam and Indonesia's pre-existing levels of investment. Generally, the greater the level of investment, the more likely a country will defend its markets. This is especially the case for Thailand, whose government has a history of providing its farmers with support throughout the value chain. Thailand's 200 pellet factories have a combined capacity to produce roughly 10-million tons of pellets per year, but the EU's quota is only five million tons per year. Excess capacity could lead to a scenario where factories might operate at 50% of their capacity if they rely solely on the EU's demand for pellets. As a result, the Thai government and its cassava association are motivated to aggressively capture other markets,

The demand for cassava feed has potential in Sub-Saharan Africa. This market does not 'exist' in an established form due to institutional and supply-side constraints. Perhaps a possible strategy for SADC's farmers to explore is to put effort into creating a market rather than trying to break into established markets, such as China, which are highly competitive.

5.3. Industrial uses

Starches are used in various markets, such as the adhesives, explosive, paper, construction, metals, textiles, cosmetic, pharmaceutical, mining and food industries, and applied to a host of applications within these markets. The food industry uses starch to produce monosodium glutamate (MSG), lysine, high fructose, glucose syrup, dextrose monohydrate, dextrose anhydrous and sorbitol. Given the widespread use of starches, this Brief does not provide an exhaustive list of applications for cassava starches. Cassava can be used to produce a native or modified starch. These starches can be used as a finished product or a raw material to create a substance that is used in a manufacturing process. An example of a finished product is MSG, and an example of a raw material is organic acids and amino-acids which are used to produce food, plastics, synthetic resins, rubber products, etc.

As a native starch, cassava has a high amylose content; as a result it has a neutral taste, is odourless and has the smoothness and transparency of a gel. Its unique properties are its viscosity and resistance to shear, making cassava starch an ideal product for the food processing industry. In addition, cassava starch can withstand acidic conditions and is stable in freezing conditions but breaks down when it is heated.

Modified starches are produced by manipulating a native starch's intrinsic physical, chemical or micro-biological processes to meet a user's

requirements for his/her specific application. For example, cassava starch would need to be modified to produce bio-degradable plastics or any application that requires properties associated with a low amylase content. This process uses advanced technologies that are rapidly evolving. Native and modified starches are not perfect substitute products, even though they are used in cross-over markets. These starches are used to produce sweeteners (maltose, glucose syrup, glucose and fructose), hydrogenated sweeteners (sorbitol, mannitol and maltol) and MSG. In certain markets where consumers are against genetically modified products, such as baby food, a native starch would be a preferable option. Generally, modified starch is used in 'heavy' manufacturing applications: paper industry, textile industry (warp sizing, cloth finishing and printing), construction materials, medicines, etc.

On a global basis, the market for starch is growing as economies continue to industrialise and consumerism spreads into peri-urban and rural areas, changing people's cultural preferences and values, altering their lifestyles and what they consume. These demand and supply factors have increased the level of consumption and changed the type of products demanded by end-users. Demand for processed foods, paper products, biodegradable plastics and cosmetics continue to rise. These products are produced using starches. Although the market for starches is growing, the pertinent question is whether the market for cassava starch is growing. The answer to this question lies in exploring what type of products is demanded, whether cassava starch has the properties to cater to this market, and whether cassava starch face competition from substitute products.

As mentioned earlier native cassava starch has ideal properties to be used by the food industry to produce processed foods and sweeteners. However, cassava starch would need to be modified to produce plastics or any product that requires a 'waxy' compared to a gel-like substance. Substitutes for cassava starch are maize, potato and wheat. These products are entrenched in developed country markets, such as the US, which prefers maize starch and Europe, which prefers potato and wheat starches. These starches' dominant market position is due to historical usage patterns, the continued development of products that require these starches' properties and the fact that the producers of these starches reside in developed countries and thus have the resources to conduct scientific research to create new applications for them. For cassava starch to gain a sizeable market position, research is required into its properties and the development of modified starches with specific properties which make them preferable for certain industries. To compete in this market requires substantial scientific resources to which SADC does not have access.

The market's growth potential is impressive because the demand for starch-based applications in the food industry and industrial sector is increasing, and industry is searching for cheaper substitutes. As a result, market timing to introduce a new starch alternative is excellent. However, this has no consequence if SADC farmers do not have the ability to tap into this market due to technological constraints. In totality the starch value chain is technologically advanced; however, within the chain exist relatively simple components. Over the short to medium term there is an opportunity for SADC's small-scale farmers to produce wet starch that could be sold to factories to produce higher quality dry starch. Although this option provides an entry point for small-scale farmers to enter into the cassava starch value chain, it reduces the overall quality of the final product. Factories' quality of starch and the efficiency of its conversion process are optimal when roots are used.

An emerging market for cassava starch is to produce bio-degradable products, such as packaging material and kitchenware. Discarded plastic products have the potential to cause environmental pollution, and as a result discarding these products places a burden on waste management systems. Studies show that consumers and industry participants are interested in buying and supplying bio-degradable plastic products. This market's annual growth is estimated to be 30% in Europe and the US, provided these products' physical properties meet industry standards and they can be placed on the compost heap. This could represent a foreign direct investment (FDI) opportunity for SADC which has the land, labour and climatic conditions to grow cassava, but requires a technology partner and capital to build factories.

6. Countries' production patterns

According to the Food and Agriculture Organisation (FAO), cassava is grown in 101 countries. These countries are not evenly dispersed amongst regions – in 2003 about 54% of the world's cassava was produced in Africa, 29% in Asia and only 14% in Latin America and the Caribbean. Furthermore, the demand drivers stimulating production among regions are different. In Asia, Latin America and the Caribbean, cassava is primarily produced for domestic (animal) feed, while in Africa cassava is produced for human consumption. Although Thailand and China produce cassava to make animal feed, it is not their primary market. China produces cassava for industrial applications, in particular raw material for starch production (MSG and sweeteners), while Thailand produces cassava mainly as an export crop.

From 2000 to 2004, the global production of cassava grew at a modest rate of 5% per annum calculated on an average annual basis (see table 2). The top 10 global producers of cassava grew their production by 3% from 2000 to 2005, while other producers achieved 5% growth. This indicates that emerging producers, such as Viet Nam, Paraguay, Malawi, Madagascar, Peru, Zambia, Rwanda, Senegal, Cambodia and Costa Rica have the potential to move into the top 10.

The world's production of cassava is geographically concentrated in Africa and Asia. This is confirmed by the fact that nine out of the world's top 10 producers are located here and that the 10 top producers comprise 76% of the world's production. Although the world's production of cassava chiefly resides in 10 countries, their individual shares of global production is relatively small, excluding Nigeria's. From 1990 to 2004, countries' positions within the top 10 changed. In 2004, Nigeria became the world's largest producer of cassava, relegating Brazil to second position. Five of the top 10 producers' share of global production declined in 2004 compared to their 1990 level. The biggest losers were Brazil, Thailand and the DRC. Nigeria and Ghana managed to increase their share of global production during 2004 compared to 1990.

A notable feature is the presence of six African countries amongst the top 10 producers. Furthermore, five of these countries' average annual growth rate was positive and greater than that of their counterparts on the list, excluding Indonesia. Africa has the distinction of having the largest producer, Nigeria, and the fastest growing producer, Angola. Africa's position as the world's dominant producer of cassava can be attributed to government policies to improve food security, introducing new, higher yielding, disease-resistant cultivars and favourable climatic conditions. Cassava has the potential to be an attractive export crop as it builds on Africa's existing strong productive capacity.

Table 2: Major producers of cassava, 1990-2004 ("000 ton)

	Year			Average annual growth (%)		Percentage of total	
	1990	1995	2004	1990-2004	2000-2004	1990	2004
Nigeria	19,043	31,404	38,179	5.09	4.50	12.54	18.82
Brazil	24,322	25,423	23,927	-0.12	0.63	16.02	11.79
Thailand	20,701	16,217	21,440	0.25	2.98	13.63	10.57
Indonesia	15,830	15,441	19,425	1.47	4.82	10.42	9.57
DRC	18,715	16,870	14,951	-1.59	-1.62	12.32	7.37
Ghana	2,717	6,611	9,739	9.55	4.69	1.79	4.80
Tanzania	7,792	5,969	6,890	-0.87	-0.82	5.13	3.40
India	4,962	5,857	6,700	2.17	2.74	3.27	3.30
Angola	1,600	2,550	6,650	10.71	10.67	1.05	3.28
Mozambique	4,590	4,178	6,413	2.42	4.58	3.02	3.16
Viet Nam	2,276	2,212	5,573	6.61	29.42	1.50	2.75
Paraguay	3,550	3,054	5,500	3.18	19.25	2.34	2.71
Uganda	3,420	2,224	5,500	3.45	2.59	2.25	2.71
China	3,216	3,517	4,216	1.95	2.48	2.12	2.08
Benin	937	1,238	2,955	8.55	5.89	0.62	1.46
Malawi	145	328	2,559	22.77	-1.84	0.10	1.26
Madagascar	2,292	2,400	2,191	-0.32	-2.88	1.51	1.08
Colombia	1,939	1,801	1,943	0.02	2.04	1.28	0.96
Philippines	1,854	1,906	1,641	-0.87	-1.82	1.22	0.81
Côte d'Ivoire	1,393	1,608	1,500	0.53	-2.95	0.92	0.74
Top 20 producers	141,293	150,809	187,891	2.06	3.49	93.04	92.61
Other producers	10,571	10,993	14,988	2.53	1.65	6.96	7.39
Total production	151,865	161,802	202,879	2.09	3.35	100.00	100.00

Source: Food and Agriculture Organisation Statistics (FAOSTAT)

In 2004 the world's largest producers of cassava were Nigeria, Brazil and Thailand, whose share of global production was 19%, 12% and 11%, respectively. Over the 2000-2004 period, both Brazil and Thailand's average annual growth rate was significantly lower than Nigeria's. Cassava production in Nigeria grew, on an average annual basis, by 4.50% per annum to become the third fastest growing top 10 producer. Nigeria's growth is impressive as it is off a larger base than other top 10 producing countries. Nigeria's success is due to the government's initiative to improve the interaction between the industry's supply- and demand-side capabilities.

The remarkable feature about the Nigerian government's approach has been the manner in which policies were sequenced and the ability to draw on international resources by forming partnerships with international agencies. Initially, the government's policies focused on improving farmers' yields and product quality. The second stage was to create a stable source of demand for a relatively simple, value-added product that could be processed at the farm gate. The government legislated that bread must contain a certain percentage of cassava flour. Once the government had stimulated demand for cassava, its next initiative was to build the industry's supply side to produce sophisticated

value-added products. SADC could learn from Nigeria's experience to build a regional industry as SADC's farmers face similar constraints. Furthermore, encouraging intra-regional knowledge could be the first step toward establishing an African cassava hub that gives Nigeria and SADC access to supply-side resources and a demand base to build a lucrative industry.

The interaction between cultivar type, planting season and soil type determine yields. If high-yielding cultivar varieties are planted, combined with good management practices, cassava yields can reach 20 tons to 25 tons per hectare. Productivity levels, based on yields per hectare, are higher in Asia, Latin America and the Caribbean compared to Africa. However, Africa's yields have reported the fastest growth, albeit off a low base, while Latin America and the Caribbean's yields have stagnated.

Over the past decade the area allocated to cassava production in Asia has decreased but yields have markedly increased; as a result, production has steadily increased. Improved productivity levels stems from the respective governments' efforts to distribute widely the new high-yielding and high-starch varieties, as well as the adoption of improved cultural practices, such as more balanced fertiliser use and soil conservation measures. Thailand and Viet Nam have aggressively reformed their cassava sector. In Thailand, new cassava varieties are planted in almost 100% of its cassava-growing farmlands and 70% to 80% of farmers apply chemical fertilisers. In Viet Nam, new cassava varieties are planted in about 50% of its cassava growing area and about 80% of farmers apply chemical and/or organic manures.

This has two implications for SADC farmers' ability to reduce Asia's dominance of the cassava market. Thailand has access to a growing domestic and international market for its cassava products. However, Thailand's ability to service this demand could be potentially strained in the medium term, as it does not have any more land available for cassava cultivation and has exploited productivity gains associated with planting new cultivars and crop management. Thailand is reaching its productive ceiling, yet demand in the region and domestically is increasing. Africa has access to the factors of production and has already established its presence as a large producer, which can be built upon to create the momentum to improve its productivity, required to capture potential surplus demand in the Asian market.

In 2004, SADC's production comprised 20% of global supply (see table 3), which is slightly larger than the world's largest producer, Nigeria. This illustrates that SADC's productive capacity is significant. From 2000-2004, SADC's production grew by 1.08%, which is lower than the global average of 3.35%. This is a troubling trend, as it indicates that SADC's relative position as a producer of cassava is dropping. On the other hand, it should be noted that these statistics might be conservative, as a large percentage of cassava grain in SADC is not traded but rather consumed as a subsistence crop.

The decline in SADC's production could be reversed easily as the region has the climatic conditions, access to land and abundant labour to improve its performance. SADC has access to the factors of production to produce cassava but not trade it. Simple processing technology that can be used at the farm gate or in the village to create an easily transportable product does not exist. A general lack of infrastructure exacerbates the problem of transporting a product which by its very nature is difficult to distribute unless it is processed. As a result, trade in cassava is constrained chiefly by two bottlenecks, access to simple, cheap micro-technology as farmers' access to capital is limited and general infrastructure. On the demand side, SADC's farmers and its industries are not taking advantage of cassava's various potential applications, as it is mainly regarded as a staple crop. This illustrates that there is an underlying marketing problem and also that industries' supply chains act in isolation. For example, although cassava is an agricultural product, its value chain could interact with livestock producers' value chain or South Africa's energy value chain, as cassava can be processed into animal feed or bio-fuels.

SADC has the potential to increase its production, and more importantly, use cassava as a crop to bring marginal subsistence farmers into the cash economy. Based on Nigeria's example, referred to earlier, it is an achievable task. The region also has the opportunity to learn from Nigeria's experience with respect to moving the production of cassava away from subsistence farming to inclusive commercial farming. This is a valuable source of intangible capital that SADC farmers can tap into, and if used properly, should reduce the potential hurdles that SADC farmers would face when they establish a cassava supply chain.

Table 3: SADC's production of cassava, 1990-2004 ('000 tons)

	Year			Average annual growth (%)		Percentage of total	
	1990	1995	2004	1990-2004	2000-2004	1990	2004
DRC	18,715	16,870	14,951	-1.59	-1.62	12.32	7.37
Tanzania	7,792	5,969	6,890	-0.87	-0.82	5.13	3.40
Angola	1,600	2,550	6,650	10.71	10.67	1.05	3.28
Mozambique	4,590	4,178	6,413	2.42	4.58	3.02	3.16
Malawi	145	328	2,559	22.77	-1.84	0.10	1.26
Madagascar	2,292	2,400	2,191	-0.32	-2.88	1.51	1.08
Zambia	640	744	957	2.92	4.09	0.42	0.47
Zimbabwe	95	150	190	5.08	2.08	0.06	0.09
Seychelles	0	0	0	0.00	0.00	0.00	0.00
Mauritius	0	0	0	-2.67	-3.51	0.00	0.00
Total SADC production	17,154	16,320	25,851	0.92	1.08	11.30	12.74
Other producers	134,710	145,483	177,028	2.42	3.96	88.70	87.26
Total production	151,865	161,802	202,879	2.09	3.35		

Source: FAOSTAT

7. Countries' consumption patterns

Data suggest that a region's economic development influences the type of value-added cassava products it demands and consumes. Generally, least-developed regions consume cassava as a staple food, while developed regions use cassava as a raw material to produce starches. In Africa, cassava is predominately consumed as a staple crop for human consumption, with a miniscule share of its total consumption being used as animal feed. Africa's consumption level is tied in theory to its production capacity. This should change over the medium term as governments and international agencies' initiatives to build a livestock feed industry gains momentum. In Latin America and the Caribbean, about 60% of cassava is consumed by the traditional food sector, while the remainder is processed into animal feed and used by industry to produce starch. In Asia, cassava is predominately used as animal feed, in the form of pellets, or industrial applications to produce starches. An exception to this generalisation is Indonesia, India and Viet Nam; where cassava is used for human consumption. This region is also experimenting with producing ethanol from cassava. In the EU, cassava is mostly consumed by the livestock industry as an animal feed for its pork industry. However, the EU's consumption of cassava feed is falling and the slack is being absorbed by the demand for industrial starches.

The top 10 consumers of cassava are located in Asia and Africa; as a result it is fair to say that the consumption of cassava has a geographical dimension. Based on data, this trend should not change as the emerging consumers of cassava are Thailand, China, Guinea, Rwanda, Peru, Kenya and Viet Nam.

The 10 largest consumers of cassava, with respect to volume rather than value, comprised 73% of global consumption in 2004. In total, the top 10 consumers' market share remained relatively stable from 1990 to 2004, as it moved within a 1% range. Countries' relative ranking within the top 10 from 1990 to 2004 also remained relatively unchanged, barring Indonesia and Nigeria. With respect to market share over the period, countries' fortunes have changed: the biggest loser was the DRC, while Indonesia and Nigeria were the biggest gainers.

From 2000 to 2004, growth in global consumption was negligible, reaching only 0.15% (refer to table 4). The top 10 consumers' demand for cassava declined by 0.35% from 1990-2004. Nine of the top 10 countries use cassava as a staple food, and thus it is not surprising that the market's growth in demand is insignificant. The market's historical low growth rate should not deter investors' interest, however, as cassava has a dual market. The tradable market is dominated by the Asian exporters that supply cassava pellets and chips to the world,

Table 4: Major consumers of cassava, 1990-2004 ('000 tons)

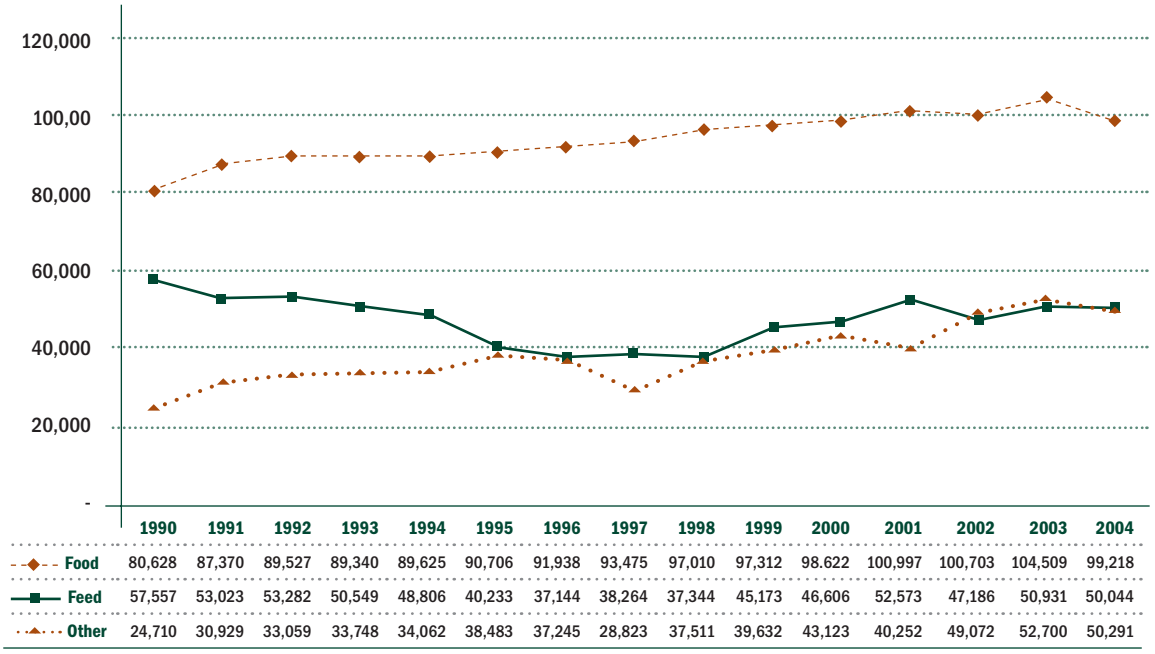
	Year			Average annual growth (%)		Percentage of total	
	1990	1995	2004	1990-2004	2000-2004	1990	2004
DRC	15,464	5,463	14,122	-0.65	-1.77	19.18	14.23
Indonesia	8,155	5,730	12,425	3.05	1.25	10.11	12.52
Nigeria	8,236	3,327	12,338	2.93	-2.80	10.22	12.43
Brazil	8,058	3,757	6,771	-1.24	-3.77	9.99	6.82
India	4,649	2,431	5,722	1.50	0.02	5.77	5.77
Tanzania	5,886	1,463	5,122	-0.99	-2.60	7.30	5.16
Mozambique	3,598	1,803	4,758	2.02	5.21	4.46	4.80
Ghana	1,949	551	4,528	6.21	1.87	2.42	4.56
Angola	1,520	1,630	3,559	6.27	5.06	1.89	3.59
Uganda	2,251	1,766	3,098	2.31	7.24	2.79	3.12
Madagascar	1,726	1,313	2,005	1.07	-2.21	2.14	2.02
Thailand	513	1,448	1,989	10.16	35.72	0.64	2.00
China	1,263	541	1,941	3.12	3.97	1.57	1.96
Philippines	1,650	860	1,551	-0.44	-2.22	2.05	1.56
Colombia	1,245	300	1,546	1.56	1.79	1.54	1.56
Côte d'Ivoire	1,254	244	1,330	0.42	-3.37	1.56	1.34
Guinea	334	707	1,202	9.58	9.67	0.41	1.21
Benin	675	1,337	1,135	3.78	3.41	0.84	1.14
Malawi	132	738	1,095	16.34	-3.76	0.16	1.10
Rwanda	258	385	1,002	10.19	5.90	0.32	1.01
Top 20 consumers	68,816	35,792	87,238	1.71	0.22	85.35	87.93
Other consumers	11,812	54,914	11,980	0.10	-0.37	14.65	12.07
Total consumption	80,628	90,706	99,218	1.49	0.15	100.00	100.00

Source: FAOSTAT

and the staple food market, mostly in African countries. The consumption data reflected in table 4 give a conservative picture of cassava's trade prospects, as it is skewed toward poorer countries that use cassava as a staple food. Growth prospects for cassava are prevalent in middle-income developing countries that require an alternative source of fuel and raw material feedstock to support the industrialisation of their economies. Therefore, growth prospects for cassava exist for its use as an industrial feedstock to produce starch and bio-fuels. Even though these markets are in a developmental stage, on a volume basis they have outpaced the consumption of cassava as food and feed (see figure 3).

An interesting observation is that the largest producers of cassava tend to be the largest consumers. Nine countries are among the 10 largest consumers and producers of cassava. The only two countries to buck this trend are Thailand and Uganda that only appear on the producers' and consumers' list, respectively. Also, most countries produce more cassava than they consume. The important factor to establish is whether countries' production surplus is exported, which would create competition for SADC farmers' product. To answer this question, trade flows are analysed in the next section.

Figure 3: Consumption of cassava on a product basis ('000 tons)



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Food	80,628	87,370	89,527	89,340	89,625	90,706	91,938	93,475	97,010	97,312	98.622	100,997	100,703	104,509	99,218
Feed	57,557	53,023	53,282	50,549	48,806	40,233	37,144	38,264	37,344	45,173	46,606	52,573	47,186	50,931	50,044
Other	24,710	30,929	33,059	33,748	34,062	38,483	37,245	28,823	37,511	39,632	43,123	40,252	49,072	52,700	50,291

Source: FAOSTAT

In 2004, SADC's share of global consumption was 32%, a fall of 4% from its 1990 level of 36% (see table 5). From 2000 to 2004, SADC's consumption of cassava declined by 0.26%, dropping below the world's annual average growth rate of 0.15%. SADC's consumption profile in terms of its absolute value and composition has remained relatively static over the period. This reflects cassava's status as a substance crop that is grown on marginal land. SADC's poor performance should not be viewed as negative but as an opportunity, as it reflects low investment in an industry where SADC's competitive advantage with respect to land and labour has not been harnessed.

Table 5: SADC's consumption of cassava ('000 tons)

	Year			Average annual growth (%)		Percentage of total	
	1990	1995	2004	1990-2004	2000-2004	1990	2004
DRC	15,464	5,463	14,122	-0.65	-1.77	19.18	14.23
Tanzania	5,886	5,730	5,122	-0.99	-2.60	7.30	5.16
Mozambique	3,598	3,327	4,758	2.02	5.21	4.46	4.80
Angola	1,520	2,431	3,559	6.27	5.06	1.89	3.59
Madagascar	1,726	1,803	2,005	1.07	-2.21	2.14	2.02
Malawi	132	300	1,095	16.34	-3.76	0.16	1.10
Zambia	608	707	902	2.85	3.87	0.75	0.91
Zimbabwe	90	142	180	5.07	2.05	0.11	0.18
South Africa	-	3	0		98.95	0.00	0.00
Seychelles	0	0	0	2.48	5.53	0.00	0.00
Mauritius	0	0	0	2.79	4.46	0.00	0.00
SADC consumption	29,025	29,826	31,744	0.64	-0.26	36.00	31.99
Other consumers	51,604	60,880	67,474	1.93	0.35	64.00	68.01
Total consumption	80,628	90,706	99,218	1.49	0.15	100.00	100.00

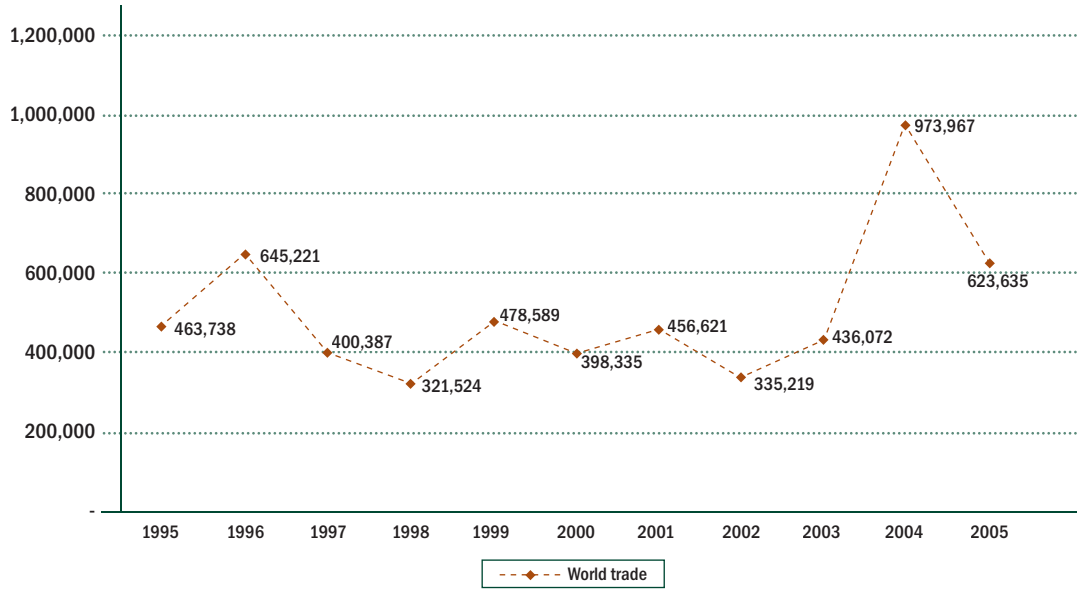
Source: FAOSTAT

8. Regional trade

Trade in cassava comprises mostly pellets and chips for animal feed, while the remainder is for starch and flour for industrial use. Trade in fresh cassava is generally limited to exchanges between bordering countries due to the product's bulkiness and perishable nature. Although cold chain management can improve the product's shelf-life, it complicates logistics which increases transportation costs that cannot be passed on to the final consumer, unless the product is destined for a specialised market.

From 1995 to 2005, trade in cassava was erratic (see figure 4). This is not surprising as such trade is dominated by animal feed, whose prospects are affected by the grain market's behaviour. The grain market tends to be volatile as it is subject to government interventions. In addition, cassava's trade spikes are due to the fact that it is a thinly traded market, whose behaviour is driven by five countries' demand patterns and three countries' supply capacity. For example, the major surge in 2003 is due to China's increasing demand, while the decline in 2001 is due to the EU's falling demand.

Figure 4: Trade in cassava, 1995-2005 (US$'000)



Source: World Integrated Trade Solution (WITS)

Regional trade in cassava has geographic and product-specific dimensions. From table 6 it becomes apparent that in 2005, the predominant regional exporter was South East Asia, with an 86% share of global exports and the largest importer was East Asia, with a 74% share of

global imports. Another feature that is immediately apparent is that trade occurs between trading blocs: East Asia and South East Asia are trade partners, and NAFTA and Central America are trade partners, while the EU's trade partners are South East Asia and Central America. Trade between the identified regional blocs has specific product dimensions, which is discussed later in this section.

Table 6: Regional trade matrix for 2005 (US$'000)

		Exporting countries								World imports	Percentage
		South East Asia	Central America	EU25	South America	NAFTA	South Asia	SADC	Middle East		
Importing countries	East Asia	459,244	-	-	816	-	-	-	-	460,070	73.8
	EU25	36,513	11,549	7,357	1,550	61	1	1	-	59,534	9.5
	NAFTA	645	43,228	2	3,480	13	1	-	-	48,725	7.8
	Central America	-	910	-	-	2	-	-	-	913	0.1
	South America	1	-	-	614	0	-	-	-	615	0.1
	South East Asia	324	-	-	0	14	4	-	-	445	0.1
	Middle East	1	-	3	-	0	0	0	8	14	0.0
	South Asia	0	-	0	-	-	9	-	0	9	0.0
	SADC	-	-	-	-	-	-	-	-	3	0.0
	World exports	533,926	66,173	7,853	7,790	201	18	11	8	623,635	100.0
	Percentage	85.62	10.61	1.26	1.25	0.03	0.00	0.00	0.00		

Source: World Integrated Trade Solution (WITS)

8.1. Regional exports

In 2005, South East Asia was the world's dominant exporter of cassava, comprising 86% of the market (see table 7). South East Asia's share of global exports has decreased since 1995, but only marginally (3%). This decline in market share does not imply that the region's productive capacity is diminishing, as it managed to grow its exports from 2000 to 2005. Although this level of growth is below that achieved by some of the other top five exporting countries, it is still significant as it is off a large base.

The region's export growth was driven by Thailand, Viet Nam and Indonesia. In 2005, intra-regional trade was negligible, accounting for less than 1% of the region's exports. The region's export market is geographically concentrated and country specific, with the majority of its exports destined for East Asia, in particular China and Korea. The region's top three export markets comprise 90% of its trade. China is essentially South East Asia's export market, as it accounted for 79% of the region's exports in 2005. In second and third place, respectively, were Korea and Spain, which comprised 6% and 5% of South East Asia's exports. These trade patterns are not accidental. The Thai gov-

ernment has pursued a focused export strategy that spans the entire value chain, from selecting cultivars that have the best properties to produce a specific product to mapping that product to a market. Developing an export strategy is more complicated than selecting a country / region to export one's product to, as it involves taking activities throughout the value chain into consideration. SADC's farmers can learn from Thailand's experience – also a developing country that faces similar constraints with respect to small-scale farmers' access to resources. This Brief does not advocate that SADC farmers should copy their Thai counterparts but they could use their experience to stimulate ideas about integrating activities throughout a value chain to create an export strategy and most importantly, methods to include small-scale farmers into this value chain. Information about Thailand's experience can be found at *www.fao.org*, under 'Global Cassava Strategy' (also refer to the Appendix for more information on Thailand and other Asian countries' production, usage and export of cassava).

Central America was the world's second largest exporter of cassava in 2005, managing to secure an 11% share of global exports, which is impressive considering that in 1995 it had a 4% market share. Although the region's exports experienced strong growth over the decade, its growth spurt occurred from 2000 to 2005, when it experienced phenomenal growth of 19%. The region's export growth is driven by Costa Rica and Nicaragua. Intra-regional trade from 2000 to 2005 was minuscule, fluctuating between a low of 0.65% and a high of 1.65%. In 2005, the region's import partners were the US and the EU, in particular the Netherlands and France. The US is the region's single largest importer; with 64% of Central America's exports. This region's export success demonstrates that exporting a specialised product, in this case fresh cassava, can be a profitable strategy. However, if this strategy is pursued, aspects of geography and importing into 'cold-chain' hubs are important. It is not a coincidence that Costa Rica's largest EU trading partner is the Netherlands, as it has the infrastructure to distribute a perishable production relatively quickly throughout Europe.

In 2005, the EU was the third largest exporter of cassava. Over the past decade, the EU's market share has declined from 7% in 1995 to 1% in 2005. Growth rates indicate that the EU shed more of its market share during the second part of the decade (from 2000 to 2005) as exports contracted by 23%. From 2000 to 2005, intra-regional trade ranged from 94% to 99% of the region's trade activity. In 2005, the region's top six export destinations were Spain, the Netherlands, Belgium, Italy, Portugal and France, which comprised 90% of the region's total exports. Trade activity is predominately concentrated within EU15 states. The EU predominately imports cassava in pellet form, which is

used as animal feed. Since 2000 this market has followed a downward trend due to the Bovine Spongiform Encephalopathy (BSE, or mad-cow disease) scare, falling domestic grain prices, strengthening of the euro against the US dollar and a change in the EU's agricultural policies that made the relative price of grain feed attractive. Spain's imports of cassava reflect its growing demand for industrial starch to support its food processing industry.

Table 7: Regional exports of cassava, 1995-2005 (US$'000)

	Year			Average annual growth (%)		Percentage of total	
	1995	2000	2005	1995-2005	2000-2005	1995	2005
South East Asia	411,394	336,252	533,926	2.64	9.69	88.71	85.62
Central America	18,367	27,494	66,173	13.67	19.20	3.96	10.61
EU25	32,517	28,988	7,853	-13.24	-22.99	7.01	1.26
South America	545	2,623	7,790	30.47	24.32	0.12	1.25
NAFTA	82	434	201	9.41	-14.25	0.02	0.03
South Asia	3,212	126	18	-40.62	-32.62	0.69	0.00
SADC	1,874	139	11	-40.43	-40.26	0.40	0.00
Middle East	285	-	8	-29.65		0.06	0.00
WORLD	463,738	398,335	623,635	3.01	9.38	100.00	100.00

Source: WITS

An interesting observation is that Africa produces the majority of the world's cassava, but is not classified as a major exporting region. This is due to the fact that cassava is grown as a subsistence crop for farmers' own usage as a staple food. In addition, cassava's physical attributes, especially the requirement to process the crop within days of harvesting activity, exacerbates Africa's supply-chain bottlenecks. These supply-side features include the availability of micro processing technology at the farm gate, farmers' access to capital to purchase inputs and good quality transport. On the demand side, markets for cassava products have not been developed as commercial interest in the product has been lacklustre due to its image as a poor man's crop. Supply-side bottlenecks, coupled with limited markets for cassava-based products, created unfavourable conditions for the tradability of cassava products. As detailed earlier, Nigeria forms an interesting case study in terms of easing supply- and demand-side constraints. In the first place, the Nigerian government reduced 'easy' supply-side bottlenecks and then created a mass market for a simple processed cassava product, after which the industry's supply side was reinvestigated to address more advanced issues.

8.2. Regional imports

From 1995 to 2005, the top three importers' share of global imports and their relative ranking changed considerably (see table 8). Furthermore,

over this period, the top three regional importers increased their value of imports and also the range of products that they imported. Over the past decade, East Asia's imports of cassava grew; however, the majority of this growth occurred after 2000. From 1995 to 2005, East Asia's imports grew by 17% but between 2000 and 2005, imports increased by 55%. This growth spurt can be attributed to the interaction between the following factors: China's rapid industrialisation, Thailand's search for another export market after the collapse of its key export market (EU) and the impact of free trade agreements, such as the ASEAN Free Trade Area and Thailand's Early Harvest Agreement with China.

East Asia's growth spurt increased its market share from 21% in 1995 to 74% in 2005, toppling the EU from its dominant market position of 88% in 1995 to 10% in 2005. Therefore East Asia's growth spurt changed the balance of power in the import market. East Asia's demand for cassava is driven by China's demand for livestock feed and starches. A relatively large importer in the region is Taiwan, but it is small compared to China. Intra-regional trade is not significant. In 2005, 86% of East Asia's imports were from South East Asia, in particular Thailand, Viet Nam and Indonesia.

In 2005, the second largest import market for cassava was the EU with a 10% share of global exports. This market's share of imports has continued to decline over the decade; however, the rate of decline was more pronounced during 2000 to 2005. Demand for cassava pellets to feed its livestock industry has steadily decreased due to the EU's agricultural policies, such as subsiding farmers' cereal production, which made substitute grain products more attractive, and exchange rate movements.

The EU's import basket of cassava products can be divided into three submarkets. The animal pellet market is dominated by Thailand. The market for pellets of flour and meal is imported from Coast Rica into the Netherlands, which re-exports these products throughout Europe. Finally, a growing market for food products made for human consumption is dominated by Costa Rica.

In the respective markets it would be very difficult for a country to challenge the market leaders' position. As a result, entering into direct competition with the respective market leaders by selling a similar product at a similar price could start a price war. SADC's farmers/producers would probably not win this war as they do not have access to established networks. Therefore, SADC farmers/ producers' ability to enter this market would be based on creating innovative, processed food products and marketing them to distribution channels that serve

specialised retailers, such as health stores, ethnic cuisine caterers and food outlets catering for immigrant populations.

In 2005, the third largest import market was NAFTA with an 8% market share, which is considerably better than its 3% market share in 1995. The region's primary importer is the US, comprising 97% of the region's imports. According to the FAO, the majority of cassava imported into the US is used for its livestock industry. The next largest user of imported cassava is industrial applications in the form of starches, while the remainder is consumed as food. Although cassava used for human consumption is the smallest market, it is the fastest growing sub-sector. This market's growth rate in value of 15% was largely driven by the US's demand for cassava for human consumption to produce starches and ethnic cuisine for its immigrant population. The region's preferential supplier is Costa Rica, which comprised 88% of its imports in 2005.

Table 8: Regional imports of cassava, 1995-2005 (US$'000)

	Year			Average annual growth (%)		Percentage of total	
	1995	2000	2005	1995-2005	2000-2005	1995	2000
East Asia	97,809	52,251	460,070	16.75	54.51	21.09	73.77
EU25	408,328	305,709	59,534	-17.51	-27.91	88.05	9.55
NAFTA	15,807	23,738	48,725	11.92	15.47	3.41	7.81
Central America	34	297	913	38.92	25.17	0.01	0.15
South America	307	2,060	615	7.19	-21.48	0.07	0.10
South East Asia	289	368	445	4.39	3.84	0.06	0.07
Middle East	87	142	14	-16.87	-37.31	0.02	0.00
South Asia	-	7	9		6.03	0.00	0.00
SADC	4	55	3	-2.54	-43.84	0.00	0.00
WORLD	463,738	398,335	623,635	3.01	9.38	100.00	100.00

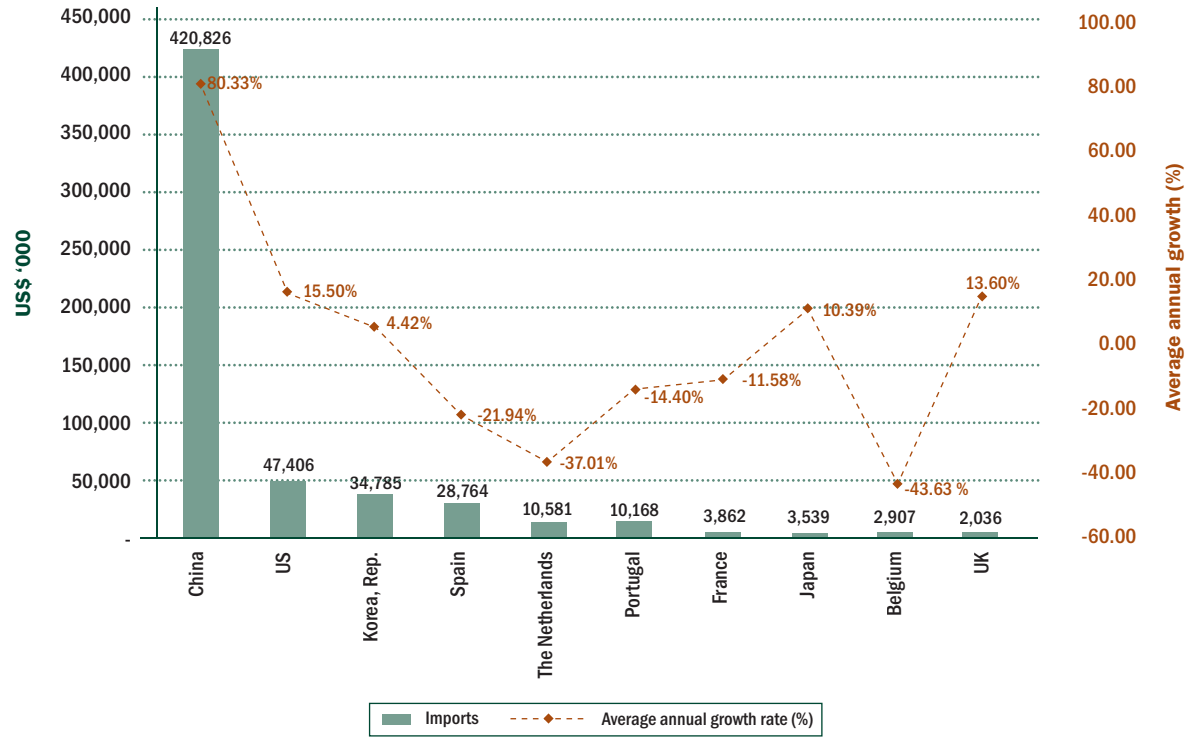
Source: WITS

9. Country trade

9.1. Countries' imports

Global imports have grown at a steady rate of 9% per annum from 2000 to 2005. However, this figure hides the fluctuation and variation in growth between import markets. This is an important point for potential exporters, as an exporter's ability to choose a 'growing' import partner will determine his/her success. Even within the top 10 importing countries, a wide variation exists between markets' prospects: China's imports grew by 80% from 2000 to 2005, while the Netherlands' imports declined by 37%. In 2005, four countries – China, the US, Korea and Spain – comprised 87% of global imports. Given these countries' dominance of the market, they effectively are the market (see figure 5).

Figure 5: Top 10 importers of cassava, 2005 (US$'000)



Source: WITS

Compared to the export market, the four largest importers are more geographically dispersed. On logical grounds this is to be expected, as creating 'artificial' climatic conditions to grow cassava is not economical and thus production is tied to areas that have suitable environmental

conditions. The geographic dispersion of large import partners provides more nodes for potential exporters to enter the cassava market. As mentioned in the supply chain section, the manner in which cassava is processed affects its perishability and its weight, which has a host of transportation implications. This, in turn, affects exporters' logistical arrangements and also shapes their decisions regarding which product to supply and which partner to select. For example, Costa Rica supplies fresh cassava to the US; however, this strategy would probably not be an effective one for Thailand to adopt.

From 1995 to 2005, the top seven importers' share of global imports changed substantially. China's share of the import market increased from 15% in 1995 to 67% in 2005, while Spain, the Netherlands and Portugal's share fell 16%, 33% and 9%, respectively. The majority of the EU' s exports were absorbed by China; as a result, the geographic location of cassava's demand base shifted to East Asia. The European market predominately imported cassava pellets for animal feed, while the Asian countries' basket of imported cassava products is more diverse, including pellets and industrial starches.

Table 9: Top importers of cassava, 1995-2005 (US$ '000)

	Trade (US$'000)			Average annual growth (%)				
	Years				Percentage of total		Uses (% per '000 ton)	
	1995	2000	2005	2000-2005	1995	2005	2000	2004
China	67,680	22,065	420,826	80.33	14.59	67.48	Feed: 42	Feed: 62
US	15,062	23,064	47,406	15.50	3.25	7.60	Feed: 59	Feed: 61
Korea, Rep.	27,261	28,015	34,785	4.42	5.88	5.58	Food: 98	Feed: 93
Spain	96,277	99,275	28,764	-21.94	20.76	4.61	Feed: 100	Feed: 99
The Netherlands	160,257	106,692	10,581	-37.01	34.56	1.70	Feed: 100	Feed: 100
Portugal	49,321	22,130	10,168	-14.40	10.64	1.63	Feed: 100	Feed: 99
France	11,029	7,146	3,862	-11.58	2.38	0.62	Feed: 91	Starch: 60
Japan	2,855	2,159	3,539	10.39	0.62	0.57	Food : 100	Food : 100
Belgium	-	51,076	2,907	-43.63	0.00	0.47	Feed: 100	Feed: 100
UK	944	1,076	2,036	13.60	0.20	0.33	Starch: 50	Starch: 58
Canada	744	671	1,319	14.48	0.16	0.21	Starch: 80	Starch: 68
Taiwan, China	-	12	920	138.81	0.00	0.15		
Italy	12,370	4,000	917	-25.51	2.67	0.15	Feed: 98	Feed: 96
Australia	329	445	732	10.45	0.07	0.12	Starch: 90	Starch: 88
Honduras	-	83	654	50.98	0.00	0.10	Food: 94	Food: 75
New Zealand	43	296	528	12.29	0.01	0.08	Food: 97	Starch: 60
Switzerland	248	260	487	13.35	0.05	0.08	Starch: 85	Feed: 81
Colombia	288	1,519	384	-24.03	0.06	0.06	Food: 79	Food: 79
Singapore	195	291	309	1.19	0.04	0.05		
Iceland	1	2	220	156.38	0.00	0.04	Starch: 95	Feed: 92
Total top 20 imports	444,905	370,277	571,343	9.06	95.94	91.61		
Other importers	18,833	28,058	52,292	13.26	4.06	8.39		
World imports	463,738	398,335	623,635	9.38	100.00	100.00		

Source: WITS and FAOSTAT

In 2005, China was the world's dominant importer of cassava, comprising 67% of global imports. More impressively, given China's large import volumes from 2000 to 2005, it managed to grow its imports by 80% on an average annual basis. China's surging demand for cassava products fuelled the global import market's 9% growth rate. A few factors contributed to the growth in China's demand for cassava products. First, China reduced its import duty from 30% to between 7% and 11.2% in preparation for its accession to the WTO in December 2001. Secondly, China's rapid industrialisation created demand for industrial feed-stocks to produce ethanol and starches. In the third place, rising per-capita income, urbanisation and the growth of the middle class increased the population's consumption of meat.

China's imports its cassava from Thailand, Viet Nam and Indonesia. Given the low value of cassava products, it is uneconomical to transport these products long distances and thus geography influences trade patterns. This is illustrated in China's decision to import cassava products from South East Asia instead of South America.

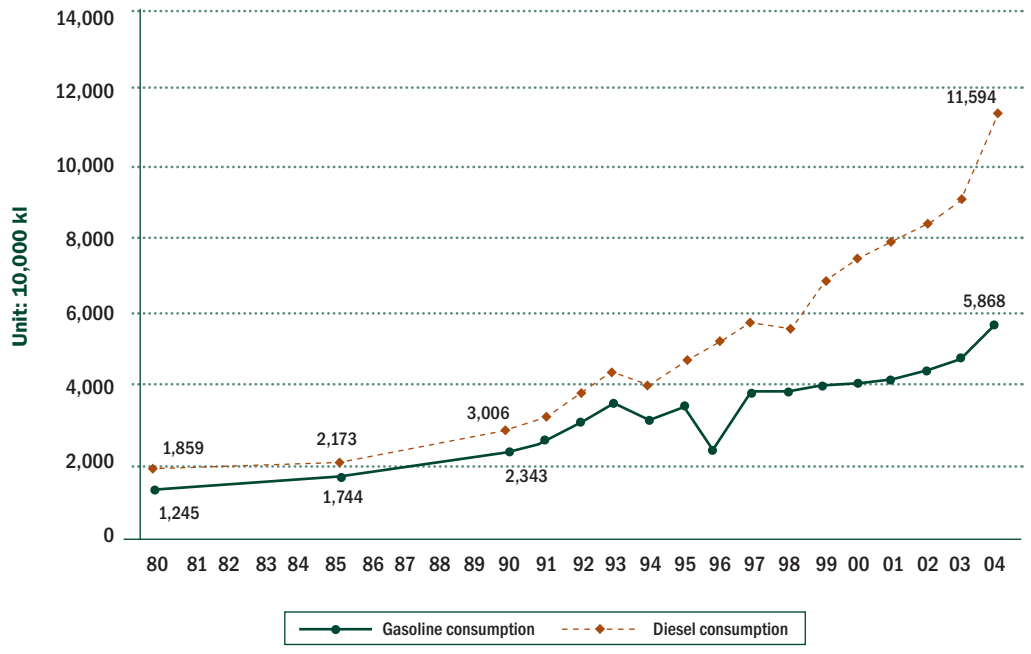
From 1997 to 2000, both Thailand and Indonesia were vying to become China's dominant supplier, Thailand won the battle. Thailand was aggressively looking for new markets to reduce its dependency on the EU. In 2000, the government launched a purchasing programme to support producer prices, resulting in the Thai Public Warehouse Organisation holding stockpiles of cassava. As a result, Thailand had the capacity to meet China's unexpected surge in demand. Viet Nam's cassava industry also grew on the back of China's increased demand, but Indonesia's industry failed to capture benefits from China's growth phase. This scenario illustrates that market timing is a crucial factor determining an exporter's potential success. SADC's entrepreneurs, producers and policy-makers could apply this lesson to entering into the ethanol market, which has the potential to be extremely lucrative.

China's imports primarily comprise dried chips and pellets used for animal feed; however, its trade is weighted in favour of pellets. China imports about 60% of its chips to produce alcohol from Thailand and 11% from Viet Nam. China imports 40% to 50% of its starch to produce sweeteners and MSG from Thailand and 20% to 30% from Viet Nam.

Trade data show that China's demand for cassava has grown exponentially. However, this is past behaviour. Is China's growth sustainable over the long term? Based on industry reports, the author asserts that China's growth in demand is sustainable, provided demand is driven by a new sub-segment, which in this case is the demand for bio-fuels. China's demand for fuel is increasing at an increasing rate (see figure 6). Fuel is required to power its industrialisation drive, and rising per capita

income has stimulated consumers' demand to own a car. Over the past two decades, China was the fastest growing automobile market in the world. From 1986 to 2004, growth in car ownership was 11.8% and by 2004, the number of cars reached 26.94-million (see figure 7). This growth should continue, and even increase, as China continues to industrialise. Over the medium term, the demand for bio-fuels should grow as the economy's demand for fuel increases based on the government's policy that 15% of China's transportation energy needs must be supplied by bio-fuels by 2020. The Chinese government has tabled legislation requiring consumers to use gasohol, which is 10% to 20% ethanol mixed with gasoline, as automotive fuel by 2008. This piece of regulation should increase the demand for cassava chips.

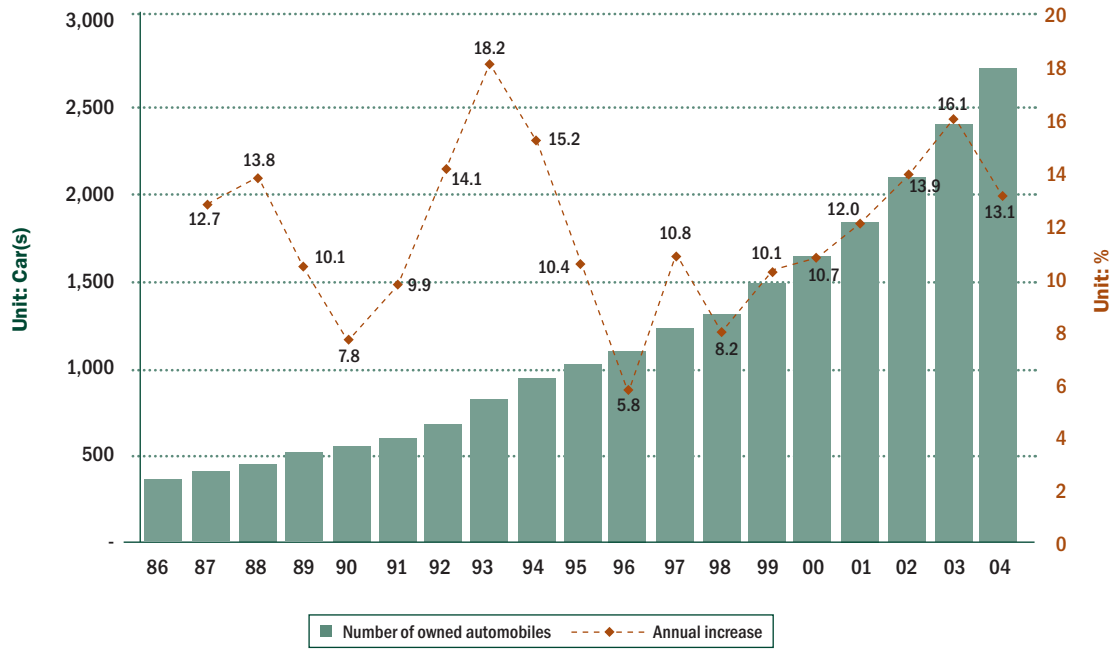
Figure 6: Gasoline and diesel consumption in China, 1980-2004



Source: Latner, O'Kray & Jiang (2006)

The ethanol industry's future growth is dependent on government support in the form of subsidies or obligatory usage rates. As a result, potential investors or suppliers to this industry are exposed to political risk. The government plans to change the manner in which it supports the ethanol industry. Subsidies will be phased out, but state municipalities will be mandated to use ethanol and municipalities will be given government grants to construct ethanol production facilities. This change affects the manner in which the government allocates funds to finance ethanol plants, but it does not affect the demand for ethanol.

Figure 7: Number of vehicles in China and their rate of growth, 1986-2004



Source: Latner, O'Kray & Jiang (2006)

As a consequence, China's production of ethanol should continue to increase past its 2004 level of 3.7-billion litres of ethanol, making it the third largest global producer.

China produces ethanol from corn and wheat; however, its primary feedstock is corn. For example, in 2006, 90% of China's ethanol was produced from corn. Corn has become a 'precious' commodity as China's economic growth increases the demand for grain and simultaneously reduces supply. Industrialisation increases urbanisation which changes a population's food consumption patterns toward convenience food and increased consumption of meat products. This led to the expansion of the livestock industry which uses corm as feed. In China corn is used as animal feed. However, due to China's industrialisation and urbanisation, both land and labour allocated to agricultural activities are decreasing. Thus, a situation has developed where China's consumption of corn is increasing at a faster rate than it can increase its productive capacity. As a result, from 2004 China became a net importer of grain. The Chinese government is concerned that being a net importer of grain could jeopardise China's long-term goal of food security and food self-sufficiency, placing it in a precarious situation where it is reliant on foreign resources to achieve food security.

The government' realises that its ethanol policy will increase the demand for ethanol to comprise a greater proportion of China's energy mix, which is growing at an increasing rate. As a result, the consumption of ethanol is given a double boost, which will have repercussions on the consumption of grain. If China does not diversify its feedstock, it is predicted that by 2010 corn consumption could increase by 25%,

which would require China to import 10-million tons of corn a year to meet demand. Also, higher corn prices will reduce the competitiveness of China's growing food industry. These considerations caused the government to revisit the manner in which its bio-fuels industry will be developed in the future.

According to Yang Jian, the director of the development planning department under the Agriculture Ministry, the Government's policy regarding bio-fuels is that it should neither impact the people's grain consumption, nor should it compete with grain crops for cultivated land. A short-term solution to the pending problem led to China's Ministry of Administration publishing a warning in December 2006 that only four companies had permission to produce corn-based fuel. This short-term solution is not viable over the long term because China requires fuel to support its industrialisation drive. Ethanol production in 2005 was approximately 920,000 metric tons (MT), with a production capacity of 1,020,000MT. The government predicts that China's ethanol production capabilities should increase to four million MT per annum by 2010.

If China is to meet the demand for ethanol without relegating its food security needs to second position, an alternative feedstock must be sought. This sentiment is echoed by Chinese officials, who state that the development of biofuel should not be at the expense of the expansion of farmland, since food is still the priority of China. They also say that more attention should be given to sweet potato and cassava that are rich in starch and suitable for planting in China based on its terrain. Sugarcane was considered but then ruled out: China's agricultural conditions are not suitable to grow this crop, industrial demand for sugar is increasing due to China's expanding food-processing industry and the sugar price is volatile.

After considering various options, cassava was selected as the new feedstock for China's ethanol industry. First, cassava is a cheaper option than grain. Producing ethanol from cassava costs approximately US$500/MT (4,000 Yuan/MT) compared to 563/MT (4,500 Yuan/MT) for stale grain; as a result, cassava is the cheaper option. Secondly, the waste pulp from the production of cassava starch is used to make ethanol (it is more cost-effective to use a by-product than to discard it). Thirdly, cassava is a versatile crop – it can be processed in the form of fresh roots during the harvest season or dried chip and extracted starch when fresh roots are out of season. Finally, stricter pollution regulations make the use of molasses uneconomical, resulting in energy companies switching their feedstock from molasses to cassava.

The government's intention to use cassava as a feedstock to produce ethanol is demonstrated by the construction of a production facility capable of producing one million MT of fuel ethanol by 2010 in the Guangxi Zhuang Autonomous Region in southern China. This production facility is scheduled to begin operations in October 2007 at a production capacity of 110,000 MT per year.

The factors mentioned above should increase the demand for cassava at a faster rate than China can domestically supply it. Not only does this provide an opportunity for SADC's farmers to export cassava, but it could also expose SADC farmers to new forms of business arrangements that simplify their operations throughout the value chain. For example, Henan's Tian Guan Group entered into a contract with the government of Laos to lease 15km^2 of land to produce cassava.

In 2005, the US was the second largest importer of cassava with an 8% share of the market, which is minuscule compared to China. However, an 8% market share is impressive considering that in 1995 the US's share of the market was only 3%. This market has also experienced steady, strong growth. The growth rate of imports between 1995 and 2005 of 12% and 2000 and 2005 of 16% was within a tight range; however, the market performed slightly better since 2002. It should be noted that on a volume basis, the US primarily uses cassava in the form of feed, but with respect to value, the US's largest market is that of human consumption.

Given that trade is discussed on a value basis, the US's imports are primarily from Costa Rica, which specialises in supplying cassava for human consumption. Demand for cassava is not broadly based throughout the population but is driven by the Hispanic and Asian population. Given cassava's characteristics, this would not be a lucrative market for SADC farmers. However, they could use this market as a case study. It shows that specialising in and exporting a 'niche' product to a target market could be a more profitable strategy than competing against low-cost producers to supply a commodity-based product to the Asian market. The question SADC's farmers should ask is where does the next profitable and geographically accessible market for a niche product exist.

Table 10: Top importers' largest trading partners, 2005 (based on a % of total imports)

	Exporters (%)					
Importer	**First**		**Second**		**Third**	
China	Thailand	81.09	Viet Nam	11.97	Indonesia	6.94
US	Costa Rica	87.82	Ecuador	5.86	Ghana	1.41
Korea, Rep.	Viet Nam	51.91	Thailand	28.80	Indonesia	16.76
Spain	Thailand	87.71	Costa Rica	5.03	The Netherlands	4.66
The Netherlands	Costa Rica	43.65	Thailand	18.11	France	14.08
Portugal	Thailand	91.64	France	5.30	Spain	1.80
France	Costa Rica	52.88	Cameroon	18.21	Belgium	6.61
Japan	Thailand	96.91	Brazil	0.00	Indonesia	0.96
Belgium	Costa Rica	59.61	The Netherlands	34.66	Ghana	2.13
UK	Costa Rica	72.35	Ecuador	12.93	Ghana	3.45

Source: WITS

In 2005, Korea was the third largest importer of cassava with a market share of 5%. The demand for cassava in Korea seems to have stagnated. Korea's share of the global import market has remained unchanged since 1995, even though its economy has grown and thus the demand for a feedstock should have increased. This lacklustre performance is reflected in the rate of growth of imports of 5% from 2000 to 2005. Since 1996, Korea's imports of pellets has followed a downward trend. The expansion of Korea's livestock industry outpaced the production of livestock feeds; as a result, the shortfall was imported. Korea's cassava imports are limited to the import of dried cassava in the form of chips and pellets. Chips are imported from Viet Nam and pellets are imported from Thailand. These markets are not contested but dominated by both parties.

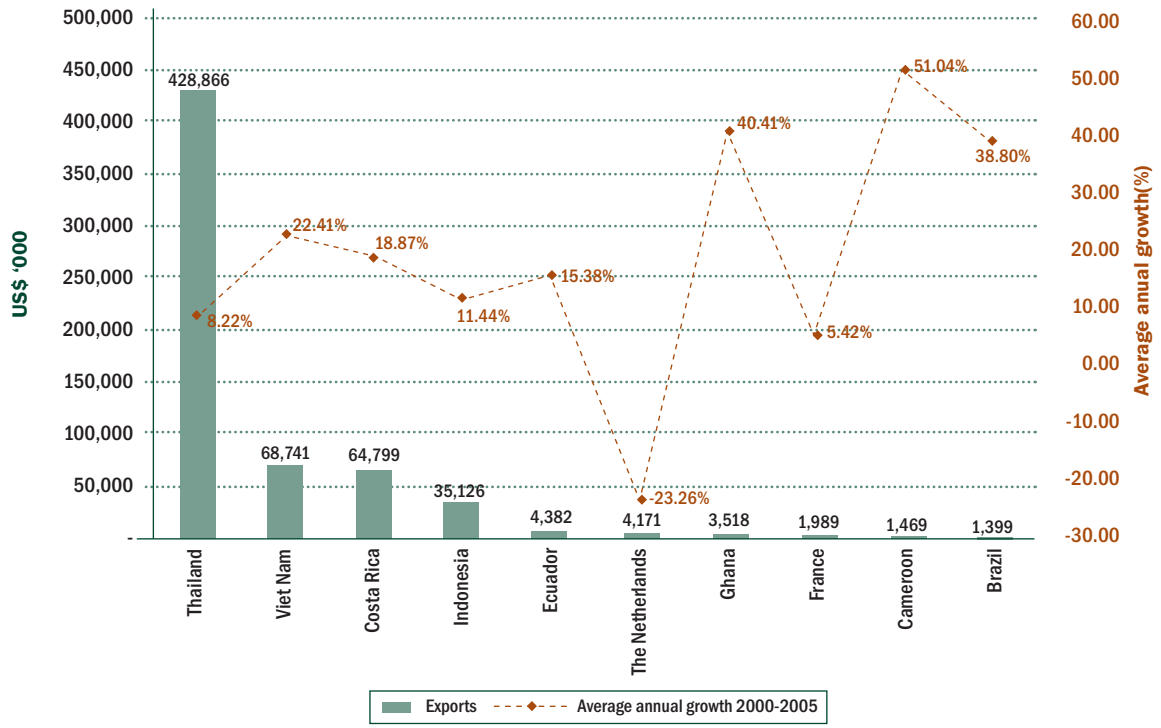
Based on trade statistics, the following countries are potential emerging importers and could serve as a potential market: Canada, Australia, New Zealand, Switzerland, Iceland, Brazil (on a volume basis the feed industry uses 49% of total cassava) and Malaysia (on a volume basis, 52% of total cassava is used by industry to produce starches).

9.2. Countries' exports

The export market for cassava experienced steady growth of 9.38% from 2000 to 2005 (see table 11). Most of this growth was driven by the top 10 exporters (see figure 8). In 2005, Thailand, Viet Nam, Costa Rica and Indonesia comprised 96% of global exports and thus these four countries effectively constitute the global export market. A notable feature is that the export market is dominated by Asian producers: in 2005 they comprised 85% of global exports and occupied three positions in the top four list of exporters.

Over the past decade, from 1995 to 2005, the top five exporting countries' market share and their relative rankings changed. Thailand maintained its position as the world's dominant exporter but lost market share. From 1995 to 2000, Viet Nam and Costa Rica substantially increased their share of the export market. It appears that these two countries absorbed Indonesia's share of the market, which significantly declined during the period under review. An interesting observation is that Viet Nam and Costa Rica pursued different export strategies. Costa Rica exports cassava for human consumption to developed countries. Products are tailored towards niche markets, such as health stores and speciality food stores that sell ethnic food. In contrast, Viet Nam exports cassava pellets to China to be used as animal feed for its livestock industry. This illustrates that to be a successful exporter, it is important to specialise in a product and map it to a country's demand profile instead of trying to export every product to every country. The above principle is an important point that SADC's farmers should note.

Figure 8: Top 10 exporters of cassava, 2005 (US$'000)



Source: WITS

In 2005, Thailand was the world's dominant exporter of cassava, comprising 69% of the export market. It managed to grow its exports from 2000 to 2005 by 8%, which is impressive, even though it is substantially below Viet Nam and Costa Rica's growth rate, as Thailand's export growth is off a large base.

One of the reasons behind Thailand's success is its ability to deliver better quality products, on a more consistent basis, than other producers, especially its African counterparts, who are plagued by adverse weather conditions, various crop diseases and civil unrest. Thai farmers have substantial support from the government throughout the supply chain, ranging from technical to financial assistance. The government's role in supporting Thailand's cassava industry has contributed to this country being the preferred supplier to the top global importing counties – China, Spain and Korea.

Thailand's trade partners import cassava primarily for their livestock industry and also for industrial applications; as a result, Thailand's largest export product is dry cassava products. Thailand was the world's third largest producer in 2004 and exports its own production (it does not rely on re-exports to service demand).

Table 11: Top exporters of cassava, 1995-2005 (US$'000)

	Year			Average annual growth, 00-05 (%)	Percentage of total	
	1995	2000	2005		1995	2005
Thailand	330,703	288,988	428,866	8.22	71.31	68.77
Viet Nam	14,155	25,008	68,741	22.41	3.05	11.02
Costa Rica	18,200	27,301	64,799	18.87	3.92	10.39
Indonesia	65,115	20,435	35,126	11.44	14.04	5.63
Ecuador	54	2,143	4,382	15.38	0.01	0.70
The Netherlands	1,028	15,674	4,171	-23.26	0.22	0.67
Ghana	873	645	3,518	40.41	0.19	0.56
France	158	1,527	1,989	5.42	0.03	0.32
Cameroon	8	187	1,469	51.04	0.00	0.24
Brazil	46	272	1,399	38.80	0.01	0.22
Nicaragua	121	101	984	57.56	0.03	0.16
Fiji	271	450	900	14.86	0.06	0.14
Venezuela	266	-	816		0.06	0.13
Belgium	-	2,315	678	-21.78	0.00	0.11
Philippines	1,205	453	674	8.29	0.26	0.11
Suriname	142	3	565	186.50	0.03	0.09
Malaysia	202	371	448	3.84	0.04	0.07
Spain	13	452	373	-3.76	0.00	0.06
Colombia	22	139	364	21.22	0.00	0.06
Tonga	39	157	350	17.42	0.01	0.06
Top 20 exporters' total	432,622	386,621	620,611	9.93	93.29	99.52
Other exporters	31,116	11,715	3,024	-23.73	6.71	0.48
Total exports	463,738	398,335	623,635	9.38	100.00	100.00

Source: WITS

In 2005, Viet Nam was the world's second largest exporter, but it trails behind Thailand, with 11% of the global export market. Viet Nam's exports may be smaller than Thailand's but the country has grown its export base at an exponential rate; from 2000 to 2005, its exports increased by 22%. Viet Nam's trading partners are China, Korea and Australia. Similar to Thailand, Viet Nam's dominant trading partner is China, which is largely due to the benefits of economic geography. It should be noted that Viet Nam's strategy to rely on a single large importer could be a risky long-term strategy.

Costa Rica was the third largest exporter of cassava in 2005, with a market share of 10%. Costa Rica is an interesting case study because it competes with the other top exporters in terms of export volumes and growth rates but it follows a different export strategy with respect to the product it exports and the markets it pursues. Costa Rica mainly exports frozen or waxed roots for human consumption to the US and the EU, mainly to the Netherlands and France.

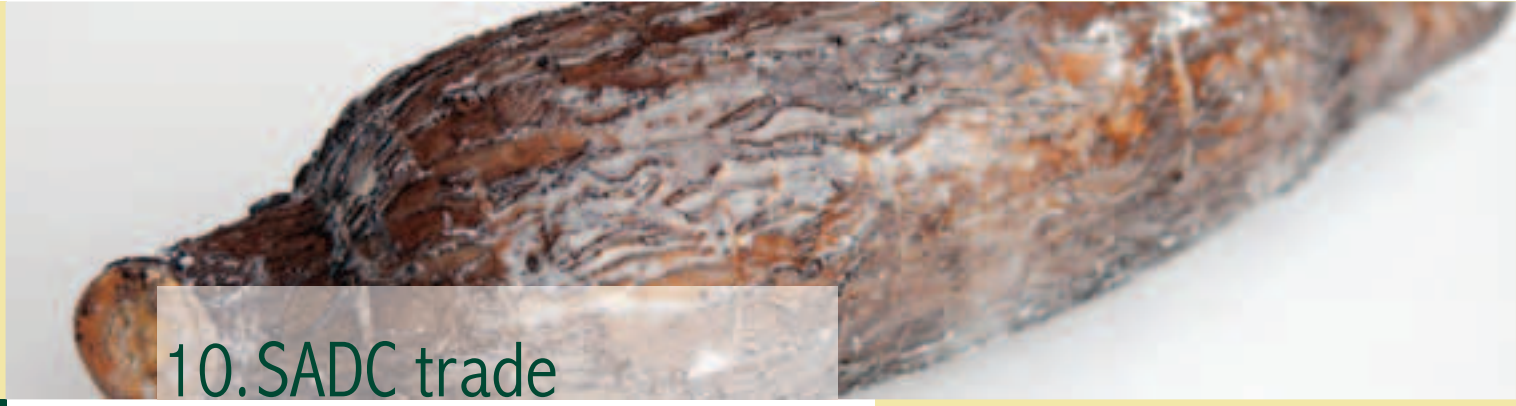
Based on trade statistics, the following countries are potential emerging exporters and could therefore compete with SADC farmers wishing to export to global markets: Nicaragua, Colombia, Paraguay and Nigeria.

The largest exporters of cassava are not the largest producers. In 2005, only Thailand, Indonesia and Ghana managed to occupy a place in both the top 10 producing and exporting countries. Considering African countries are large producers of cassava, this indicates that Africa is not taking advantage of its productive capacity.

Table 12: Top exporters' largest trading partners, 2005 (based on a % of total exports)

	Import markets (%)					
Exporters	**First**		**Second**		**Third**	
Thailand	China	79.57	Spain	5.88	Korea, Rep.	58.06
Viet Nam	China	73.28	Korea, Rep.	26.27	Australia	0.17
Costa Rica	US	64.25	The Netherlands	7.13	France	3.15
Indonesia	China	83.13	Korea, Rep.	19.97	Romania	0.93
Ecuador	US	63.35	Colombia	8.75	EU	12.75
The Netherlands	Spain	32.14	Belgium	24.16	Italy	16.44
Ghana	EU	38.96	The Netherlands	35.91	US	19.03
France	The Netherlands	74.89	Spain	9.82	Portugal	3.68
Cameroon	EU	48.91	France	47.86	Switzerland	1.46
Brazil	EU	32.27	The Netherlands	26.56	France	10.76

Source: WITS



10. SADC trade

10.1. Trade with the World

Three out of the world's top 10 producing countries are in the SADC region. These countries are the DRC, Tanzania and Angola, and they are ranked in fifth, seventh and eighth positions, respectively. SADC's imports are negligible, which is understandable, given its productive capacity with respect to climate, land and labour. An area for improvement is SADC's exporting capacity. SADC accounts for less than 1% of global exports, yet its production comprises 20% of global output. This indicates that cassava's potential as a cash crop is not being exploited due to supply- and demand-side bottlenecks. Given the crop's perishable nature, subsistence farmers on marginal land grow only an adequate amount to consume as a staple food, and thus their yields are low. Marginal areas tend to be underdeveloped; as a result, farmers' access to supply-side infrastructure and their resources to engage in marketing activities are limited. These supply-side rigidities make it difficult for farmers to export their crops. Therefore, improving SADC's ability to export cassava will require sequenced, supply-side and demand-side initiatives.

Table 13: SADC's usage of cassava, 2004 ('000 tons)

	Domestic supply			Domestic utilisation		
	Produce	Import	Export	Feed & seed	Other	Food
Angola	6,650	1	0	1,300	1,792	3,559
Botswana	-	0	-	-	0	-
DRC	14,951	2	-	359	471	14,122
Madagascar	2,191	1	0	84	104	2,005
Malawi	2,559	1	-	385	1,080	1,095
Mauritius	0	2	0	-	2	0
Mozambique	6,413	0	0	369	1,287	4,758
Namibia	-	1	-	-	0	1
Seychelles	0	0	-	-	-	0
South Africa	-	76	0	-	75	0
Swaziland	-	0	0	-	0	-
Tanzania	6,890	4	2	58	1,711	5,122
Zambia	957	0	1	-	54	902
Zimbabwe	190	1	0	-	10	180
Total SADC	40,801	88	4	2,555	6,586	31,744
Total World	202,879	20,203	18,930	50,044	54,890	99,218
SADC's share of total (%)	20.11	0.44	0.02	5.11	12.00	31.99

Table 14 shows that SADC is a net exporter of cassava to the world, yet over the period under review, SADC's participation in global import and export markets was poor. A worrying sign is that the region's participation in global markets deteriorated from 2000 to 2005 when trade in cassava entered into its growth phase.

World trade in cassava grew by 9% from 2000 to 2005, while SADC's exports declined by 40% over the period. This suggests that SADC has been locked out of trade and was unable to tap into growing markets. SADC countries' import partners only include two of the top 10 importing countries. These countries are Portugal and France that are ranked in sixth and seventh position, respectively, and whose combined share of global exports is 4%. Malawi exported cassava to Portugal, while France imported cassava from Madagascar and the DRC.

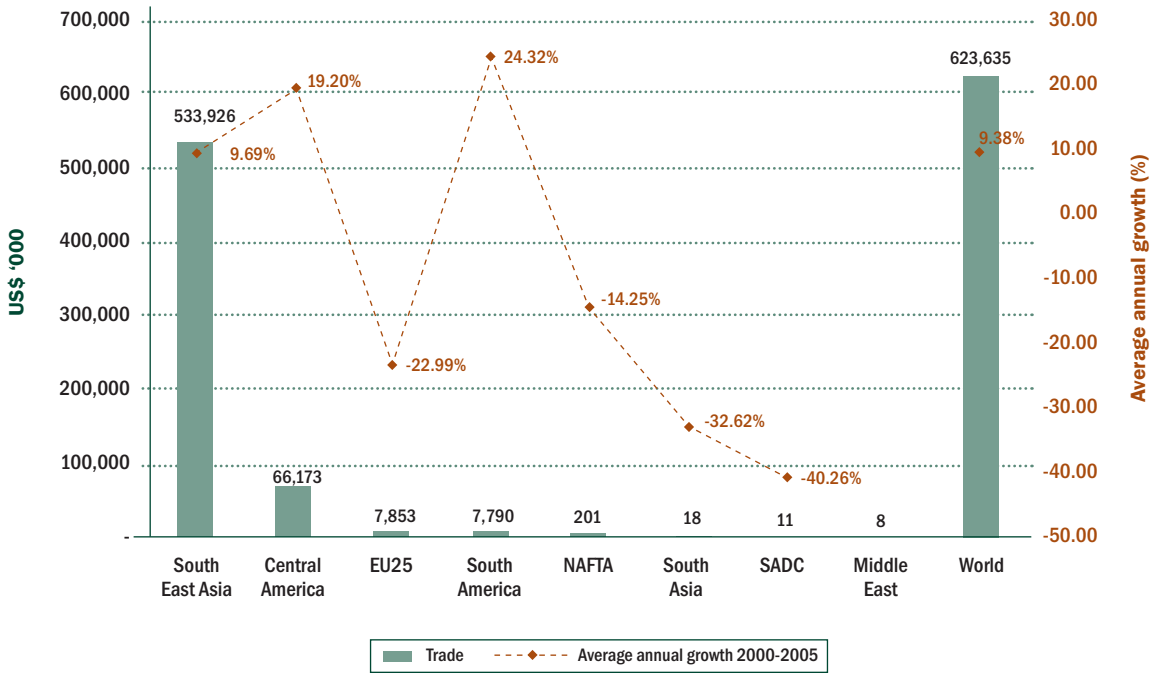
Table 14: SADC's trade with the World, 2000-2004 (US$)

Imports (US$)					
	2000	2001	2002	2003	2004
Botswana		3,076	27,259	1,958	19,560
Lesotho	2,761	146	9,263	7	
Mauritius		5,748	7,538	9,127	10,865
South Africa	371	188	162	380,716	1,451
Swaziland	370	186	17	256	3,875
Tanzania				1,131	
Zambia	584	57		1,164	1,347
Total SADC	4,086	9,402	44,240	394,359	37,098

Exports (US$)					
	2000	2001	2002	2003	2004
Botswana			82,603		14
Malawi	16,374		30,155		
Namibia		58	177		
South Africa	203	1,961	708	9,077	7,906
Swaziland	180	581		46	
Tanzania	17,052	147,328	1,516	7,796	1,048
Zambia		40	174		45
Total SADC	33,809	149,968	115,333	16,919	9,013

Source: Southern African Trade Database, Trade and Industrial Policy Strategies (TIPS)

Figure 9: Regional exports, 2005 (US$'000)



Source: WITS

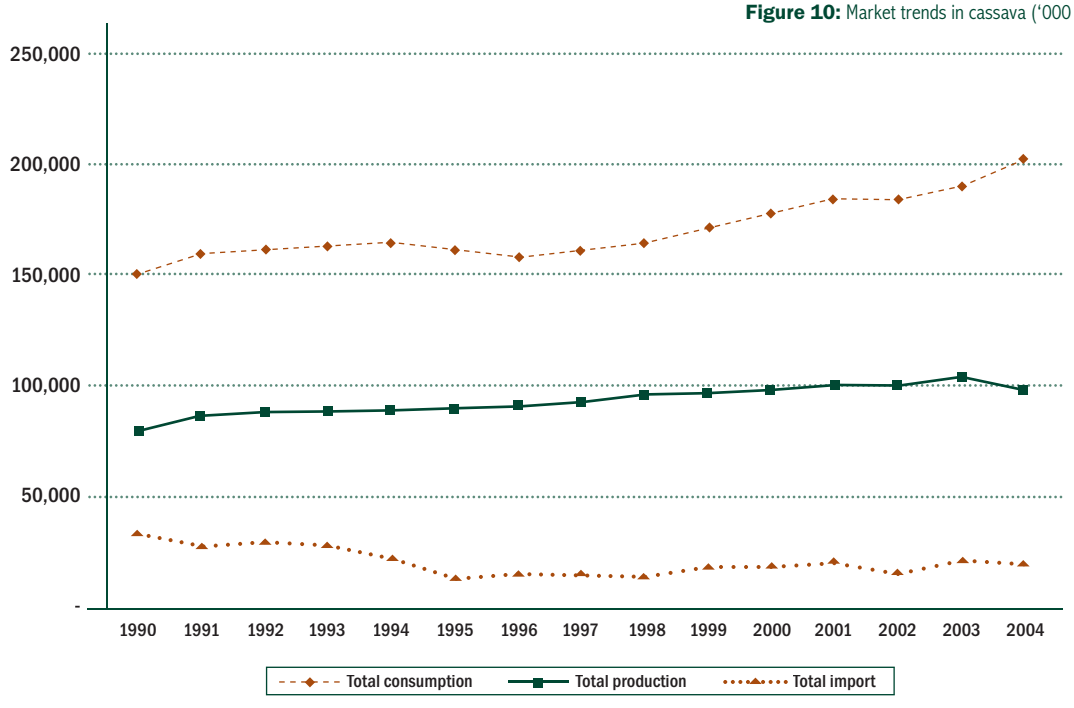
10.2. Intra-SADC trade

Intra-trade between SADC states is negligible and appears to be random. This is in line with expectations, as SADC countries grow cassava as a subsistence crop. The majority of intra-SADC trade occurs between South Africa, Angola and Botswana. South Africa is the region's largest importer, which is again in line with expectations as the country is not a dominant producer and uses cassava as an industrial input.

11. Key countries' propensity to trade in cassava

The differential between production and consumption is due to the fact that cassava does not have a set harvest period (see figure 10). A striking feature of this market is that only a small percentage of cassava produced is traded. Only one of the top 10 producing countries, Thailand, also appears on the list of top 10 exporters. This reflects the crop's status as a lowly subsistence crop grown on marginal land by small-scale farmers in lower income developing countries. The low level of trade in cassava is not entirely a demand but also a supply issue. Raw cassava is not an export-friendly product as it is bulky and perishable. The majority of cassava is produced in poor countries, whose infrastructure is poor and access to resources to create a market is limited. Also, the majority of production is required to satisfy domestic consumption needs. Both these factors have made cassava a relatively obscure 'tradable' product. Another issue that has also affected cassava's tradability is a lack of scientific research into the plant's properties and its industrial applications. This is not surprising, as the dominant producers of cassava are poor countries that do not have the resources to conduct research.

Figure 10: Market trends in cassava ('000 tons)



Source: FAOSTAT

However, the market for cassava is on the cusp of entering into a new phase. Over the long term, a four-tiered market for cassava products should develop. The first market will be for domestic consumption as a staple product and cassava will be grown and consumed in lower-income developing countries. International trade in this market will be thin, as the product is complicated to transport and has a low value.

The second market will be for animal feed that will be consumed in middle-income developing countries. Economic development and urbanisation have led to the growth of the middle class, whose diet comprises more livestock products than their rural counterparts. Changes in socio-economic conditions have fuelled the livestock industry's expansion, which increases the demand for feed. Another factor that will affect this market's growth is the price of complementary and substitute products. Grain prices recently reached their highest level in seven years, and this trend is expected to continue as the demand for grain increases due to the production of bio-fuels. Cassava feed is cheaper than its grain-based substitutes, and as it is a commodity product, relative prices should impact consumers' behaviour. The popularity of cassava feed should increase and trade should grow at a steady rate. Cassava animal feed will be grown and processed in middle-income developing countries, such as Thailand, Viet Nam and Indonesia, as exporting cassava requires infrastructure, marketing and distribution channels. Traditionally, cassava feed is considered an entry level value-added product, and as such would provide SADC farmers with an opportunity to produce value-added products. Also, marketing cassava feed in SADC would not be difficult as the livestock industry is expanding and the price of grain-based products is becoming prohibitively expensive for farmers to feed livestock. This product is simple to transport, which is important as infrastructure in SADC is poor. As a result, cassava has potential for intra-regional trade.

The third market is the one for industrial applications, such as starches and the production of ethanol. These products will be produced in upper-middle-income countries and consumed in upper-middle-income and developed countries. Trade in this market is projected to grow at an increasing rate. The implication is that SADC's farmers should ultimately integrate their operations into supply chains to create industrial products.

The fourth market is for premium-quality cassava for human consumption in developed markets. This market's degree of tradability is dependent on consumers' demand for fresh or processed cassava in the form of convenience foods. Trade in fresh cassava has a geographical

dimension and requires complicated cold chain management. This is an area where SADC countries could share infrastructure across countries and products. For example, South Africa has developed cold chain management to export cut flowers. This infrastructure could be used by cassava exporters, especially considering that Rotterdam is a hub for fresh flower imports and a large re-exporter of cassava throughout Europe. Processing cassava into convenience foods simplifies or eliminates some logistical issues and SADC producers could tap into South Africa's sophisticated processed food sector. As a result, exporting processed food presents a viable opportunity for the region. This market is expected to experience strong growth, albeit off a low base.

The previous paragraph established that over the long term, trade in cassava as a percentage of production should increase. To understand the market's unfolding dynamics it is useful to analyse the manner in which the industry's leaders source and consume cassava. The countries represented in table 15 have been selected as they are dominant producers, suppliers, importers and exporters.

Based on industry trends, over the medium term both Brazil and Indonesia will continue to grow cassava for their domestic use. China, Korea, the Netherlands, Spain and the US will import cassava to satisfy domestic demand. Experts predict that the nature of demand in the US, Korea, the Netherlands and Spain should remain relatively unchanged. Another factor that will drive China's demand for cassava is its bio-fuels industry; as a result 'other uses' of cassava should substantially increase. Although China has its own plans to grow cassava on marginal land and thereby supply its bio-fuels industry, this should not significantly affect its imports in the near term, as its demand will be so great as to continue increasing at a much faster rate than its productive capacity. Indeed, given China's incredible growth over the last 30 years and its massive population, which is rapidly becoming ever more affluent, the demand for bio-fuels and other products made from cassava (for example, MSG) is likely to result in large imports for many years to come.

Viet Nam's domestic usage of cassava should also increase as a wealthier population consumes more livestock products. At this stage, however, there is little evidence as to how much of the increase in demand Viet Nam can meet domestically. Should the country be able to expand production significantly, it will not only meet its domestic demand, but will most probably also capture a large share of the Chinese market.

Table 15: Key countries' usage of cassava, in 2004 ('000 tons)

	Supply ('000 tons)			Utilisation ('000 tons)		
	Produce	Imports	Export	Feed	Other	Food
Least developed countries						
Bangladesh		371	0		252	119
Cambodia	362	3	24		140	202
Cameroon	2,093	0	3	138	509	1,443
Côte d'Ivoire	2,128	0	18	42	105	1,963
Ecuador	89	14	19		-6	89
Gabon	230	1	0		130	100
Ghana	9,739	2	78	1,057	3,308	5,298
Honduras	18	8	1		11	14
Kenya	643	12	5		149	501
Myanmar	139	8	-		34	113
Nicaragua	87	2	16	44	-13	42
Rwanda	766	1			-98	865
Middle-Income developing countries						
Argentina	170	11	2	105	4	70
Brazil	23,927	180	1,389	11,714	4,048	6,955
China	4,216	11,305	426	9,077	4,088	1,931
Colombia	1,919	45	157	78	208	1,523
Costa Rica	295	3	174		-3	127
Czech Republic		18	0	17	0	
India	6,700	12	8		437	6,268
Korea, Republic of		1,044	43	994	8	
Malaysia	430	432	151	64	259	388
Paraguay	5,500	3	30	2,471	2,016	987
Peru	971	36	2	2	269	735
Philippines	1,641	199	3	45	230	1,562
Thailand	20,209	4	15,604	2	2,164	2,443
Viet Nam	5,821	1	2,731	2,328	364	400

Source: FAOSTAT

Costs Rica's strategy to export a specialised product to niche markets in developed countries does not seem likely to change.

Nigeria's participation in export markets is likely to improve due to the government's successful initiatives to build the industry's supply and demand side. Furthermore, the government has alluded to the fact that it is building its domestic industry to provide a base to create an export crop. Nigeria's economy does have the capability to build critical mass in a specific product as domestic consumption is spread between

various cassava products. The interesting question is whether Nigeria's exporting ambitions will come to fruition. Perhaps this provides an opportunity for SADC's farmers and its Nigerian counterparts to form an alliance. Although South Africa does not import vast quantities of cassava starch, it has the potential to, and as it has established food processing, paper and chemical industries that use a wide range of industrial starches it might consider sourcing cassava from Nigeria in the future. This need not necessarily run contrary to the idea of SADC countries exporting to the South African market, and Nigeria does not have to be a major competitor or inhibit development of commercial growing of cassava in the SADC region. Rather, if Nigeria, South Africa or another SADC country were to develop an industry that processes cassava, and achieve some scale economies, this could be a positive development for the region, as they would then gain a geographic advantage over the South East Asian and Latin American countries. Cassava has the potential to be a truly African product.

Another interesting issue is whether Thailand will have the capacity to meet its growing domestic demand, while simultaneously satisfying China's increasing demand for imports. On the supply side, Thailand has planted cassava crops on its marginal land. The only alternative to increase its production is to increase productivity. However, 100% of its crop comprises new, improved, high-yielding cultivars. Thailand's production costs should increase over the medium term as it faces land constraints and a shortage of labour, and fertilisers tend to be relatively expensive compared to its Asian counterparts. As a result, Thailand's productive capacity is approaching its limit. On the demand side, domestic demand for cassava should increase to produce ethanol. Although ethanol is at present made from sugarcane, this could change. A study by Kasetsart University concluded that in Thailand, using dry cassava chips is the cheapest and must convenient way to produce automotive fuel on a large scale. A facility to produce ethanol from cassava is already being constructed in Khon Kaen.

In addition, since 1990, Thailand has become a net importer of soybeans and maize, which are used to feed livestock. The growth of China's livestock industry has increased the demand for soybeans, pushing up its price. This could cause Thailand to increase its domestic consumption of cassava pellets, creating a gap for other exporters to cover Thailand's exports to other Asian countries. A distinction must be made between diverting existing export supply into the domestic economy and an increase in the Asian market's ability to consume cassava feedstock. The region's livestock industry has grown, which would imply greater demand for cassava pellets. However, turning potential

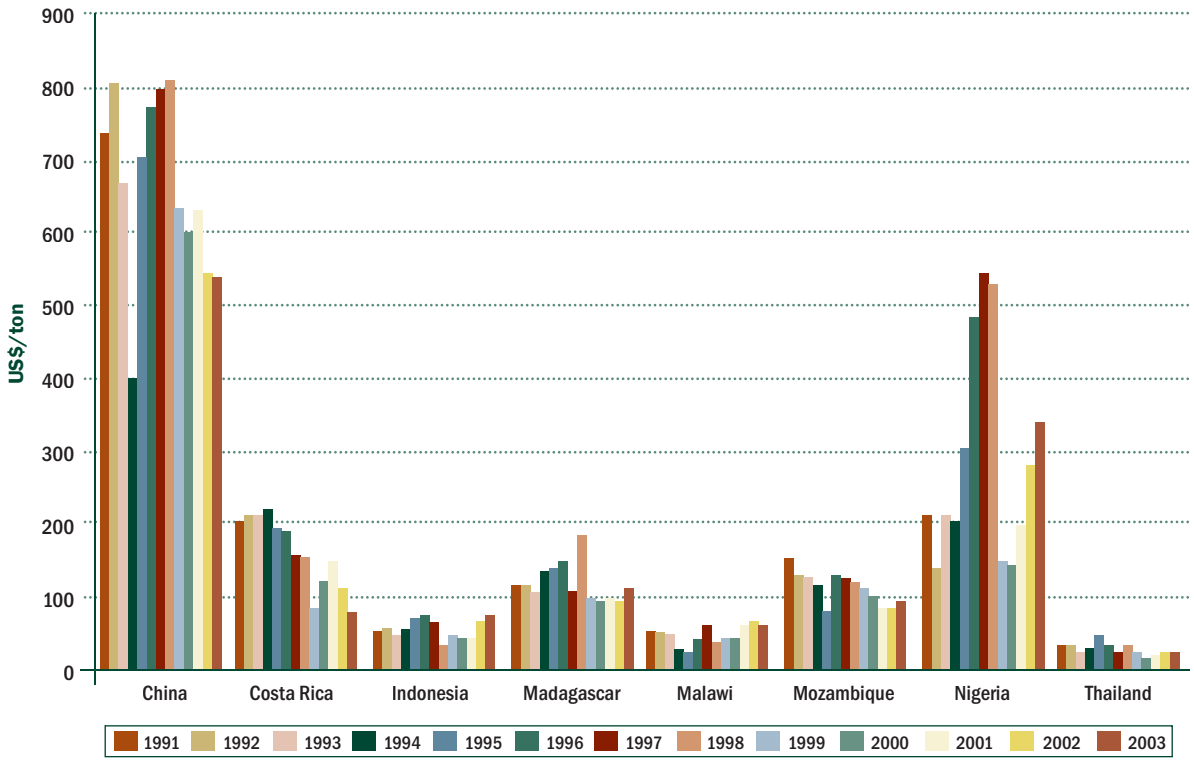
demand into actual demand is dependent on the price of substitutes and complementary products. In spite of recent price increases of all three crops, the cassava-soybean or cassava chips-leaf meal-soybean mixes are now considerably cheaper than maize soybean mixes with the same crude protein contents. Over the medium term, Thailand's ability to satisfy the demand requirements of its trade partners might be constrained, which provides an opportunity for SADC farmers to broaden their export markets, provided they are low-cost producers.

12. Prices

12.1. Producer prices

This section's discussion is based on price data obtained from the FAO and covers cassava in its fresh and dried form. The FAO's price data are a good starting point to form a basic understanding of price trends and provide one with information to ask pertinent questions. One of the problems associated with using this data source is that the thinner a country's trade, the more likely information will be inaccurate. The implication is that price data for SADC countries will be inaccurate.

Figure 11: Countries' producer prices (US$/ton)

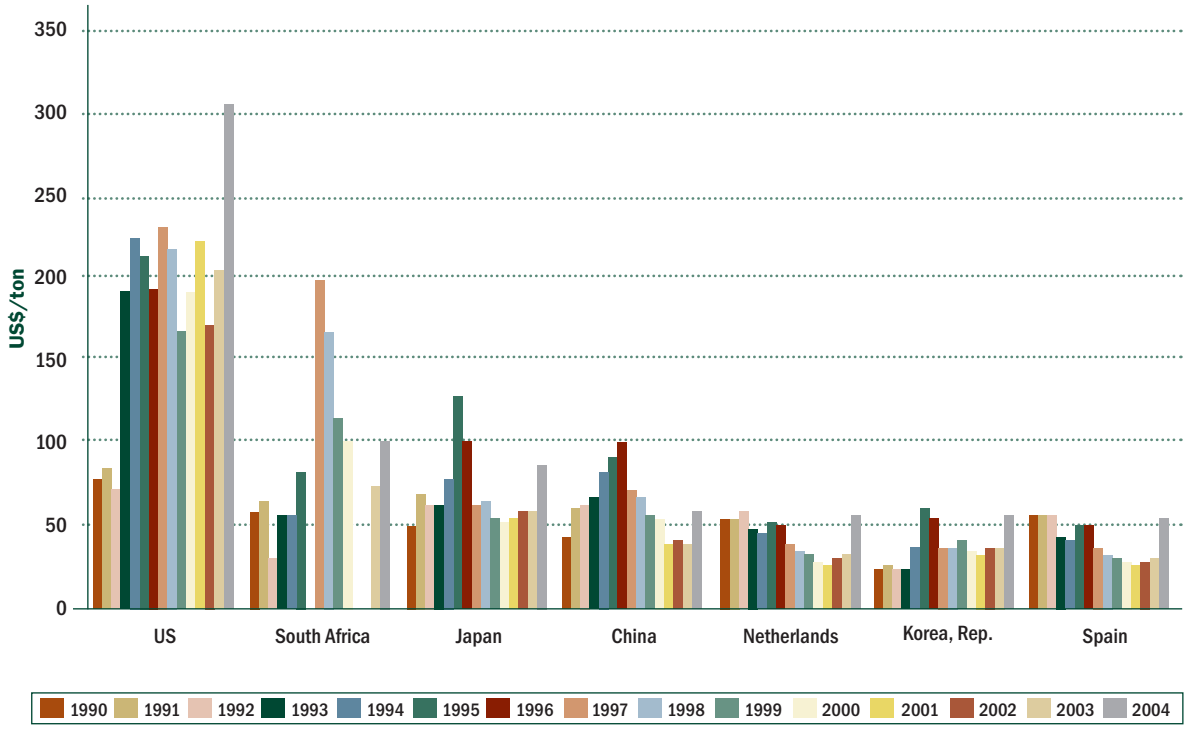


Source: FAOSTAT

Producer prices for countries represented in figure 11 followed a progressive downward movement over the period, except for China and Nigeria, which experienced price swings. Nigeria's price swings are due to the government's initiatives to invest in the industry and the policies it has implemented to increase demand. China's prices are volatile because of the interaction between constrained supply due to crop failures and increased demand. It is interesting to note that the dominant

exporters of cassava share a similar producer price structure, and that their producer prices tend to be low. An encouraging sign is that Malawi's producer price is in line with the world's largest exporter, Thailand, and the world's fourth largest exporter, Indonesia.

Figure 12: Countries' average import price (US$/ton)



Source: FAOSTAT

12.2. Average import prices

The average import prices of countries illustrated in figure 12, excluding South Africa and US, seem to follow a general trend: from 1994 to 1995 prices increased, then declined from 1995 to 1997, stabilised from 1997 to 2003 and from 2003 started to enter into an upward phase. This brief trend line illustrates that prices tend to exhibit a cyclical pattern, which could be linked to the business cycle of an industry that uses a particular product application. The implication is that farmers should be aware of the business cycle that affects their market, and should supply more than one product to an industry to minimise their exposure to business risk.

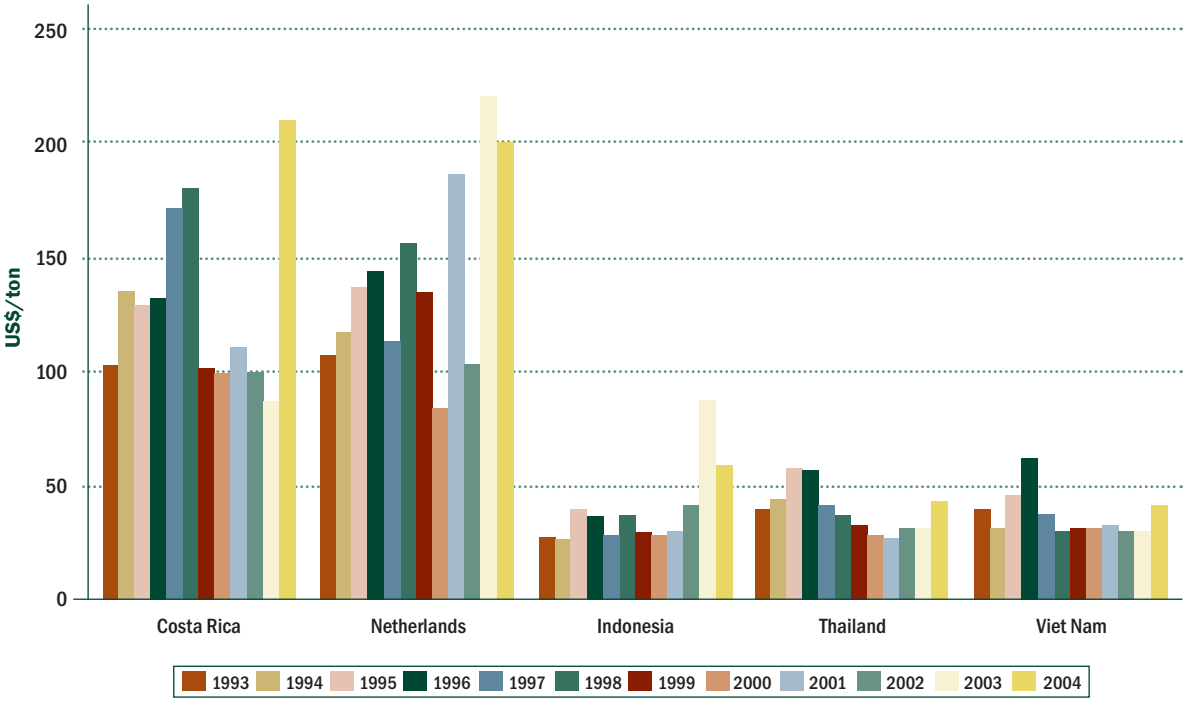
The US's average import price per ton is significantly higher than that of The Netherlands, China and Korea. This price differential reflects a product difference. The majority of the US's imports are superior quality cassava for human consumption.

12.3. Average export prices

Countries' average export prices from 1993 to 2005 seem to be random, but when the data are analysed there appears to be a tenuous link between export prices, product markets and geographic markets (see figure 13). The Netherlands and Costa Rica's average export prices are volatile, but not random as they move through high peaks and low troughs. Costa Rica exports cassava for human consumption, which is a more specialised product than animal feed. It is no coincidence that the Netherlands' average export price is similar to Costa Rica's as it re-exports Costa Rica's product throughout Europe.

Thailand and Viet Nam's prices tend to move in tandem and thus exhibit the same trend, although off a different base. Both these countries export a 'commodity'-based industrial product to China. This raises the question whether China's position as the world's dominant import market gives it the ability to negotiate prices with its suppliers. If this is the case, then SADC farmers' ability to supply this market will be cost and not necessarily quality driven. As a result if SADC's farmers wish to enter the Chinese market, they must be able to compete against Thailand and Viet Nam's low average export price.

Figure 13: Countries' average export price (US$/ton)

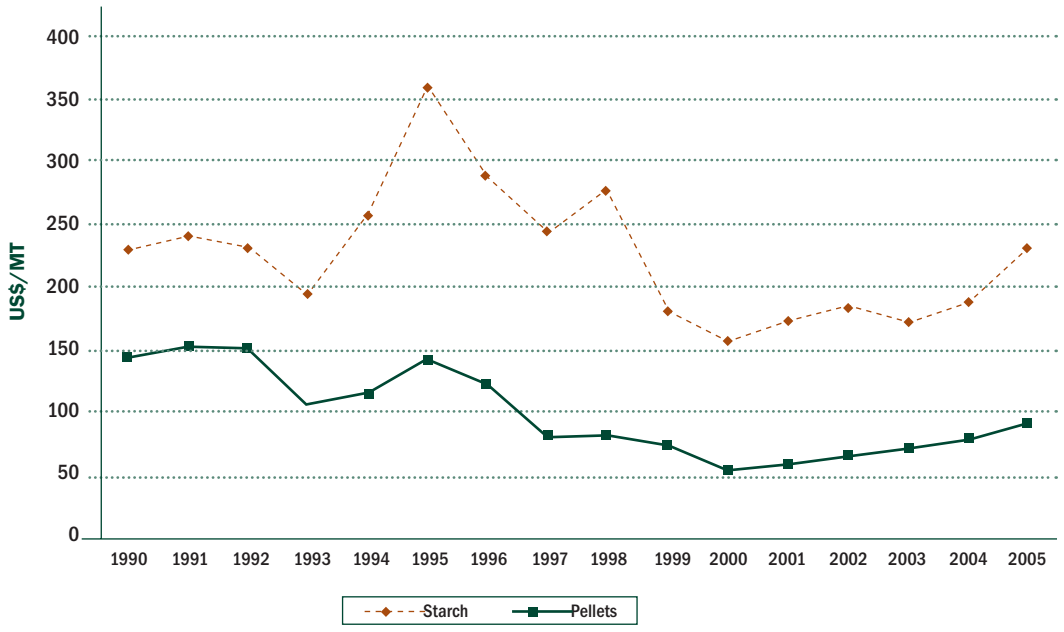


Source: FAOSTAT

12.4. Pellet and starch prices

The free-on-board (FOB) prices for pellets and starch follow a similar trend over the period, although off different bases (see figure 14). The average annual price for starch is higher than the price for pellets. This differential reflects that starch is a higher value product than pellets and as such involves a more complicated process. The export price of pellets fell from 1996 to 2000 due to competition from substitute products but this trend was broken in 2001 due to the Thai government's intervention and greater demand in East Asia. Demand was largely driven by China's consumption, which was due to cheaper cassava pellet prices and its poor sweet potato crop. China's buoyant economy increased the demand for pellets, lifting depressed prices. The recovery of pellet prices during 2004 to 2005 was due to a combination of factors: China's economic growth, product scarcity caused by drought and the impact of the Thai government's ethanol programme. Thailand's investment in the cassava feed industry gives the government an incentive to use its resources to safeguard its investment by manipulating prices. This could have a potentially negative effect for SADC's farmers, as they are exposed to additional market risk.

Figure 14: Starch and pellet FOB prices (US$/MT)



Source: The Tapioca Trade Association

13. Market access

Countries use tariff barriers and non-tariff barriers to protect domestic farmers from imported goods. Tariffs increase the price of imported goods compared to domestic goods, thereby giving domestic producers a relative price advantage. Non-tariff barriers usually take the form of strict sanitary and phytosanitary measures or adherence to certification measures, such as 1SO 9000 standards. Non-tariff barriers increase a producer's costs throughout the supply chain due to the complexity of the processes that he/she must adhere to and the bureaucratic cost of ensuring that procedures are documented. As a result, non-tariff barriers' potential to hinder exporters' ability to sell their products into foreign markets is greater than tariff barriers. Unlike tariffs, non-tariff barriers do not affect all producers equally. It is more onerous for farmers in developing countries to satisfy non-tariff barriers as their access to supply-side inputs is limited compared to their developing country counterparts. However, collective organisation and the pooling of resources amongst SADC farmers could be an effective strategy to reduce this burden.

On average, countries place higher tariff rates on a good as it moves up the value chain. As a result the tariff rate applied to cassava starch products will be greater than that applied to raw cassava. Also, a bigger discrepancy exists between countries' tariffs for value-added goods compared to commodities. For example, tariffs on cassava starch in the main importer countries range from 0% in Canada, Indonesia, Malaysia and the US to 480% in the Republic of Korea. When a farmer plans to export a value-added good, he/she should pay special attention to investigate tariff rates and quotas, and also any discrepancies that might exist between countries' rates.

13.1. Tariffs

13.1.1. EU

A general import duty of 9.50EUR/100kg is levied on cassava products that fall into the following sub-categories: pellets of flour and meal, cassava for human consumption and pellets made of chips. This general tariff does not apply to countries that have negotiated a bilateral trade agreement or qualify for a special provision. As a uniform tariff rate is not applied to countries' imports, exporters should refer to *macmap@intracen.org* and TARIC [2] for more in-depth tariff information. Table 16 is provided to give farmers a broad sense of tariff rates applied to countries' imports. It is not an in-depth study of tariff rates applied to

[2] Tarif Intégré de la Communauté (Integrated Tariff of the European Community)

SADC's exports. SADC farmers should investigate whether they qualify for preferential treatment as a least developed country. The fact that Thailand receives preferential treatment is a concern as it is the world's dominant and cheapest exporter of cassava chips. Indonesia also receives preferential treatment but its exports to the EU are of a smaller magnitude than Thailand's.

Table 16: The EU's tariff schedule

	07.14-1010 Pellets of flour and meal	07.14-1091 Cassava for human consumption	07.14-1099 Pellets made of cassava chips
Conventional rate of duty	**9.50EUR/100kg**		
Preference for WTO members (excl. TH*, ID*, CN*)		6% for imports below a quota of 145,590 tons	
Preference for countries which are not members of the WTO		6% for imports below a quota of 2,000 tons	6% for imports below a quota of 30,000 tons
Preference for ACP countries	8.60EUR/100kg	0%	8.80 EUR/100kg
Preference for OCT	0%	0%	0%
Preference for least developed countries under GSP (excl. MM*)	0%	0%	0%
Preference for AL*, BA*, YU*, AD*, HR*, MK*, LB*, SM*	0%	0%	0%
Preference for China		6% for imports below a quota of 350,000 tons	
Preference for Indonesia		6% below a quota of 825,000 tons	
Preference for Thailand	6% for imports below a quota of 5.5-million tons within a maximum quantity of 21-million tons over each four-year period.		

* AD - Andorra, AL - Albaria, BA - Bosnie-Herzegovina, CH - China, ID - Indonesia, HR - Croatia, MK - Former U=Yugoslav Republic of Macedonia, MM - Myanmar, LB - Lebanon, SM - Sam Marino, TH- Thailand, YU- Yugoslavia (Serbia and Montenegro)

Source: TARIC, cited in ITC (2003)

According to the ITC, before a product can freely circulate within the EU, an import certificate must be obtained in accordance with Reg. (EC) No 1291/2000 (OJL152). An import licence must be obtained before an importer can take advantage of quota arrangements. To gain an import licence, importers must satisfy the conditions stipulated in EC 2449/1996 (0JL333). For more information, please refer to *http://europa.eu.int/eur-lex*.

13.1.2. US

The general tariff rate levied by the US on countries' exports is not excessive. A host of countries have preferential access to the US market, but they are not major exporters of cassava. SADC countries receive preference under the Generalised System of Preferences (GSP), and thus their products enter into the US at a lower price than products from Asia's dominant exporters. Preferential access could give SADC farmers a price advantage, provided their initial cost base is competitive with industry standards.

Costa Rica has preferential access to the US market under the Caribbean Basin Economic Recovery Act. Given Costa Rica's preferential access and its proximity to the US market, it is doubtful whether SADC

Table 17: The US's tariff schedule

	07.14-1010 Frozen cassava	07.14-1020 Fresh, chilled or dried cassava
General tariff	7.9%	11.3%
Tariff for Cuba, Laos and North Korea	35%	50%
Preference under GSP (excl. Costa Rica)	0%	0%
Preference under Caribbean Basin Economic Recovery Act	0%	0%
Preference under Andean Trade Preference Act	0%	0%
Preference for Canada	0%	0%
Preference for Israel	0%	0%
Preference for Mexico	0%	0%
Preference for Jordan	1.9%	4.5%

Source: ITC (2003)

farmers could compete against it with respect to exporting fresh cassava for human consumption.

Cassava can only be imported into the US once an import permit is obtained. This permit certifies that the product satisfies phytosanitary regulations and the produce is pest and disease free. The first step of the process to obtain an import permit is to contact a national plant protection agency in the exporting country. For a list of foreign contacts, please refer to *www.aphis.usda.gov/ppq/permits/phytosanitary/contact.pdf*

13.1.3. China

China's tariff rates are in line with other large importers, notably the EU and the US. An important issue to consider is that Thailand's exports to China are subject to a zero tariff duty. This gives Thailand's exports a relative cost advantage in this market. Based on average import prices, it is more apt to state that a zero tariff rate entrenches Thailand's status as a low-cost supplier to China. The issue facing Thailand is not market access for it product but whether its rate of production is sufficient to satisfy both domestic and China's demand for cassava. This could imply that as the market for cassava becomes constrained, the advantage that preferential tariff access gives an importer becomes less important.

Table 18: China's tariff schedule

07.14-1010: Fresh Manioc MFN: 10%	07.14-1020: Dried Manioc MFN: 7%	07.14-1030: Chilled / Frozen Manioc MFN: 11.2%

Source: MacMap, cited in ITC (2003)

For example, China is entering into arrangements to secure agricultural products from countries that do not necessarily have preferential access. The larger issue for China is access to land and labour to provide a consistent source of supply.

13.1.4. South Korea

The tariff rate applied to cassava products is in line with other major importing countries' rates, provided exporters do not exceed import quotas. Import quotas for chips are 150,000 tons and 296,000 tons for manioc pellets. In 2003, duties were 10% for chips and 2% for pellets. Once an importer exceeds the quotas, an excessive tariff is applied to his/her goods that could be in the region of 907.1%. A tariff rate of 47.8% is applied to frozen cassava.

13.2. Non-tariff barriers

Cassava's products span a multitude of industries that are subject to different requirements. Regulation that covers food for human consumption is probably more comprehensive than standards applied to animal feed or feedstock for industrial applications, such as bio-fuels. This section does not attempt to provide an exhaustive list of non-tariff barriers for the various cassava products. Instead, it provides examples of general non-tariff barriers to illustrate their breadth. After this discussion, exporters should realise that general research about this topic is insufficient, and that an exporter's research should be product- and market-specific.

Cassava should be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 3-1997) and other relevant Codex texts, such as Codes of Hygienic Practice and Codes of Practice.

Cassava should also comply with any microbiological criteria established in accordance with the Principles for the Establishment and Application of Microbiological Criteria for Foods (CAC/GL 21-1997).

Although it is not mandatory, it is generally accepted industry practice that suppliers have Hazard Analysis and Critical Control Point (HACCP) quality systems in place. If a supplier's systems are not certified, it limits the marketability of his/ her goods, especially in developed countries.

Cassava's quality is based on its moisture, ash, crude fibre and starch content. Different countries have different quality standards. However a general 'norm' does exist throughout the industry. Moisture content

should range from 12% to 14%, ash content and extraneous inorganic contaminants, such as sand and soil, should not exceed 3%, crude fibre content is generally accepted at 14% and starch content at 74% to 82%.

Qualify standards tend to be market and product specific. The EU's quality standards for feed material are stipulated in Commission Directive 98/67/EC (OJ L 261). If the moisture content of cassava feed exceeds 14% of the weight of the feed material, it must be declared. For roots of cassava, regardless of their presentation, the maximum content of ash insoluble in hydrochloric acid is 4.5% of dry matter. According to directive 02/32/EC (OJ L 140), a cassava product's hydrocyanic acid content must be below 100mg/kg, its aflatoxin content must not exceed 0.05mg/kg if cassava is used as a complementary feeding stuff for cattle, sheep and goats, and 0.03mg/kg for pigs and poultry. For dairy animals and young animals, the maximum content is 0.005mg/kg.

14. Marketing activities

Distribution channels tend to be product and market specific. As a result, distribution channels will be different for animal feed, food ingredients, convenience foods and starch-based products used to manufacture goods. Given the difference between distribution channels on a product-specific basis, and also the variables existing within product-specific distribution channels, this Trade Information Brief does not cover this issue.

Although the manner in which a product is packaged is largely determined by the buyer, countries have minimum regulations. As a result an exporter should consult an industry association in his/her country to ensure that a product's packaging satisfies the importing countries' regulations.

15. Way forward

The way forward comprises five stages. First, markets must be identified that have grown over the past five years or are entering into their growth phase. This is not a simple task because a market's economic stage of development and its government's agricultural policies affect the type of cassava product it demands. For example, the market for cassava feed in Africa is predicted to grow and be lucrative, whereas in Europe its growth is tapering off. Given this Trade Information Brief's scope, this section does not discuss the prospects of exporting specific products to specific markets but rather highlights emerging trends. Secondly, whether the quality and volume of cassava exist to satisfy a user's requirements should be investigated. Thirdly, the impact of substitute products on the demand, price and properties of cassava-based products must be considered. In the fourth place, measures should be proposed that could be used to improve cassava's competitiveness in its target market compared to its substitute products. Finally, strategies must be developed to integrate small-scale farmers into established industry value chains, such as the processed food value chain or the bio-fuel value chain.

Trade patterns are influenced by the interaction of regional, country and product dimensions. Experts predict that cassava feed is a potentially lucrative market in SADC. The region's demand for livestock products is increasing, which increases the consumption of feed. Importing maize and wheat to satisfy this demand is a relatively expensive option and drains foreign reserves. On average, Africa uses 20% of its productive capacity to produce feed. Given the low value of cassava feed, transporting the product over large distances is not profitable. These circumstances provide an opportunity for SADC's farmers to supply cassava feed to the region's livestock industry. However, this does not imply that a market does not exist for native and modified starches to be used in SADC's food, textile, paper and pharmaceutical industries. Alternatively, in Asia, it is touted that the next growth market for cassava will be its usage in industrial applications as a modified starch and to produce bio-fuels, especially in Thailand and China. Although the above anecdotes illustrate that differences exist between countries' demand drivers and usage trends, if data are analysed on a generalised level, it becomes apparent that the market for starches or starch-based products offers the greatest potential for cassava, on a global basis.

Starches are a versatile product that can be used in an array of industries and applications, such as processed food, paper, textiles, ethanol and bio-degradable plastics. Even within an industry, starch has a multitude of uses. According to the FAO, the extent of specific functional properties of starches required by the food industry alone is

almost unlimited, as no other ingredient provides texture to as many foods as starch does. In addition, given the rise of consumerism and urbanisation, consumers' demand for processed foods continues to grow. Another important factor is that starch is used to manufacture a range of products that cut across various industries with different business cycles and demand drivers. Therefore farmers' exposure to volatile market movements, on average, should be reduced. Starch is the quintessential value-added cassava product. Generally, value-added products tend to be application-specific and as a result are less prone to price swings than commodity products.

Competition between cassava and other starch sources is not based on physical commodities but on the functional characteristics of these commodities' value-added products. As a result a starch should be viewed as a set of functional characteristics suited to a particular application, and not a product per se. Native starches have biological properties that make them better suited to certain applications. Native cassava starch is very resistant to acid conditions and intermediately resistant to freezing but very unstable during heating (sterilisation), making it suitable for some and unsuitable for other applications. Furthermore, cassava starch's neutral taste and odour, its transparency, smoothness and gel-like viscosity make it particularly suitable for many processed food items.

The starch market is lucrative, but entrance is based on a product's functionality and its cost. Cassava might be a cheaper product but does it have the desired properties to compete against other starches? To explore a crop's functional properties requires research and development activities. Cassava is viewed as a poor man's subsistence crop; as a consequence, research into cassava's physical starch properties lags behind its substitute starches. This places cassava at a relative disadvantage compared to other crops that have benefited from the development of superior cultivar strains and processing technologies that make it easier for them to fit into industrial activities. A comparative lack of interest in cassava has created an unstable crop characterised by sporadic cultivation, poor processing methods and lower quality products, which has marginalised cassava's usage in industrial applications. Thus, substitute starches have an unfair advantage, and in essence one is not comparing like with like. Therefore, for tropical starches to tap into the lucrative industrial starch market, research is required to develop new products to satisfy users' specifications.

Initially this research should explore cassava's physical, chemical and organic properties to create a product that is easier to process and distribute. This implies that research to produce a superior starch begins with designing an improved cultivar type and ends in the laboratory

where a starch is engineered. Based on this logic, creating a better starch encompasses improving activities throughout the value chain; as a consequence, the following activities are proposed as part of the way forward. First, a more competitive crop must be created. This involves modifying cassava's functional characteristics to develop a cultivar that produces roots which have a higher starch and nutritional content and thin, easy-to-peel skins. Research at this level should also consider end-users' requirements and then a starch must be designed with the functional requirements to satisfy this need. This research is not overly complicated, as slight changes in amylose/amylopectin ratios have a significant effect on functional characteristics. Furthermore, the costs incurred to produce tailor-made starches could be recouped from end-users. Industry has an appetite to invest in developing a starch that is not grain- or soybean-based due to these commodities' continued price hikes. This situation makes it easier for cassava starch to gain acceptance, provided it can compete against substitute starches in terms of its functional properties and consistent availability of quality supply at a relative price advantage.

Developing countries' access to resources to conduct scientific research is limited. However, this Brief argues that cassava starch can only compete against other starches if more value-added research is done on its functional properties. It seems that the starch market is potentially lucrative but inaccessible; however, this is not entirely the case. Developing countries should devise strategies to spread research and development costs amongst institutions and consider forming partnerships with the private sector. This process could start with collaboration between various domestic institutions, regional institutions (forming relationships between SADC and other African trading blocs/ agencies) and tapping the resources of international institutions. These ventures should not solely focus on producing 'outputs' (research) but rather foster co-operation throughout the value chain by encouraging collaboration between national research and international extension institutions that work with local and provincial government institutions. Encouraging participation at the local level is vitally important, as it ensures that research is not an academic activity but improves the function throughout the supply chain. As a consequence, the full benefits derived from this process will not be realised unless farmers become directly involved in testing, selecting and disseminating new practices and technologies.

Asian countries have used the above approach to improve the profitability of their cassava industry. These countries' national research institutions collaborated with the Centro Internacional de Agricultura Tropical (CIAT) to develop a cassava cultivar that produces a 20% to 40% higher yielding crop whose roots have a greater starch content. Research had social and financial benefits, as cassava is grown pre-

dominately by small-scale farmers. Thailand used farmer participatory research programmes to create opportunities for small-holder farmers in marginal areas on sloping and undulating land to participate in commercialised agriculture. These farmers were involved in evaluating promising cassava germplasm, developing effective soil conservation practices and investigating balanced fertilisation and cropping systems. This project was financed by the Nippon Foundation from 1994 to 2003. By the end of the project, new high-yielding and high-starch varieties were adopted in nearly one million hectares (98% of cassava area) in Thailand, 100,000 ha (40%) in Viet Nam and 36,000 ha (10%) in China, benefiting at least 800,000 cassava farmers.

The next area for research should be improving processing methods, especially post-harvesting techniques, to lower production costs. Given fresh cassava's bulky, perishable nature it is not economically viable to transport it over long distances. This opens up opportunities for small-scale farmers to get involved in rudimentary processing activities, provided they have access to machinery, finance and skills. Small-scale farmers tend to dry cassava in the sun. This processing technique is not ideal as cassava can be contaminated, which makes it unfit for consumption. Small-scale farmers cannot afford to purchase a flash-dryer, and in addition, this technology is diesel- or fuel-powered, which pushes its operational cost above most farmers' means. Portable micro-rotary dryers need to be developed to process cassava into a storable, high-quality product at the farm gate. It might be argued that incorporating small farmers into processing activities could reduce the competitiveness of a country's exports as scale economies are not fully exploited. This is not the case. Thailand has structured its cassava industry in such a manner that export-led growth benefits parties throughout the value chain. Their model integrates small-scale farmers into the value chain by creating farmer associations that pool supply-side resources to invest in machinery and creates nodes for small farmers to tap into the private sector's marketing resources and distribution networks.

The third stage of research should include developing new products and markets that exploit cassava's unique starch characteristics, with emphasis placed on the processed food industry and applications to create bio-fuels. Developing new products tends to stimulate demand for other products based on the initial product. There is a reinforcing relationship between market demand and product development: This implies that for either to be successful, products and markets need to develop in co-ordination, and production, processing and marketing need to be integrated.

Although international starch markets have great potential, they also have drawbacks. They are complex and protected. Before starch pro-

ducers venture into international markets, they build up critical mass by concentrating on supplying their domestic markets. In SADC's case, due to the market's size, this approach could be extended to creating a regional market. This may imply two policy outcomes: import substitution for competing products, especially if they are subsidised by the supplying countries, as is the case of potato starch from the EC, and further progress in reducing tariff and non-tariff barriers.

16. Conclusion

Cassava was selected as an export crop for SADC farmers because of its hour-glass supply chain. Growing and harvesting cassava is a manually intensive activity and thus lends itself to small-scale production units. Post-harvesting activities involve milling and drying cassava and are not capital intensive or complicated, and thus they can be conducted at the farmgate or within the community or village. Other activities in the supply chain, such as refining, extracting, marketing and packaging; tend to be more capital and knowledge intensive and thus benefit from scale economies. These activities are done by fewer larger-scale units, which then distribute the final product to a larger number of consumers. The shape of the supply chain provides possibilities for small-scale farmers located on marginal lands to become involved in producing a cash crop and to participate in rudimentary value-added processing activities. However, for these benefits to be realised, new micro-drying technology must be developed and the supply chain must be analysed to provide small-scale farmers with nodes to tap into commercial agriculture's marketing and distribution networks.

Cassava can be processed into an array of products that can be used by numerous industries. The complexity of processes required to make these products vary. The simplest product is staple food and the most advanced is a modified starch. A country's demand profile for a specific cassava product is linked to its stage of economic development. Therefore trade in cassava products tends to be country and product specific. Despite product specificity amongst countries, broad generalisations can be made. Over the long term, cassava's best potential growth market is its application in starch and starch-based products. On a price basis, cassava starch can compete against its substitute products, but cassava's ability to compete against them with respect to their functional properties is limited to specialised markets. Cassava's status as a poor man's crop has resulted in minimal scientific interest in the crop. This has created the perception that cassava lacks the wide range of intrinsic starch characteristics found in the gene pool of competing crops like maize, wheat and potato. As a result, cassava starch's application is limited compared to its substitutes, but perhaps more importantly, it is locked out of specialised markets that are less volatile and more profitable than mass markets. Research into cassava's properties and its value-added applications has been made a priority by the FAO.

The market for cassava feed is growing, but its growth rate has tapered off since the 1980s. This market's growth is driven by the expansion of the livestock industry in Africa, South America and Asia. Consumption

of cassava feed is growing in countries that produce cassava, while consumption in non-producing countries, such as the EU, has stagnated due to competition from substitute products. As a result, trade flows should remain largely unchanged. Another issue to consider is that growth does not imply profitability. The demand for cassava feed is growing but average export prices are too low to cover production costs, unless a farmer can match Thailand's average export price, which might not be feasible given Thai farmers' direct and indirect government support throughout the vale chain.

The market for animal feed is unstable and thus relatively high risk compared to other markets because the price of cassava feed is affected by the price of substitute and complementary products, which in turn is influenced by agricultural policies and climatic conditions. It might be argued that cassava starch faces the same problem, but this is incorrect as starches compete on a basket of factors, of which one factor is price. This TIB suggests that SADC's farmers should enter the feed market, as it represents the second stage in supplying a value-added product, but be selective about which market it supplies. Competing against Thailand, the world's low-cost producer, will be difficult. The best strategy would be to supply a geographically close, uncontested growing market, such as sub-Saharan Africa.

Data presented in this TIB illustrate that building on SADC's production capacity to turn cassava into a cash crop has economic and social benefits. For these potential benefits to become tangible requires sequenced programmes that build on the industry's supply- and demand-side abilities, identify bottlenecks and address constraints. On the supply side, these measures should initially focus on improving yields and reducing processing costs, as these activities form the basis of developing value chains for lucrative products, such as cassava feed for Africa, starches for developed markets, and ethanol for Nigeria, Ghana, Thailand and China.

Access to resources is a constraining factor in SADC. Establishing a new value chain is a resource-intensive activity, therefore to stretch scarce resources further, the development of a processing network that shares similar standards is important. On the demand side, restructuring measures could encompass the following activities: stimulate the development of a domestic market that has the flexibility to slot into regional markets and use local markets to test the popularity of innovative cassava-based products. For example, cassava can be used as a raw material to produce bio-fuels. To explore lucrative opportunities in this field, the value chain involved in producing cassava and bio-fuels should be mapped and areas of co-operation should be explored.

19. Appendix

Table 19: Characteristics of cassava production and usage in Asian countries, 2003

	China	India	Indonesia	Malaysia	Philippines	Thailand	Viet Nam
Cassava production ('000 t)	3,901	7,100	18,474	370	1,400	18,460	5,228
Cassava harvested area ('000 ha)	240	270	1,240	38	780	1,050	372
Cassava yield (t/ha)	16.2	26.3	14.9	9.7	7.8	17.6	14.1
Utilisation – main	Starch: domestic	Human consumption	Human consumption	Starch: domestic	Human consumption	Animal feed (50%) - exp. (90)/ dom. (10)	On-farm pig feed
– secondary	On-farm pig feed	Starch: domestic	Starch: dom./export		Starch: domestic	Starch (50%) - exp. (60)/ dom. (40)	Starch: exp./dom.
Farm size (ha/farm)	0.5-1.0	0.4-0.6	0.4-1.0	2-3	3-4	4-5	0.6-0.8
Cassava area (ha/farm)	0.2-0.4	0.3-0.4	0.3-0.5	-4	-	2-3	0.25-0.30
Crop. system (%) – monocrop	40	70	40	99	60	95	65
– intercrop	60	30	60	1	40	5	35
Time of planting	March	Apr/Sept	Oct/Nov	Year-round	May-Aug	Apr-May Oct-Nov	Feb-May
Land preparation	Manual/oxen	Manual/oxen	Oxen/manual	Tractor	Oxen	Tractor	Oxen/manual
Planting position	Horizontal	Vertical	Vertical	Horizontal	Horizontal	Vertical	Horizontal
Weed control	Manual/ herbicides	Manual/oxen	Manual/ herbicides	Herbicides/ manual	Manual/oxen	Manual/ mech./ herbicides	Manual
Fertilisation – organic	Some	Some	Some	None	Some	Some	Some
– chemical	Low	Rel. high[1]	Rel. low (N only)	High	Low	Low-medium	Low
Labor cost (US$/day)	1-2	2-3	1-2	4-5	2-3	3-4	1-2
Labor use (mandays/ha)	90	327	167	-	109	52	120
Production costs (US$/ha)	300-500	500-1,000	300-500	390-520	300-700	300-500	200-700

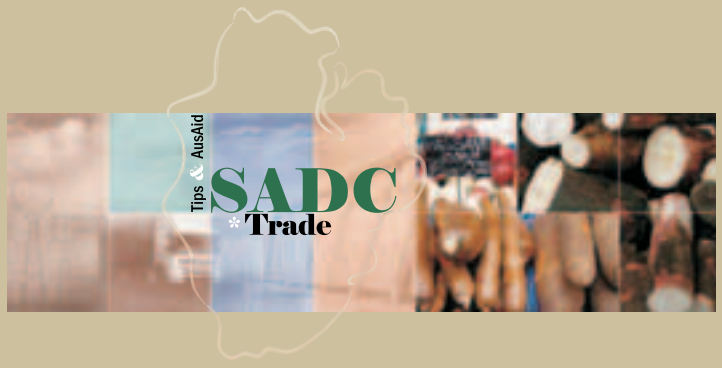
[1] in irrigated areas

Source: Howeler (2003)

Table 20: Quantity (tons) and destination of cassava product exported from Thailand, 2003-2004

	Chips		Hard pellets		Starch	
Country	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**
Africa	-	-	-	-	-	-
Australia	-	-	-	-	38,591	37,667
Bangladesh	-	-	-	-	19,666	23,801
Belgium	-	-	114,825	128,970	2,413	1,615
Brazil	-	-	-	-	20,010	30,343
Canada	-	-	-	-	4,826	19,364
China	1,968,283	2,557,330	21,800	-	132,162	239,645
France	-	-	-	-	4,984	5,170
Germany	-	-	-	-	5,131	13,736
Hong Kong	-	-	-	-	71,726	75,732
Indonesia	-	278	-	-	280,639	114,580
Iran	5	-	4	-	-	-
Israel	-	-	-	-	-	-
Italy	-	-	38,000	58,775	-	-
Japan	357	221	20,489	36,608	312,959	363,568
Laos	-	-	-	-	3,823	39,420
Malaysia	1,212	8,010	1,804	8,835	122,539	3,691
Mexico	-	-	-	-	833	96,509
The Netherlands	-	-	933,104	739,241	35,213	1,001
New Zealand	-	-	-	-	5,401	86,728
Norway	-	-	-	-	1,560	5,410
Philippines	-	-	6,200	6,200	35,464	1,640
Poland	-	-	-	-	-	-
Portugal	-	-	292,375	85,153	-	-
Saudi Arabia	-	-	-	-	4,604	61,336
Singapore	-	-	-	-	60,218	23,021
Spain	-	-	554,425	848,018	-	-
Sri Lanka	-	-	-	-	3,773	5,404
South Korea	-	-	-	81,150	31,628	11,463
South Africa	4,166	-	-	-	18,541	44,724
Sweden	-	-	-	-	5,090	6,320
Switzerland	-	-	5,00	-	20	34
Taiwan	1	4,522	31,400	14,300	282,735	301,878
UK	-	-	-	-	2,484	3,868
US	-	-	-	-	40,016	43,760
Other	-	-	-	-	62,457	104,974
Total	1,974,024	2,570,361	2,019,516	2,008,610	1,609,569	1,766,400

Source: Thai Tapioca Trade Association (2004)



a

TRADE AND INDUSTRIAL POLICY STRATEGIES (TIPS) &

AUSTRALIAN AGENCY FOR INTERNATIONAL DEVELOPMENT (AUSAID)

partnership

AFRICAN GOVERNANCE FACILITY PROGRAMME
SADC TRADE DEVELOPMENT

TIPS is an independent, non-profit economic research institution active in South Africa and the Southern African region in pursuit of viable economic policy solutions to developing country needs.

AusAID manages the Australian Government's official overseas aid programme, which endeavours to advance Australia's national interest by helping developing countries to reduce poverty and achieve sustainable development.

Trade and Industrial Policy Strategies (TIPS)

814 Church Street
Arcadia 0083
PO Box 11214
Hatfield 0028
South Africa

t +27(0)12 431 7900
f +27(0)12 431 7910
e info@sadctrade.org
w www.sadctrade.org

Australian Government, AusAID

292 Orient Street
Arcadia 0083
PO Box X150
Pretoria 0001
South Africa

t +27(0)12 342 8267/3781
f +27(0)12 342 4201
w www.ausaid.gov.au