



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org



African Agribusiness
and Agro-industries
Development Initiative

Tanzania's Cashew Value Chain: A diagnostic



UNITED NATIONS
INDUSTRIAL DEVELOPMENT
ORGANIZATION




INTERNATIONAL FUND FOR
AGRICULTURAL DEVELOPMENT



FOOD AND AGRICULTURE
ORGANIZATION OF THE
UNITED NATIONS



UNITED REPUBLIC
OF TANZANIA



This document has been prepared by Peter Masawe, Frank Hartwich, Margaret Ikongwe, Fredrick Romani, and Juliet Kabege. Feedback on a prior version of the document have been received from Toshiaki Ono and Elly Minani Kafiriti. For comments please contact Peter Masawe (utafiti@iwayafrica.com) or Frank Hartwich (f.hartwich@unido.org). Special thanks go to all the stakeholders interviewed during the course of the study and who have provided a wealth of information on the status of affairs in the value chain (see Annex 1).

The opinions and information contained are the responsibility of the author(s) and should not necessarily be considered as reflecting the views or bearing the endorsement of UNIDO. Although great care has been taken to maintain the accuracy of information herein, neither UNIDO nor its Member States assume any responsibility for consequences which may arise from the use of the material.

This document may be freely quoted or reprinted but acknowledgement is requested.

Reference: UNIDO (2011). Tanzania's Cashew Value Chain: A diagnostic.
United Nations Industrial Development Organization (UNIDO). Vienna, Austria.

Tanzania's Cashew Value Chain: A diagnostic



UNITED NATIONS
INDUSTRIAL DEVELOPMENT
ORGANIZATION



INTERNATIONAL FUND FOR
AGRICULTURAL DEVELOPMENT



FOOD AND AGRICULTURE
ORGANIZATION OF THE
UNITED NATIONS



UNITED REPUBLIC
OF TANZANIA

Abstract

This report presents findings from a diagnostic of the status of development in the cashew value chain in Tanzania carried out by the Ministry of Industry and Trade and UNIDO in March 2011. The diagnostics uses the UNIDO approach of integrated value chain analysis focusing on the dimensions of primary production and inputs; processing capacity and technology; end-markets and trade, governance of value chains, sustainable production and energy use, value chain finance; and business environment and socio political context.

The diagnostics draws from a review of existing literature describing the situation in the value chain, field visits to the Mtwara, Tandahimba and Newala districts, physical examination of existing production and processing facilities, interviews and consultations with key stakeholders, as well as a desk study to compare and analyze all information. Among the interviewees were the permanent secretaries in three ministries, other ministerial staff in the field of industry, agriculture and local development, representatives of the Cashewnut Board of Tanzania, district and regional administrators and technical staff in government agencies and research stations, representatives of cooperatives and farmers organizations, farmers, warehouse operators, processors, and street vendors.

The results show that there is substantial potential to extend the production of cashewnuts by improving productivity on existing farms, engaging in new plantations using improved varieties and to increase domestic processing of cashew nuts beyond the current 40% while also making use of by-products. More than half a million of Tanzanian's could benefit from such development in terms of employment and increased incomes. However meeting this potential is not easy. While Tanzania's cashew nut sector, due to a combination of seasonality and price, is well positioned in the international market for raw cashewnuts its processing sector still remains underdeveloped and insufficiently competitive, particularly in the presence of strong buyers of raw cashewnuts for the Indian market. Reasons for this can be found in a combination of factors including the lack of technical and managerial experience of most processors, the difficult business environment characterized by overregulation and inappropriate infrastructure, deteriorated machinery and equipment, limited access to appropriate financial products (for processing), costs for labor, services and inputs, as well as the lack of coordination between the various actors in the value chain.

While the more advanced automated processing technology which has been brought to the country in the 1980s largely rests idle new processing initiatives, many of them small to medium-scale, favor half-automated labor-intensive technology solutions from India. Development interventions, in the short to medium-run, may look into the propagation of Indian technology while long term perspectives need to consider upgrading of this technology to reach systemic competitiveness.

In the field of primary production the diagnostic finds that access to credit, insufficient application of inputs, delayed rehabilitation of plantations, lack of knowledge on plantation agronomy but also on farming as a business, as well as insufficient price incentives are the reasons that no further increase in production has materialized. However, the diagnostics also recognizes that the 2007 introduction of the warehouse system has brought some improvements in production quality and farm-gate price, though this may have come with some costs regarding the efficiency in internal marketing.

Potential also exist in improving the profitability of processing through diversifying the product range including through commercial utilization of the readily available waste, and by utilization of other by-products such as cashew nut shells liquid (CNSL), and cashew apples for biogas generation. Further the exploration of domestic and East African markets for roasted and processed cashew nuts may be promising as much as implementing strategies of certification and quality improvement which allow processors to penetrate international markets for quality kernels.

The organization and governance of the value chain as well as the articulation of its stakeholders is still in its initial stages and much coordination would be required to establish viable supplier-processor-buyer relationships. Such relationships also bear the potential for creative funding solutions that go beyond

the current “18-22 % loan fits all” options that are currently available at the market. The Cashew Board of Tanzania may need to be strengthened in order to be able to play its role as a provider of market information, advisory services and regulation functions in a more pro-active way. The function of cooperatives and their unions in internal marketing may be revised emphasizing particularly the urgency to improved services provision to cooperative members.

Finally the diagnostic suggests that the Government and development agencies should engage in an integrated value chain development support program that would foster the development of and value addition in the cashew industry. Main ingredients of such a programme are improved access to finance at various levels of the chain, capacity building, technological upgrading, use of by-products, chain coordination, and an improved business environment. Putting such a programme under the umbrella of the Africa Agribusiness and Agro-industry Development Initiative would allow to solicit technical subsistence from UNIDO and many other agencies, as well as public investment, in parts from IFAD and AfDB.

Acronyms

3ADI	African Agro-Industry and Agribusiness Development Initiative	MT	Metric tonne
AfDB	African Development Bank	NARI	Naliendele Agricultural Research Institute
AMCOS	Agricultural marketing Cooperative Societies	NGO	Non Governmental Organization
CATA	Cashewnut Authority of Tanzania	NMB	National Microfinance Bank
CBO	Community Based Organization	PCS	Primary Cooperative Society
CBT	Cashewnut Board of Tanzania	PCS	Primary Cooperative Society
CDC	Cashewnut Development Center	PDN	Produce Delivery Note
CIP	Cashewnut Improvement Programme	R&D	Research and Development
CNSL	Cashewnut Shell Liquid	RAA	Regional Agricultural Advisor
CORECU	Coast Region Cooperative Union	RCN	Raw Cashew Nuts
CPIPP	Cashewnut Production Improvement Pilot Project	RVF	River Valley Foods
CRDB	National Microfinance Bank	SACCOS	Savings and Credit Cooperative Societies
DALDO	Districts Agricultural Development Office	SIDO	Small Industries Development Organization
DDTF	Cashew Development Trust Fund	TANECU	Tandahimba and Newala Cooperative Union
FAO	Food and Agriculture Organization	TRA	Tanzania Revenue Authority
FAOSTA	Food and Agriculture Organization Statistics	TSh	Tanzanian Shillings
FOB	Free On Board	UDSM	University of Dar Es Salaam
HACCP	Hazard Analysis and Critical Control Points-	UN	United Nations
IFAD	International Fund for Agricultural Development	UNIDO	United Nations Industrial Development Organization
MoAFSC	Ministry of Agriculture, Food Security and Cooperatives	US	United States
MAMCU	Mtwara and Masasi Cooperative Union	USD	United States Dollars
MITM	Ministries of Industry, Trade and Marketing	VETA	Vocational Educational Training Authority
		WRS	Warehouse Receipt System

Table of Contents

ACRONYMS	VI
INTRODUCTION	1
MAPPING OF THE VALUE CHAIN	2
Product	2
Value chain actors and their functions	2
Flow of product and end-markets	4
Service providers	4
1 ST DIMENSION: PRIMARY PRODUCTION AND INPUTS	6
Production	6
Plantation	8
Post-harvest handling and storage	8
Inputs	8
Farm economics	11
Knowledge and extension	12
2 ND DIMENSION: PROCESSING CAPACITY AND TECHNOLOGY	13
Kernel Production	14
By-products and further Processing	16
Existing processing capacity	17
Processing Economics	18
3 RD DIMENSION: END MARKETS AND TRADE	21
Marketing of Raw Cashewnuts	22
International Market for Kernels	23
International Market for CNSL	24
Local Market for Kernels	25
Standards and Quality Control	25
4 TH DIMENSION: GOVERNANCE OF VALUE CHAIN	28
Power relationships	28
Coordination mechanisms	28
Relationships between chain actors	30
Type of Chain Governance	31
5 TH DIMENSION: SUSTAINABLE PRODUCTION AND ENERGY USE	32
6 TH DIMENSION: VALUE CHAIN FINANCE	34
Financial attractiveness	34
Financial risks	34
Availability of finance	35
Financing gaps	36
7 TH DIMENSION: BUSINESS ENVIRONMENT AND SOCIO-POLITICAL CONTEXT	38
Regulations	38
Public and private service provision	38
Social and cultural context	39
SUMMARY AND RECOMMENDATIONS	41
LITERATURE REFERENCES	47

Introduction

This study diagnoses the current status of the cashew value chain in Tanzania and identifies entry points for its further development. It aims at informing the development of a strategy for the development of the cashewnut industry. This information is relevant for the development of a value chain development support programme as it is currently envisaged in the context of the Africa Agribusiness and Agroindustry Development Initiative (3ADI) that the Government of Tanzania, namely the Ministry of Industry, the Ministry of Agriculture, Food Security and Cooperatives, and the Prime Minister's Office are planning to implement with support from UNIDO, FAO, IFAD and the AfDB.

The study follows the UNIDO methodology of industrial value chain diagnostics (UNIDO 2011) that provides for an integrated view on the value chain emphasizing the dimensions of inputs and supplies, production and processing technology and innovation, markets and trade, value chain governance, value chain finance, energy and cleaner production and policy environment and institutions.

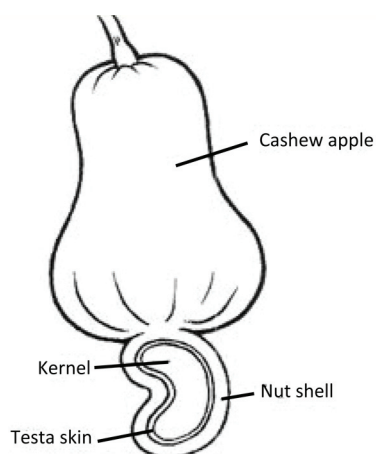
The findings presented draw from existing analyses and are complemented through information collected during interviews and consultations with key actors in the value chain and a range of stakeholders. The authors acknowledge the limits of this information base and propose that a more detailed value chain analysis, particularly of the poorly understood internal marketing, processing and trade sector should be conducted during the initial stage of any project that engages in supporting the development of the value chain.

Mapping of the Value Chain

Product

The main product in the cashew value chain is the raw nut. According to the statistics from Cashewnut Board of Tanzania (Hanga 2010, personal communication) 40% of these raw nuts are processed domestically into cashew kernels which are sold on local markets or become exported; the rest is exported in raw form. There are several by-products and wastes from raw nuts including the shells. The nut has a shell of about 3cm thickness inside which is a soft honey comb structure containing a dark reddish brown viscous liquid, the Cashew Nut Shell Liquid (CNSL). Another by product is the testa from kernels which can be used in poultry feeds among others (see Figure 1). Cashew apples can be used to process other by-products, but very few are currently utilized. However, the potential of using cashew nut apples to produce juice, wines, marmalades, pickles and in particular ethanol is high (Honorata et al 2007). Other cashew producing countries such as Brazil and India have already been realizing efficient use of these by-products improving the overall efficiency of production and processing substantially.

Figure 1: Cashew fruit



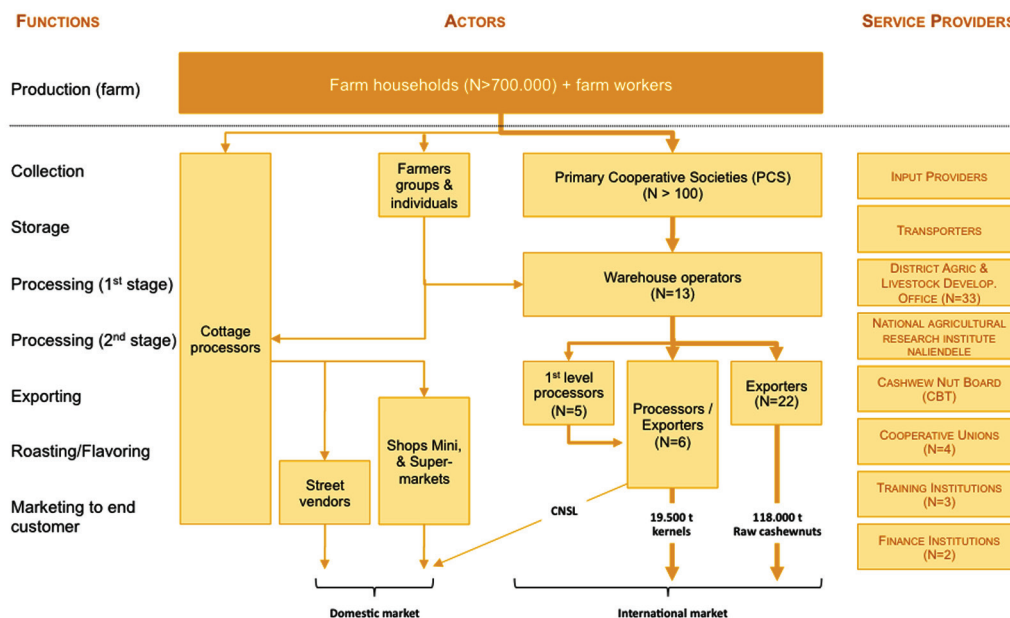
Value Chain Actors and their Functions

The primary actors in cashew value chain (those who produce, transfer and own products) are farmers, Primary Cooperative Societies (PCSs), regional cooperative unions, processors, exporters, roasters and retailers (including shops as well as roadside and street vendors) (see Figure 2).

- **Farmers:** According to the Zonal Information Extension Liason Unit at Naliendele Agricultural Research Institute there are 734.144 households in Tanzania's Southern Zone (Mtwara, Lindi, and Ruvuma Districts) growing cashew. Assuming that there are at least 3 individuals in these households directly benefiting from cashew production, the total number of cashew beneficiaries is around 2.1 million. This does not include other production regions in the Northern coastal regions. It also does not include the households of hired labor who engage in planting, pruning, weeding, application of pesticides, harvesting and bulking. The number of hired labor may well extend the number of farmers making the cashew nut sector an important income source for even more than half a million Tanzanian households. There are also a number of large cashew nut plantation owners, some of which leave their plantations idle or operate at a minimum level of efficiency looking at the cashew nut plantation as an investment in the future.
- **Primary Cooperative Societies (PCS):** These, on behalf of the member farmers, provide inputs (mainly pesticides) and procure supplies in bulk (e.g. farm equipment, fertilizers, sprayers, and gunny bags). The cooperative buys raw cashewnuts from its members who in return

receive a first payment; the cooperatives usually require a credit to lay out these payments. The primary cooperatives sell the raw cashew nuts to buyers via the warehouse system. In return they receive a cess (deducted at the product level). They use part of the fees earned for service from the cess to construct storage facilities at farm level and eventually provide other services such as savings and revolving credit products for cashew inputs, and even investment in common assets such as irrigation schemes, to their members.

Figure 2: Actors in cashew value chain and their functions.



- **Cooperative Unions:** Assist Primary Cooperative Societies to procure materials in larger quantities, such as gunny bags and sisal ropes, loan acquisition and transfer of money to primary society offices, identification and registration of authorized transporters of rawnuts to the warehouse and also interact with the warehouse marketing system. They also prepare the sale catalogue for every consignment in the warehouse based on the information provided weekly by the warehouse operator to the union.
- **Farmers groups and individuals:** When forming under a legal status such as a cooperative or a private company such groups attain the right to sell raw cashew nuts to the export market. These groups have been often established in response to members' discontent with the operations of primary cooperative societies.
- **Processing groups:** Some few farmers groups have ventured into the processing of cashew nuts locally, though their number is still low given the challenges of mounting processing operations. There are also farmers groups which work with certain individuals that process cashew nuts locally (for simplicity they are subsumed in this group as well).
- **Warehouses:** All raw cashew nuts, by law, have to be transported to certified warehouses where they will be stocked in designated lots separated for each cooperative. The warehouses provide a receipt for the reception of the goods. The lots then will be auctioned to buyers (a process in which the warehouses do not engage themselves). The buyer pays the amount to a bank which will apportion payment to the various parties engaged. This system is intended to eliminate or minimize the number of middle players, and limits marketing to be operated only by receipt system.
- **First level processors:** Only engage in processing of cashew nuts up to the level of de-shelling before peeling. This type of processing can be outsourced to certain operators while 2nd level processing, requires more rigorous application of hygienic standards.

- **Second level processors:** Second level processing starts with the peeling of cashew nuts reaching out till sorting and packing. Second level processors, when they do not outsource engage also in first level processing. In general processors can be categorized into small, medium and large scale processors. Small scale processors produce for local market while medium scale to large scale processors produces for local, regional and international markets.
- **Exporters:** Exporters and also large scale processors, their main markets are Europe, India, Middle East and USA for kernels and only India for raw nuts.
- **Street vendors:** These are hawkers that sell cashew nuts on the roadside and at traffic lights. Often they operate on an individual basis. Sometimes also they work for middlemen that send them out and get paid after the products have been sold leaving them only a very small commission for selling the product.
- **Shops, minimarkets and supermarkets:** Cashew nuts are available throughout the country at shop outlets, roadside stands, mini markets and larger supermarkets.
- **Cottage processors:** These de-shell, peel, and roast cashew nuts manually in backyards. Often these operations are run by agents that engage in selling the product at small stands at the roadside.

Flow of Product and End-Markets

Raw nuts are sold through auctioning to end-buyer markets. Two main marketing channels must be distinguished, the export and the domestic market. Little information is available of how much products reach the domestic market. Estimations range between 1 to 5% of the total national production. More accurate information is available regarding exports. For the season 2010-2011, value of total exports including both kernels and raw cashew nuts may have been above 250 Million USD. (In comparison, for 2008 FAOSTAT reports only 70 Million USD of revenues from exporting cashew products). Around 40% of the raw cashew nuts are processed domestically while 60% are shipped to India for further processing generating substantial value addition and employment. Raw cashew nuts are channeled through the warehouse receipt system regardless whether they become locally processed or exported. An exception is the nuts that get processed for the domestic market in small backyard operations.

Service Providers

Service providers include the Cashewnut Board of Tanzania (CBT), District Agricultural and Livestock Offices, government research and extensions services, financial institution such as CRDB and NMB, and NGOs.

- **Input suppliers:** They provide fungicides, pesticides and pesticide spraying machines. Inputs into primary production also include farm inputs and planting materials. Inputs are privately licensed businesses; and many provide an out-sourced service of input supply to the local government within the context of the subsidy voucher scheme.
- **Transporters:** Their main function is to transport raw cashew nuts from the cooperatives to the warehouses. In case of processed cashew nuts they would also transport from processing plants to the local markets and to the ports.
- **Cashewnut Board of Tanzania:** CBT's main functions as set out in the Cashew Act No. 21 of 1984 (As amended in 1993) is to advise government on cashew industry policies and strategies, promote the development of cashew nut production, processing and marketing, assist research and development for the industry, to regulate and control the quality of cashewnuts, to collect and disseminate information on the industry, to facilitate the formation of associations, to enforce regulations, to provide technical services to cashew farmers, processors, buyers or exporters and to represent the Government in international fora. In particular the board licenses growers, buyers, sellers, processors and exporters; grants permits for buying and exporting of cashewnuts and appoints inspectors.

- **Research:** The National Agricultural Research Institute Naliendeke as well as various university institutions such as University of Dar Es Salaam (UDSM), support development of appropriate technologies for production and processing cashew value chains; however, they are facing financial and technical resources to effectively undertake the support responsibilities.
- **Training and education:** Institutions that engage in technical and management training and education include CAMATEC, Small Industries Development Organization (SIDO), Naliendeke Research Institute, and the Vocational Education Training Agency (VETA).
- **District Agricultural and Livestock Offices:** These, sometimes in collaboration with NGOs and CBOs, provide services through trainings, farmer field schools, and media releases. Under the district offices there are government staff working on the ward and village level. Theoretically each village would have an extension worker paid by the government to support farmers in affairs of agricultural production. Extension shall also be provided by the CBT and chambers of commerce but their means of outreach and range of services is reportedly limited.
- **Financial service providers:** Financial institutions play a substantial role in the chain. With Government guarantee the National Microfinance Bank and CRDB Bank having been providing credits to primary cooperative societies for procurement of cashewnuts from farmers. Processors are also requiring loans for buying products and capital investments but access to financial products has been reportedly rather difficult.

1st Dimension: Primary Production and Inputs

Production

According to FAO 2008 data cashew nut production in Tanzania ranks 16th in terms of the farm gate value it generates. However, the cashew nuts constitute an important export crop generating substantial foreign currency income.

The area under production, during the last years, ranges from 80,000 to 90,000 hectares. Production, in the last decade has been below the peaks around the year 2000. The last two years, however, seem to have been marked by a substantial upward trend (see Figure 3). Traders reported that high prices for raw cashewnuts are the main reason for increased production. However, in general, there are a number of systemic constraints which prevent Tanzania from further increasing its production (see Table 1).

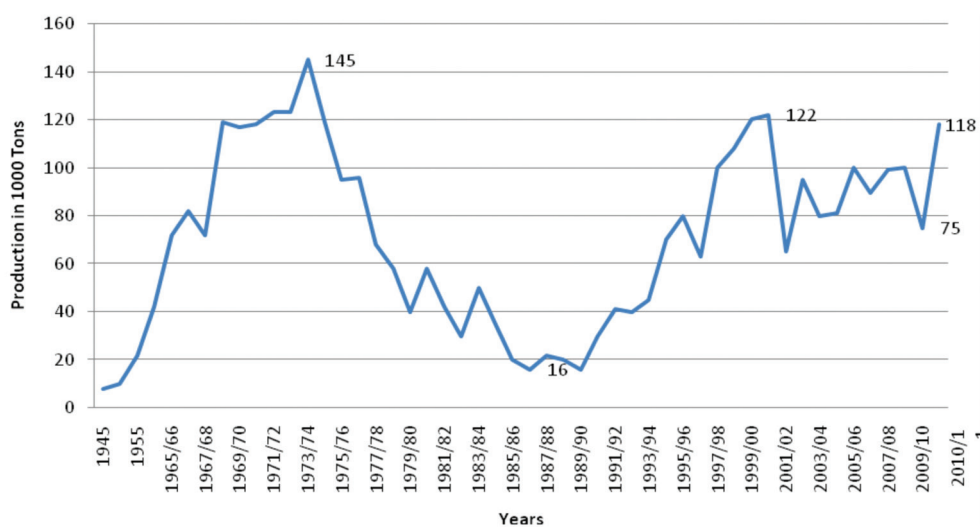
Table 1: Production of main crop and livestock products in Tanzania in 2008

Rank	Commodity	Production (Int \$1000)	Production (MT)
1	Indigenous Cattle Meat	511520	247316
2	Bananas	498785	3500000
3	Cassava	439566	6600000
4	Maize	392414	3659000
5	Rice, paddy	272215	1341846
6	Beans, dry	246583	850000
7	Cow milk, whole, fresh	226049	850000
8	Vegetables fresh nes	179205	955000
9	Cotton lint	146963	99000
10	Groundnuts, with shell	135947	300000
11	Sweet potatoes	132847	1322000
12	Plantains	130424	600000
13	Sorghum	105947	900000
14	Tobacco, unmanufactured	92619	50800
15	Potatoes	79777	650000
16	Cashew nuts, with shell	65111	99100
17	Mangoes, mangosteens, guavas	53567	220000
18	Indigenous Chicken Meat	51092	43803
19	Sugar cane	48269	2370000
20	Natural honey	47056	270

Source: FAOSTAT, 2010



Figure 3: Production of raw cashew nuts in Tanzania (1961-2010)



Source: CBT 2011

Box 1: Systemic constraints to extended cashew nut production in Tanzania

Low farm gate prices for raw cashew nuts (this does not apply under the current 2009-2011 conditions). In the past the prices have not given enough room for producers to invest in plantation management.

Many of the plantations are over-aged with tree-yields in decline. Necessary rejuvenation of the plantations is hampered by lack of finance and de-motivated plantation owners.

Many of the plantation owners are elderly people who do not have the force and resources to improve on cashew nut production. Among the young generation, that would need to take over the plantations, few are interested in growing cashew nuts. In fact, many young people migrate to urban areas because they do not have access to land. Appropriate low-interest rate loans that would allow investing in replanting higher-yielding trees are not available.

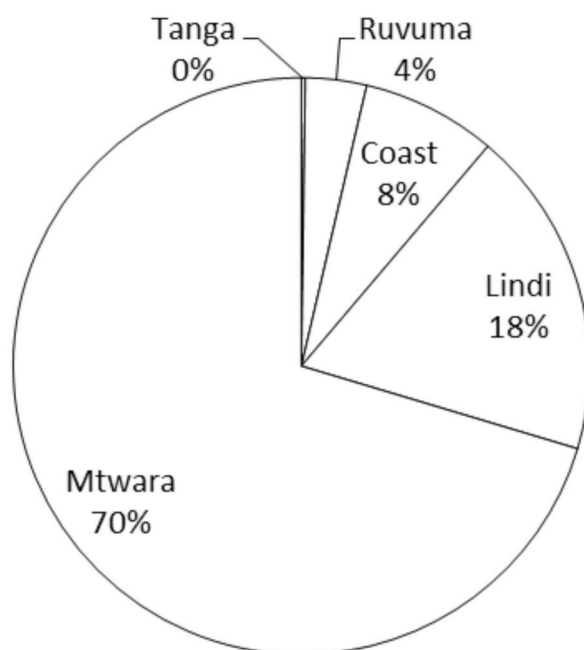
Application of inputs, particularly pesticides, is insufficient affecting productivity substantially. The existing credit institutions as well as the cooperative societies do not provide sufficient finance to farmers to be able to purchase sufficient inputs.

Farm gate prices, in combination with high production costs, have been too low to provide good incentives for production. Farm gate prices have been low due to the elevated costs of the overall organization of the chain, i.e. the accumulated costs of bringing the product from farm to port, including taxes, transport costs, other fees and costs of negotiation and organization. It is only in 2010/2011 that such costs have dropped to less than 20% of the value of the product FOB Mtwara.

Production costs in low-productivity plantations have been too high, in combination with the farm gate price, to generate profits of sufficient magnitude to boost production.

Main production regions are Mtwara, Lindi, Coast as well as Ruvuma and Tanga (see Figure 4). In 2009/2010 season Mtwara and Lindi regions produced more than 87% of the national production. Much of the production is concentrated in a few districts such as Tandahimba, Newala, Masasi, Mtwara, Mkuranag and Nachingwea. There have been also efforts to introduce cashew cultivation in regions such as Iringa, Dodoma and Singida, but the results have been rather poor.

Figure 4: Cashew Production by regions 2010/11



Source: CBT 2010

More than 85% of the plantation owners are smallholder farmers of around one hectare. They use own labor or extra household manpower. Given the structure of land tenancy and demographics the majority of the cashew farms are owned by elder people. Many of such farmers are too poor to hire labor, apply pesticides or invest in rejuvenation of plantations (Martin et al. 1998). Meanwhile, youth have moved away from the villages where most of the cashew production is located seeking better income and employment opportunities in urban centers.

Farmers often organize in primary cooperative societies, either in so-called Agriculture Marketing Cooperative Societies (AMCOS) or Savings and Credit Cooperative Societies (SACCOS). Through the AMCOS farmers are able to jointly market their products efficiently and get in turn pesticides and other inputs at a better price. Through the credit societies, farmers get access to credits they need to buy pesticides and hire labor. According to the Mtwara Regional Commission (personal communication 2008), between 2005 and 2008 over 3,000 farmers in 35 villages had mobilized to form 28 AMCOS which are also linked to 21 existing SACCOSs. The same coverage was reported for Lindi region. However, the societies are often not run in the sense of true cooperatives that service their members and redistribute all incomes. Rather, many societies sprung out of the need to form an organization to be able to market the product. Often the societies are run as businesses of some few influential members, many of which had operated as private buyers (before the government regulated that only cooperatives and farmers groups are allowed to sell cashew). Given growing discontent of many farmers about how the cooperatives are managed some farmers groups sprung up. Their role in marketing and or processing, however, is still negligible. For the moment there seems to be no viable alternative to working with the cooperative societies. Going back to the system where private buyers send their agents into the plantations is not an option, due to the lower prices farmers would then get.

A small proportion of cashewnuts is produced on medium to large plantations owned by individuals who do not live on the farms meaning that the farms are operated by hired labor. Many of these farms are poorly managed and some of them have been abandoned when cashew production became less profitable. To put these plantations back into production they are yet to be rehabilitated and issues of ownership need to be clarified.

PLANTATION

Cashew nuts can be planted in mono or mixed (in combination with maize, groundnuts, etc.) cropping systems (NARI 1990). The tree is of medium size and [HYPERLINK "http://en.wikipedia.org/wiki/Evergreen"](http://en.wikipedia.org/wiki/Evergreen) evergreen, growing to 10-15m tall. Up till harvesting plantation work consists in weeding, pruning and spraying pesticides. Cashewnuts are the main raw materials in the cashew value chain at present. Cashew trees are planted in plantations of around 70 trees per hectare. At maturity/ripening stage the fruits fall on the soil where they are picked up and the nut is separated from the apple. The cashew apple constitutes 80 percent weight of the product and the nut is about 20 percent (Sobhana et al. 2011). The apple eventually gets used to produce juice or alcohol however, in practice, the cashew apple is not commercially utilized.

POST-HARVEST HANDLING AND STORAGE

The raw nuts are dried in open space under the sun for a minimum of three days and the apples eventually can be used to produce juice and/or alcohol (Honorata et al 2007). Raw cashew at the farm level is harvested over a period of about four months; for most plantations in Tanzania this is between October and February (Masawe et al. 2011). The process of harvesting and drying is simultaneous and continues until the nuts, after about 3 days of drying, have attained the required moisture content of 8-10%. Storage with moisture content above 10% will result into decay or rotting of the nuts. This leads into low out-turn which is not profitable. The dried nuts are sorted into two grades (Standard Grade and Under Grades) and then become stocked in 80kg jute/sisal bags, as the minimum specification for further marketing. Farmers store their nuts for short periods in their houses before transporting to the primary cooperative society for marketing. Inappropriate storage, for example the use of plastic, flour, or fertilizer bags instead of yute bags and not using pallets to stack nuts often results into deterioration in nut quality.

INPUTS

Productivity and quality in cashew production depends on the application of inputs and use of improved planting materials as well as the knowledge with which these are applied. In fact, various studies have shown that the main costs in cashew production relate to inputs, particularly fungicides, and hired labor (see for example Ashimogo et al., 2008).

Pesticides: Without controlling powdery mildew disease there will be a crop loss of more than 70% and the remaining production will be of poor quality (Sijaona and Shomari 1987, Waller et al., 1992). There are also a number of other pests, such as Helopeltis bugs, coconut bugs and mealy bugs which attack young succulent shoots causing no flowering and hence low cashew production unless controlled. It is therefore necessary to undertake pest and disease control measures to cashew plantations. Incorrect use of pesticides, whether over-doses or under-dose, cause severe effects. For example, applying lower rates than the recommended ones make the pathogen to build resistance against that fungicide (Sijaona and Mansfield, 2001). On the other hand, excessive use of inorganic pesticides can lead to high levels of the chemical above authorized limits in the kernels, unnecessary environmental pollution and unnecessary additional cost to the farmer.

Sulfur in form of dust and wettable was the first fungicide to be recommended for the control of powdery mildew disease (Sijaona, 1984). Thereafter organic fungicides including, Bayfidan, Topas, Anvil, Bayleton and of recent many others generics fungicides have also been recommended for control of the disease. Attempts were also made by some input suppliers to have a contract of supplying pesticides to individual farmers on credit but it was found to be not sustainable; credit recovery was slow and many farmers defaulted.

Pesticides and spraying machines (manual or motorised) under subsidy are mostly supplied by private companies directly to the primary cooperative societies in bulk who then distribute these to their member farmers. The input subsidy is limited to a choice of inputs (fungicides, insecticides and motorized blowers) though farmers also need to machinery such as chainsaws and other equipment for the rehabilitation of farms. To purchase these materials, the cooperative societies use their own input trust fund which farmers contribute when selling cashewnuts. There is also a 50% subsidy for pesticides paid by the state which the cooperatives can access (see table 4b and Box 2). However, the amount of pesticides sourced by the cooperative societies is usually not sufficient for all the members (covering eventually only 10 to 50% of the quantity needed). Therefore farmers would need to complement what they get from the cooperatives with their own contributions. This also includes planting materials.

Box 2: Procedure of obtaining subsidized inputs for cashew production

The national cashew input fund draws funds from two sources, the Ministry of Agriculture, Food Security and Cooperatives (budgeted annually) and cashew export levy (collected annually). For example in 2010 the Ministry contributed 2 Billion TSh while the cashew levy is expected to contribute over 4.9 Billion TSh (in 2009 the contributions were 1.8 Billion and 2.5 Billion respectively).

The chairperson of a Primary Cooperative Society (PCS) would usually write a letter to the Districts Agricultural Development Office (DALDO) requesting for a permit to buy a particular pesticide (fungicide/insecticide) from an authorized dealer approved by the Cashewnut Board of Tanzania (CBT). Input suppliers/providers (pesticides) must sign a contract with Cashewnut Board of Tanzania (CBT) indicating their selling price before their product can be included in the list of subsidized pesticides.

The PCS would need to prove to the District Agricultural and Livestock Development office that it would be able to pay for the 50% cost of the market value of the pesticide. The remaining 50% of the cost will come from the input subsidy funds. The DALDO would issue a permit which is taken for signature at the office of the Regional Agricultural Advisor (RAA). The PCS takes the permit signed by both DALDO and RAA to the input supplier to take the input at 50% down payment and signs a delivery note that it received the inputs. The input supplier prepares an invoice (attaching a copy of a receipt issued to PCS) which is sent to the regional office (RAA for verification and approval). The Cashewnut Board would then make final payment of the remaining 50% drawing from the funds. The cashew input account is managed by CBT by making payments approved by RAA. CBT does not have authority to use the money for anything else except inputs.

Input dealers do not directly negotiate with the clients until when they are given permit to sell subsidized pesticide. If they do so they will sell pesticides at Market value i.e. no subsidy. The tender opening is undertaken at CBT office in the presence of all applicants. Benchmark prices for the various pesticides are provided by the Board. Interactive discussions are openly held to come to a consensus on the price of each pesticide for each company thereafter companies are invited to sign a contract to supply cashew inputs where the prices are stipulated. This contract is distributed by respective companies to the primary cooperative societies. Individual companies are allowed to promote their products and most of them undertake this exercise using media and physical training of beneficiaries of how to apply the pesticide for better results.

There are many pesticides in the market which require different application rates, timing and frequency of application. Most farmers are not capable to read and follow the application instructions adequately. Although some input suppliers undertake training to promote their products, the number of farmers reached is too low to have a positive impact. This has resulted into misuse of pesticides. The total amount of pesticides used in 2010/2011 seasons is shown in Annex 1. About 5,000 Mt of sulfur dust (fungicide against powdery mildew disease) was distributed while the amount of fungicides and insecticides distributed was 82,805 and 72,278 liters respectively. The price of Sulfur dust was TSh 22,000 per 25kg bag. The prices for Insecticides and fungicides ranged between TSh 21,000 to 30,000 per liter without subsidy. The subsidy of the pesticides is 50% of the market price. Pesticides are imported through Dar es Salaam (Mtwara port does not receive international ships) and are transported to the production regions by road raising its price substantially. For example the cost of transporting 1kg of Sulphur dust (Fungicide) from Dar es Salaam to Lindi is TSh 80 and to Mtwara is TSh 120. This increases the overall price of sulphur by 9% and 14% for Lindi and Mtwara regions respectively.

Planting materials: New cashew varieties and improved cashew clones tolerant to powdery mildew disease are available in Cashewnut Development Centers (CDC) and Research Substations/trials sites (Masawe 2006) and would increase production and quality but few farmers have yet to make this investment. The supply of improved seeds and seedlings is undertaken by government through CDC and research substation and trial sites under Naliendele Agricultural Research Institute. There is a total of 10 such centers.

Machinery for cultivation: Large scale farmers may consider using tractors and other machinery for cultivation. Such machines can be hired from private individuals or groups that jointly own them. However, the main challenge is affordability; resource-poor farmers still find it difficult to pay the rent for such machines, let alone buying.

FARM ECONOMICS

For many farmers cashewnut production has been the main source of income and improving their livelihoods. According to Ashimogo et al (2008) per hectare cash flow and gross margins are in the order of 271 US dollars (at an exchange rate of US dollars 1=TSh 1164). The same estimates on return per labour day is about 3.8 US dollars and return on investment at 4.15 dollars per one dollar invested presents the incentive for farmers to maintain cashew farms. Recent data from NARI together with a higher exchange rate suggest that margins are slightly higher (see Table 2) .

<i>Item</i>	<i>low performance</i> <i>(Naliendele Research Station 2010)</i>	<i>high performance</i> <i>(Naliendele Research Station 2010)</i>	<i>farmers fields</i> <i>(Ashimogo 2008 Study)</i>
No trees	70	70	69
Yield per tree (kg)	8	15	8
Total yield kg	560	1,050	915
Farm gate price (in TSh)	1,500	1,500	552
Total Revenue	840,000	1,575,000	505,080
Variable costs			
Pesticide/Fungicide	63,000	63,000	26,895
Insecticide	21,000	21,000	
Pesticide application	22,400	22,400	0
Hiring of labour (weeding)	135,000	135,000	50,505
Hiring of labour (harvesting+ripping)	810,000	810,000	106,800
Transport to cooperative	7,000	13,125	
Packaging materials	21,000	39,375	
Value of other inputs			8,100
Total input value			44,805
Value of seedling			9,810
Loading and offloading	1,400	2,625	2,715
Total variable cost	1,080,800	1,106,525	249,630
Gross revenue	(240,800)	468,475	255,450
Fixed costs			
Family labour	-	-	-
Land cost	100,000	100,000	100,000
Total Fixed cost	100,000	100,000	100,000
Gross margin	(340,800)	368,475	155,450

Source: Data from Naliendele Research Station, Ashimogo 2008

KNOWLEDGE AND EXTENSION

Knowledge on efficient production and proper plantation management is not commonly applied among farmers. The years of low prices (for example from 2000 to 2007) have resulted in reduced interest of farmers in proper plantation management; investments in weeding, pruning and pest control hardly paid off in this period. The agricultural extension would have to play an important role in guiding farmers towards use of knowledge on efficient production and good agricultural practices. Basis for identifying farmers to be visited by the extension services is an inventory of farmers owning cashew trees at village level (recorded in village register books). However, extension services face challenges related to inadequate number of staff, lack of skills and training, poor working conditions, insufficient motivation and lack of equipment (vehicle/motorbikes, bicycles).

CONSTRAINTS

- Given the unaffordable economic conditions and low prices in the cashew value chain over the last years farmers have not invested in the maintenance and proper management of cashew plantations. Badly maintained and over-aged plantations provide only for low levels of productivity.
- Farmers lack knowledge and skills in the management of the plantations. They also require further training on how best to market their products, eventually through the cooperative societies or other farmers groups, and how to acquiring loans and manage the plantation financially.
- Farmers and primary cooperative societies dry and store nuts poorly.
- The existing extension services that are supposed to reach farmers are inadequate, erratic and discontinued. In consequence farmers lack information that would enable them to improve their production, apply proper agronomic techniques, apply pesticides in the right dose, be productive and produce cashew nuts efficiently and be able to run cashew nut production as a viable commercial business.
- There is not enough planting material available which would enable farmers to rehabilitate their plantations and reach levels of productivity which render cashew nut production profitable.
- The existing finance and input distribution system makes the application of inputs (pesticides, fungicides, motorized blowers, spare parts) costly and often inaccessible for smaller farmers. Those who have preferential access to cash may be less affected but most farmers end up applying too few inputs at the wrong timing, leading to substantial losses in productivity.
- The existing cooperative societies only partly count with the confidence of their member farmers. Logistical and financial management at the cooperatives is often not adequate. Distribution of gains among the members is not transparent and often a substantial share ends up in the hands of a few individual leaders.
- Little attention is currently paid the way raw cashew nuts are stored at farmers and cooperatives. Improved storage technology and practices could help to improve the quality of cashew production (both in raw cashew nuts and kernels) and avoid contamination.



2ND DIMENSION: PROCESSING CAPACITY AND TECHNOLOGY

Cashew processing in Tanzania gained momentum in 1970s when the national cashew production was reaching 145,000 Mt. Starting from 1968 till the late 1970s, 11 cashew processing factories with an accumulated capacity of around 100,000 Mt were constructed with funds from the World Bank (Brown et al 1984). The factories were owned by the Cashewnut Authority of Tanzania (CATA). All factories were large scale mechanized types using either Italian or Japanese technology. In subsequent years cashew production declined due to various reasons and was not able to feed the capacities of the factories. The decline in production was partly due to farmer's abandoning their farms in response to being moved to communal villages (Ellias 1980). However other factors related to market factors (low producer prices), no market show up, inefficient farmer organization, low local processing capacity, Poor extension services (little use of farming technology, ineffective use of farm inputs, poor farmer training) cannot be ignored (Masawe 2007).

The oil crisis in 1970s and the war between Tanzania and Uganda also affected the country's economy as well as the levels of subsidies that the government could give to processing factories. A Cashewnut Production Improvement Pilot Project (CPIPP) operating between 1985 and 1989 identified factors behind the decline in production. The CPIPP was succeeded by Cashew Improvement Programme (1990-1996) which addressed some of the constraint and this resulted into increased production. However production did not increase to the point to use the existing processing capacities. Mismanagement and an incompetently implemented privatization strategy led to further deterioration of processing activities leading to a situation where most raw cashewnuts were exported to be processed abroad.

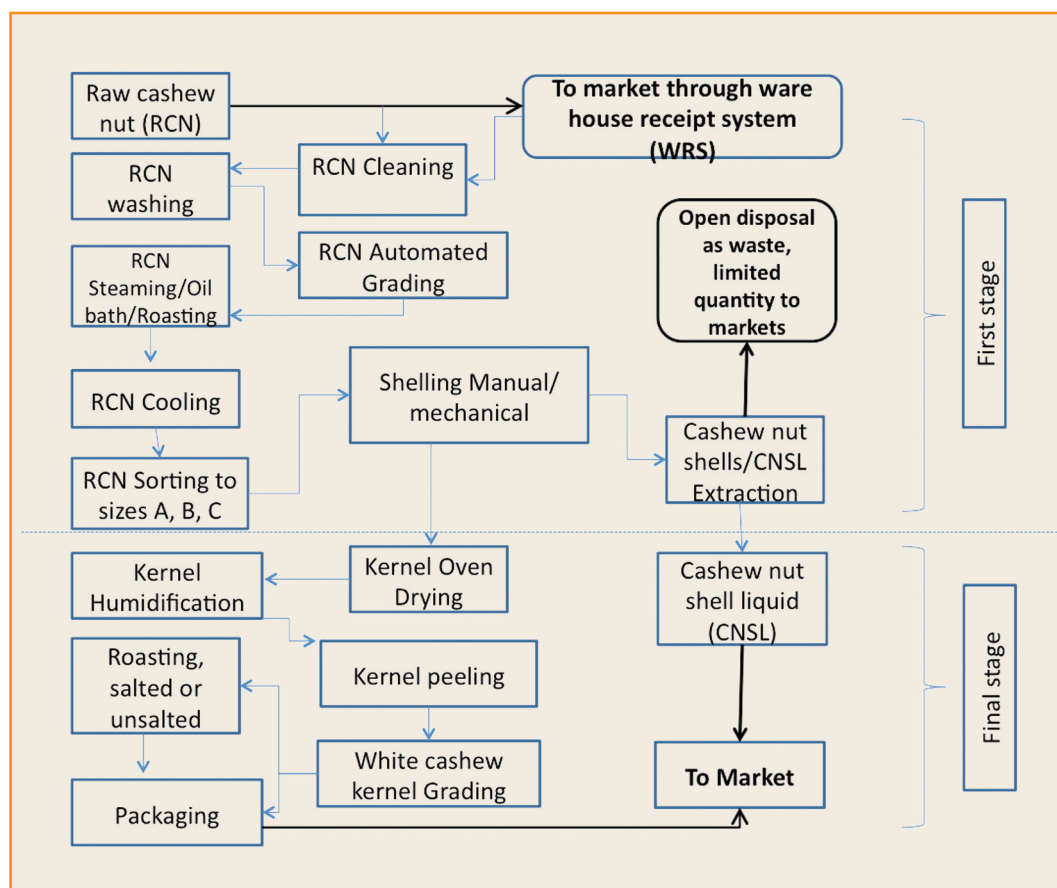
The cashew tree produces fruits that consist of two parts: a pear-shaped stalk called the cashew "apple" and a grayish-brown kidney-shaped nut, which is attached to the lower end of the apple and contains a slightly curved white kernel. The nutshell, which is smooth and oily, contains a toxic, resinous material from which is obtained the Cashew Nut Shell Liquid (CNSL). The main steps for processing of cashewnuts are as follows:

1. Raw nut are sun dried for three days around homestead or collection point
2. Raw nuts marketed to the warehouse or stored in-house
3. Raw nuts from the warehouse or from the in-house are cleaned removing foreign matters
4. Raw nuts are washed with clean water
5. Raw nuts are auto graded into two grades (large and small). The sizes determines the time to be taken when roasting in hot oils/oil bath
6. Roasted nuts are cooled and then sorted into three sizes A,B,C.
7. Graded nuts are shelled manually or mechanically to separate kernels from shells.
8. CNSL is extracted /expelled from the shells which are thereafter disposed. Kernels are dried in oven for about 6-8 hours. Kernels are then humidified before peeling takes place (manual/mechanical)
9. Kernels are graded into several grades before they are either vacuum packed or roasted, salted or unsalted ready for marketing.

Processing in the cashew value chain can be sub-categorized in first stage and second stage processing (see Figure 5) which is followed by a final step processing in form of roasting, flavoring and packaging.

Today only 40% of the cashewnuts produced in Tanzania are processed in the country providing jobs to low-skilled laborers, most of them women who earn between TSh 4,000 to 6500 per day. The number of workers in the cashew processing industry may range between 5,000 to 12,000 workers. The rest is mainly shipped to India where it gets processed by large companies with labor intensive technology. Companies also receive a subsidy from the Government of India meant to support local employment. Further development of processing in Tanzania may have stark effects. For example, members of CBT and large processors have indicated that more than 30,000 jobs could be created immediately if 100,000 Mt of raw nuts will be processed in Tanzania making use of the existing large automated factories.

Figure 5: Simplified cashewnut processing flow chart



Source: The Authors

A report from the United Nations (FAO 2009) recommends that small enterprises should be encouraged to undertake de-shelling and primary processing “which can generate good incomes to smaller community groups”. Indeed processing and value addition of cashew nut could bring an additional USD 70 million to the country to be distributed among producers, processors and the various service providers in the value chain. There are several good reasons why rural households should get involved in cashew processing including its high value of the product and the by-products, the limited requirements in terms of labor and inputs, the relative simplicity of the process, the continuous labor opportunities, and the diversification of income sources. However, those who engage in processing also face risks such as mismanagement, lack of skills, missing to find good marketing options, and not getting sufficient raw materials.

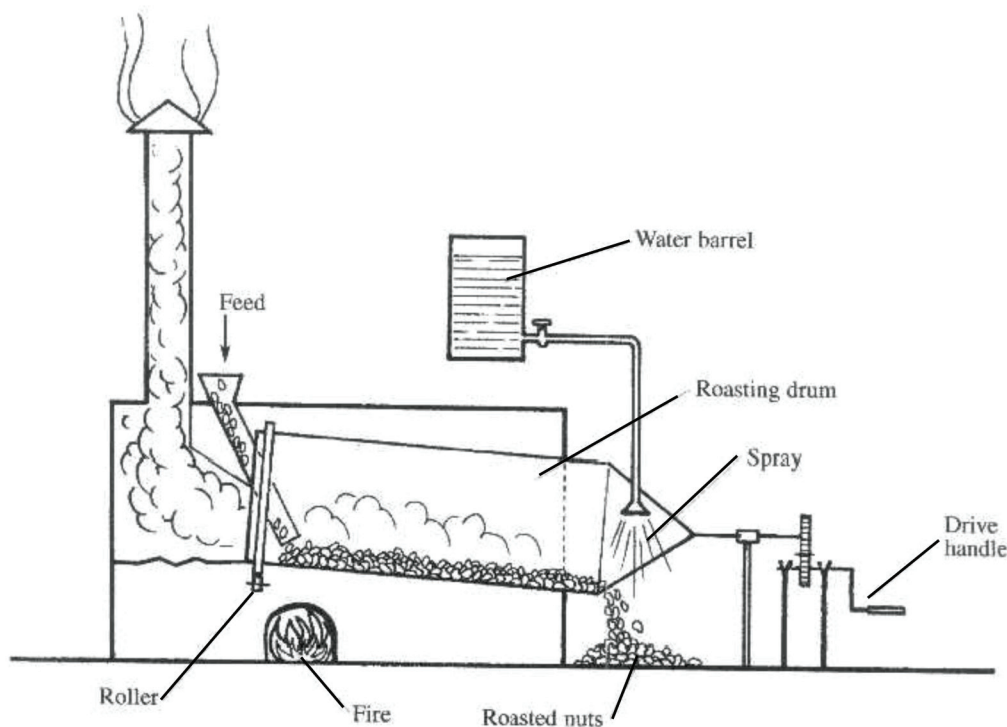
KERNEL PRODUCTION

The raw nuts, after being separated from the apple, can be kept for about a year provided they are properly dried immediately after harvesting (moisture 8 -10%) and properly stored to prevent mould. Storage with moisture content above 10% will result into decay or rotting which leads into low out-turn. Usually the nuts are sun dried and constantly turned over for several days until the kernels rattle in the shell.

Producing kernels the critical processes to engage in are preparation for de-shelling (roasting/steaming/boiling), de-shelling, drying, peeling and grading most of which have been nowadays mechanized, with various degrees of efficiency. For example, in India, the traditional processing consisting of roasting the raw nuts and then shelling by hand is largely being replaced by a process of steam cooking the nuts and opening them with manually operated cutting machines. This modern steam cooking method reduces the percentage of broken kernels. Nevertheless, it is difficult to shell and peel the testa mechanically due to the shape of the cashew nut and the brittleness of the kernel for which reason these processes still engage manual labor. To prepare cashewnuts for de-shelling there are basically three technologies available:

1. **Pan or drum roasting:** Mainly cottage processors for local consumption. It involves roasting rawnut on the pan or in a drum where most of the CNSL burns. Kernels from this type of roasting are not white. Cracking of the nut is done manually using a wooden hammer or a stone. It is labour intensive.
2. **Steam Heating/Boiling (India Technology):** Currently being promoted but CNSL not extracted. There is a need to develop appropriate technology of extraction of CNSL from the shells. A lot of trained workers are required at all stages of processing and in particular at shelling, peeling and grading. The kernels produced here are white whole nuts.

Figure 6: Drum roasting with steam (Indian technology)



3. **Oil bath:** Mechanized large scale cashew processing where CNSL is also extracted. Here there are two types of technologies:-Italian technology (Oltmare) and Japanese technology. The Japanese technology is very capital intensive, it needs skilled workers and few operations require manual labor. Cutting machines can process 320 nuts per minute which are fed automatically by conveyers. The kernels produced here are white whole but scotches can be obtained. The Italian Technology is more labor intensive in comparison to the Japanese technology. It requires many workers though not necessary skilled. It is slower with ability of cutting 78 nuts per minute which are manually fed.

Grading is the last step in the kernel production and is important as a substantial part of the profit can be lost due to incorrect grading. Grading can actually only be performed by experienced workers. Some processors like Agrofocuss Ltd opted to purchase automated kernel grading machines, sophisticated machines which are not easy to handle.

BY-PRODUCTS AND FURTHER PROCESSING

Value addition for other cashew by-products (apples, shells, CNSL, testa) have not been adequately exploited as additional source of income and efficiency in the processing industry. For example, the cashew apples constitute viable raw material for value added products such as beverages, snacks, jam and particularly ethanol. The current production volume of raw cashew nuts of around 140,000 Mt of national

production would yield an estimated 1.4 million Mt of apple fruits which could be further processed. A very small proportion of fresh cashew apples is used in making locally fermented drinks in the villages. The local knowledge on production of gin (Nipa) is practiced in certain districts using locally made equipment for distillation. However, consumption is left to the village level as it is illegal and subject to heavy penalties including jail sentence to prepare, transport, possess or drink cashew gin. Eventually, if restrictions were to be relaxed, there is a potential for local gin and ethanol production for industrial use, though appropriate and more efficient distilling equipment would be required. In fact, the highest potential in processing the apple lies in producing bio-ethanol to complement local energy demands. Residuals from alcohol production can be used for animal and poultry feeds.

Processing of cashew nut apples is restricted to two sites in Tanzania: Naliendele Research Station and Ndanda Mission run by the Benedict Fathers. The products at the processing plants of these two organizations include juice, syrup, jam, pickle and wine. The cashew research programme at Naliendele Agricultural Research Institute has undertaken extensive research on product, technology and market development of value added cashew apple products. However, the programme did not get further than to the product development stage and no private companies have been set up yet to pursue production. The use of cashew gum has not been trialed in Tanzania yet though it was found to have similar properties like gum Arabica. In Ghana cashew gum is used in the production of chocolate pebbles which could increase farmers' income, however, more research needs to be undertaken to ascertain its potential as well as sustainability (Gyendu-Akoto et al 2008a).

Another important by-product resulting from the processing of raw nuts is Cashew Nut Shell Liquid (CNSL) a natural resin found in the cashew nutshell. It consists of about 90% anacardic acids and 10% cardol. In 2008 a barrel of CNSL sold around 550 USD. CNSL can be used in developing chemical products of high value, including drugs, antioxidants, fungicides, dental treatments etc.; though this is not practiced in Tanzania. For example CNSL is used as a basis in the production of antioxidants, stabilisers and demulsifying agents for water in oil type petroleum emulsions for petroleum products. Further CNSL is used for manufacturing of CNSL Resin, Cardanol (Cashew Phenol), Cashew Friction Dust, Anti corrosive lining (lining) chemicals, Paints, Varnishes, Enamels, Insecticides and Fungicides, Cashew Laquers, Bakelite, Electrical conductress, Cashew Cements, Core Oil, Red Oxide, Wood, Fuel, Specialty Chemicals, Foundry Chemicals and many other Industries. CNSL is also used in tropical folk medicine. Despite all this potential, in Tanzania CNSL is mainly used on construction sites and for anti-termite treatment of timber. Some extraction of CNSL has been undertaken by companies such as: BUCO (Masasi), Lindi, Mtama (Lindi), Agrofocuss (Newala I), Micronix (Newala II) and Premier Cashew (Dar es Salaam). There are also some individuals who buy cashew nut shells and extract CNSL in unlicensed backyard-type operations, often putting workers and neighboring communities at risk. Most CNSL, however, is eventually burned to heat steamers for roasting raw cashew nuts or simply thrown away with the shells. Testas which constitutes 8% of the nut could be value added or used for animal feeds, shells after extracting CNSL could be used to make briquettes. Ashes from burnt shells could be good source of fertilizer but a study needs to be undertaken to ascertain it before commercialisation.

The kernels could also be used as raw materials for value added final products like butter, powder (Ray et al. 2006), soup concentrates, paste and confectioneries but this is not put into practice at the moment. However, so far value addition on kernels in Tanzania is only realized by roasting and salting for snacks which are sold in mini and supermarkets, shops, bars, bus stations, airports, restaurants as well as in the streets/road sides. According to information obtained from CBT, major cashewnut roasters in Tanzania include Premier Cashew Dar es Salaam (presently not operating), Mohamed Enterprises Ltd (Mbagala) Dar es Salaam, Kilimanjaro Natural Ripe Dar es Salaam –(for Shops and mini/super markets including Shoprite and Pricionair), Kimara Processing – Dar es Salaam (for Shops and mini/super markets including Shoprite), Imalaseko Super Market Dar es Salaam, Octopus Company Limited (Mtwara), Naliendele Agricultural Research Institute Mtwara (for research and demonstration purposes), Newala Processing group (Newala Mtwara), Mikindani Processing Group Mtwara, Mnuja General Enterprises Mtwara and Kasuga and Family Mtwara. There are many other individual roasters who are not documented at CBT. However, with recent changes in Cashewnut Act 2009, it is illegal to undertake any value addition without registering the premise with CBT.

EXISTING PROCESSING CAPACITY

The current capacity of cashew processing in Tanzania is around 140,000 Mt distributed across the aforementioned 11 large scale cashew processing factories and three medium cashew processing factories using the Indian Technology (with an annual capacity ranging from 3,000 to 10,000Mt). However, much of this capacity cannot be mobilized as many factories would require rehabilitation and further investments to reach their full capacity. Further, some smaller processing units of around 300 Mt have been established by farmers groups. However only one of the latter is operational due to lack of working capital.

Table 3. Cashew processing factories in Tanzania, their technology

Factory	Owner	Original technology set up	Technology currently used	Estimated capacity	Production in season 2009/2010
1. Mbagala (TANITA II)	In Dispute	Japanese	none (no machines)	12,000	Not operational
2. Lindi	BUCO Lindi	Italian	Italian	10,000	Not operational
3. Masasi	BUCO Masasi	Italian	Italian	10,000	Not operational
4. Tunduru	Korosho Africa Ltd	Italian	India	10,000	Operational
5. Newalal	Agrofocus (T) Ltd	Italian	Italian	10,000	Operational
6. Olam Factory	Olam (T) Ltd	Indian	Indian	10,000	Operational
7. TANITA I Kibaha	Safa petroleum	Japanese	Japanese	10,000	Not operational
8. Likombe	Micronix	Japanese	Japanese	10,000	Not operational
9. Newala II	Micronix	Japanese	Indian	10,000	Not operational
10. Tandahimba	River Valley Food Ltd	Indian	Indian	10,000	Not operational
11. Vingunguti Premier Cashew	Fidahusein	Indian	Indian	8,000	Not operational
12. Mbagala	Mohamed Enterprises (T) Ltd	Indian	Indian	5,000	Operational
13. Mtama	Lindi Farmers Company Ltd	Italian	Indian	5,000	Trial phase
14. Nachingwea Factory	Lindi Farmers Company Ltd	Italian	Italian	5,000	Not operational
15. Kibaha	UVUKI	Indian	Indian	3,000	Not operational
16. Sanol Factory Mikindani	For Olam	Indian	Indian	2,000	Under Olam
17. Jakaas Nachingwea	For Olam	Indian	Indian	2,000	Operational
18. Mtwara MCC	CC2005 Ltd	Japanese	Indian	2,000	Operational
19. Masasi High Quality	Masasi Farmer group	Indian	Indian	1,500	Operational
20. Naliendele Research Institute	Ministry of Agriculture	Indian	Indian	300	Operational
21. Mbutano Masasi		Indian	Indian	300	New
22. Rufiji	Farmer groups	Indian	Indian	300	Trial phase
23. KITAMA	Kitama farmers group	Indian	Indian	300	Trials phase
24. Tanga	DAMROS	Indian	India	300	Not operational
25. Annar Factory Newala	Process for Olam	Indian	Indian	2000	Operational
Total				136,700	

PROCESSING ECONOMICS

Processing of raw cashew nuts becomes profitable due to economies of scale; at small volumes the cost structure limits its profitability. For example, larger scale technology (Japanese and Italian) cashew processing provides advantages over the Indian Technology with regard to food quality and safety but also with regard to costs, provided the factories operate at a reasonable capacity level. However, all 11 large scale factories do either not use the large-scale technology any more or run completely under capacity (see Table 3). Since 2000 semi-manual cashewnut transformation on the basis of Indian technology is used in processing cashewnuts and it was considered to be more appropriate for the Tanzanian context and hence got promoted with an intension of replacing large scale processing. This was partly because none of the large scale cashew processing that were privatised was operational. In consequence there are now around 10 medium scale cashew processing units also using Indian Technology with capacities between 300 Mt to 3,000 Mt per year. Table 4 provides some rough information on the processing costs of a 300 Mt operation using Indian equipment (costs for equipment are subsumed and a usage fee). The data, however, seems to be quite inconsistent and further studies on processing costs should be conducted.

Table 4: Cashewnut processing margins (with Indian technology) in TSh per 1000kg of raw cashew nuts

<i>Stages of Processing</i>	<i>High outturn (253kg whole kernels and 25kg of pieces)*</i>	<i>Low outturn - 155kg whole kernels and 40kg of pieces)**</i>	<i>High outturn</i>
Revenues (at 12,000 TSh per whole kernels)***	3,186,000	2,100,000	4,860,000
Costs			
Purchase of 1000 kg raw cashew nuts	(1,500,000)	(1,500,000)	(1,500,000)
Fee for use of equipment****	(75,000)	(75,000)	
Depreciation and maintenance costs			(68,750)
Storage operation costs			(750)
Materials (cooking oil, powder, etc..)			(18,750)
Grading of rawnuts (12 people x 800 TSh)	(9,600)	(9,600)	
Boiling and cooling (3 people x 2,500 TSh)	(7,500)	(7,500)	
Shelling of rawnuts (280kg kernels x700 TSh/kg)	(196,000)	(147,000)	
Drying (2 daysx3peoplex5,000TSh/day)	(30,000)	(30,000)	(149,625)
Peeling (2500 TSh/kgx289kg)	(100,000)	(75,000)	
Grading of kernels (2daysx3peoplexTSh2,500/day)	(15,000)	(15,000)	
Roasting (excluding energy costs) (2daysx3 peoplexTSh2,500/day)	(30,000)	(30,000)	
Packaging	(75,000)	(75,000)	(75,000)
General utilities (water, electricity, etc.)			(10,250)
Marketing costs			(30,000)
Profit Margin	1,147,900	135,900	3,006,875
Profit Margin in USD	765	91	2,005

Source: Based on data from Naliendele Research Station, Kitama Farmers Group Business Plan

** Out-turn for kernels may vary between 270-300 kg for every 1000kg of raw nuts*

***Out-turn for kernels may vary between 190 -230 kg for every 1000kg of raw nuts*

**** Local Prices in Mtwara is whole kernels (no grading) = 12,000/ per kg and pieces (no grading) = 6,000/ per kg*

***** Processing fees at Naliendele Agricultural Research Station include ware and tare of equipment, electricity, cleaning, security guards and water bills*

Mohod et al (2010) studied opportunities for small-scale nut processing in India and reported that most energy and time requirement for cashew processing relate to drying of the raw nuts in open sun, steaming of raw nuts and kernel drying.

Processing of nuts also requires capital investment. The capital is bound for almost a year, otherwise there would be no continuous supply of raw materials for processing. Where such funds are available in form of credits the interest rates are too high to make profit. Many processors are actually not able to cope with this challenge (see Box 3 and Box 4). Another serious constraint is the availability of (partly skilled) labor (See box 5).

Box 3: Stocking Raw Cashewnuts for Processing – Experience of the Kitama Farmers Group

The Kitama Farmers Association is a private group with over 250 members that was formed in 2010 to engage in cashew processing. Farmers would supply raw nuts to be processed in the group's own processing facilities, a donation by UNIDO to showcasing a pilot medium-scale processing plant owned by farmers. The group developed a business plan that envisaged selling the final product to a large scale buyer. Also the option was thought of to provide processing services for individuals (Maize or rice mill model). However, the group has not yet started processing because member farmers sold all stocks of raw nuts, due to the very attractive prices, to nearby primary cooperative societies. The group would have needed to buy raw materials from the warehouses (300Mt at TSh 1800/kg)) in the order of TSh 540 Million (USD 450.000) to have sufficient stocks available for process throughout the year. They would also need refinancing for payment of salaries, packaging, utilities and other related costs. Lately the group negotiated with River Valley Foods Ltd which pre-financed the buying of stock and buy the processed nuts. Still the factory needs to connect to electricity and water before starting operations.

Source: Interview with group leaders, February 2011

Box 4: Challenges of Scale, Finance, and Marketing: Experiences at the Newala I Factory

The factory, set up as one of the 11 large processing plants in 1973 is located in Newala and has a capacity of processing 10,000 Mt annually. Agrofocuz Tanzania Ltd bought the factory from the government in 2006. Upon acquisition, the company rehabilitated the factory which has been neglected for many years and currently one out of two production lines is operational with a capacity to process 5000 tons of raw cashewnut annually. In the 2010/2011 season the total amount processes will reach 200 Mt of raw cashew nuts. This quantity corresponds to a loan the company was able to get from a Bank which enabled it to buy raw materials from the ware house operator (the same company is also operating a warehouse). All quests of the company to get additional finance to be able to buy more raw materials have been turned down. In the end the factory operates with extremely high running and fixed costs. A major challenge, for example, is the high costs for heating the oil bath for roasting the shells. Meanwhile international buyers, attracted by the company's quality kernels, show interests to buy larger quantities but refuse to buy when instead of 3 containers per month the company can only deliver one container.

Source: Interview with company management, February 2011

Box 5: Labor shortage in processing – the experience of OLAM Tanzania Ltd.

In 2004/05 Olam Tanzania Ltd., subsidiary of Olam International (an international trader and processor of agricultural commodities), signed a memorandum of understanding between the government and local processors. The idea was to revitalize the local processing industry and increase processing capacity from 20,000 in 2005 to 80,000 in 2009/10. This was to be achieved while the export levy for raw cashewnuts was raised from 10% to 15%. In 2006 Olam bought the warehouses of the Likombe factory, in Mtwara Municipality. The company installed cashewnut processing equipment using Indian technology. Currently the factory can provide work for 4500 laborers. At present, Olam Tanzania Ltd is the largest cashewnut processor in Tanzania producing some 12.000 Mt of kernels. However, Olam faces difficulties finding enough workers for its labor intensive processing activities. The reason is that many workers are attracted by eventually finding better paid jobs in other urban areas of the country or they find rents for housing in prospering Mtwara getting too high (due to oil industry and newly established education centers) preferring to return to their villages. At times there are better paid seasonal jobs, e.g. in public roads construction, which attract laborers. Many workers also return to their farms during planting season, regardless of the wage offered to them. The company has therefore partly outsourced 1st level processing to a number of subcontractors who operate in more remote areas where labor is still sufficiently available. Local processors, like Olam, also face challenges such as high interest rates (though Olam is partly able to get refinanced through access to international financial markets), lack of skilled labor, pesticide residue in kernels, competition with foreign companies for raw materials, and lack of by-product realization.

Source: Interview with factory management, February 2011

CONSTRAINTS

One of the crucial issues that many development agents have been posing is why Tanzania is exporting so many raw cashew nuts despite having processing facilities in place. The reasons, certainly are structural and a whole set of factors must be taken into account.

- Cashew nut processing is competing with selling the raw cashew nuts to India, where a 5% subsidy is paid by the state to local processors that employ a larger number of workers. At the given high prices processors, who all engage also in the selling of raw cashew nut, rather consider the option of selling their products directly than going through the troubles of processing.
- Under the current system it is very difficult for processors, both commercial and small-scale, to get loans that would enable them to acquire raw cashew nuts at affordable prices and stock sufficient quantities to maintain continuous processing operations over the year.
- Workers for the rather labor-intensive processing are not available sufficiently and continuously throughout the year. Processing competes with other sectors where the pay is better or with seasonal farm activities that are important for the food security of the family.
- There are only few (around 5 to 7) companies that process cashew nuts commercially. With the exception of one company (OLAM) they all suffer from lack of technological and managerial capacity. Often they use large processing facilities from the past with huge fixed and running costs. These facilities would require upgrading and adaptation to lower scale operations.
- The existing local (farmers) groups and individuals that want to engage into processing start with virtually no experience in the processing business and lack all the technical knowhow as well as administrative and marketing capacities. They are not able to compete with the commercial processors if farmers do not give them cashew nuts and accepting delayed payment.
- With few exceptions processing is too costly to be competitive in an international comparison; Vietnam and India can process cashew nuts at lower costs. This is due to the high costs for energy, inefficient use of processing technology, inadequate management and the low utilization capacity of the existing processing facilities. Frequent power and water cuts aggravate the situation.
- The quality of Tanzanian cashew nuts is usually good (more than 90% are sold as Grade A). However, hygienic standards, particularly when part of the processing is done manually, poses a challenge, particularly to small and recently established processors.
- The potential of producing and marketing efficiently various by-products (apples, CNSL, etc..) needs to be exploited in order to render processing operations efficient. At the moment the profit margins are inadequate.
- With the exception of an export tax on raw cashew nuts of 15%, there is currently no particular government support schemes that would provide additional incentives, training or support to processors to get into and stay in business.
- There is no venture in the value addition of kernels such as butter, soups, powder, pastes and others. The market for such products is not understood and there is no knowledge on how to process these products.

3RD DIMENSION: END MARKETS AND TRADE

Three main cashew products are traded on the international market: raw nuts, cashew kernels and cashew nut shell liquid (CNSL). A fourth product, the cashew apple is generally processed and consumed locally.

The cashew kernel is the main commercial product. The kernel, which is the edible part of the nut, contains 47% fat (of which 87% are unsaturated fatty acids); 21% protein, 22% carbohydrates, and the remaining 10% made up of other substances including calcium, phosphorus, iron and various vitamins, the main ones being A, D and E. The cashew kernel has a high percentage of polyunsaturated fatty acids, in particular linoleic acid, and is an important source of sodium, calcium, potassium, magnesium, phosphorous, iron, copper, zinc, chlorine and selenium. According to medical sources, cashew nuts may help to lower the cholesterol level in blood and to control diabetes.

Currently 28 countries produce cashew nut for export and/or domestic consumption. Vietnam is the largest producer with more than 1 million Mt followed by India and Nigeria who produce both around 700.000 Mt. Although India is the second largest producer, it is not a major exporter of raw nuts. Most of their production is processed for export. Next come Cote d'Ivoire, Brazil, Indonesia, Philippines and Tanzania. In the past 20 years, Tanzania ranked fourth or fifth in global cashew production after India, Nigeria, Brazil and of recent Vietnam (FAO 1991). In the early 1970s, Tanzania was the second biggest producer of raw cashewnuts in the world after Mozambique (FAO 1991). The highest production of 145,000 Mt was exported in 1973/74 season and thereafter the production started to decline recording as low as 16,400 Mt in 1986/87.



Cashew is the most important export crop in Tanzania after tobacco, coffee and cotton (Table 5). Other export earners include Minerals (mainly Gold, Tanzanite, diamond) Industrial manufactured goods, fish, marine products, Forestry products, flowers, horticultural products, leather and live animals. It has consistently been the main cash income for farmers in the Mtwara and Lindi regions for more than half a century, although it is also grown in other regions (Shomari 1988). Statistics on illegal cashewnut cross-border trade are, from Tanga to Kenya and from Mozambique to Mtwara. Eventually the two export and import streams just level out.

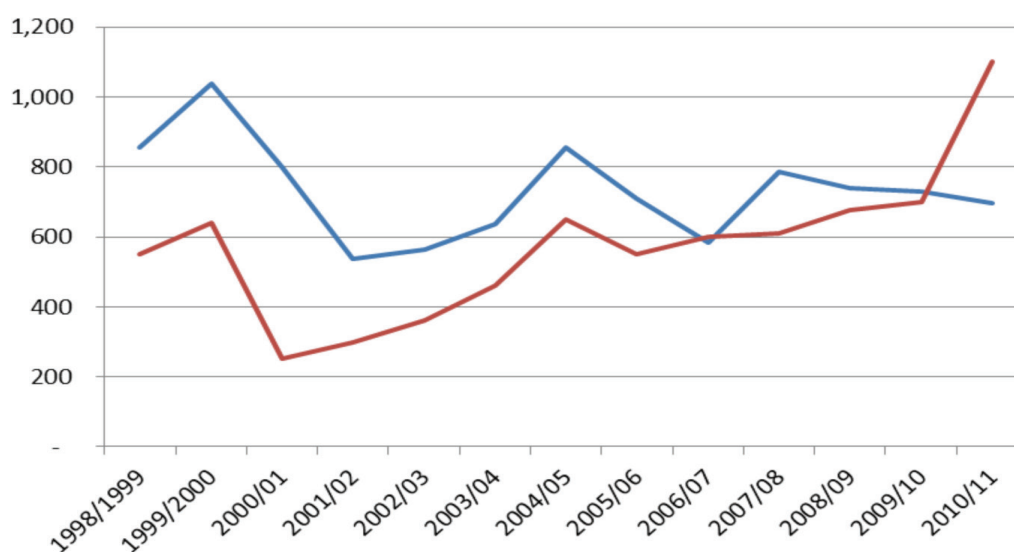
Table 5. Major export crops of Tanzania in 2008

Rank	Commodity	Quantity (tonnes)	Value (1000 \$)	Unit value (\$/tonne)
1	Tobacco, unmanufactured	45910	177752	3872
2	Coffee, green	45356	100001	2205
3	Cotton lint	54116	80893	1495
4	Cashew nuts, with shell	52743	42871	813
5	Tea	28103	42545	1514
6	Flour of Wheat	58493	36672	627
7	Peas, dry	72290	36024	498
8	Cotton Carded, Combed	33792	34866	1032
9	Sesame seed	31776	31268	984
10	Palm oil	19612	27875	1421
11	Cashew Nuts Shelled	7725	26503	3431
12	Cocoa beans	9721	25555	2629

Source: FAOSTAT 2011

Recent price rallies (see Figure 7) have changed the situation in the sector as the value of raw cashew nuts has almost tripled. This was the result of competition between buyers but also a reflection of a tight supply situation on international cashew markets due to shortcomings in the production of Cote d'Ivoire (civil strife) as well as Vietnam and Brazil (harvest losses). The price trend has been also favorable in the way that the actual price became higher than the indicative price agreed in stakeholders meeting and announced by the Cashewnut Board at the beginning of the harvesting season, which was a good incentive to farmers. In 2009, the price of raw nuts was TSh 600 (\$0.5), and it raised to TSh 800 (\$0.8) in 2009. In 2010 it reached, up to a record high of TShs 2,182 (\$1.5) (CBT 2010).

Figure 7. Comparison of prices for raw cashewnuts FOB Dar Es Salaam (in US\$ per Mt and TShs per kg)



Source: CBT 2010a

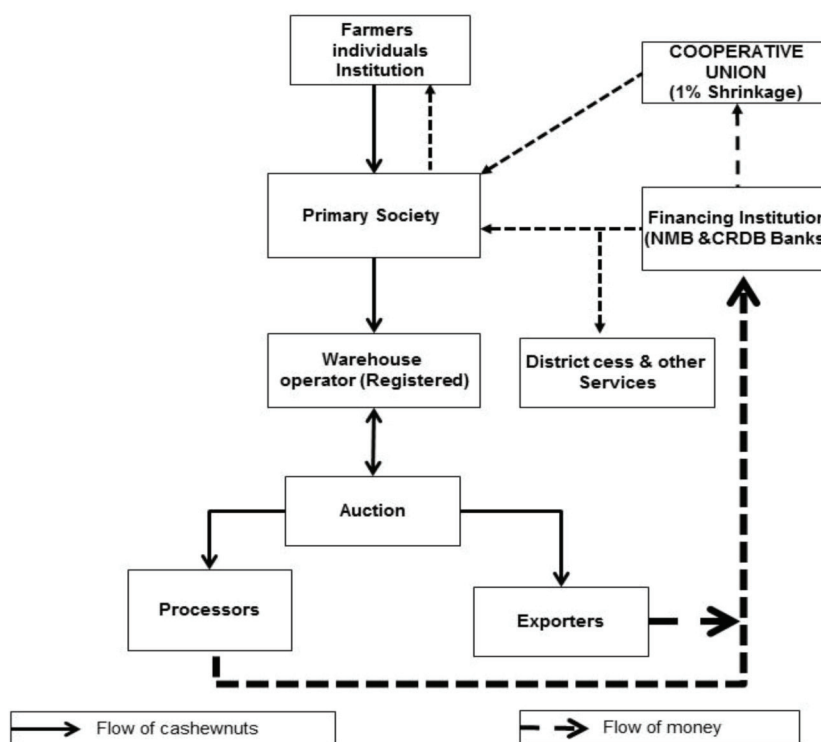
MARKETING OF RAW CASHEWNUTS

Most of the cashew crop is exported as raw cashewnuts (RCN) (118,000 tons in 2010/11) and only a small portion (around 20,000 tons) is processed internally. Previously raw cashewnuts were bought from farmers via primary societies who acted as agents of buyers. During this time some buying agents have been reported to conduct unethical marketing practices such as: (i) buying outside designated centers; (ii) buying using a single price (which is often low) for a mixture of standard grade and under-grades; and (iii) lack of regard to grading (Ashimogo et al. 2006). There is also anecdotal evidence to suggest that farmers have been cheated regarding the weight of their crop (see Poulton, 1997). Those benefiting from such practices are weighing clerks and officials who re-weigh purchased nuts after the buying posts have been closed, (when they re-bag the nuts into standard sacks of 80kg each) selling the difference between nuts purchased and nuts bagged.

There was a modest competition but exporters managed to keep prices low. For examples, traders/buyers could agree to delay purchase of raw cashewnuts causing a tendency among farmers to sell at any price. Hence, the indicative farm gate price announced by the Cashewnut Board of Tanzania could not effectively be put into practice. Low farm gate prices also made farmer to cheat on quality including adding foreign materials like stones and sand. The system attracted a lot of middlemen in the cashew trade before it reaches the exporters and processors. The costs for the engagement of all these service providers were deducted from the farm gate prices.

Since 2007, the marketing of raw cashewnuts in Tanzania is organized through the warehouse receipt system with auctioning taking place on weekly or bi-weekly basis (at the office of Cashewnuts Board of Tanzania) during the harvesting season (Figure 7). The warehouse operator is obliged to record the weight, the grade, kernel out-turn and more important moisture content. Nuts with moisture content above the limits are not accepted. Through the introduction of the system most middlemen could be eliminated a fact to which many attribute the rising farm gate prices over the last two years (from under 1 USD to 1.5 USD). Instead primary marketing and cooperative societies became the main link for farm producers to the warehouse buying system, in fact they can be considered to fulfill the functions of middlemen. The introduction of the warehouse receipt system, which started in Mtwara Region, did not go without stiff resistance from traders accompanied by much propaganda pro and contra state interference.

Figure 8: Marketing cashewnuts through Warehouse Receipt System



Source: The authors

There is a common perception among traders/exporters that they benefit more from exporting raw cashewnuts than from processing; the former is an operation in which they get back their investment in 90 days for the latter it takes at least a year, let alone the investments to be made in equipment, machinery, salaries and other costs. However, the export of raw nuts bears negative structural impacts on the industry such as the export of employment opportunities, the loss of potential income from cashewnut by-products (CNSL, Testa and Shells), and others.

The market for raw cashewnuts is not diversified and a large quantity of the nuts produced in Tanzania still end up in the hands of few buyers in India, opening opportunities to fix prices. The demand of raw nuts in India is high because of the differences in crop cycle. Harvesting in Tanzania takes place six months earlier than Indian. In this context, India processors are ready to buy raw nuts from Tanzania even at a higher price, just to keep their operations running throughout the year. The Government of India also give subsidy to importers of raw cashewnuts as it creates employment and also brings in by-products which when the value is added it increases government revenues.

Furthermore, the amount of raw nuts available and the prices in East Africa particularly in Tanzania plays quite a substantial role in influencing the price of raw nuts in West African region. This is due to the fact that harvesting in Tanzania and Mozambique (southern hemisphere) takes place at a time when India does not harvest (northern hemisphere) (Nawale et al 1984).. While cashewnuts harvesting in West Africa takes place the same time like in India, only Tanzanian cashewnuts are available during September, October and November. Export in Mozambique is allowed from January.

INTERNATIONAL MARKET FOR KERNELS

One can assume that worldwide more than half of cashew kernels are consumed in the form of snacks while the remaining share are included in confectionery. Demand for cashew kernels is robust, growing at a rate of lately 7% annually, with every expectation that the market will remain strong. The cashew competes in the same market with other edible nuts including almonds, hazels, walnuts, pecans, macadamias, pistachios and peanuts. There has recently been a considerable rise in demand for edible nuts by consumers interested in quality and health aspects of food. The breakfast cereal, health food, salads and baked goods markets are all expanding markets for cashew nuts.

One major factor that affects the consumption of cashew kernels in world markets is competition from other tree nuts. The major importers in developed countries contract their requirement for the whole year based on the sales from previous years. If prices of a commodity fluctuate over a wide range, they will not want to trade in that item for fear of incurring heavy losses. Since cashew nut production is carried out mostly by small-holders - and not on a large plantation scale with stable harvests - year to year variation in crop yield is a regular feature resulting in wide price fluctuations for cashew kernels. On the other hand, almonds and pistachios are grown in very large plantations in the United States and thus their prices are steady year after year (Nayar, 1995).

Processed kernels can be better marketed wider if they are sold as a branded product. In the first place importers would like to know the product brand before importation due to assurance in quality. All local processors do not sell branded products as there is no kernel brand in the market at present. In the past Tanzania used to market kernels using a brand called "CATA NUTS". This brand ceased to exist in the market when cashew processing factories came to a halt in 1980s. Reviving the brand or introducing new ones needs to be accorded a high priority. The biggest competitors for Tanzanian cashew kernels are India, Brazil, Vietnam, Mozambique and unlike Tanzania all those countries have registers their proper cashew kernel brands.

As there is no regulation regarding the export of kernels, each processor is obliged to find its own buyer. A foreign company like Olam (T) Ltd has assured relationships with major buyers such as UNILEVER, WALMART and others and does not compete with any local processors. The main consumers of cashew kernels are North America (50%), Europe (29%) and others (21%). One argument is to focus on marketing of cashew products in Africa, Turkey, Middle East and Far East avoiding unnecessary market competition (in USA, Europe, Russia and Japan) with Asian countries. However, these markets also require delivery of larger quantities and the prices are not always attractive, probably due to uncertainty in the quality and reliability.

At firm level, some buyers also operating as processors such as Agrofocust Ltd, OLAM Tanzania and River Valley Foods Ltd (RVF) reported newly established export markets against the operational limitations of low supply capacity and limited skills levels. These challenges were reported to apply to existing markets notably the export to India, as well as the newly identified markets which moreover did not even require graded kernels. At the time of the study, most of these processing industries had not been able to process the quantities required to match the orders, and a number of factories had not even started operation. Reliability and retention of labour in the industry was also reported as a challenge due to the mobility of skills to other emerging sectors such as construction, further increasing the cost of training and production.

INTERNATIONAL MARKET FOR CNSL

Cashew nut processing allows for the development of an important by-product, which can increase its added value. The liquid inside the shell (CNSL) represents 15 percent of the gross weight and has some attractive possible medicinal and industrial uses. CNSL in the nut occurs mainly as anacardic acid (90%) and cardol around slightly lower than 10%. During the hot-oil bath process for extraction of CNSL, anacardic acid gets decarboxylated to cardanol. So in the technical grade CNSL, the main components will be cardanol and cardol and of course, some polymerised CNSL. CNSL is one of the few natural resins that is highly heat resistant and is used in braking systems and in paint manufacture. It contains a compound known as anacardium, which is used to treat dermatological disorders. The main markets for CNSL are the United States, the European Union (mainly the United Kingdom), Japan and the Republic of Korea. Together these account for over ninety percent of world trade, most of which is supplied by India and Brazil. The markets for processed kernels are no longer regulated and processors have to find their own market. Large scale processors like Olam Tanzania Ltd has a ready market in India or elsewhere through India. Local processors do not have a reliable market for kernels outside the country because of lack of processing skills making them unable to produce volumes required which is a minimum of one container (16Mt) per month.

LOCAL MARKET FOR KERNELS

A small proportion of cashew kernel that is sold on the local retail market is packaged in small packs of 50g to 500 g as white or roasted. The outlet of these operations, are city and highway hawkers. While this sector seems to be growing and present a huge potential this goes not without concerns about the food safety of such products.

The market outlets of cashew kernels in Tanzania vary in terms of size of the packs and volume traded. Most consumers prefer packs weighing 125g to 1kg in super market, shops, airports, bus stations. Smaller packs of 50g to 100g are preferred for immediate consumption in hotels, restaurant, kiosks, airlines, bus stations, roadsides and street vendors. Most of these kernels are roasted in oils as dry roasting has not been practiced. Dry roasting is much better because kernels can be stored for longer period without deteriorating the quality. Processing cashew kernels for the local market has its challenges particularly packaging materials. Packing materials, which are currently used, differ from trader to trader.

The quality packing materials is limited and generally high cost as they are imported instead of producing them locally. Small and medium packing materials are more suitable for local and regional markets compared to the conventional packs of 25lbs (11,34kg) and 50lbs (22.68kg). The most popular packs range from 50g to 1kg mostly of white or roasted kernels but not vacuum packed therefore they cannot be stored for longer periods. Some vendors in Dar Es Salaam have labelled their packs as "Processed in Newala or Product of Newala" because many consumers believe that kernels from Newala are the best kernels in Tanzania (no proof for this exists). Street vendors prefer to sell packs of 50g to 250g. Large scale processor sell 1kg of kernels standard grade (WW320) almost TSh 17,000 while street vendors sell at maximum of TSh 12,000/kg. Some local shops in major cities such as Arusha, Mwanza, and Dodoma sell roasted kernels up to TSh 20,000-25,000.

The local market for kernels has not been fully utilized as in other countries like India and Brazil. The potential for both local and regional markets is very high but needs promotion. Many people seem not to be aware of the local cashew kernel trade. Currently there are no designated locations in major cities where cashew kernels are sold in bulk. The market certainly can be further explored. Particularly consumers

should be informed about the health benefits that consumption of cashew nuts brings.

STANDARDS AND QUALITY CONTROL

Raw cashew nuts are usually sold in two grades; the “standard grade” and “under grade” as per The Cashewnuts Industry Act 2009. The board appoints a technically qualified person to be a grading expert who verifies grades of all cashewnuts to be stored or kept in warehouses, factories and ports awaiting to be exported. In the 2010/2011 Standard Grade Cashew Nuts were sold (FOB) at TSh 1,100,000 per Mt whereas Under Grades at TSh 880,000. Due to favorable price incentives, the amount of undergrades in 2010/11 season was very small. Tanzania, in the past, has exported raw cashew nuts of lower quality. However, the quality of cashewnuts has gradually improved since the Warehouse Receipts System was introduced. The system has resulted in optimal compliance to quality standards only in 2010 when most of cashewnuts were sold as standard grades.

Depending on the shape, size and color of the kernels, cashew kernels are graded differently. For example, the Government of India Act prescribes 33 different grades of cashew kernels of which only 26 grades are commercially available and exported. The important factors of grading are color, shape and size of the cashew kernel.

There are two colors: white and scorched. The nuts are scorched due to overheating (trays holding kernels are supposed to be rotated from one level to another in the oven as the source of heat comes from a certain point). Scorched kernels may have the following colors: brown, light brown, amber, deep ivory or yellow while white may have white, pale ivory, pale ash grey or light yellow colors. There are about 24 cashew grades but the most common ones are listed in Table 4 below. Each grade has a different price and W180 is the most expensive and not easily available in the market. Kernel trading is done by grades and each processor must comply with the grading therefore they have grading supervisors (unless there is a special order).

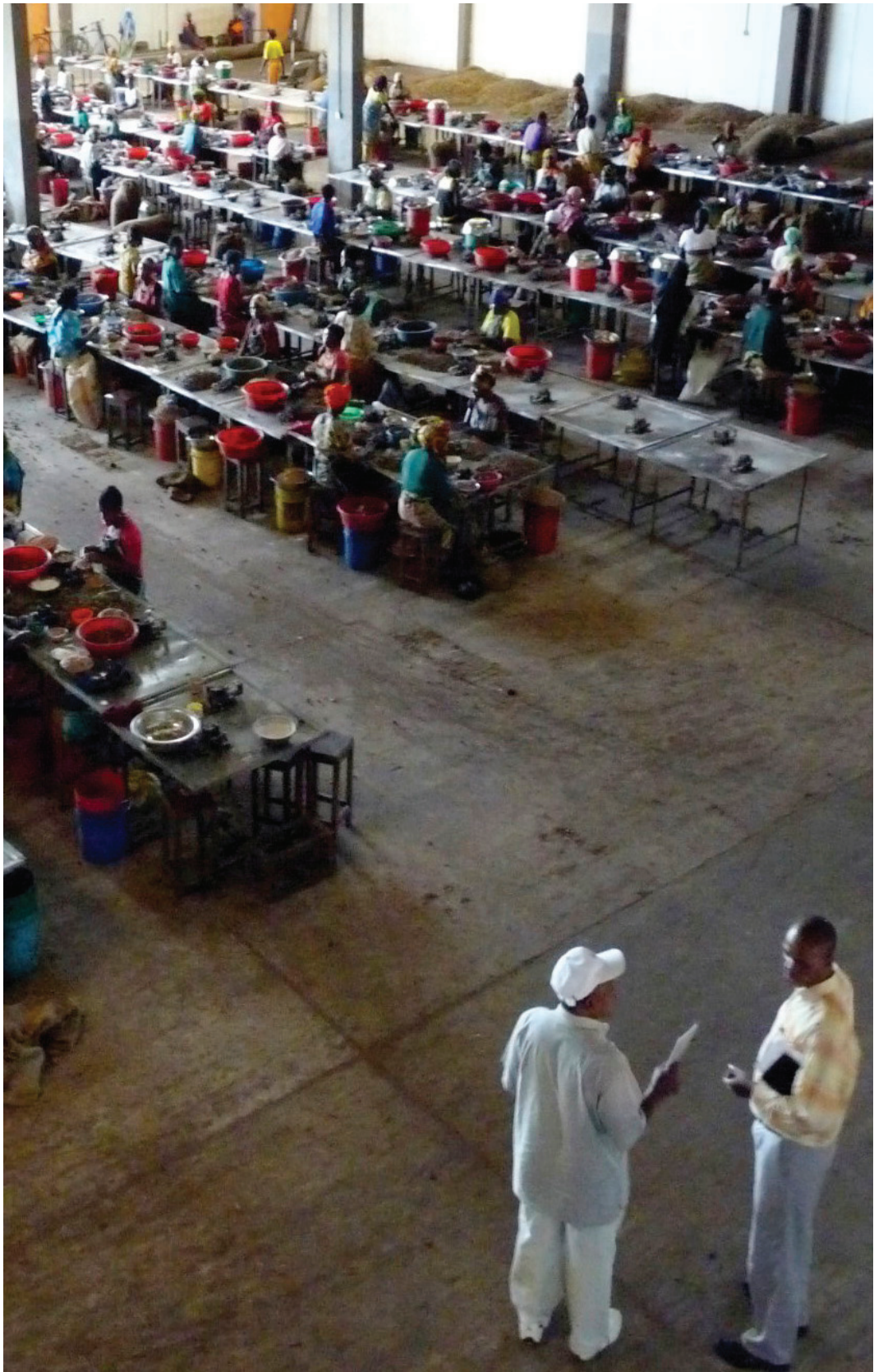
Table 4a: Grades for Cashew Kernels

White wholes		
Grade	Number of kernels per lb (kg)	Price per lb 2009 US\$ (FOB India)*
W180 (super large)	120-180 (266-395)	-
W210 (large)	200-210 (395-465)	-
W240	230-240 (485-530)	3.10-3.15
W280	270-280 (575-620)	
W320	300-320 (660-706)	2.90-2.95
W450	<300 (<660)	2.60-2.65
White pieces		
Butts	A kernel broken cleanly across the section of the nut.	
Splits	A kernel which has broken down the natural line of cleavage to form a cotyledon	
Pieces	A kernel which has broken across the section but does not qualify for a butt and is above a specific size.	
Small pieces	As above but smaller.	
Baby bits	Very small pieces of kernel which are white in color	
Scorched grades		
Wholes	Whole kernels that have been slightly scorched during the process but are otherwise sound. These are not graded according to size.	
Butts	Butts that have been scorched.	
Splits	Splits that have been scorched	
Pieces	As for pieces, but which have been scorched during processing and contain all but the very small pieces	

Source: <http://market.worldcashew.com>

CONSTRAINTS

- On the farm level packaging materials, especially bags, are often not available in sufficient quantity. In response old bags and plastic bags are used which are detrimental to the quality of the nuts. Usually the primary cooperative societies are supposed to provide bags to their members who, in turn, receive a deduction from their final payment. The unions could accumulate the orders of their member cooperatives and source in bulk cheap bags from abroad.
- Marketing of raw cashewnuts has become more transparent. However, information on opportunities and prices to sell raw cashew nuts is not freely available. The system does not help buyers from abroad to enter the market. Further there is no market intelligence provided that would allow local producers and processors to anticipate risks and opportunities of changing prices for raw cashew nuts and kernels in the future.
- Individuals and groups as well as companies who want to process cashewnuts, if they would follow the official way, would need to engage in double transaction of selling the crop through the primary societies and buying stocks from the warehouse on auctions. However, processors may only be competitive and add value profitably when they avoid these costly transactions and buy directly from farmers.
- Processors are left alone to find their own markets to sell their products. There is no establishment of a common brand such in competing countries. Processors strike deals with international buyers without considering their own cost structure. Other processors cater to the informal market which absorbs kernels only in limited quantities and due to seasonal ups and downs.
- The procedure on how lots of cashew nuts are sold at the auctions may still not be open enough to support to rule out fraud and corruption.
- The marketing of the few by-products, mostly CNSL, testa and shells is not consistently pursued. The remains of the cashew apples are not collected and marketed as there are no buyers.
- Local and regional markets could be an important outlet for locally processed cashewnuts, however the market is still not well understood. Limitations to this market may lay in the limited awareness of people on health benefits of cashewnuts over other nuts.



4TH DIMENSION: GOVERNANCE OF VALUE CHAIN

Value chains require a certain degree of coordination. Entering (and keeping a share of) markets requires efficiency, products of a certain quality, compliance with standards, knowledge about final consumers and many other attributes. In order to meet such requirements, formally independent firms link to each other in a network and/or cluster-like structure to find a way to exchange products and knowledge so as to be competitive. Chain governance refers to the organization between actors in the value chain that allows bringing a product from primary production to end-use. This part of the diagnostic focuses on a) the power that buyers and suppliers exercise in the value chain, b) the existing coordination mechanisms that enable transactions and the flow of knowledge in the chain and c) the nature and quality of the relationships firms maintain among themselves and with service providers and regulatory institutions.

POWER RELATIONSHIPS

Prior to introduction of the warehouse receipt system in 2007 exporters were the ones deciding the farm gate prices of the raw nuts despite that fact that an indicative price had been announced by Cashewnut Board of Tanzania. Sometimes purchasing of nuts was delayed to intentionally cause panic among farmers needed to pay school fees as well as medical, social and cultural services. This problem has now gone with the introduction of the warehouse receipt system. However, substantial buyer power is still concentrated in the hands of two main buyers in India that buy raw cashew nuts from the various exporters.

Processors, their number may not exceed 25 (excluding backyard operations), are currently in a weak position given their difficulties to finance and get access to raw materials. Previously processors could maximize profit on the expense of the farmers to whom they gave lower prices. Now, providers of primary materials are the warehouses where they need to face competition with exporters who turn raw cashew nuts into money in less than 90 days. Processors also struggle to get reliable buyers from abroad. Most work in isolation to not face competition from other processor missing out on opportunities for joint sourcing of primary materials, joint marketing and exchange of knowledge about best practices in processing. The association of cashew nut processors is weak as a good number of its members have abandoned processing or process very few.

COORDINATION MECHANISMS

The Cashew Board of Tanzania has the overall mandate of overseeing and regulating the cashew industry. The marketing of raw cashewnuts has been restructured to operate primarily through the warehouse receipt system according to the Warehouse Receipt Act 2005, Act No 10 of 2005. Introduced by the Government in 2007 the system has improved access to end market, although still over 60 per cent of Tanzanian cashewnut is exported in raw/unprocessed.

Once per year before the start of the cashewnut marketing season the cashew board brings together all stakeholders to set a indicative (benchmark) price. Arguments used to identify the price relate to current local and world market conditions as well as the structure of fees and taxes (see Table 6) that have to be paid by and to various institutions in order to get the product from the farmers' fields to the warehouse. The indicative price serves as the minimum price of which cost structure for taxation are calculated and the farmer gets paid 75% of this amount by the cooperative society upon delivery of the product (600 TSh/kg in 2010/11). A second payment (TSh 200/kg) will be transferred via the cooperative to the farmer after the product has been auctioned and the buyer has paid the product to the respective bank. The auctioning takes place at different locations for instance in Mtwara it is hosted by the Cashewnut Board of Tanzania and the Regional Commissioners office in Lindi region on weekly or bi-weekly schedule, depending on the available lots. A 3rd payment resulting from the auctioning price minus the first two payments and marketing fees (244 TSh in 2010/11) will be paid out some weeks after the auction by the bank to the cooperative societies (the bank also pays out the marketing fees according to the tax structure to the various agents). The amount that the cooperative then pays out to the farmers varies across the cooperatives and depends on the arrangements these have with the farmers.

Table 6: Tax Structure for Raw Cashewnuts from 2007/2008 to 2010/2011 seasons (in TSh/kg)

ITEM/ACTIVITY	(2007-08)	(2008-09)	(2009-10)	(2010-11)
1. Operational Costs:-	TSh	TSh	TSh	TSh
Primary Cooperative Society cess	30.00	50.00	50.00	50.00
Cooperative Union cess	14.00	21.00	21.00	21.00
District cess (5%) of indicative price	30.50	33.75	35.00	40.00
Sub Total	74.50	104.75	106.00	111.00
2. Marketing costs:-				
Warehouse costs	8.00	17.00	17.00	15.00
Transport to warehouse	50.00	65.00	55.00	50.00
Shrinkage (2%) and (1% 2010) of indicative price	11.00	13.50	14.00	8.0
Fumigation (Primary Society Warehouse)	2.00	2.00	2.00	2.00
Sub-total	71.00	97.50	88.00	83.00
3. Loan costs				
Interests rate	15.00	8.00	15.00	15.00
Loans costs	3.00	0.00	3.00	3.00
Sub-total	18.00	8.00	18.00	18.00
4. Cost of purchasing RCN				
Gunny bags	27.50	31.25	29.00	31.25
Crop insurance	2.00	1.00	1.00	0.00
Loan insurance	2.50	1.00	1.00	0.00
Distribution of gunny bags	1.00	1.00	1.00	1.00
Transportation of money	6.00	5.00	5.00	0.00
Sub-total	39.00	39.25	37.00	32.25
Total	202.50	249.50	249.00	244.25
Indicative price per kg of RCN	610.00	675.00	700.00	800.00
Price of RCN in the warehouse	812.50	924.50	949.00	1044.25

Source: CBT 2010a

Cashewnuts are sent to accredited warehouse operator for auctioning. While the product is not anymore in the custody of the farmer, any subsequent costs and losses in value at the warehouse such as deterioration in quality or shrinkage arising from poor handling is deducted from the price paid to farmers.

The cooperative unions provide information (received weekly from warehouse operator) on weight, grade, moisture content and outturn of the lots of raw cashewnuts that the cooperative societies deliver to the warehouses. The lots are separately stored at the warehouse and are advertised in a sales catalogue where potential buyers have an access. Buyers submit bids which are put in a closed tender box positioned physically at the union offices (MAMCU in Mtwara, Ilulu in Lindi, TANECU for Tandahimba and Newala districts; CORECU Coast region and Dar es Salaam). The buyer with the highest offer gets the acceptance of bid in a closed bidding process overseen by a maximum of 14 committee members (chaired by CBT) depending on the number of cooperative unions in the region. For example in Mtwara region the committee includes representatives from CBT, the warehouse licensing board, the two banks engaged, 4 unions and 2 cooperative societies.

The actual prices at which the lots are sold at the auction (not the indicative price but a price above) and the winners are not officially published at the end of the buying season anywhere or on websites. The availability of this information is often limited. Additionally, the actors and regulators are cautious that a few large players dominate the market for kernel world over.

The Cashew Development Trust Fund (CDTF), formed by the Cashew Act from 2009 is meant to support the development of the cashew industry including production, processing value addition and marketing. So far the sources of fund are from 15% levy that is collected from the export of raw cashew nuts, contribution from the ministry of agriculture for inputs, contribution from District Councils and processors as beneficiary of the cashew levy. It has six trustees representing local government authorities (1), Farmers (3), Processors (1) and MoAFSC (1). The CDTF is becoming lately operational with a bank account in place while recruitment of staff to manage the fund is in the final stages. The trust fund is expected to be operational in April 2011 starting with money from cashew levy collected in 2010/11 which is about TSh 14 billion and contribution from MoAFSC for inputs (TSh 2 billion)

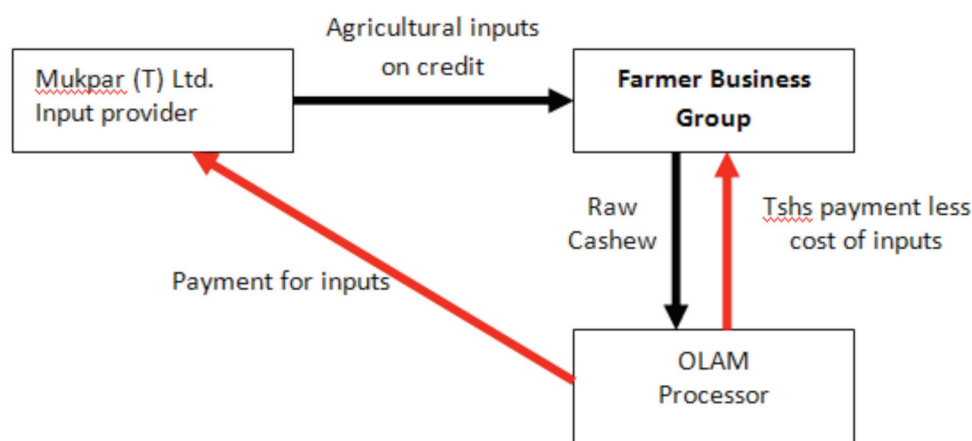
RELATIONSHIPS BETWEEN CHAIN ACTORS

The Cashew Board of Tanzania, is mandated to regulate the sector, also tries to link suppliers with buyers. Though this may currently be successful with regard to bringing cooperative societies together with local buyers in the warehouse receipt system it is less so when it comes to linking producers and processors outside the cooperative societies to international markets and to making international buyers of kernels become interested in the supply from Tanzania. Also, one finds that the linkages between cashew farmers and cashew processors are rather weak and limited to interactions during the cashew buying season.

There is virtually no formalized contractual relationship between producers, primary cooperative societies, regional cooperative unions on one side and processors on the other side. Among the few efforts towards a better vertical integration in the value chain was an initiative of some input suppliers (Mukpar (T) Ltd, Syngenta Agro Services AG, Tanzania) attempted to give input loans as a means of promoting its products but the scheme was soon abandoned when difficulties in loan recovery occurred.

Another initiative has been made by processors such as Olam in Mtwara (see Figure 9) and Premier Cashew in Coast region to enter into contract farming and outgrower schemes. Farmers were provided with inputs on credit and payment (agreed amount) was to be deducted when selling cashewnuts to the processors during cashew marketing season. This was operational for few years with difficulties because farmers were selling their cashewnuts to other buyers who offered a better price (without deducting the costs for inputs and credits). The processors were not able to recover some of their loans from farmers. However, the introduction of warehouse receipt system in 2007/08 season made this system inapplicable because cashews were sold by auction.

Figure 9: Contractual agreement on provision of input credit



Indeed, one opportunity of improved vertical integration and chain governance is that farmers and farmers groups are contracted by processors to supply cashewnuts at an agreed percent advance payment of agreed price on delivery. Through such an arrangement, processors would have a better basis for calculation and assure availability of raw materials while farmers would be able to work towards a fixed price and enjoy access to finance opportunities. It would also exclude charges such as warehouse service fees and other operational costs to the benefit of both producers and processors. Further, arrangements could be developed which enable farmers to benefit from shares dividend annually. In the case where the farmer(s) get such shares from processors they would benefit from profit accrued from value addition, which would likely be an incentive to increase production and quantity of raw nuts supplied to the factories. In the end farmers and processors would have established a system for capturing mutual benefits from value addition through improving yield, quality of raw nuts, access to credits and by processing and marketing. However, the degree of organization that such system requires has yet to be achieved.

TYPE OF CHAIN GOVERNANCE

Overall, the type of governance that dominates in the Tanzanian cashew value chain can be considered of a “market-based” type with very loose coordination among the various segments of the chain. The relationship between firms in the value chain is mainly determined by the price at which the product is sold. A certain Buyer power is exercised by the buyers in India but it does not translate into strict instruction on how to produce and the characteristics of the product to be produced. Market-based chains are common when the product is fairly standard and non-differentiated such as the case with raw cashew nuts. The price is determined by supply and demand amongst many buyers and sellers (in an auction, for instance) and there is no exchange of information between buyer and supplier to ensure that specifications and qualities are met.

The governance of the chain particularly the application of the warehouse receipt system and its associated taxes and deductions that go to the various agents engaged is costly; approximately it has been 25% of the value of the raw nuts in the 2008/2009 season. A study on the UN programme in Lindi and Mtwara finds that the warehouse receipt system and is incurring high costs are inevitably paid by the farmers (Match Maker Associates 2008) lowering their incentives to extend production.

CONSTRAINTS

- The current system channelling the product from the farm gate to the warehouse involving a range of players and procedures (based on auctioning and the warehousing receipt system) is cumbersome. While some players may find comfort in that system many find it bureaucratic, in-transparent, and costly. Some items in the tax structure, though negotiated and agreed upon among stakeholders, seem to be excessive and ill-justified.
- The auctioning system is based on closed bidding to avoid price-rigging and fixation. However, there is a lack of transparency on who finally gets the acceptance of bid and at what price.
- Primary cooperative societies manage the collection of raw cashew nuts and the purchase of inputs, particularly pesticides. However, these cooperatives are often influenced by a number of individuals who run operations as buying agents. Such individuals can find comfort in buying inputs from certain agents while the farmers would rather benefit from getting cheapest. Eventually benefits from the operations are often not equally distributed to all members jeopardizing the coherence and solidarity of the cooperative. In the end some primary cooperative societies provide better final payments than others.
- There are too many players engaged in regulation including the Cashewnut Board, Unions, the Warehouse Licensing Board, Ministry of Agriculture and Cooperatives, and local Governments etc. One strong and capable overseeing regulator would most likely provide a better service. The board is also mandated to fulfill functions of information exchange and dissemination of technical knowledge. However, under the current structure and budget it is unlikely to comply with this mandate adequately.
- The current governance system of the value chain is biased. There is no “tax structure” for processed cashew nuts and all actors facilitating the marketing of raw cashew nuts, including cooperatives, unions, warehouses and the cashew nut board profit from it.
- There is currently no platform or chain organization where the actors in the value chain (producers, cooperatives, processors, traders, regulators, service providers) can meet and discuss options to develop the chain that are of benefit to all of them. The one annual meeting organized by CBT to discuss the distribution of the tax structure does not suffice that purpose.

5TH DIMENSION: SUSTAINABLE PRODUCTION AND ENERGY USE

Use of inputs: Cashew production is an activity that usually requires application of pesticides. Particularly sulfur and organic fungicides are used to fight powdery mildew disease. Though many farmers often do not use the sufficient quantity of chemicals at the right time (rendering the application close to useless) sometimes they overdose with detrimental effects on workers and the environment. Chemicals are also used to fumigate raw cashew nuts and kernels in warehouses and storage spaces. If not properly applied residues may remain that have hazardous effects on consumers violating food safety regulations, particularly in importing countries. To make cashew more environmentally friendly there is a need to look into aspects of reducing usage of industrial pesticides by developing appropriate organic pesticides (from CNSL and other botanicals) or developing varieties resistant to pests and diseases by using both conventional and biotechnology approaches (Cavalcant 2007).

Energy use: Cashew processing plants require a substantial amount of energy, especially for the roasting of the raw cashew nuts but also for mechanic sorting and drying of kernels. Particularly the oil bath technology – large-scale but rendering the best quality nuts - requires substantial energy supply which currently is provided through diesel. The Indian technology uses smaller steam tanks which are heated with electricity or fired with cashewnut shells, a process in which CNSL is wasted and toxic smoke is emitted. The medium and small scale cashew processing factories requires electricity for oven drying of kernels and lights (factory/domestic use). Brazil has managed to use cashew shells to generate electricity for domestic and factory uses. Similar approach could be used in Tanzania.



Bio-fuel could also be obtained from processing cashew apples (the ones which are not used for juice and wine production) (Honorata et al 2007), if an appropriate technology is put in place. The estimated amount of cashew apples produced in Tanzania is about 1,000,000 tons. Assume only 10% of 700,000 tons of cashew apples are used to produce juice at an extraction rate of 70% about 49,000 tons (approximately 49 million litres) of juice will be available. If each litre is sold at price of USD 0.5 about USD 24.5 million will be realized within a span of about 60 days. An additional source of income in processing cashew apples lies in selling the molasses as animal feed. However the potential for bio-fuel production can only be met if appropriate technology is made available.

Use of water: Almost all cashew plantations in Tanzania are rain-fed. Irrigation has been tried at a few spots, especially in rejuvenated plantations, but it seems evident that irrigation is not economically viable for nut production. Varieties for apple production grown mainly in Brazil require irrigation for optimum production though they have not been introduced to Tanzania yet. Processing of raw cashewnuts as well as kernels requires clean and potable water for washing nuts and cleaning of equipment. In fact processing plants have a substantial need for water, which they find difficult to respond to due to frequent water supply cuts in the public grid. The introduction of water saving and recycling technologies would help processing plants to become less dependent on public water supply and reduce costs.

Effects on bio-diversity: Cashew plantations are perennial and one encounters a higher degree of biodiversity than in other plantations such as cotton, sisal, coffee or tea. This is due to the larger distance between the trees, a space which is sometimes used for intercropping of maize or groundnuts. A less well explored subject is that cashew cultivation deserves carbon credit: There are over 30 million cashew trees in Tanzania.

Emissions: The smoke from the burning of shells, either to generate energy for the roasting process or simply to get rid of the waste, have hazardous effects on neighboring communities. No filters also environment problem in the air. Often located in residential areas, they emit ordure and toxic smoke.

Waste management: If not properly disposed, the cashew by products, like cashew shells may cause environmental problem as their decomposition process is slow; traces of cashewnut shell liquid in the soil are microbial activities making soils not suitable for agriculture.

CONSTRAINTS

- Producers lack knowledge and information on correct application of pesticides. Too few efforts are made to replace pesticides with less toxic, let alone organic substances. Research and extension does not address the issue.
- Energy in apples and shells is not captured and reused appropriately. A main reason is lack of knowledge, technology and capacity. Hence processing is energy intensive and costly.
- Byproducts, especially shells, are often not appropriately disposed. In cases where they are burned the smoke contaminates neighboring communities.
- Despite substantial water usage, processors find it difficult to save and recycle water.
- Contamination during de-shelling process CNSL/Oil and drum or pan-roasting (disposal of partially burnt shells).

6TH DIMENSION: VALUE CHAIN FINANCE

FINANCIAL ATTRACTIVENESS

Interest in the cashew nut sector has been growing due to the high prices. Since two years, due to high prices, producers feel more attracted to grow cashew nuts. Middlemen and traders also find the cashew sector attractive and invest time, money and resources; they usually have fewer troubles to find banks and investors to support them in this. Only the processing sector seems to remain less attractive. The reasons are manifold and range, as discussed above, from lack of managerial capacity, knowledge, experience and technology, not being able to reach economies of scale, and erratic water and energy supply to problems of marketing and a discriminating “tax structure”. In fact, the few processors currently operating in the country face serious difficulties to acquire loans, not only short-term to pay workers and operations of the factory but also capital for buying enough stocks of raw cashew nuts and for buying machinery and equipment.

With regard to stocking raw cashewnuts at the processing level a particular challenge exists: Cashew nuts are mainly harvested within a span of 90 days only (Masawe et al 2011) and directly marketed thereafter. Farmers are used to sell to the warehouse system and get cash in a short period of time. Processors who want to ensure adequate consignment of raw materials to enable processing operations run throughout the year must compete with large buyers at the auctions. The amount of cash needed there is substantial. For example a large-scale processing factory with a capacity of 10,000 Mt would require to stock raw nuts worth USD15m (farm gate price 2010/11).

However, banks still find it much more attractive to lend money to buyers of raw cashewnuts who can pay back the loan within 90 days and engaging in the risky business of supporting for at least a year the operations of struggling or newly establishing processing plants (Masawe et al. 2011a).



FINANCIAL RISKS

Risks in cashew nut production are limited to crop failure due to weather conditions and pest infestation as well as price volatility. When farmers apply sufficient fungicidal control measures a minimum harvest can be assured. Financial risks in the marketing of raw cashew nuts are somehow limited and relates to the operations on the level of the warehouses. Perceived risks here relate to the marketing of raw cashew nuts, degrading of products, contaminations with pesticides, or simple theft and fraud. Financial risks are supposedly highest in the processing segment where investors find it difficult to do monitoring and control the return on investment. Important questions the need to ask include the following:

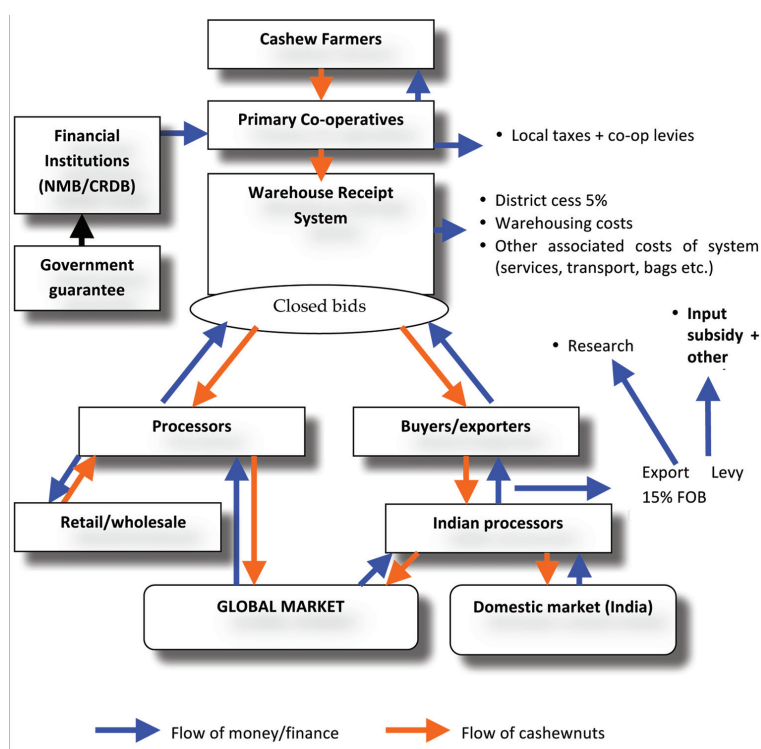
- Does the processor dispose of appropriate collateral or matching capital to allow for a loan or investment?
- Is the processor going to find a buyer that pays a good price?
- Is the buyer going to accept the quality delivered, what happens if the processor delivers less than the buyer looks for?
- Is the processor going to get enough primary products and workers to operate at a capacity level that guarantees profit?
- Is the processing equipment operational and sufficiently well maintained? Does staff have sufficient knowledge and experience to manage processing effectively? Are the costs of processing low enough to guarantee profits?

Where banks have engaged in financing of cashew processing activities (for example the BUCO Factory), they managed their risk through assuming ownership of the stock of raw cashew nuts. Before release of the raw nuts to the production line (from the factory warehouse or store) the bank and processor need to be present on site to verify. After processing the final product, kernels, remains the joint property of the processor and the bank. The latter still would need to verify proper storage and be present when it is sold. Altogether, the procedures are too time consuming and difficult to be attractive for banks.

AVAILABILITY OF FINANCE

Figure 10 provides an overview on the flow of money (and product) through the cashew nut value chain. Though it does not go into details where farmers, cooperatives, processors and buyers/exporters get finance and credits from, it shows where potential credit relationships can be set up.

Figure 10: Flow of money and product in cashew marketing system in Tanzania



Source: The Authors

Currently there are only two banks, (National Microfinance Bank and CRDB Bank Limited), that provide loans to traders and cooperatives in the sector, mainly supporting the commercialization functions of these actors. Various micro-finance institutions exist in the rural areas. However, their loans, small in size, target rather the consumptive and humanitarian needs of rural households. Where credit facility is available it is expensive (18 – 22%). Ashimogo et al., (2008) note that some credit institutions are in place but farmers refrain from taking loans because of the fear of crop failure or low farm gate price that will make them not to be able to repay the expensive credits. Farmers that are willing to take the loan finally face an insurmountable problem to present collaterals finance institutions ask for to secure their loans (Masawe et al 2011a). Also farmers are constraint with regard to their capacity to demand for loans and manage financial transactions (Ashimogo et al. 2006).

No bank or finance institution seems to have sufficient expertise in the business of processing and there are no adequate finance products available that respond to the short, medium and long term financial needs of processors. For example, if a processor wants to get a credit to purchase raw cashew nuts banks would offer a standard loan at 18 to 22%; too high given the duration of the loan of one year.

Another source was District Input Trust Fund but this is locally arranged in each district but it does not have linkage with the former. Farmers make their own arrangements with the District Agriculture and Livestock Development Office and primary cooperative societies on contributing a certain amount of money at primary cooperative level (from the first payment of individual farmers). Each farmer gets a pass book indicating how much he or she contributed to the fund. Using the same pass book the farmer will get subsidized input of the equivalent amount less administrative costs. This is a service that the primary societies offer to its members but it is not done in all districts.

Stakeholders and the Government have proposed to introduce an Agricultural Bank which provides affordable interest rates of around 8-12% (en lieu of the 18 to 22 that private banks charge at the moment). Implementation may still take time and meanwhile the cashew industry needs to explore other options of finance.

FINANCING GAPS

On the farm level producers find it almost impossible to get enough finance to rejuvenate plantations and pay for inputs and labor. The informal sources of finance such as friends, family, business colleagues clubs, associations, societies, or savings do not match the financial needs. On the transformation level, interviews with processors revealed that the most important financial needs relate to the procurement of raw nuts, maintenance/repair of the machines, payment of operational costs including hiring labor and salaries. Table 7 summarizes the main financial needs in the different segments of the value chain.

	<i>Need/ Purpose</i>	<i>Volume needed</i>	<i>Risks</i>	<i>Interest</i>
Production (Commercial farm)	Working Capital (Planting material, Inputs, labour, transport)	High	Medium	Medium
Collection	Working Capital (labour, transport)	Low	Low	Low
Storage	Working Capital (gunny bags, labour, pallets)	High	Low	Low
Internal Marketing	Working Capital (packaging material, labels, adverts/promotion)	Low	Low	Low
Processing (first stage)	Working Capital (labour, equipment, fixed assets, waste management/ use for value added)	High	High	High
Processing (second stage)	Working Capital (labour, equipment, fixed assets, packages, waste use)	High	High	High
Exporting	Working Capital (transport, Documentation)	Medium	Low	Low
Packaging and Branding	Working Capital (Production of packing materials, packages, labels, promotions, transport)	Medium	Low	Low
Roasting and Flavouring	Working Capital (fixed assest, lobour)	Medium	Low	Medium
Marketing to end Consumer	Working Capital (fixed assets, storage, transport)	Medium	Low	Low

Source: The authors

CONSTRAINTS

- On the farm level finance institutions and banks provide too few and too expensive credits for hiring labour, purchasing inputs and rejuvenating plantations. Often the problem is that farmers cannot provide the necessary collateral for getting the loan (Masawe et al. 2011a). Also, the loan often comes too late. Finance institutions do not understand the business of cashew nut production to be able to provide suitable finance products to farmers.
- Most farmers can only get credits only through the cooperatives, which in many cases do not exactly represent their interests.
- On the processing level finance institutions and banks provide too few and too expensive credits to buy raw materials (cashew nuts), hire labor, and fix, maintain and operate processing equipment. Finance institutions do not understand the business of processing and they provide no suitable financial products that respond adequately to the (short, medium, and long-term) financial needs of processors.
- There are now guarantee schemes that banks and finance institutions can use to lower the risk of credit failure among debtors in the value chain.
- No integrated value chain finance schemes exist that involve triangular relationships between finance institutions and a combined set of actors, for example farmers/cooperatives/warehouses or farmers/processors/buyers.
- Finance received is often inappropriately managed by the farmers, cooperatives and processors.

7TH DIMENSION: BUSINESS ENVIRONMENT AND SOCIO-POLITICAL CONTEXT

The government has repeatedly expressed its willingness and commitment to foster extended processing and value addition in the cashew value chain through various programs and regulations. The business environment for producing, processing and trading in cashewnut is still marked by the general constraints that businesses face in Tanzania including electricity and water shortages, availability and access to finance, bureaucratic procedures and regulations on roads and in warehouses, factories and harbors, as well as problems to get skilled labor. These factors seem to weigh particularly heavy on the processing segment of the value chain.

In 1995 an exported levy of 3% FOB was introduced and distributed as follows: 1% Research, 1% CBT and 1% Inputs. In 2005 the levy was increased to 8.5% FOB (1% Research, 2% Treasury and 5.5% Inputs). The cashew levy was again reviewed in 2006 to 10% FOB and was distributed as follows: 3.5% Treasury, 5.5% Inputs and 1.0% Research and finally in 2010 the levy was further increased to 15% FOB is distributed as follows: 65% Cashew Development Trust Fund (Research, Input, Processing, and Marketing) and 35% Treasury. Currently most of the fund is used to provide pesticides to farmers while other parts go to the Government.

The Government had a dialog with local processors in 2004/05 season on how to increase cashew processing. MOU was signed between the two parties in which the government committed to supported local processors among others by removing export levy on kernels and gradual increase of export levy as follows:- 3%, 8.5%, 10% and 15%. Processors came up with strategies of increasing volume processed annually as follows:- 20,000 (2005/06), 30,000Mt (2006/07), 40,000 Mt (2007/08), 60,000Mt (2008/09) and 80,000Mt and (2009/10).



REGULATIONS

The cashew value chain is largely influenced by government regulation and taxation. The Cashew Board of Tanzania (CBT) operating under the Ministry of Agriculture, Cooperatives and Food Security (MoAFSC) coordinates operations of the warehouse receipt system and facilitates the actors to ensure quality of raw and processed cashew nuts across the value chain; and is involved in annual price negotiations including the coordination of the consultative process that sets an indicative minimum price.

The arrangement for cashew marketing is driven primarily by the warehouse receipt system, as one of the reforms introduced by government to make the markets fairly competitive. It offers elements of competition that is advantageous to the farmer and also to buyers. Traders need to deal with the following permits and papers in order to buy and export cashew nuts:

- Business license, issued by Ministry of Industry Trade and Marketing under the Tanzania business registration by Business Registration Agency (BRELA).
- Tax Identification Number issues by the Tanzania Revenues Authority (TRA).
- Value Added Tax Certificate Authority (TRA).
- License from the Cashewnut Board of Tanzania to buy cashew from authorized centers (warehouse operators).
- Export license to be issued once in a season by CBT.
- Export permit for each lot to be exported) issued by CBT after the exporter have paid export levy of 15% (payment made to Tanzania Revenue Authority) .
- Produce Delivery Note (PDN) issued by CBT .
- Invoice from Cooperative Union that they won the bid in the auction.
- Release warrant from the respective Bank that they have paid for the lot they bided.

PUBLIC AND PRIVATE SERVICE PROVISION

The productive activities at farm level, processing and trade are undertaken by the private sector, while the government and its agencies, the Ministries of Industry, Trade and Marketing (MITM); Agriculture, Food Security and Cooperatives (MoAFSC) and Local government (PMORALG) have the mandate of setting policies and oversee the regulatory framework at the various levels of the cashew value chain from production, marketing, value addition as well as overall sector coordination. The Government and its agencies also engage in research and extension services as well as business support services including input supplies, which are funded in part through development programmes and taxes.

Extension: While some districts and regions have managed to invest in upgrading of extension services, in many cases, the quality and efficiency of services provided to the farmers is inadequate. The extension service was decentralized in 1997/1998 and is not with the Ministry of Agriculture, Food Security and Cooperatives any more but with the District Authorities under the Ministry of Regional Administration and Local Government. Later this year, there will be a further separation of the district crop and livestock development offices into a crop and a livestock section eventually resulting in a more targeted service provision. There are NGOs like Action Aid, Dutch Connection, CBOs and religious organization supporting farmers in cashew production and processing. Development partners like UNIDO, FAO etc. are also supporting farmer groups in cashew value addition. Chemical companies (Mukpar, Syngenta) have been providing farmers with improved planting materials with an intention of increasing an area under cashew which will enable them to sell more products. SIDO has also been training farmers on how to use their cashew shelling machines and ovens but the quality of the materials have not been accepted as they break cashew kernels compared to the ones imported from India.

Research: Naliendele Agricultural Research Institute (NARI) is one of the seven agricultural research zonal centers under the Ministry of Agriculture, Food Security and Cooperatives. NARI also undertakes training in good agricultural practices to farmers as well as value addition in cashew to potential and exist-

ing small scale business operators.

The research on product development such as from cashew nuts and apples to various products and training in cashew processing is provided to stakeholders on demand and at recovery of direct operational costs. The centre, in the past has contributed to increasing quality and quantity of cashewnuts (new varieties), increasing productivity (develop knowledge and technologies). However, there is still much need to research and investigate more efficient methods of production such as multiplication by tissue culture to address the demand for quality cashew seedlings and to sustain the growing industry capacity (Mnoney and Mantel 2002). Related to the selection and multiplication of improved varieties, research on cashew biotechnology has been initiated though the centre is facing a number of challenges to sustain this service, among them human resource, finance resources and infrastructure (NARI 2009). The NARI has plans to strengthen collaboration with other business service providers in introducing a limited scope of appropriate quality analysis in cashewnuts activities to be provided through an equipped and certified agriculture or food research laboratory, and recruitment of qualified laboratory technicians.

Cashew research activities are 75% funded by Cashew levy and it has established Cashewnut Development Centres in major cashew growing areas. The CDCs are training center and also they serve as an exit point for research technologies to farmers.

SIDO has been undertaking research on developing various equipment for cashew processing but they have not been able to win the local market due to low quality. As a result, an individual farmer in Newala fabricated his own shelling machine but it has not been promoted therefore its efficiency is not known. CARMATEC in Arusha and Automech in Morogoro are also fabricating cashew processing equipment but the quality is still not acceptable. The College of engineering at University of Dar es Salaam is also partly involved in fabricating some equipment but they lack finance.

SOCIAL AND CULTURAL CONTEXT

Cashew nuts affect many people in the Tanzania. The number of households engaged in the sector as plantation owners, workers on plantations and in processing plants, or service providers may well be above 500,000. The processing sector, particularly, provides income and employment for many women. In the South-East of the country cashew nut cultivation constitutes the mainstay of the livelihoods of the majority of people. Cashew nut prices and job opportunities in processing dictate life in this part of Tanzania. However, there are certain attitudes of farmers, cooperatives and people engaged in marketing which are not conducive to a further development of the sector. Over the years people have gotten used to low standards in producing and handling the product (often cheating on weight and quality), payments are delayed, verbal contracts are broken and everybody buys and sells where possible to his or her maximum individual benefit. It will be a challenge to change such conditions towards a more conducive environment based on trust, collaboration and chain coordination.

CONSTRAINTS

- For many buyers (particularly new ones that would bring more competition to the sector) the purchase, transport and export of raw cashewnuts require many regulations and licenses that are too cumbersome to comply with. For buyers of processed products no clear pre-defined procedure exists.
- There is limited understanding of the various regulations and few support is given by government agencies and others to help buyers to go through all of them. The understanding of the oversight role of regulatory agencies is also limited.
- Over the years, farmers, processors, buyers and marketers have developed attitudes based on distrust, fraud and individual rent seeking.
- There is no programme that engages in providing the necessary training and support services that the different stakeholders in the value chain need.

- The cost of production and processing across the chain is influenced by infrastructure development. For example, in remote regions such as Tunduru the price of inputs is high while the price of raw cashewnuts is low in comparison to Mtwara.
- Infrastructure and administrative capacity for public support to the generation and diffusion of technical and other knowledge to produce, process and market cashewnuts is in place. However, it is not adequately financed and managed. At the end information does not get to the majority of farmers and processors who need it.

SUMMARY AND RECOMMENDATIONS

In the following recommendations are provided based on the above analysis. They respond to both constraints and opportunities as they were introduced under the seven dimensions discussed above.

1ST DIMENSION: INPUTS AND PRIMARY PRODUCTION

The production of cashew nuts is increasing in reaction to good price signals farmers received during the last two years. However, the production in existing plantations is far from meeting its potential. To meet this potential the following suggestions can be made:

1. The production can double if inputs are affordable and timely available. The current system of Government subsidies (50%) is appropriate but remains ineffective if farmers can't get access to loans to finance the other 50%. Financing institutions, cooperatives, and farmers groups need to find alternative ways to facilitate access to funding. Experience has shown that even if funds are available inputs are not delivered on time. To ensure that fungicides/spraying machines are timely available, those inputs need to be sold during cashewnut buying/selling season, the place where Warehouse Receipt System is taking place.
2. Rehabilitation and upgrading of cashew farms would contribute to production increase and revive the productivity of the many unproductive plantations. This requires that farmers get access to long-term, low interest loans. It also requires campaigning for the advantage of re-planting and providing the necessary planting materials, which need to be multiplied by research institutes and outgrown by service providers. Districts could be asked to develop a plan, with support from the district councils collaborating with input suppliers and research, on how many hectares annually can be replanted or top-worked (by grafting). Similar programme has been implemented in cashew development Project in Ghana (CDP 2007). The programme would need to be supported through research that would need to develop more efficient methods and procedures to multiply improved planting materials using biotechnology approaches (Tissue culture/micropropagation) to meet the increasing demand.
3. The quality of cashew nuts is determined by size, shape, weight, external appearance (disease, spotted, shriveled), acceptable moisture content (not exceeding 10 %) and kernel quality. The kernel quality includes color, size (related to grade), shape (whole or broken) and peelability of testa. Improving the nut quality is key to raising smallholder incomes and enhancing the competitiveness of the Tanzanian cashew industry.
4. Data monitoring on Cashewnut quality (post-harvest handling, drying, grading, packing, storage) as well as good agricultural practices (appropriate agronomic practices, integrated pest management) at district and regional levels is an important first step to set up a system of product traceability. CBT in collaboration with Cashew Development Trust Fund (CDTF) may set up a quality programme and provide training, advice and guidance for quality improvement measures on all levels of the chain.
5. Collaboration between CBT, research, district agricultural offices, input suppliers and other training and service providers is important to reach a broader coverage of farmers that received technical training and advice. At the moment human and financial resource available to provide training, extensions and technology transfer is not adequate and most likely is continuing to be so. In fact, the building of a network of local advisory services should be encouraged, for example through programs for training of trainers and organizational development. Farmers would be able to pay for these advisory services if the current taxations are eliminated. The introduction of a cashew subject matter specialist on the district level would be a starting point.
6. Training also needs to be received by the heads of the primary cooperative societies. Capacity strengthening is particularly required with regard to financial management and organizational development. As well it should extend to the type of services that cooperative should render to its members complying with standards of cooperative development worldwide.

7. As practiced in the cotton sector, the purchase of pesticides could be organized in bulk through international tendering. This would allow getting favorable prices and to minimize the costs incurred in the current system in which local suppliers import small quantities and sell to farmers at high price. It would also open up the opportunity to set up an effective centralized inputs credit scheme. One could even envisage the introduction of online international bidding scheme for input suppliers where the information is accessible to all actors in the chain.

2ND DIMENSION: PROCESSING CAPACITY AND TECHNOLOGY

Cashew nut processing in Tanzania is still in its infant stage, despite all the efforts that have been made in the past to introduce various technologies. The exception is one large processing company that has managed to engage in the production of kernels on the basis of semi-mechanized labor-intensive technology from India. Altogether there may be some 15+ processors, both companies and farmers groups. With one exception, all processors face serious difficulties in their operations. In order to achieve a broader based development of small, medium to large processing entities in Tanzania which would capture a larger share of value added in the global cashew value chain the following suggestions can be made:

1. To increase efficiency and profitability of processing technologies currently used need to be replaced, improved, adapted and/or further propagated. Completely new technology needs to be introduced for the transformation of by products such as, for example, ethanol production.
2. Cashew apples can be processed into alcoholic / non-alcoholic drinks (fresh apples), gin (fresh and dried apples), food products (apple pulps) and livestock / poultry feed (apple pulps). For drying cashew apples (those which have started deterioration in the farm) there is a need to conduct training in appropriate technology of sun drying to improve hygiene and retain high sugar content in the products. A promotion campaign could be launched to raise awareness among farmers regarding the income potentials of cashew apple processing.
3. Given the current situation of most processors, substantial skills development and training is required. Capacity strengthening should embrace all levels of processing, be it first level or second level processing of cashew nuts, CNSL extraction or adding value on apples. The training must include technical aspects as well as logistics, management and marketing skills. It should include exercises of benchmarking to showcase most important problems, technical upgrading and business development, etc.. To assure processors get started and reach necessary degrees of efficiency experts can stay with them for a period of time (e.g. 3 month) and coach them in setting up processes and businesses.
4. Introduction of alternative and value added products would improve the value and price earned by farmers. There is a number of value-added and by-products which need to be further studied, both with regard to technical feasibility and economic profitability. For example, cashew gum can be used to replace gum Arabic. Appropriate technological feasibility studies needs to be conducted to further explore these potentials.
5. Lack of finance (low interest loans) for local processors to be able to hold stock for one year is a limiting factor in cashew processing at all level. It may be important to look into possibility of creation of special revolving funds (to be managed by CDTF) to hold cashew stocks for local processors. The 35% export levy which currently goes to treasury could be used as one source of seed money. If cashew processing capacity increases the government will earn more foreign currency through value addition and use of cashew byproducts. It will also increase its revenue from PAYEE, use of utilities not even mentioning creation of over 30,000 jobs for rural women and youth.
6. The locally available packing materials are expensive. Imports take time due to import and port regulations. The government could look in to options to reduce taxes on importation of such materials as well as reducing taxes on locally manufactured packing materials.
7. Principles for food safety should be introduced into cashew nut processing. This would include building awareness across the chain and intensive training on quality aspects. Good Manufacturing Practices (GMP), Good Hygienic Practices (GHP) and food safety standards such as Hazard Analysis Critical Control Points (HACCP) and ISO 22000 shall be introduced. Relevant processing units shall

be chosen where the above principles and standards are implemented. These centres would act as models for the other processors.

8. Good packing and packaging principles should also be introduced and implemented. The training initiatives shall also recognize this topic as a priority within the cashew nut production chain.

3rd DIMENSION: MARKET AND TRADE

Marketing of raw cashew nuts to external markets is largely monopolized by buyers from India. With regard to marketing of kernels individual processors are left without support to reach out to buyers, domestic and from abroad, and process, package and advertise final products adequately. Marketing of kernels therefore is still erratic, ad-hoc and unprofessional. The domestic and East African market may constitute a huge potential but there are shortcomings with regard to presentation and advertisement. In order to secure a larger and more profitable outlet for the processed products of the cashew value chain the following suggestions can be made:

1. More transparency needs to be provided by CBT so that buyers and sellers better understand where and at what price products are sold. A market information system could be set up for that purpose. The outcomes of the bidding must be made available to the public and cases of irregularities must become subject to scrutinizing. Online advertisement of lots and online bidding should be allowed.
2. Modalities need to be worked out to enable producers and processors getting more direct access to international markets for raw nuts and kernels. A web-based electronic auctioning and marketing system could be put in place for that purpose.
3. The human and financial resource available to the CBT as well as other agencies is not sufficient to help sellers and processors to comply with market demands and quality requirements and effectively market their products. Training in quality control to meet international standards, marketing strategies and analysis of market intelligence information will improved the efficiency of the board.
4. The cost of packing materials and the lack of packaging technology limit many processors to create a better product. Deals with importers could be struck to import materials in bulk.
5. The existing Cashewnut Processors Association of Tanzania is weak and does not meet regularly. . Organizational development and capacity strengthening could help to make it a more viable organization supporting actively its members through political lobbying, service provision and sourcing of equipment in bulk. On the other hand, importation of packing materials takes time due to procedures to clear them from the port. The government could look in to options to reduce taxes on importation of such materials as well as reducing taxes on locally manufactured packing materials.
6. Quality control needs to be introduced to the purchase of processed products for local and international markets. Branding of cashew nut products from Tanzania is essential. A whole marketing and branding strategy should be developed to reach consumers on domestic, regional and international markets. Quality and Food Safety Standards shall be reviewed and updated where necessary, and formulated where absent.

4TH DIMENSION: GOVERNANCE OF VALUE CHAIN

The governance of the value chain is dominated by the warehouse receipt system which has been made obligatory by the Government in 2007 as well as the associated auctioning system and tax structure which determines the share of duties and profits for the various agents engaged in the internal marketing of the raw cashew nuts, including cooperatives, cooperative unions, warehouses, transporters and buyers. The system discriminates the processing of cashew nuts in the sense that processors need to bid for acquiring cashew nuts. In order to achieve an organization and governance of the value chain that is less costly, favorable to processing and finally promoting competitiveness in an international context the following suggestions can be made:

1. Maintaining a levy on raw cashewnut exports may constitute a disincentive for exporters of raw cashew-nuts but the funds thus generated (and managed by the Cashewnut Development Trust fund) should also be reinvested into the development of the processing sector. The current practice de-facto subsidizes the

same system that produces and markets raw cashew nuts, the levy is ineffective with regard to the promotion of value addition and agro industrialization. In fact, the current practice lowers the competitiveness of Tanzanian Cashewnuts on the world market.

2. Local processors, due to the current organization of the chain in terms of warehousing and auctioning, have difficulties to source primary materials (raw cashewnuts) due to competition with buyers who sell abroad. As in other countries, export restrictions could be raised for the first weeks of the season till processors have assured provision with raw nuts.
3. The role of the CBT needs to be strengthened so it can emphasize its duties in promoting local processing. At the moment most of its capacity is deviated towards dealing with the commercialization of raw cashew nuts. Capacity building (short and long term training, study tours) for staff members at the Cashewnut Board of Tanzania in management information system, regulations and entrepreneurship will improve the performance of the board.
4. The introduction of the warehouse receipt system was envisaged and introduced to reduce the number of middlemen involved in the marketing of raw cashewnuts. The system has been to a certain extent successful. However, there is a room for further reduction of the number of actors engaged in the regulations by reviewing and streamlining the roles of each one. The role of Cashew Industry Development Fund as service providers is yet to be exploited and the possible areas is likely to be bulk purchase of input and delivers, supervision of quality control from the farm, storage to processing and support to R&D on processing solutions.
5. The type of services that cooperatives and their unions deliver to the farmers is currently inadequate and overpaid (through the given tax structure). Their main role is currently that of a buying agent and this is not enough in the support of the development of the value chain where much sensitization, knowledge transfer, training, facilitation of access to credits and inputs is required.
6. There are too many licenses and papers to be dealt with in order to buy and export cashew nuts in Tanzania. The processes can be streamlined. The introduction of more efficient and timely delivery of warehouse and other operational documents and linkage to the use of such documentation for mutual accountability between actors in business transaction will increase efficiency.
7. Currently there is no "tax structure" for cashew kernels to encourage local processors. Having a levy on raw cashewnuts but not kernels provides incentives to processors but there is a need to work out a mechanism whereby as more raw cashew nuts are processed there is also a levy on kernels to support the industry.
8. A platform should be organized where the actors in the value chain (producers, cooperatives, processors, traders, regulators, service providers) can meet and discuss options to develop the chain that are of benefit to all of them. The organization of such meetings needs to be institutionalized and supported with resources.

5TH DIMENSION: SUSTAINABLE PRODUCTION AND ENERGY USE

The environmental effects of cashew nut production relate to the use of pesticides in farmers fields, the effects of plantations on biodiversity, contaminations that occur during transport, storage and processing and the management of waste. There are solutions available to lower detrimental impacts on the environment and many of them are low cost. They are not applied yet due to lack of knowledge and inability to cover the additional costs of their introduction. In order to lower the impact of cashew production on the environment the following suggestions can be made:

1. Applying fungicides is inevitable for farmers to realize higher yields and good quality cashewnuts. However, inappropriate use may have a negative impact on production as well as on the environment. Inadequate or excessive use of pesticides among farmers is mainly the result of limited knowledge. Extension and advisory services have not been able to effectively pass on messages on good agricultural practices in the past. Re-introduction of the "Training of Trainers programme" for extension staff and the setting up of a network of private advisory service providers may solve this problem. There are too many pesticides currently sold in Tanzania confusing farmers. Relevant Standards shall be reviewed/introduced accordingly.

2. Water is used in the cashew processing factories to clean nuts and equipment and could as well be recycled for use as there is little contamination.
3. The variation in energy use and efficiency can also be improved through capacity utilisation and development of alternative energy supply sources. Most of the mechanised factories are currently operating at very low capacity, yet the operational cost including energy and water remains almost the same. The availability of shells to generate power has also not been fully exploited. Existing factories can be supported to modernise their equipment to use of shells for direct heating, or to generate electricity from the shells for thermal heating using boilers (shells heat water to generate steam; steam under pressure runs power turbines that generate electricity for factory operation and other local uses, a case of Brazil system).
4. The energy used for roasting of cashew nuts is one of the main cost items in industrial processing of cashews. Technical solutions must be found to use alternative sources of energy or use energy more effectively. A more efficient use of shells in roasting, either directly through burning them or through the generation of energy, is an important option to explore.
5. Processing of cashewnuts is energy-intensive. The highest potential for saving energy exists on the level of roasting, drying and more efficient use of shells as a source of energy. Putting technologies that can achieve this in would require also adequate finance and training.
6. An additional, largely untapped, potential for producing energy is through bioethanol production from the cashewnut apple. Cashew apples are mostly left unused on the farm. Technology and logistics for alcohol production from apples is yet to be put in place while the awareness for this opportunity needs to be raised among farmers and entrepreneurs as well. Further, additional R&D is required on the commercial production and of bioethanol from cashew apples.
7. Currently processing plants using the Indian technology burn shell to heat up the steam used for roasting raw cashewnuts. The resulting smoke from the burning is toxic and contaminates neighboring communities. Technologies should be applied that allow extraction of CNSL upfront and cleaner burning of the residues.
8. Most cashew shells are currently thrown away causing environmental hazards through contaminating the soil, exposed areas do not allow for agricultural activities for years. Before disposing the shells CNSL should be extracted and the residues can be used in making briquettes.
9. The shells can be effectively used in the production of energy but only on a larger scale. In the future, linking cashew processors with entities that specialize in energy-from-shell production may be an option. However, basis for such an operation must be an assurance of constant supply of shells. For this to happen, the cashew processing needs to take place in large volumes throughout the year, or the nuts and apples must be collected and stored at a central point.

6TH DIMENSION: VALUE CHAIN FINANCE

Finance is scarce along the value chain. Farmers and particularly processors cannot find the necessary credits to finance the investments they need to fully operate. If they get access to funding, this is too expensive and not fitted to their short, medium and long term needs. In order to alleviate the credit crunch in the cashew value chain the following suggestions can be made:

1. Cashew farming is profitable only when it is done following good agricultural practices which require investments in inputs and labour for weeding, pest and disease control, harvesting and post-harvest handling. However, the terms and interest rates of credits for farming activities in Tanzania are generally prohibitive. While loans are expensive banks and credit institutions demand collaterals and assurances that clients can't comply with. Introduction of guarantee schemes to compensate lenders for failing loan repayments could help to make access to credit easier.
2. The type of financial products and credits that are given out to farmers and processors do not correspond to their short, medium and long term needs of the clients. For example, borrowing money at 18-22% interest rate to buy larger machinery is inappropriate; a lower cost loan should be pro-

vided by banks for which the value of the machine can be used to secure the loan. In fact, banks and credit institutions do not understand the kind of business that cashewnut producers and processors engage in. In consequence farmers, input suppliers and processors do not get access to the finance they need. Exporters, on the other hand, are able to access short term finance using commodity buying agreements. There is a need to train bank's agricultural desks on understanding the cashewnut business and its environment and to tailor financial products that respond to the needs of the sector.

3. Farmers, cooperatives and processors have often too little knowledge on how to apply for loans and how to manage the funds once they got in. Training actors in the value chain on proper financial management is crucial if more loans should be provided to the sector.
4. There are alternative options to engage buyers and cooperatives in handing out loans to farmers and processors. However, these systems need to be carefully designed and developed gradually only where there are trust relationships built between buyers and sellers. This can also be linked to rural and small industry finance schemes that are currently set up by the government. One option is to encourage cashew farmers to form credit cooperatives or strengthen the existing primary societies. The other one is to work with buyers in outgrower schemes. Both require substantial training and monitoring on the level of farmers and processors, a task that can be overtaken by NGOs.
5. Engaging buyers and cooperatives becomes even more interesting if these get linked to credit institutions in some sort of triangular relationships (loan recipient, buyer, bank). The warehouse receipts can be used to secure such loans. Banks may be even interested to finance producers, processors and buyers of a certain lot simultaneously opening up opportunities for fully integrated value chain finance. Such arrangements should be piloted throughout the sector to render evidence on best practices to be applied through the sector at a later stage.

7TH DIMENSION: BUSINESS ENVIRONMENT AND SOCIO-POLITICAL CONTEXT

The environment for doing business in the cashew value chain is not hostile but a complicated one. Processors and traders need to deal with a number of permits which they only get if they have access to the network of stakeholders. Outsiders may find it extremely difficult to engage and invest in the sector while those who know the sectors for years maneuver easily over the various hurdles and stumbling blocks. To improve the business environment in the cashew value chain one should consider the following suggestions:

1. Procedures, regulations and licenses to buy and process cashew nuts must be simplified without losing overall oversight on movement and quality of products (through CBT).
2. The government should facilitate the creation of new businesses in processing but also service provision, for example advisory services, in the sector. This can come through tax exemption schemes, training, and investment support.
3. A commodity exchange and e-auctioning system should be introduced to improve the efficiency in marketing of cashew nuts, both raw and processed.
4. The cashew levy and government funds should be used more intelligently to foster public research and extension services that support the development of the sector. The existing structures need to be revised with the aim of increasing autonomy of operation while not reducing the oversight function of the government. Research and development should be able to attract financing from the private sector as well as from development partners as long as delivery of public goods is assured.
5. Technology institutes and universities should be encouraged to develop and adapt technologies on the farm and processing level. This requires funding and close collaboration and linkage with the user community.

LITERATURE REFERENCES

- Ashimogo G., Mlozi M. and Silayo V. 2006. Market analysis and survey of small scale cashew processing firms. Vol I. BACAS Consultancy Final Report presented to PEA, Common Fund for Commodities, Regional Cashew Improvement Network of Eastern and Southern Africa-Mtwara Tanzania
- Ashimogo G., Mlozi M. and Silayo V. 2008. Cashew profitability analysis and projection of the sector's future performance in Kenya, Malawi, Mozambique and Tanzania. BACAS Consultancy Final Report presented to PEA, Common Fund for Commodities, Regional Cashew Improvement Network of Eastern and Southern Africa-Mtwara Tanzania
- Azam-Ali, S.H. and E.C. Judge (2004). Small-scale Cashew Nut Processing. FAO, Rome.
- Brown LC, Minja, E. and Hamadi A. S. (1984). Cashew production in East Africa. Paper presented at the conference Advancing Agricultural Production in Africa, Arusha, Tanzania
- Cavalcant J.J. V., M.D. Vilela de Resende. J. R. Crisostome, R. de Paiva 2007. Genetic control of quantitative breeding strategies for cashew improvement. *Crop breeding and Applied Biotechnology* 7:186-195.
- CBT 2010. Procurement record 2010, Cashewnut Board of Tanzania.
- CBT 2010a. Press Release. Opening of cashew marketing season September 2010. Cashewnut Board of Tanzania
- CDP 2007. Technical Report Cashew Development Project from March 2003-December 2008. Loan No. F / GHA / PL / AAA / 2001 / 1. African Development Bank, Cashew Development Project, Ministry of Food and Agriculture, Accra Ghana
- Ellis, F. (1980) A preliminary analysis of the decline in cashewnut production, 1974-1979: causes, possible remedies and lessons for rural development policy. *Economic Research Bureau, University of Dar es Salaam.*
- Gyendu-Akoto E. I. Oduro, F.M. Amoah, J.H. Oldham, W.O. Ellis, K. Opoku-Ameyaw, F. Asante and S. Bediako, 2008. Quality estimation of cashew gum in the production of chocolate pebbles. *African Journal of Food Science*, Vol (2) pp 016-020.
- Gyendu-Akoto E., I. Oduro, F.M. Amoah, J.H. Oldham, W.O. Ellis, K. Opoku-Ameyaw and Rasheed Bin Hakeem 2008. Physical-chemical properties of cashew tree gum. *African Journal of Food Science*, Vol (2) pp 050-064.
- Honorato T.L., M.C. Rabelo, Goncalves L.R.G., Pinto G.A.S. and Rodrigues 2007. Fermentation of cashew apple juice to produce high added value products. *World J. Microbiol Biotechnol* 23: 1409-1415.
- Martin, P. J. and L. J. Kasuga Cashew farm upgrading: Agronomic options for increasing cashew production by smallholder farmers in Tanzania. *Expl. Agric.* (1998), volume 34, pp. 137-152.
- Masawe P.A.L., F.A. Kapinga and P.D.S. Caligari 2011. Variation in the Period of Nut Harvesting Among Cashew Trees in Southern Tanzania. Proceedings of the Second International Cashew Conference held at Hotel Africana Kampala, Uganda, 26th -29th April 2009. CABI UK (In press) Masawe P.A.L., E.P. Cundall and P.D.S. Caligari. 1996. Distribution of cashew flower sex-type between clones and sides of tree canopies in Tanzania. *Annals of Botany* 78: 553-558.
- Masawe P.A.L. 2009. Modern Agro-practices in Cashew. *Journal of Science, Technology and Management: Vol 02; Issue No. 02 Jul-Sept 2009.* Tirunalla, Pathanamthitta, Kerala, India.
- Masawe P.A.L. 2006. Tanzanian cashew cultivars, Selected clones. 1st Edition. Colour Prints (T) Ltd. ISBN 99-44-01-9
- Masawe P.A.L. and L.J.F. Kasuga. 2007. An overview of Tanzanian cashew industry. Paper presented to the African Cashew Alliance General Meeting, Dar Es Salaam 2007
- Masawe P.A.L. and F.A. Kapinga 2011a. Towards a sustainable cashew industry in Tanzania. Proceedings of the Second International Cashew Conference held at Hotel Africana Kampala, Uganda, 26th -29th April 2009. CABI UK (In press)
- Mnoney E.E. and S. Mantel 2002. Clonal propagation of cashew (*Anacardium occidentale* L.). *Journal of Horticultural Science and Biotechnology* (2002) 77 (6) 649-657
- Mohod A., S. Jain and A.G. Power 2010. Energy option for small scale cashew nut processing in India. *Energy research Journal* 1 (1): 47-50
- NARI 1990 and NARI 2009. Annual Cashew Research Report for 1990 and 2009. Naliendele Agricultural Research Institute, Ministry of Agriculture, Food Security and Cooperatives Tanzania.
- Nawale, R.N., M.J. Salvi and V.P. Limaye, 1984. Studies on the fruit set and fruit drop in cashew (*Anacardium occidentale* L.). *Cashew Causerie* 6, 5-7.
- Nawale, R.N., M.J. Salvi and V.P. Limaye, 1984. Studies on the fruit set and fruit drop in cashew (*Anacardium occidentale* L.). *Cashew Causerie* 6, 5-7.
- Poulton, C. (1998): The Cashew Sector in Southern Tanzania: Overcoming Problems of Input Supply: In: Smallholder Cash Crop Production under Market Liberalization, pp. 113-176.
- Ray B.R.M., D. Vijayalakshmi, and K.V. Jamuna 2006. Formulation and Utilization of Cashew apple powder in selected foods. *Kanataka J. Agric. Sci.*, 19 (2): 455-457
- Shomari, S.H. (1988). A review on cashew research in Tanzania. A paper presented to Tanzanian Agricultural Research Masterplan Conference, Arusha 12-15 December 1989.
- Sijaona M.E.R. and S.H. Shomari 1987. Powdery mildew disease of cashew in Tanzania. *TARO News letter* 2, 4-5.
- Sijaona, M. E. R. (1984) Investigations into effectiveness of sulphur w.p. against *Oidium anacardii* Noack on five cashew tree types at Naliendele. *Rivista di Agricoltura Subtropicale e Tropicale* 78. 199-209.
- Sijaona, M. E. R. and Mansfield J. W., (2001). Variation in the response of cashew genotypes to the targeted application of fungicide flower panicles for control of powdery mildew disease. *Plant Pathology*, 50: 244-248.
- Topper C.P., P.J. Martin, N. Katanila, L.P. Kikoka, R. Lamboll, P.A.L. Masawe and S.H. Shomari 1998. The historical and institutional background of the Tanzanian cashew industry. Proceedings of International Cashew & Coconut Conference Tanzania (1997), BioHybrids Int Ltd, Reading, UK, 76-83.
- Waller J.M., Nathaniels N.Q.R., Sijaona M.E.R. and Shomari S.H. 1992. Cashew powdery mildew (*Oidium anacardii*) in Tanzania. *Tropical Pest Management*, 38.160-163.

ANNEX 1

People contacted by Phone/visits

Name	Organization	Location	Telephone	Subject discussed
A. Mpesha	Director River Valley Foods Tandahimba	Tandahimba	+255 783524247	Cashew processing
Abdu Hyghaimo	Regional Livestock Advisor Mtwara	Mtwara	+255 784363631	Cashew value chain
Abdala njovu	District Executive Director Tandahimba	Tandahimba	+255232410023	Cashew processing, Inputs and warehouse receipt system
Amani Rusaka	Regional Agric Engineer	Mtwara	+255 232333194	Cashew value chain
Anatoli Tarimo	Regional Commissioner Mtwara	Mtwara	+254 232333194	Cashew value chain/3ADI Mission
Audax P. Rutabanzibwa	Head Legal Unit MoAFSC	Dar Es Salaam		3ADI mission in Tanzania
Ayubu Mbawa	Director of Finance Cashewbut Board of Tanzania	Mtwara	+255 232333303	Cashew value chain
Baldwin Masawe	Director - Mohamed Enterprices Ltd Mtwara	Mtwara	+255713501006	Warehouse receipt system
Beatus Malema	Assitanr Director Crop Promotion	Dar Es Salaam	+255 754 608806	3ADI mission in Tanzania
BenoMhagama	DG CBT Mtwara	Mtwara	+255 754 525303	Cashew Value chain
Branch Manager	NMB Mtwara	Mtwara	+255 782224767	Loans to support cashew value chain
Col A. Tarimo	RC Mtwara	Mtwara	+255 232333194	Policy issues
D.M. Biswalo	DPP MoAFSC	Dar Es Salaam	+255 755630407	3ADI mission in Tanzania
David Kunze	Chief Accountant	Mtwara	+255 232333303	Cashew value chain
Eline Sikazwe	Director of Industry Developemnt Ministry of Industry Trade and Marketing	Dar Es Salaam	+255 222127893	3ADI mission in Tanzania
Elly Kafriti	Zonal Director ARI Naliendele	Mtwara	+255 784 809938	Cashew Research and development
Fidelis Myaka	Director for Research and Development	Dar Es Salaam	+255 784 415905	3ADI mission in Tanzania
Francis Kasoyaga	Branch Manager CRDB Mtwara	Mtwara	+255 755948650	Financing cashew value chain
Geoffrey Kirenga	Director of Crop Development	Dar Es Salaam	+255 756480069	3ADI mission in Tanzania
Gerald	Mocrops (T) Ltd	Dar Es Salaam	+255787858855	Input supply
H.H. Mkungura	GM Ilulu	Lindi	+255 713846911	Warehouse operation
H.L. Nakwele	Manager Annar cashew Factory Newala	Newala		Cashew processing
Hamis Kitemwe	Chair Person Kitama Group	Tandahimba	+255 784461048	Cashew processing
Haroun Maarifa	Sulphur dust stockist	Dar Es Salaam	+255 784267041	cashew Input

Tanzania's Cashew Value Chain: A diagnostic

Hassan Mshinda	Director General, Costech	Dar es Salaam	+255 784 782210	Supporting cashew value chain in Tanzania
Henry Mpande	Director BUCO	Dar Es Salaam	+255 754556680	Cashew processing/ marketing
I. Mpakate	General Manager TANECU	Tandahimba	+255 755 050753	Warehouse operation
Isabel Dismas	DALDO Tandahimba		+255 784 818377	Inputs, warehouse operations
Issac M. Komba	PC OI (for DCD/R)	Dar Es Salaam	+255 754 386 096	3ADI mission in Tanzania
John Mngodo	Director National Food Security	Dar Es Salaam	+255 754 853 075	3ADI mission in Tanzania
Joyce Mapunjo	Permanent Secretary MITM	Dar Es Salaam	+255 222181398	3ADI mission in Tanzania
Kaboa Kaisi	Member Kitama group	Tandahimba		Cashew processing
Kasoyaga	CRDB Mtwara	Mtwara	+255 755948650	Loans to support cashew value chain
Krishna P.	Mukpar (T) Ltd	Mtwara	+255 754298472	Input supply
Krishnakumar R. Pillai	General Manager Olam (T) Ltd	Dar Es Salaam	+255 783 791123	Cashew processing/ marketing
L. B. Silomba	Director of Agriculture CBT Mtwara	Mtwara	+255 713515104	Cashew production
Lema	Branch Manager NMB Mtwara	Mtwara	+255232333004	Financing cashew value chain
Lila Mwinyikondo	Processing Training Coordinator CBT	Mtwara	+255 784282343	Cashew Processing Factories
Louis Kasuga	Agronomist and Cashew Processors - ARI Naliendele -	Mtwara	+255 784 791445	Cashew processing
Luc Moshaly	Director BUCO	Dar Es Salaam		Cashew processing
M. Karamagi	Agrofocus (T) Ltd (Newala 1 Factory)	Dar Es Salaam	+255 784 400540	
Magehema	District Executive Director Ruangwa	Ruangwa	+255 786 359468	Warehouse Operations/ Inputs
Mahanga	District Plant Protection officer	Tandahimba	+255785194130	Inputs,
Majogo	Crop Officer Tandahimba	Input	+255 784809941	Input/agricultural extension
Mawji	Director Anna Cashew processing Company Newala	Mtwara	+255 784 503195	Cashew processing
Mayank Srivastav	Factory manager Olam (t) Ltd	Mtwara		Cashew processing
Mike Laizer	Director General SIDO	Dar Es Salaam	+255222151948	Cashew processing equipment
Mohamed Bakari	Factory Manager, Agrofocus (T) Ltd Newala	Newala	+255717134783	Cashew processing
Mohamed Hanga	Director of Marketing CBT Mtwara	Mtwara	+255 754 494127	Cashew marketing
Mohamed Muya	Permanent Secretary Ministry of Agriculture Food and Cooperatives	Dar Es Salaam	+255222862054	3ADI mission in Tanzania
Mpesha A.	River Valley Foods	Tandahimba	2.55784E+11	Cashew Processing
Mr Bruce	D/Director Corporate Banking CRDB Bank	Dar Es Salaam	+255 754365991	Loans to cashew value chain
Mustafa Matata	Former Factory Engineer BUCO	Dar Es Salaam	+255 756288999	Cashew Processing Factories
Muzamil M. Karamagi	Agrofocus (T) Ltd (Newala 1 Factory)	Dar es salaam	+255 784 400540	Cashew Processing
Mwatima Juma	IFAD Country Officer TZ	Dar Es Salaam	+255 754536630	Supporting cashew value chain in Tanzania
N.R. Raam Prakash	Factory Manager Olam (T) Ltd	Raam.prakash@olamnet.com	+255 789791169	Cashew processing
Name	Organization	Location	Telephone #	Subject discussed

Peniel M. Lyimo	Permanent Secretary Prime Minister's Office	Dar Es Salaam	+255 222135076	3ADI mission in Tanzania
Philip Alfred	Director Corporate Banking DSM	Dar Es Salaam	+255 784313161	Financing cashew value chain
Rajabu N. Mtunze	Ass Direcotr Agro-proccesing and Renewable Energy	Dar Es Salaam	+255 754 687156	3ADI mission in Tanzania
Robert Pascal	Senior Manager Agribusiness NMB DSM	Dar Es Salaam	+255222128142	Financing cashew value chain
Said Awadhi	Secretary Kitama Group	Tandahimba		Cashew processing
Shibu	Olam (T) Ltd Mtwara	Mtwara	+255 783791119	Cashew Processing
Shokat K. Kara	Administrative manager Chimbuli Tarding Company Ltd	Mtwara	+255784 570501	Warehouse operations
Sofia Kaduma	Deputy PS MoAFSC	Dar Es Salaam	+255222863503	3ADI mission in Tanzania
Sofia Mtama	Board Member Kitama Group	Tandahimba	-	Cashew processing
Tweve Underson	Crop Production Manager	Mtwara	+255232333303	Cashew value chain
V.Y. Mbuta	GM CORECU	Kibaha	+255 713501106	Warehouse operation
Veronica Kibambi	CDC Manager Mkuranga	Mkuranga	+255689 561826	Planting material production
Yahaya Semuli	Quality Control Manager CBT	Mtwara	+255232333303	Cashew value chain
Yasin P. Nayar	Chimbuli Trading Company Ltd	Mtwara	+255 784 360774	Warehouse operation
Zacaria Mbunda	ARI Naliendele	Mtwara	+255 784443742	Cashew apple processing
Yusufu A. Matumbo	Regional Administrative Secretary	Mtwara	+255 232333014	Cashew value chain

ANNEX 2

Cashew Production by district 2006/07 - 2010/2011

District/Region	2006/07 (M/Tons)	2007/08 (M/Tons)	2008/09 (M/Tons)	2009/10 (M/Tons)	2010/2011 (M/tons)
Mtwara (M)	2,359.373	9,424.924	424.470	434.360	768.873
Mtwara (V)	5,096.247	—	5,189.597	5,335.578	11,203.376
Tandahimba	19,519.988	24,121.053	20,702.182	24,436.005	35,996.900
Newala	10,520.327	9,111.000	6,754.505	9,270.163	14,230.189
Masasi	16,510.053	14,370.881	11,261.268	7,623.670	17,218.209
Nanyumbu	—	5,178.164	6,064.201	2,731.178	4,453.362
Mtwara Region	54,005.988	62,206.022	50,396.223	49,830.954	83,870.909
Lindi (M)	200.000	281.066	377.951	41.045	1,451.729
Lindi (V)	726.975	3,971.423	3,984.759	2,448.738	2,943.636
Nachingwea	11,458.076	6,889.908	5,746.229	4,812.672	6,296.345
Ruangwa	5,056.364	8,440.417	5,682.617	1,437.558	3,029.745
Liwale	5,299.589	3,557.807	3,784.364	6,708.507	7,171.335
Kilwa	138.318	693.663	2,012.343	418.346	1,065.898
Lindi Region	22,879.322	23,834.284	21,588.263	15,866.866	21,958.688
Mkuranga	5,290.295	2,951.536	1,395.486	2,790.540	6,428.552
Kibaha	104.000	251.399	348.096	42.205	391.369
Bagamoyo	9.700	542.285	62.905	—	81.258
Rufiji	1,156.993	933.711	1,184.136	1,189.540	2,102.913
Kisarawe	23.509	975.640	253.840	—	0.000
Mafia	39.000	103.377	14.912	—	3.693
Coast Region	6,623.497	5,757.948	3,259.375	4,022.285	9,007.785
Muheza	10.000	—	55.551	—	0.000
Pangani	19.500	271.840	48.093	45.000	0.000
Tanga	—	100.000	—	393.900	0.000
Korogwe	—	22.646	67.728	44.900	0.000
Mkinga	—	887.454	403.873	1,490.892	0.000
Tanga Region	29.500	1,281.940	575.245	1,974.692	256.950
Kinondoni	—	—	—	—	0.000
Temeke	1,523.148	3,158.819	478.521	151.610	0.000
Ilala	554.000	179.723	64.336	22.202	0.000
DSM Region	2,077.148	3,338.542	542.857	173.812	0.000
Tunduru	6,657.733	2,622.379	2,619.890	3,380.037	3,996.805
Songea	—	—	—	—	0.000
Mbinga	—	—	—	22.500	0.000
Namtumbo	—	65.605	86.941	75.518	88.581
Ruvuma Region	6,657.733	2,687.984	2,706.831	3,478.055	4,085.386
Ludewa	—	—	—	20.000	—
Kyela	300.000	—	—	—	—
Kilosa	—	—	—	—	—
Morogoro/ Iringa/Mbeya	300.000	—	—	20.000	—
Sub Total	92,573.188	99,106.720	79,068.794	75,366.664	119,179.718
Unreported sales 30%	39,674.223	42,474.309	33,886.626	32,299.999	51,077.022
Expected Production	132,247.411	141,581.029	112,955.420	107,666.663	170,256.740

Source: CBT 2010



3ADI

**African Agribusiness
and Agro-industries
Development Initiative**

www.3adi.org