Soya Bean & Maize Value Chain Analysis
Agriculture Value Chain Analysis

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Maize and Soya Bean Value Chain Analysis

Abstract

The purpose of the presentation is to highlight and recommend promising agricultural chains that can be developed to give meaningful economic benefits to small holder farmers. This will be anchored on sustainable partnership with the private sector. This paper will aim to analyze and assess the leading agriculture value chains which can be done in partnership with NGOs. This will act as guide to government in formulation of policies that would facilitate the springing up of small holder based viable value chains, which can have potential to yield increased production, incomes and employment through enhanced participation and involvement of small holder farmers. The value chains study includes maize, dairy and soya beans. The data was collected through desk review and interviews with the small holder farmers and stakeholders in value chains additions. Value chains addition is the way to go if the Land Reform is to record resounding successes for the small holder farmer.
Introduction

Agriculture is the backbone of our Economy and all efforts must be done to make the small holder farmer reap maximum profit from their produces. The small holder farmer after surviving the decade of long political and economic crisis that plagued Zimbabwe since the year 2000. The unstable economic environment during this period led to total collapse of mindful value additions on small holder farms and the farmers were very demotivated. There was serious reduced production in part due to decline in services that farmers require for them to produce and market their products. The processors (including graders, driers, abattoirs, etc), inputs suppliers, traders, technical and business trainers, transporters and other business development service providers were left with limited capacity to deliver services and contribute to the revival of rural agro-economy. With the new political dispensation in Zimbabwe in the form of Global Political Agreement, there is a general consensus on the need to revive small holder farmer through Private, Non Governmental Organization and Government partnership to realize this goal. Also to make the land reform a resounding success to the small holder farmer value addition is the way to go. This paper will analyze the value additions that can be done on farm by the small holder farmer.

MAIZE

Maize is the most important grain crop in Zimbabwe, being both a major feed grown and a staple food for the majority of the population. FAO reported that maize that maize and maize production account for the 43% of the total dietary energy supply (DES) between 2003 and 2005 and the average per capita food consumption of maize and maize production was 120 kg/year between 2004 and 2008. Apart from the being consumed as raw grain maize can be processed into maize meal or alternatively used to make a variety of other by products, which include flour, oil, maputi, samp and grit used in the making of snacks as well as stock feed.

In terms of production maize is the second most produced crop after sugarcane, contributing an estimated 11.6% of the gross value of total agricultural production in 2005. (CSO Abstract of Agriculture 2005). At least 1.5 million tonnes of maize is consumed by humans with an average of 350 000 tonnes (MOA) being utilized by other commercial users including the animal feed industry whilst the reminder, (estimated at an average of 10% gets used for seed and the other industrial purpose. FAO 2004.

Maize is one of the easiest crops in Zimbabwe; hence many small scale farmers opt to grow it. It’s grown well in Ecological regions 1-3. It is grown in the rainy season from November to March. If normal weather prevails at least 1.2 million hectares of maize should be planted to meet the domestic human requirements of 1,825 million tonnes on average.

The land reform embarked by the government in the year 2008 gave quite a number of small holder framers vast pieces of fertile land, for these farmers to realize the much anticipated financial gains from Agriculture; they would need to add value to their maize. Year in year out small holder farmers beg for inputs from government, but if value addition is given chance the
farmer will have enough cash to buy their own inputs and can as well overcome the effect of droughts.

Efforts To Promote Maize Productions.

Several programs have been pursued through government funded initiatives from 200 to date to improve maize output. Such programs mainly involved provision of subsidized inputs at concessionary interest includes the following:

- The government input schemes (GIS) 2000
- The productive sector facility (PSF) 2004
- The Agricultural Sector productivity Enhancement Facility (ASPEF) introduced in 2005
- The Southern African Development Community (SADC) provision of seed and inputs support Initiative (2008) that primarily targeted small holder farmer in communal, old resettlement and small scale commercial farmers.
- Fertilizers support to farmers unions conservation agriculture that are supported by the European Union, South Africa and Spain.

A look at these efforts shows that the support is aimed at increasing yield. These efforts can be said are aimed at aborting maize shortages in the country. Little or no effort is being done to add value to the maize produced by the small holder farmer to get maximum benefits. It can be said in recent years Zimbabwe is now experiencing maize deficit that have led to international donors food relief agencies playing an increasing role in meeting the food shortages. The effort being done to increase production is very commendable but the issue of value addition is worth considering if the small holder farmer is to be assisted from extra poverty status they currently have.

MAIZE VALUE CHAIN ANALYSIS

Maize can be added value on farms into several products for the smallholder farmer to maximize earnings. Maize can be processed into the following:

- Maize meal
- Samp
- Maputi
- Grit
- Oil
The smallholder farmer needs assistance to make this a reality. There is need of government, private sector, donors and Nongovernmental organizations to assist them technically and financially. If the maize from small holder farmers gain some value before marketing the farmers will get meaningful economic benefits, this needs sustainable partnership with private sector.

PROCESSING ON FARM

1. Maize meal
If a farmer sales a tone of maize the average price is about $300. The farmers can thus be taught and organized into cooperatives or clusters were they can process maize into maize meal and packed it into the following categories 5, 10, 20 and 50 k kilograms. The average price of processed roller meal is 0.50c per kilogram so a to ne will fetch USD 500 there by giving the small holder farmer an additional $200 per tonne, though processing cost will need to deduct.

2. Maputi
Using the same price a tone of maize will cost USD 300. If a farmer processes the maize into Maputi, the process per unit will be high as well. There are three types of Maputi namely:

- Dry Maputi
- Oil maize snacks
- Spiced Maputi

The average price is as follows per 50 grams:

- Dry Maputi 0.10c
- Oil maize snacks 0.25c
- Spiced Maputi 0.35c

A 50kg maize packet will give:

<table>
<thead>
<tr>
<th>Commodity</th>
<th>weight</th>
<th>Price</th>
<th>Total Amount gained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Maputi</td>
<td>1000</td>
<td>0.10</td>
<td>USD 100</td>
</tr>
<tr>
<td>Oil Maize seed</td>
<td>1000</td>
<td>0.25</td>
<td>USD 250</td>
</tr>
<tr>
<td>Spiced Maputi</td>
<td>1000</td>
<td>0.15</td>
<td>USD 150</td>
</tr>
</tbody>
</table>

The above analysis shows that a 50kg can fetch approximately an average of USD 150 after value addition per tonne. The price thus is on the high side as it will realize a price of USD 1500 per tonne. However it should be noted that manufacturing costs needs to be factored in and these include labor, power, rentals, and packaging and other production costs. Nevertheless the farmer will be rewarded handsomely by value addition than selling raw maize grain to GMB and Millers or oil processors.
3. Samp
Samp can be used as a substitute for rice in many communal households and even in urban areas. The average cost price prevailing in the market for 1 kg of Samp is USD0.60. Thus a 50kg of maize produces at least 25kgs of Samp. Therefore a tonne of maize will give at least 500kgs of Samp and it will sell at 0.60c per kg. The price per tonne of maize will thus be USD 3000.

4. Oil
A farmer can express oil from the maize seed but the oil value in maize is very low to approximately 10%. A tonne of maize will therefore give 100 litres of cooking oil. A litre of oil cost about USD 1, 70 thus a tonne will give an estimate of USD 255. However this will not be viable unless they increase the price per litre to about USD 2, 50. but considering the stiff competition from imports they will not get any market unless its for domestic consumption.

5. Grit

ON FARM PROCESSING
The smallholder farmer can do their processing in the rural areas. They will cater for the lack in customers within their communities. Smallholder’s farmers need processing / milling systems for maize ranging from manual to motorized shellers or threshers for cereals. Most of this technology is manufactured in Harare, Norton and Bulawayo with distribution networks in major cities, towns and rural service centers. Mhazvo et al (2007) documented the industrial players who can help smallholder farmer to add value to their maize and pointed out that the local industries have the capacity to manufacture complete shellers, threshers that can be used by the small holder farmers. It can also be said for motorized equipment technology the electric motors and the engine components have to be imported from South Africa and Asia. A snap survey carried out by the writers noted that the sales of these small machinery is very high during the tobacco selling seasons showing that that small scale farmers are much prepared for value addition and their products. Most of the machines used by the small holder farmers are either manual or use diesel. The motorized from China are also affordable by the smallholder framer and the engine spare parts.

CONSTRAINTS IN THE MAIZE VALUE CHAINS PRODUCTION
Maize productivity by smallholder farmers is very poor and uncompetitive and over the past years the national average yield has been below half a tonne per hectare. This has been attributed by several factors which include:
- Government policies
Lack of effective enforcement of SPS standards. The farming sector has therefore been characterized by poor quality grain commodities emanating from the prevalence of standard commodities on the grain markets, which at times forces the domestic supply base to be competitive than higher quality grain imports.

- Cheap maize imports from Brazil and South Africa
- High transport cost.
- Most rural roads are in bad state.
- Low producer price of maize
- Limited market information from extension service
- Unreliable supply of cheap inputs
- Limited access to appropriate packaging material for processed products and marketing skills
- Inadequate support service from training institutions, private sector consultants, small scale enterprises advisors and research institutions
- Limited capacity to mobilize capital for equipment and working capital
- Technology for processing by small holder farmers is very limited – need to improve technology in order to improve production efficiency resulting in low costs of production.
- Stiff competition from cheap genetic modified imports.

CONCLUSION AND RECOMMENDATIONS

Given the findings of the study there is clear need to develop sustainable strategies that involve the government, banks, NGOs in order to increase the production base of the maize subsector. In that regard the following recommendation have been identified as being necessary and sufficient towards the end. These include the following:

- There is need to strength the link between farmer and the markets
- Revise the Genetically Modified Organism (GMO) policy and possible consider introductory GMO maize production to the smallholder farmers as an option to augment and promote local production.
- Reliable supply for low cost inputs (e.g. seed, fertilizer, water and electricity) on time.
- Improve technology through research and development.
- Increase irrigation capacity and refurbish available irrigation facilities.
- Improve farm level finance through loans to smallholder farmers.
- Capacitate the GMB through adequate financing to enable it to play its role effectively
- Need to mechanize buy using tractors
- Need to recapacitate Department of DDF so they can improve rural gravel roads.

SOYA BEAN

Soya bean is generally perceived as a high value crop and its value is underlined by the crops significance in terms of an important source of protein for both livestock and human
populations. The popularity of soya bean is also generally attributed to its multipurpose benefits as cash and food processes consumption and marketing activities much more lucrative. The crops nitrogen fixation abilities make it a prefect rotation option with crops such as maize and tobacco and it is reduces input costs and constrained smallholder farmers.

Aside from seed itself, soya bean is used to produce a variety of high value marketable soymilk, soy yoghurt, soy flour and soya in Zimbabwe is used in oil expression. In Zimbabwe soya bean contribute 50% (GoZ 2008) approximately 95% of all soya bean produced in Zimbabwe is destined for the processing industry for the production of soya bean oil. Soya bean oil cake a byproduct of the oil extraction process is sold to feed manufactures domestically and in the region. Soya bean cake is an important protein source of livestock particularly in the poultry and piggery subsectors. Soya bean cake extracts can also be used in the manufacture of consumables such as soya chunks. Another important by product of the soya bean extractions process is the gains which contains lecithin used in the manufacture of bread. This presentation is going to analyze how smallholder farmer can benefit by adding value to their soya beans before marketing on the farm. Most smallholder farmers grow soybean during the summer season as a rain fed crop, since most of them cannot afford irrigation, thought the crop does well if grown under irrigation. It is grown from November to march mainly in ecological regions 1-3 which receives annual rainfall of above 700mm.at the moment we have a deficit of soya bean to feed the manufacturing industry.

EFFORTS TO BOOST SOYA BEAN PRODUCTION

- Efforts by RBZ
- Soya bean trash force

SOYABEAN VALUE CHAIN ANALYSIS

Smallholder farmers need to process the soybean into various products at the farm to add value to the crop and maximize profits. Oil seed processing is capital intensive requiring specialized knowledge and state-of – the –art technology, which smallholder farmer cannot afford. There are three main methods of extracting oil from soybeans and these include:

- Solvent extraction
- Mechanical expeller (continuous pressing or screw pressing
- Hydraulic pressing

Solvent extraction is a very expensive method used by large scale producers. Mechanical expeller (continuous pressing or screw pressing) is a widely applied method of mechanical oil extraction popular among middle to small scale processors, thus machines coast between USD5 000 to USD 50 000 making it ideal for smallholder frame value addition. At the farm multipurpose screw press/ expellers are ideal for processing soybeans. The disadvantage is that
yield of oil I slow, with residual oil in the cake not going beneath 3-5 %. The throughput of these mechanism scar pressers is reportedly between 5 to 10 litres a day. Other smaller appropriate technology convert soya bean into useful household product e.g. flour, milk and oil. Such technology is manufactured by Precision Grinders (Hino) and Tauroy Engineering (Lister Petter Ts2 driven grinders.) A snap survey of the Magaba informal sector in Mbare shows that quite a number of these machines are being manufactured using simple materials and are sold at very affordable prices. These machines are manual, which makes them not suitable for commercial purposes. A lot of these machines also being imported from China and are available in the Chinese shops along Kaguvi Street and downtown.

MARKET OF SOYA BEAN PRODUCTS
The smallholder soya bean farmer must target their immediate environment. Most households in rural areas cannot afford to buy the required cooking oil per month because of the cost. The smallholder farmer can thus process for example 5 to 19 litres a day. It can be enough to cover the community oil requirement but it has to be cheaper than oil in the shops. It can be said assuming that each household can afford cooking oil. It is estimated that an average of 3 litres per month will be consumed. In a rural district with 20 000 households it will mean they require

20 000* 3 litres = 60 000 litres
And the farmer can only produce 10 liters per day implying that:
10 liters * 30 days = 300 litres.

This farmer can thus only sell to 30 households meaning that the market is too big to satisfy, thus it can capacitating quite a number of small holder farmers to extract oil, which will in turn go a long way not only in increasing income but also on improving nutritional level. The current cooking oil prices are averaging USD 2.00 per litre. The small holder farmer needs to set out a price lower than USD 2.00 and capture the market.

On the soya chunks, the market is filled with local chunks which are said to be of low nutrient content as compared to the imports. This can be propounded by a snap survey done at Mbare Musika showed that most of the chunks sold there are not branded and unlabelled. The average price of soya chunks at Mbare Musika in Harare as of June 2012 was averaging USD 1.00 per kilogram. The smallholder farmer can manufacture good chunks to Mbare Musika market and benefit as most of the chunks there are not branded making it easy to penetrate the market without competing with big brands. Since meat is very expensive among the rural poor chunks can be a good source of protein. There is a big market in the countryside as well.

The smaller holder farmer can extract as much as 15% of oil and 85% for cake. This means that a tonne of soya bean will give about 150 litres of oil and USD 400.00 worth of oilcake. On average the smallholder farmer will get an average of USD 600 per tonne of soyabean, however if the soya bean is sold as raw it will fetch a price of USD 400 which is a much lower price. Products like soya milk, soy yoghurt can also give additional cash to the farmer.
Furthermore additional markets for soya bean can be found with NGOs. They have feed programs dealing with largely captive audiences in schools lunch programs, hospitals, orphanages relief programs. The biodiesel plant in Mount Hampden can be used by smallholder farmers by simplying supplying the soya bean for crushing and be paid after selling the soya bean product not the soya bean itself.

Uses of soya bean

1. Home use
   - It is pounded into flour and blended with other ingredients.
   - Once pounded it can be boiled and strained resulting in a suspension similar to milk. This can be consumed as a nutritious milk substitute for children weaning food. Once in milk form it can be participated with a simple chemical such as MgSO₄ to form case. The case can be friend and used as meat substitute. Although these are possible they will require some extensive education before becoming recognized and used by most home makers. If used regularly to enhance home nutrition, improved child health should be visibly noticed within about three weeks.

2. As industrial Crop:
   - As an industrial crop soya beans is a cash crop similar to other cash crops produced by farmers. Soya bean is a main source of protein and edible oil. It can be blended into animal foods. It can also be processed into weaning formulas for babies.
   - In many industrialized countries the processing of soya bean has become even more sophisticated for meat dishes that are often difficult to differentiate from the real product. You can sometimes find ground beef labeled textuarilised vegetable protein or artificial seafood. Most of these products have a soya bean base and are much tastier than soya bean curd.

Constraints in Soya Bean Value Chains

- Productivity in the soya bean sector has been poor and uncompetitive.
- The smallholder farmer has no market for the on farm soya bean products.
- Midsummer droughts are adversely affecting the yield as most of the farmers are not able to irrigate the crop and most of the drought is experienced during flowering when the crop will be requiring large amounts of water.
- Poor financing , soya bean is a capital intensive crop requiring from fertilizer, herbicides and insecticides
- Inputs are not reliable and sometimes too expensive. In one of the rural areas visited during this study a 50kg bag of Ammonium Nitrate (AN) cost USD 42.00 instead of the gazette price of USD 29.00. This put the small holder farmer at a disadvantage as they cannot afford to buy the input.
- Lack of knowledge, expertise and technology of how to extract oil using the machines.
- Most farmers are not educated on how to produce by products like oil, milk, yoghurt and flour from soya bean.
- There is a problem with specify of rhizobium. This implies that unlike other legume reddish crops such as beans and coup peas, ground nuts etc, in which the same rhizobium bacteria will inoculate and fix nitrogen with many legume species soya bean requires a specific rhizobium
species. This unlike most legumes will modulate and fix nitrogen from rhizobium bacteria already in the soil, soybeans have to be inoculated before they can effectively fix nitrogen. Apart from that the seed needs proper storage during the season.

**Recommendations**

Generally processing soya bean into oils, cake flour and other products is a way of adding value. There is need to develop a sustainable strategy involving the government, NGOs and farmers in order to increase the production base. NGOs like SNV can capacitate the farmer by training them on various value additions. The financial sector can fund the production of soya bean products whilst the government can provide subsidized inputs to the small holder farmer. This multisectoral approach will definitely yield the required result of increasing income for the smallholder farmer. The government can also incorporate technology in the curriculum of institutions of higher learning.

The private sector can also contract the smallholder farmer by equipping them with the inputs and machines and thus later buy the products for example the oil can be brought by national foods or olivine. This is called TOLL manufacturing (tolling), which is an agreement through which a company (the toll manufacturer or thus the Toller) uses its own specialized processing equipment to make oil for the farmer. There is need to reduce over reliance in the importation of key production inputs such as seed and fertilizer. Imported inputs have meant that the domestic farmer inputs costs has risen and remained higher. There is need to reduce the cost of inputs in soya bean production and boost local production and encourage more smallholder farmers.

The farmer needs adequate financing on the farm and processing operations. The farmer needs a special bank to address their particular needs of through specialized concessionary interest rates to promote the expansion of production. In addition they are needed to upgrade irrigation and consistent input supply to improve soya bean.

The question that now arises and needs to be addressed in order for the productive farmers to become profitable is do they have the a business mindset, access to finance, infrastructural support and access to transport and market? One of the most practical solutions to this dilemma is the division of responsibilities between the private sector and NGOs. NGOs can add value through capacity building activities such as farmer group strengthening and business training activities. One aspect of value chain implementation might be enhancing access to mechanization or other means of enhancing the resources smallholders have to manage their land. All these efforts however need to be gender sensitive women also need to be fully involved at all levels.