DEVELOPMENT OF A COMPETITIVE **SOYA BEAN VALUE CHAIN**

OPPORTUNITIES AND CHALLENGES

CZI
CONFEDERATION OF ZIMBABWE INDUSTRIES
Enterprise Leadership Service

ZIMBABWE ECONOMIC POLICY ANALYSIS AND RESEARCH UNIT
ZEPARU

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OPPORTUNITIES AND CHALLENGES[1]

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List of Acronyms

AGRITEX	Department of Agricultural Research and Extension Services, Ministry of Agriculture
AMA	Agricultural Marketing Authority
AN	Ammonium Nitrate fertilizer
ARDA	Agricultural and Rural Development Authority
COMESA	Common Market for Eastern and Southern Africa
DAFF	Department of Agriculture, Forestry and Fisheries, Republic of South Africa
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FFRI	Fertilizer, Farm Feeds and Remedies Institute
GMB	Grain Marketing Board
GMO	Genetically Modified Organisms
GoZ	Government of Zimbabwe
Ha	Hectare
ITC	International Trade Centre
LMAC	Livestock and Meat Advisory Council
LSCF	Large Scale Commercial Farms
MAMID	Ministry of Agriculture Mechanization and Irrigation development
MT	Metric Tonnes
OGIL	Open General Import License
PQS	Plant Quarantine Services
R&D	Research and Development
SADC	Southern Africa Development Community
SI	Statutory Instrument

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Executive summary

Competitiveness in global commodity markets refers to the ability of a country to deliver a product at the lowest cost to other market suppliers. The competitiveness of a market actor is influenced by the agro-climatic conditions, available resource endowments, the availability of technology and support infrastructure like transport and irrigation infrastructure, the effectiveness of institutions and the enabling environment reflected through agricultural and macroeconomic policies. Policies influence land, labour, marketing and finance costs which impact the level of competitiveness of farmers. The combination of these factors affects productivity and transaction costs incurred by farmers determining their ability to deliver products at competitive costs to the market.

Over the last decade, Zimbabwe's competitiveness in the soya bean market has sharply declined. The country's soya is not currently not competitive domestically nor regionally. Low yields, high production costs and ineffective policy implementation has largely driven this phenomenon Between 2000 and 2015, production of the crop has declined from 135,417 metric tonnes (MT) to 41,768 MT (Table 7).

The lack of competitiveness in Zimbabwe's soya value chain has led the country to be a net importer of soya bean and soya bean products, importing approximately 9,300 tonnes of soya beans and seed, approximately 119,000 MT of crude oil and 78,900 MT of soya meal in 2016 (Figure 4) This is a precarious challenge given Zimbabwe's liquidity crisis. Source countries for imports have mainly being Zambia, Malawi and India. Soya bean imports from regional neighbours such as Zambia, land in Zimbabwe at $250-$300/MT, significantly cheaper than the local price of $500/MT (more or less the break-even cost of production of local soya bean farmers). Processers and agribusiness value chain actors therefore find it more competitive to import inputs for manufacturing rather than buying locally. As a result of current foreign currency shortages however, soya imports have been constrained resulting in local soya meal prices surging to $680/MT in December 2016 compared to an average landed price of $599/MT for imported soya meal (Zimbabwe Poultry Association, 2017). This has important implications for related industries such as livestock.

The main driver of the soya bean value chain is the stock feed industry largely due to the poultry sector. This sector consumed around 70% of total feed produced between 2012 and 2016. Increases in local soya meal prices therefore significantly affect the competitiveness of livestock and other related value chains that depend on the soya bean industry. Current output from soya production falls short of the national demand of 600,000 metric tonnes required for oil expressing and 200,000 MT required for livestock feed production with the gap filled by competitive imports of soya bean, crude oil and cake. Addressing competitiveness issues in the soya value chain is therefore critical to manage liquidity in the country and unlock the full potential of other agricultural value chains. This study assessed, and mapped the viability of the soya bean value chain in Zimbabwe with a view to identifying bottlenecks, policies and measures or strategies to enhance competitiveness of the subsector from primary production to processing through to the finished product. Findings were based on extensive review of literature and consultations with key stakeholders in the sector.

Results from the study identify several reasons for the poor performance along different segments of the value chain. Firstly, the low competitiveness of production inputs in Zimbabwe drives up the cost of soya bean production to regionally uncompetitive levels. These inputs include fertilizers, seed, and chemicals. Secondly, soya bean production is adversely affected by inefficient farming practices. Profitable and competitive soya farming depends on economies of scale. Farmers' limited knowledge on good crop management; inadequate farm mechanization and irrigation infrastructure however all affect productivity of local farms resulting in declining yields and increased transaction costs per unit output. This has resulted in uncompetitive break-even prices of locally produced soya products. Investment in farm infrastructure and world-class technologies along the value chain is therefore critical to develop a competitive soya bean value chain. With constrained public finances, private sector investment in Zimbabwe's agricultural sector is a must to drive growth. An unpredictable investment climate in the country's agricultural sector has however dampened such investment over the last decade.

Further, competition from other crops such as maize which receive high public investment, have crowded out private sector participation and created perverse incentives for players to prioritise maize production and distribution at the expense of weakly supported crops such as soya bean. Local soya yield trends suggest that declines in area of production results in declines in yield per area planted (Table 7). Experiences from other countries (e.g. Brazil and Argentina) highlight that a strategy of sustained increase in soya bean area production coupled with consistent application of modern input technology (e.g. genetically modified seed) yields positive results in achieving competitiveness of soya production. This is due to advantages of economies of scale realised. A government driven strategy to coordinate land use for various crops as part of an overall agricultural strategy is therefore key to drive competitiveness across the sector, including the soya bean sub-sector.

In Zimbabwe, low prioritization of soya bean production at both public and farmer level, has also resulted in market failures in support services such as extension and research; marketing; access to market information; and public investment in production. This has affected the predictability of supply in the domestic soya market and overall competitiveness of the value chain. From the processing side, the value chain also faces challenges that impact the viability and sustained competitiveness of value added products. These include inconsistent availability of raw materials; obsolete equipment; lack of access to affordable finances; high costs of production; weak linkages with other segments of the value chain; stiff competition from imports and regulatory issues. Increased imports of soya bean products dampen the demand for locally produced soya bean. Further, given that the soya value chain is driven by demand from the livestock sector, primarily poultry, increased import of chicken significantly reduces demand for local soya thus weakening the local soya to poultry value chain.

Analysis of various countries' experiences as well as the experience of other local commodity value chains reveals several lessons that can be picked for the development of a competitive soya value chain in Zimbabwe. Firstly, successful soya bean producing countries have strong public investment in agricultural infrastructure; technical capacity building; research and development and complementary policies in other agricultural crops. Leading countries in global soya bean production, such as USA, Argentina and Brazil, also have a long history of government interventions through investment friendly agricultural policy, economic and structural reforms. Argentina for example has witnessed dramatic increases in soya bean production and exports as a result of creating a more favourable environment for investment and growth. Unlike the USA and Brazil whose soya bean sector is destined for domestic consumption, Argentina's soya sector is mainly export oriented, resulting in the Argentine soybean chain now being the most integrated to world trade amongst all producer countries. A common thread identified among countries analysed is that dramatic increases in soya bean output result from increases in the resources used (land, human resources, capital) as well as from the introduction of new technologies (improved seeds, fertilizers, chemicals, no-till and other modern technological packages). Given that Zimbabwe possesses comparative advantage in land and human resources, implementation of a strategy to increase land used for soya production as well as improvements in the investment climate for the agribusiness sector could similarly yield dramatic increases in Zimbabwe's trade and export performance whilst facilitating inclusive growth in small towns and rural districts, given the integration of agriculture in such regions.

Lessons from other successful local value chains show that organised demand promotion; enhancing ease of doing business; export incentives and value chain financing are critical drivers of value chain competitiveness. In addition, institutionalisation of commodity value chains, inclusive participation of small farmers; and well-coordinated values chain players are other critical success factors. The cotton subsector for example rides on an institutionalised cotton value chain; provision of input and extension services through contract farming; and an established marketing arrangement. The well-coordinated dairy value chain actors established their own value chain financing through the creation of a revolving fund financed through surtax on imported milk, an innovative self-driven initiative to overcome access to finance constraints. Development of a commodity specific strategy and roadmap at national level has also been identified as critical in strengthening and building competitiveness along the value chain as evidenced in an analysis of the horticultural value chain in Zimbabwe.

Significant opportunities exist along the soya bean value chain to enable Zimbabwe to achieve self-sufficiency in soya production and net export of soya bean and associated by-products. Like Brazil, Zimbabwe has a comparative advantage in climatic conditions and availability of arable land for expansion of soya bean production. Further, sufficient supply of high yielding seed varieties, despite unaffordability by farmers, as well as human capacity advantages of highly educated and sophisticated farmers who require minimum investment in terms of input support and training, positions Zimbabwe well in developing a competitive soya value chain. Local and global population growth is increasing demand for livestock and Zimbabwe's resource advantages provide a good foundation to dramatically transforming the sector as occurred in Latin America, provided the country creates an enabling environment for agricultural investment.

Public and private sector players in the soya value chain could consider several recommendations to develop a regionally competitive industry and reduce long term reliance on imports. Implementing ease of doing business reforms within the subsector, streamlining of licencing costs and short-term support through introduction of investor friendly local content policies in the value chain could be considered to strengthen the sector. The soya subsector also needs institutionalisation to ensure a well-coordinated and organised value chain. Such arrangements will govern production and marketing of soya bean and address constraints related to training; input and output support; mechanisation; investment in productivity enhancing technologies and optimisation of land use. Government support to the agricultural sector through appropriate policies should include synchronization and consolidation of various commodity strategies and conclusion of the land ownership issue. Factoring implications of crop policy interventions in other sub sectors, and streamlining duplication in Grain Marketing Board (GMB) and Agricultural Marketing Authority (AMA) Acts are also necessary to avoid sector-wide market failures and increase the agriculture sectors's contribution to greater inclusive growth, industrialisation, increased export revenues and employment in Zimbabwe.

1. Background

Over the last decade, Zimbabwe's soya bean production has been on a declining trend (AMA) 2016). According to the Ministry of Finance and Economic Development the area under soya bean production declined by 46%, between the 2015/16 and 2016/17 agriculture season to 21651 ha[2]. Several reasons explain this suboptimal production performance. These include the harsh economic conditions; use of retained seed by 90% of the farmers; lack of adherence to recommended agronomic practices, low technical skills as well as limited access to capital and inputs. The national average yield per hectare (y/ha) was estimated to be 1.9 mt/ha in 2013 and only 0.5mt/ha for small holder farmers. This is considerably below that of high producing countries like Argentina which averages 3.4mt/ha. The decrease in productivity means that the gap has to be met by imports from neighbouring countries like Malawi, South Africa and Zambia. Not only has the country been heavily dependent on imports of soya but also crude oil, refined cooking oil and soya bean meal. Local production is just enough to meet 5% of the country's oil needs with the soya crude oil import bill hovering around US$119 million in 2016, an amount that is enough to produce 550,000 tonnes of soya bean. Currently, large scale commercial farmers are producing 65% whilst the smallholder farmers account for 35% of the national soya bean production (SNV, 2016).

According to the Ministry of Finance and Economic Development the area under soya bean production declined by 46%, between the 2015/16 and 2016/17 agriculture season to 21651 ha.

Soya bean is grown from November to March mainly in ecological regions 1-3 which receive annual rainfall of above 700mm. Though the crop does well under irrigation, most smallholder farmers cannot afford irrigation infrastructure and thus grow soya bean during the summer season as a rain fed crop. Soya bean farming is beneficial to farmers due to its high nitrogen fixation capabilities. This makes it perfect for rotation with crops such as maize and tobacco. It also reduces input costs for constrained smallholder farmers. However, few farmers grow soya bean on a regular and commercial basis with most farm production focusing on maize and cash crops such as tobacco and cotton. This crop mix is unlikely to change in the future if there are no deliberate interventions to promote soya bean production.

In 2010 Zimbabwe consumed an estimated 90,000 MT of soya bean cake and 165,000 MT of soya bean oil. However, 48% of the domestic soya bean cake consumption was met with imports which also accounted for 60% of the domestic market consumption of soya bean oil. Capacity utilization in the cooking oil sector stood at 10% before the introduction of SI 126 of 2014 and later rose to 40% after the introduction of SI 136/2014*(ibid)*. In 2015, the Government of Zimbabwe removed cooking

2 http://www.zimtreasury.gov.zw/index.php/treasury-quartery-bulletins

oil from the Open General Import Licence (OGIL) thereby reducing the quantity of imported cooking oil on the domestic market. The perennial high level of imports in the soya bean value chain in Zimbabwe reflects weak or broken linkages. Most actors undertake specialized activities with their functions only connected to a few links in the value chain. The stock feed industry remains the main driver of the soya bean value chain in Zimbabwe.In the fourth quarter of 2016, manufacture of poultry feed dominated the industry with a monthly average of 29,394MT (worth $16.8million) and accounted for 66% of all feeds produced by weight and 73% by monetary value (Zimbabwe Poultry Association, 2017).

a. Value chain concept

The World Bank (2010) defines value chain development as an "effort to strengthen mutually beneficial linkages among firms so that they work together to take advantage of market opportunities, that is, to create and build trust among value chain participants." The Food and Agriculture Organisation (FAO) defines value chain analysis as a description of activities within and around an organization, and relates them to an analysis of the competitive strength of the organization. Therefore, the value chain analysis evaluates the value each particular activity adds to the organizations products or services[3]. Accordingly, value chain analysis has been used to detect opportunities for growth and development associated with certain commodities, products and services. Value chain analysis breaks down the chain into its constituent parts to better understand its structure and functioning. The analysis consists of identifying chain actors at each stage and discerning their functions and relationships; determining the chain governance, or leadership, to facilitate chain formation and strengthening; and identifying value adding activities in the chain and assigning costs and added value to each of those activities. Thus, United Nations Industrial Development Organisation (UNIDO) has developed tools for value chain development and related challenges of fostering competitiveness, upgrading and clustering in sectors such as cotton and textiles, furniture, leather, agroindustry, energy, and others (UNIDO; 2011)[4].

The value chain diagnostic tool seeks to understand how actors in the value chain operate and coordinate their businesses to ensure that primary materials are transformed, stored, and transported and reach, in certain form and quality, end-consumers. The value chain diagnostics analyse the various activities carried in the chain and how these have effects on groups of people, e.g., regarding poverty reduction, employment, income generation, firm development, economic growth, or environmental sustainability.

BOX 1:
United Nations Industrial Development Organisation Value Chain Diagnostic Frame

For each of the diagnostic dimensions a sequence is followed which focuses on the objectives of the diagnostics, guiding questions, useful parameters, analysis of development opportunities and potential impact and sources of data.

Mapping: A Value Stream is the set of all actions (both value added, and non-value added) required to bring a specific product or service from raw material through to the customer. Value stream chain maps are the core of any value chain analysis presented in pictorial or diagrammatic format. Mapping is about drawing a preliminary visual representation of the structure of the value chain and detecting its main characteristics.

3 http://www.fao.org/fileadmin/user_upload/fisheries/docs/ValueChain.pdf

4 UNIDO (2011). Industrial Value Chain Diagnostics: An Integrated Tool. United Nations Industrial Development Organization (UNIDO). Vienna, Austria.

Diagnosing the Chains; the information gathered for each of the suggested parameters should enable the analyst to conduct three types of analyses: the first one is the interpretation of the current situation based on the status of value chain development in absolute terms and in relation to competing value chains. The second one is identification of main development opportunities reflecting on the existing possibilities to develop the value chains and the third one being able to reflect on possible impact scenarios.

End Markets and Trade; The ultimate consumer decides which products are purchased, therefore firms in any value chain need to consider demands of the end market to determine how best to sell their products and to understand the nature and quality of products they will be able to sell in the future. This section assesses the conditions in the end-market that determine production in the value chain.

Value Chain Governance; Value chains have a certain degree of coordination in which independent firms link to each other in networks or clusters to find ways to exchange products and knowledge to be competitive. The focus here will be on the power that buyers and suppliers exercise in the value chain, the coordination mechanisms that transactions and the flow of knowledge in the chain and the nature and quality of relationships firms maintain among themselves and with service providers and regulatory institutions. Dominant actors, coordination mechanisms and type of governance in the chain will be identified and the information used to reason about opportunities for skills development and upgrading of certain firms under the prevalent governance regime in the value chain.

Value Chain Finance: Firms require finance to run their daily business, expand operations and explore new markets and, as such, for a value chain to develop guaranteed timely access to adequate finance for all businesses in the chain is key. This section will provide for understanding of the supply of finance in the value chain, both from formal and informal sources, and to compare this with existing finance needs in the various segments of the value chain.

b. Objectives and justification of the study

Soya bean has uses for both human consumption and industrial purposes. In other parts of the world, the crop has helped countries increase inclusive growth and improve trade performance due to increasing global demand of soy and related by-product. Despite challenges facing Zimbabwe's soya value chain, opportunities lie in value addition; creation of linkages of the soya bean farmer to oil pressers.

Soya bean is important for Zimbabwe in that it has a high nutritional value due to its high protein and oil content. The crop is also used in food fortification as it doesn't change food taste and smell, can be ground into flour for use in bakeries and is also a popular meat substitute Texturized Vegetable Protein (TVP). Furthermore, soya bean is the main source of cooking oil for households in Zimbabwe and a critical input in many industrial manufacturing processes including paints, linoleum, oilcloth, printing inks, soap, insecticides and disinfectants and cosmetics, pharmaceuticals, paint, plastic, soaps and detergent industries. It can also be used in the manufacture of synthetic fibre, adhesives, textile sizing, waterproofing and fire-fighting foam.

The crop forms an important source of fertiliser for other crops. Soya bean production increases the level of nitrogen in the soil thus where crop rotation with soya is practiced, especially with cereals like maize and wheat, overall yields of rotated crops increase. In addition, the rapid rise in urbanization has over recent years increased the demand for poultry and pork products. Resultantly demand for stock feeds to which soya cake is a key ingredient has simultaneously increased. More so, the Government has recently implemented several support measures to the edible oil industry which include import restrictions on cooking oil and this has so far recorded some quick wins to the oil processors. Given these recent developments, a key window exists to strengthen the value chain and leverage opportunities to drive soya led industrialization, employment creation and food security as has happened in Latin America over the last few decades.

The main objective of the study was therefore to:

- Understand the current linkages that exist between the various soybean value chain actors;
- Understand the level of throughput at each value chain stage;
- Identify the enabling and inhibiting macro, policy, market and supply issues that impact; on effective linkages, throughput and competitiveness;
- Understand the cost drivers at each segment of the value chain;
- Suggest Policy measures and incentives key to sector revival;
- Learn from international best practice on the effective development of soya bean value chains.

Whilst some work has been done to understand Zimbabwe's soya bean value chain, a lot still needs to be explored particularly on the linkages and cost drivers at each segment to which this study will contribute.

c. Outline of the paper

The study is structured in the following manner. The first section gives an overview of soya bean value chain in Zimbabwe, focusing on the linkages and throughput at the various stages of the value chain. This is followed by the section on challenges and opportunities for the development of the soya bean value chain with particular focus on the strength, weaknesses, opportunities and threats in the soya bean value chain. These sections are followed by section on value chain strengthening, lessons learnt from other countries and the policy measures and interventions needed to support the revival and growth of the soya bean value chain.

2. Overview of soya bean value chain in Zimbabwe

a. Status of production and productivity issues

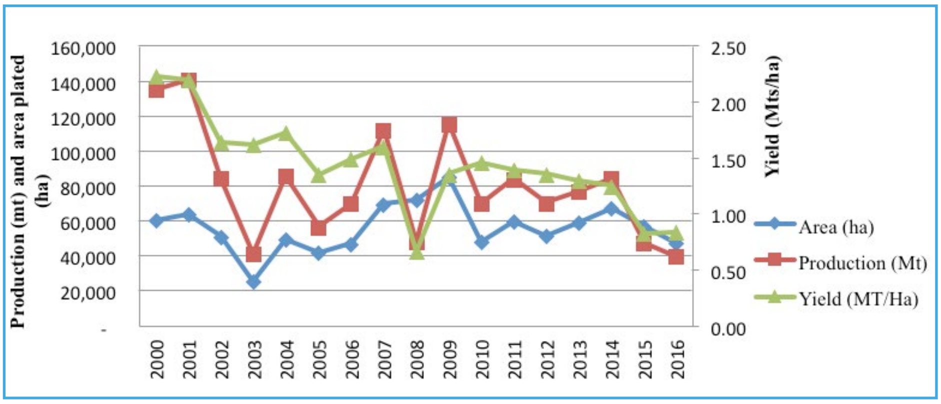
i. Soya bean production

Soya bean production is of high socio-economic importance in Zimbabwe due to its multiple linkages and industrial uses. It is also one of the country's most lucrative cash crops; resultantly it has been given a high priority inZimbabwe's Agriculture Investment Plan (ZAIP). The crop is grown mainly on A2 farms during the rain-season as a rotational crop with wheat (SNV 2016). From 1996, production rose with total harvest peaking at 140,763MT in 2001. Since then, production has steadily declined to a low of 47,755MT in 2016. Consultations with stakeholders revealed that in 2017 the industry is expecting to harvest around 25,000MT. This compares poorly with regional neighbours such as South Africa which harvested 741 500MT of soya bean in the 2015/16 growing season and expects to harvest more than 1 million tonnes in 2017[5]. Neighbouring Zambia is similarly expected to witness increases in production from approximately 267 490MT in the 2015/2016 season to 351416MT in 2017 . Zimbabwe's production therefore not only ranks poorly within the region but also falls far short of the national demand of 600,000MT required annually by local industry and short of the ZAIP 2017 target of 186,000MT.

...production has steadily declined to a low of 47,755MT in 2016. Consultations with stakeholders revealed that in 2017 the industry is expecting to harvest around 25,000MT. This compares poorly with regional neighbours...

Figure 1

Soya bean production, hectarage and yield between 2000 and 2016



Source: Agricultural Marketing Authority (2016) Zimbabwe Agricultural Statistical Report (2000- 2016)

5 https://apps.fas.usda.gov/psdonline/circulars/production.pdf; http://www.agriculture.gov.zm/index.php?option=com_content&view=article&id=357:cfs&catid=100&Itemid=154

ii. Soya oil and meal production

About 97% of soya bean processing is done using solvent extraction. Whilst 600,000 MT of soya bean is required to meet the country's soya oil needs, this is way higher than the quantities required by stock feed manufacturers, with a current consumption of 110,000-140,000 MT of soya bean equivalent. Hence it will be technically plausible for Zimbabwe to produce 200,000 MT of soya bean to meet the local animal feed requirement while at the same time allowing oil expressers to continue importing crude oil to augment local production.

Soya bean produces 30% of cooking oil nationally, and its oilcake, which is a by-product of oil extraction, is sold to stock feed manufacturers (SNV, 2016). In Zimbabwe, soya constitutes 18% oil and 78% cake. This means that greater part of soya bean is not oil. Soya bean residues are a basic ingredient in the production of certain stock feeds which are, in turn, essential to the production of monogastric animals such as broilers and pigs which cannot digest cotton seed meal[6]. Livestock production is highly dependent on soya as a source of protein with 70% of the stock feed going to the poultry industry, and 5% to pig production (LMAC, 2017). This implies the need for close linkages between the oil expressers and stock feed producers.

30%

SOYA BEAN PRODUCES 30% OF COOKING OIL NATIONALLY, AND ITS OILCAKE, WHICH IS A BY-PRODUCT OF OIL EXTRACTION, IS SOLD TO STOCK FEED MANUFACTURERS

Zimbabwe's soya strategy focuses mainly on oil extraction however unlike the case in other countries, e.g. South Africa, where the main product is cake. Between 2012 and 2014, South Africa increased investment in crushing plants as part of an import substitution strategy. These investments have driven new demand for soya beans. Over that period, South Africa's crushing capacity grew from 860 000MT to 1 340 000MT thereby boosting local soya production by 63%. The country is currently projected to produce more than 1 million tonnes of soya beans in the 2017/2018 agricultural season.

iii. Imports of soya bean products

The gap between local production and the national demand is met by imports mainly from countries in the region like Malawi, South Africa and Zambia. The country also imports crude oil, refined cooking oil and soya bean meal (see Figure 2).

5%

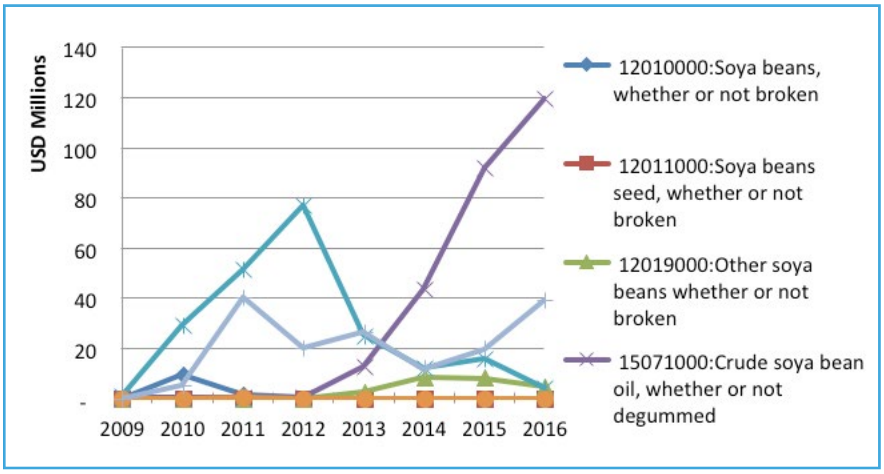
LOCAL PRODUCTION IS JUST ENOUGH TO MEETS ONLY 5% OF THE COUNTRY'S OIL NEEDS.

The domestic soya meal requirement for the stock feed industry is 105,000MT (134,000MT soya beans). In 2016, Zimbabwe imported 78,900MT of soya meal at a cost of $39.8 million. The average landed price of soya meal in 2016 was $599/MT. As the scarcity of foreign currency intensified at the end of 2016, local soya meal prices surged to $680/t in December 2016 (Zimbabwe Poultry Association, 2017).

Local production is just enough to meets only 5% of the country's oil needs. The current import bill of crude soya oil hovers around US$119.9 million; an amount sufficient to produce 550,000 of soya bean. Soya cake is mainly imported from mainly Zambia South Africa and Malawi, while raw soya is chiefly imported from Zambia and Malawi.

6 http://www.cfuzim.org/~cfuzimb/images/vatsoyapaper.pdf

Figure 2
Soya bean product imports between 2009 and 2016



Source: ZIMSTAT

The steep drop in cooking oil imports illustrated in Figure 2, is explained by import restrictions imposed by government on refined oil since 2014. This has seen local refined oil shelf space occupants sharply increasing to 95% from 15% in 2014 (Sukume, 2016). However, imported crude is still a major drain on foreign currency. For example, crude oil imports increased by 28,065% to US$119.9 million between 2009 and 2016(see Figure 2). This perpetuates low capacity utilisation of the country's crushing capacity as local manufacturers continue to value add imported crude oil to produce cooking oil. This is in comparison to regional countries such as South Africa which have prioritised import substitution strategies to stimulate domestic soya bean production, increase content of locally produced soya in processed products and save foreign currency.[7]

The expected 2017 output of 25,000 tonnes coupled with the tight access to foreign currency for crude oil imports implies that refined cooking oil and soya cake will be in short supply on the market. This notwithstanding, there is sufficient manufacturing infrastructure in the country to absorb up to 500,000 tons of production per annum. An opportunity therefore exists for Zimbabwe to implement an import substitution strategy in the soya sector to boost local production, increase supply of domestic crude oil, save scarce foreign reserves whilst meeting market demand for refined oil and soya cake. Increased supply of domestically produced cooking oil to 7 million litres/ month through resuscitation of oil expression industry is one of the key result areas under the value addition and beneficiation in the Zimbabwe Agenda for Sustainable Socio-Economic Transformation - ZimAsset (Government of Zimbabwe, 2013a). This is almost a third of the current installed capacity that can produce up to 20 million litres of cooking oil per month. Increases in soya bean production on farms and capacity utilisation of processors enables efficiency gains from economies of scale, thereby strengthening competitiveness across the entire value chain.

b. Mapping of the value chain-players and stakeholders

i. Current linkages between the various actors and sub actors

The soya bean value chain in Zimbabwe encompasses several actors and support service providers (see Table 1). The players in the value chain play important specialized functions which are heavily dependent on each other for the value chain to be fully effective in the value addition process.

7 http://www.grainsa.co.za/south-africa-s-soybean-industry:-a-brief-overview

Table 1
Value Chain players and activities

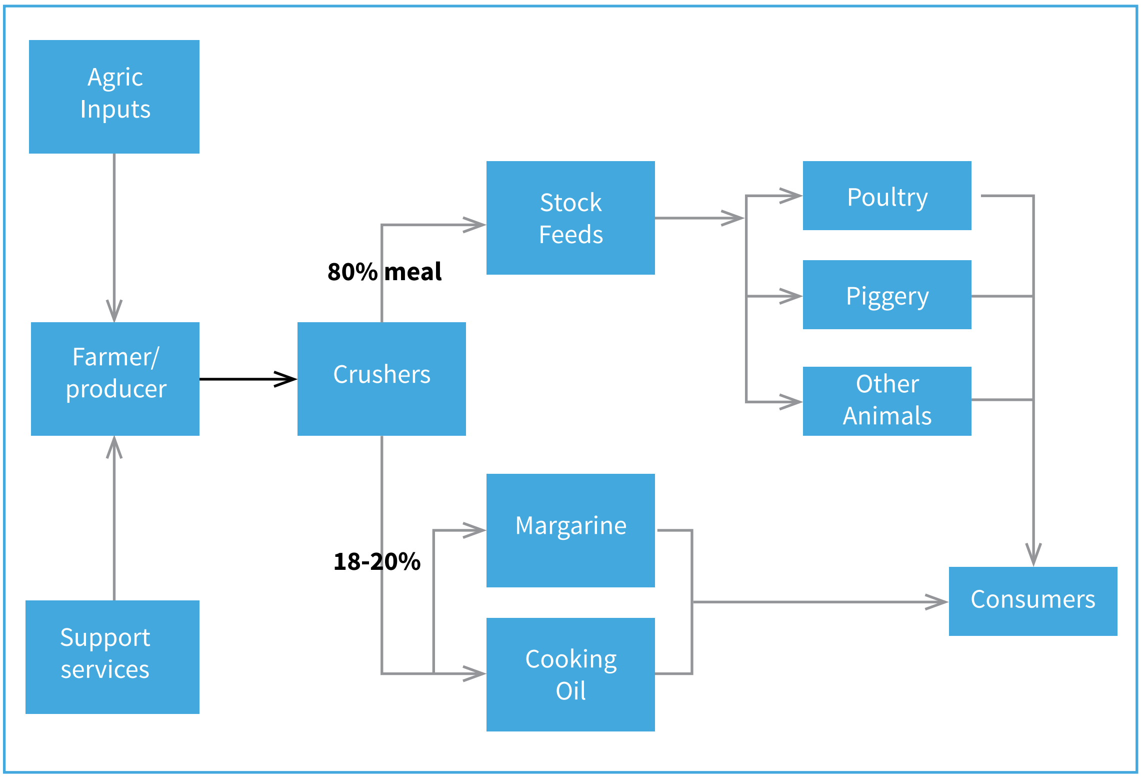
Level	Activities
Production, Input Suppliers and service providers	• At the various stages, goods and services include: land, labour, soybeans and meal, input suppliers for fertilizers and plant health products, transport, energy and finance. • Fertilizer manufacturers • Seed producers • Farm equipment manufacturers • Financial institutions • Extension services • Contractors • Knowledge brokers/ information providers (Met department, Emkambo, Ecofarmer etc) • Transport providers • Pesticides
Marketing	Primary producers may sell beans in three key ways: directly through a market, to a trader, or to a processor. Farmers and farmer organisations Grain traders Contractor Storage facilities (GMB and other private players) In Zimbabwe approximately 95% of all soya beans produced is destined for the processing industry to produce soya bean oil.
Processing	Soya beans processing by firms that manufacture edible or cooking oil and stock feeds. Farmers and other industry players at times also undertake toll crushing for their own use or resale. Oil seed processing is however capital intensive requiring specialized knowledge and state-of the art technology, which smallholder farmers cannot afford. The leading oil processors in Zimbabwe which include: Surface Oil Investments Pvt Ltd, Olivine Industries and United Refineries control 82% of market share of the edible soya bean oil market. On the other hand, leading consumers of soya cake/meal are animal feed manufacturers namely: National Foods(NF), Agrifoods, Fivet, Windmill, Capital Foods, Novatek and Triple C.
End market	*Human Consumption* • Soybean oil for human consumption • *Soya milk* • *Soya Flour* • *Soya bean fortified foods* • Soya bean cake extracts can also be used in the manufacture of consumables such as soya chunks for human consumption. *Animal Feed* Soya bean cake a by-product 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. Globally, only 2.5% of soya meal is used for human food and for industries other than animal feed. Cows consume 21% of the word's soya meal, pigs 25% and poultry 46%.

Farmers grow soya bean either on their own or through contract farming arrangements with oil expressers and animal feed manufacturers. For many years, all soya beans had to be sold to the Grain Marketing Board. However, since 1992, marketing has been decontrolled allowing farmers to sell freely to various purchasers within Zimbabwe. These buyers are however obliged to be registered by the Agricultural Marketing Authority of Zimbabwe. The demand for soya beans largely comes from the crushing or processing industries. This trend is similar in other countries. The increase in demand is predominantly from oil expressers and stock feed manufacturers. Increased demand for animal feed is largely because of increases in livestock production to meet increasing food demands. The demand for oilseed meal increases with the demand for protein feed induced by rising incomes and population growth.

The Value Chain Map

Figure 3 illustrates the linkages in the soya value chain map. The whole value chain depends much on the activities of the products or activities of its immediate predecessor and processes. In this regard, if the links are broken, they affect performance of the subsequent value chains. Nominally, the value of the product increases at each stage until it reaches the consumer (Figure 3).

Figure 3
Soya Bean Value Chain linkages



ii. Level of throughput at each stage of the value chain

The main driver of the soya bean value chain is the stock feed industry. The industry's current soya bean demand is estimated at between 110 000 –140 000 tonnes annually. In 2016, 51 539 MT of soya beans were crushed to produce 41 225 MT of local soya cake/meal. A total of 120 798MT tonnes of soya cake/meal was used in the production of animal feed and this accounted for an estimated 22.6% of the total raw materials used in feed production. Of the total meal used in the stock feed industry, only one third was produced locally with the balance imported from South Africa and Zambia at a cost of US47.3 million. In order to facilitate substitution of imported soya meal, strengthen the local value chain and meet the demands of industry, domestic production of soya beans would therefore need to treble.

The country produced an estimated 522,816 tonnes of animal feed in 2016 of which poultry feed accounted for 68%, in line with annual trends. According to the Stock feed Manufacturers Association (SMA) between the period 2012 and 2016 an estimated 69.3% of feed production was destined for poultry production and this has been attributed to the increase in poultry production and consumption[8].

Oilseed expressers are also one of the main consumers of soya beans. Approximately 95% of all soya bean seed produced in Zimbabwe is for the production of soya bean oil for human consumption and cake for animal feed[9]. According to Techno Serve (2011) 97% of soya bean processing is done using solvent extraction. This is a method where the soya bean is cracked, heated, flaked and the oil extracted by solvents to make a high-quality soya meal. Depending on the method of extraction soya bean crushing yields 80 percent meal and 18 percent oil for soya beans.

Due to increased investment in the oil expressing sector, there has been an increase in cake production and subsequently soya bean oil production through the solvent extraction method. The country's oil expressers currently processes approximately 10,000 tonnes of soya cooking oil per month against an installed capacity of supply 20,000 tonnes per month, thus oil expressers are currently operating between 50-60% capacity utilization[10].

Of the country's estimated soya bean demand, local production only accounts for an estimated 5% to 15% of the total requirement whilst the rest is met through imports. Thus, an estimated 120,000 to 180,000 tonnes of soya beans and soya bean equivalent meal/cake is imported annually, mainly from Zambia, Malawi and India. On the other hand, to augment the local soya bean oil production, crude oil is also imported from South Africa.

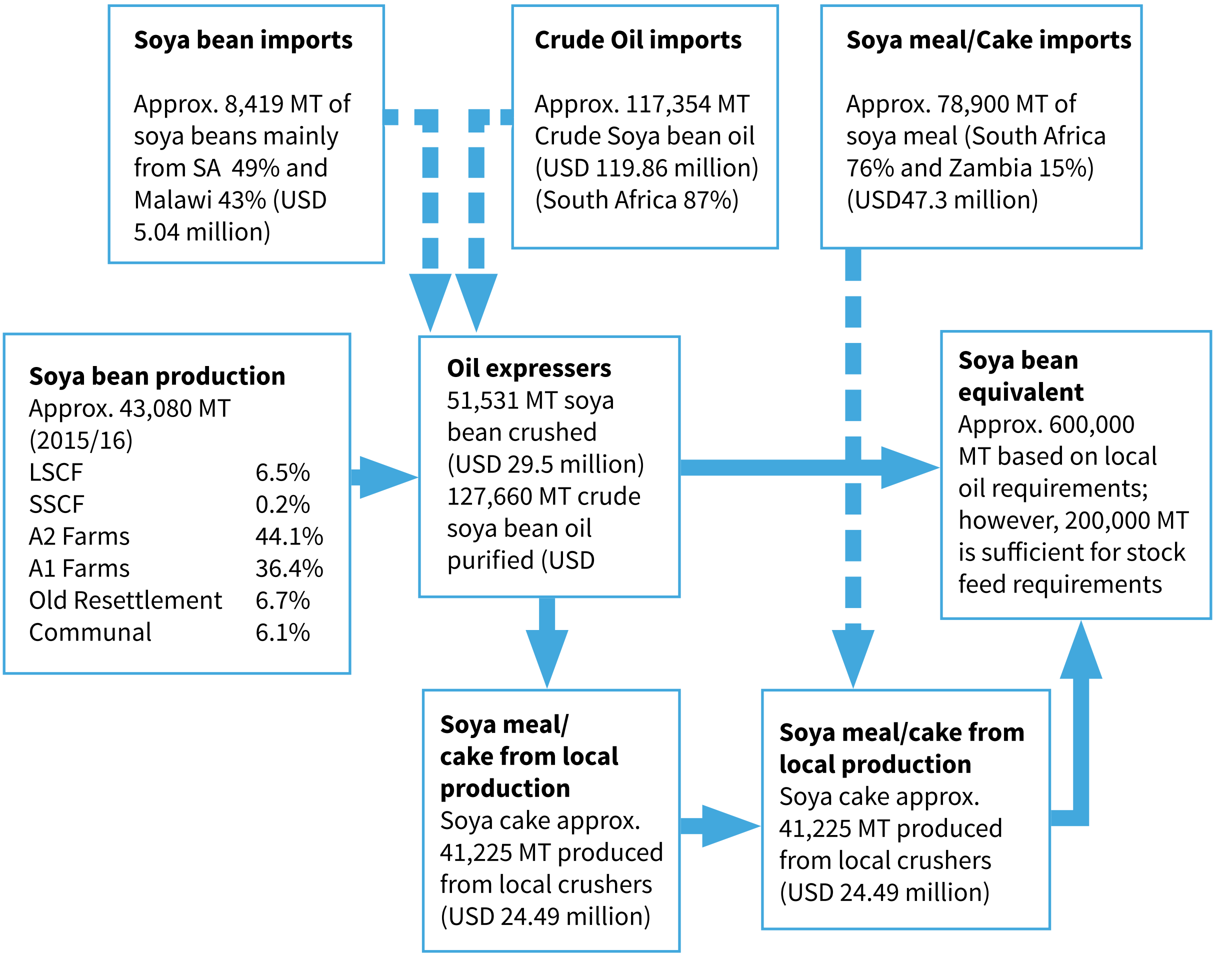
8 https://gain.fas.usda.gov/Recent%20GAIN%20 Publications/Annual%20Report_Pretoria_ Zimbabwe_10-31-2014.pdf

9 http://siteresources.worldbank.org/EXTMULTIDONOR/ Resources/Findings1-Agriculture.pdf

10 Cooking oil industry regains capacity, Newsday July 5 2017, https://www.newsday.co.zw/2017/07/05/cooking-oil-industry-regains-capacity/

Figure 4

Throughput at each stage of the value chain for the year 2016



Source: Adapted from Sukume (2015), ZimStat (2016)

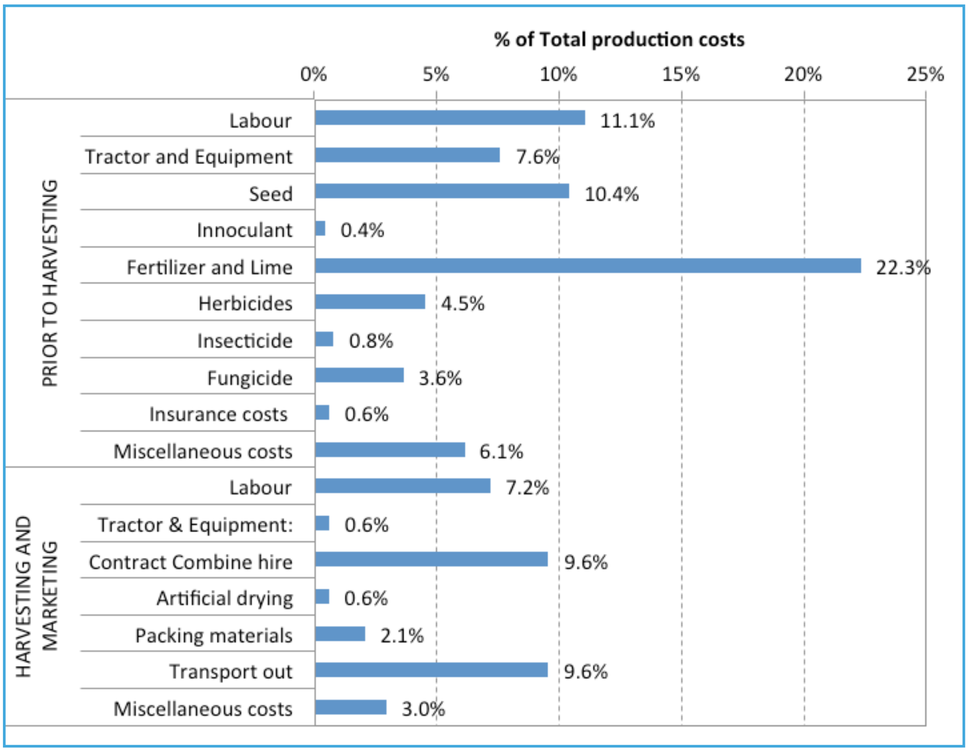
iii. Cost drivers at each segment of the value chain

Farm level

It has been estimated that the production of soya bean at farm level costs USD 1,141.5/ha. At current yields, this translates to USD$878.08/MT. In Zambia, the cost of production is estimated at USD$398/MT (Technoserve, 2011). Interesting to note is that historically, Zimbabwean soya was more competitive than Zambia driving exports into the Zambian market.

The current high cost of soya bean production in Zimbabwe is driven by inefficient farming practices, high cost of fertilizer and lime; labour costs; seed; hiring of combine harvesters and transport (fuel and transport costs). Fuel is an important input in agricultural production. Currently fuel tax in Zimbabwe is charged at 26% whilst that of neighbouring countries like Zambia is 9%. This significantly impacts competitiveness of Zimbabwean agriculture commodities. The high cost of seed has resulted in most farmers preferring to use retained seeds in their farming activities further compromising their yield potential. Farmers require 90-100kg /ha of soya bean seed compared to 25kg/ha in the case of maize. Soya beans require constant pesticide and herbicide application because they are prone to several diseases and pests. Figure 5 highlights the different inputs contribution to the production cost of soya bean at farm level.

Figure 5
Soya bean production costs



Close to half (43.8%) of the cost of production is explained by fertiliser and lime, labour and seed costs. Raising yield levels to those of comparator countries coupled with strategies to lower costs of fertiliser and lime, labour and seed would contribute to rebuilding Zimbabwe's competitiveness in its own domestic market and reversing the trend of high soya imports.
Given the low yield per hectare, the high cost of production pushes the breakeven price higher making it an unattractive crop to farm. The current national average yields per hectare of 1.3 tonnes per hectare are significantly lower than the yield potential of the soya bean varieties grown. The current break-even price of soya bean is greater than the import parity price making it more viable for processors to import cheap soya bean from neighbouring countries which have a landing price of between USD250 –USD 500 per tonne. The table below summaries the required break-even prices at various yields levels.

Table 2
Different break-even points at different yield levels

Target yield (ton/ha)	1.5	2	2.5	3
Average Selling price	570	570	570	570
Total Variable Cost (TVC)	1,141.5	1,271.30	1,352.64	1482.43
Break Even price/ tonne	761.01	635.65	541.06	494.14

Source: Zimbabwe Farmers Union

At current yields of 1.3MT/ha, Zimbabwe's soya bean is highly uncompetitive. In order to be regionally competitive, Zimbabwe needs to increase current yields by more than 20% and reduce costs by 30% - 50% to achieve yields of between 1.6 and 1.8 MT/ha and costs of between USD 480 to USD 810 per hectare.

Soya bean processing
Techno Serve (2011), estimated that processing costs of soya bean in the country range between USD 50 and USD 120 per tonnes. This has mainly been attributed to the lack of raw materials

and lack of improved technology which reduce production efficiencies. Production costs for Surface Oil Investment Private Limited which has the most recent and efficient processing technology in the country ranges from USD 50 and USD 80 per tonne whilst other players have costs of between USD80 and USD 120 per tonnes.

Manufacturers have been experiencing increased search/transaction costs in procuring soya beans. This is due to limited availability of adequate soya bean volumes and the lack of a formal trading system for the interaction of buyers and sellers. Soya bean processing is dominated by large scale millers who have been operating below capacity owing to the shortage of raw materials and foreign currency[11]. Whilst some large processors improved technologies some are still using old equipment that results in production inefficiencies and high production costs.

c. Soya bean by- products value chain

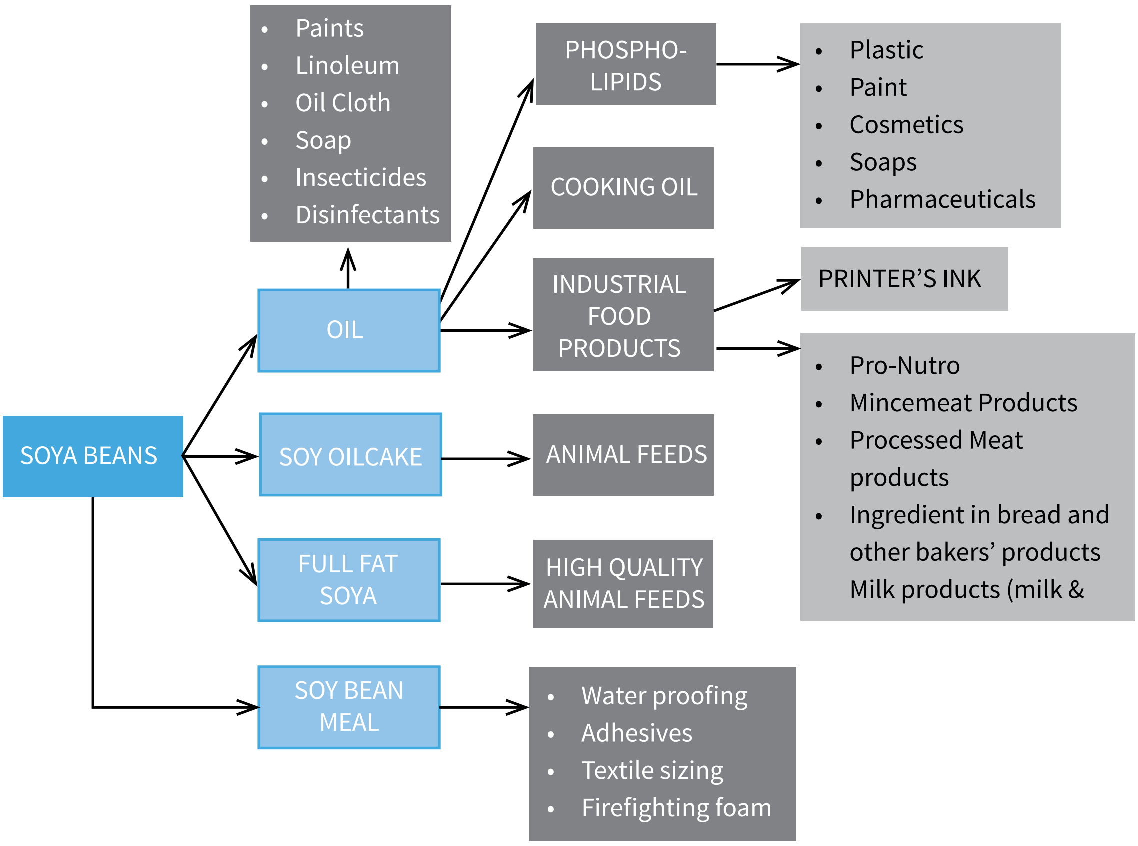
i. Extent to which the soya bean value chain is linked with other VCs

Industrial linkages

Soya production has strong industry linkages. The crop supports processing of value added products such as soya beans cake, soymilk, soy yoghurts, flour, margarine and soya beans oil(SNV 2016). Figure 6 below summarises some of the manufacturing products that can be produced from soya bean and its by-products.

Figure 6

Soya bean value chain tree



Source: South African Department of Agriculture, Forestry and Fisheries (2016)

11 Cooking oil industry regains capacity; https://www.newsday.co.zw/2017/07/05/cooking-oil-industry-regains-capacity/

Soya bean can also be useful in the production of additives, cereals and snacks. More so its edible uses include baby food, bakery products, beer, candy and cereals. In addition, soya gums, a product made from degumming of crude oil can be used to produce lecithins. These can be further processed to make alcohol, cosmetics, oil sprays, paint, margarine, butter, mayonnaise, coffee creamer, medicinal soya gums can also be used to produce emulsifiers like bakery products, candy, chocolate, coatings and ice cream. Reined soya oil can be issued to make mayonnaise, detergent, coffee creamer, medicinals, epoxy, caulking and compounds. Further processing of refined cooking oil produces shortening and lightly hydrogenated soya bean oil. Interesting to note is that many of the products listed have sought protection under the S.I 64 import restriction policy. As a raw material, the inclusion of soya bean in local content policies designed to stimulate local production of such products is necessary.

Linkages with livestock value chains

Views from the stakeholders revealed that Zimbabwe's soya bean value chain is most linked to livestock value chains like poultry, beef, dairy, piggery and pets. Moreso, soya bean is a key ingredient for bee and fish foods. It is a key ingredient to livestock feed to the extent that it constitutes 70% to poultry feed. The decreasing productivity of soya beans has a negative impact on livestock production (GoZ 2013). Therefore, development of the soya bean value chain will boost its production given the strong linkages between the value chains.

Linkages with other crop value chains

Soya bean is strongly linked to other crop value chains like maize and wheat where it is used in crop rotation for nitrogen fixation. Soybean is very critical for residual fertility. Stakeholders revealed that, 40kg of nitrogen are left per hectare implying that subsequent crops grown after soya use less basal fertilizer.

Biodiesel production

Global shortages and price fluctuations of fossil fuels and the possible impacts on the ozone layer have encouraged the developments of alternatives to natural fuels. Of plant-derived diesel feedstocks, soya bean yields the most of oil by weight, up to 20%. Soya has become the primary source of biomass-derived diesel in the United States and Brazil (McFarlane, 2011).

ii. Status of soya bean value adders (employment creation potential)

Major oil expressers include Surface Wilmar, Pure Oils, Olivine Industries, United Refineries and Willowton. Processing capacity is at 500,000 MT but capacity utilization is at 16% owing to limited supply of soya beans and forex for crude cooking oil imports. The use of old equipment by some processors results in production inefficiencies resulting in uncompetitive prices. Zimbabwe imports semi processed crude oil and refines it before it can be sold to the local market. Huge potential therefore lies in value addition and beneficiation of soya products. However, the level of soya bean manufacturing into diversified products is still low. Pursuing a strategy of a diversified soya value addition has huge potential in promoting industrialization in Zimbabwe thereby creating jobs. The scope for value beneficiation on soya bean by products needs further exploring to establish the level of demand for those products. There is still a knowledge gap among the farmers on how to process and utilize soya bean to enhance household nutrition and food security. In addition, investment in appropriate technologies for their manufacturing needs to be looked into.

3. Challenges and Opportunities for the development of the Soya Bean Value Chain

3.1 Challenges

Several reasons explain the suboptimal production performance of the value chain. This section highlights the challenges that explain low production at the input supply, production and processing levels.

a. Economic Issues

i. Input supply

Soya bean inputs include lime, fertilizer, herbicide, inoculants and high-quality seed. These inputs constitute 42% of the total cost of production of local soya bean farmers. The consistent supply of these inputs to the farmers is marred with challenges.

High input costs

Fertilizer

The bulk of fertilizers (compound L in particular) and chemicals are mainly imported as local production is insufficient to meet demand. Major cost drivers in input production are raw materials which constitute 70-80% of the total costs. Most of these are imported and are determined by international commodity prices. Fertilizer producers mainly import potash and gap fill on phosphorus. The other costs comprise labour, utilities and logistics. Utilities in Zimbabwe are not only costly but unreliable in supply (see pages 34 and 56 for power and water respectively). Further, the inefficient rail infrastructure in the country leads to missed production windows as stock takes too long to haul to the production plant.

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Availability of basal fertilizer like compound L, most suitable for soya bean production is also challenge. Farmers therefore end up using compound D. Further, uptake of rhizobium is therefore very low. Fertilizer and lime contributes close to one quarter of the total cost of production. Addressing challenges to accessing competitively priced fertilizer and lime represent a significant opportunity to reduce costs of soya production, increase yields due to greater fertilizer use and strengthen the competitiveness of local farmers in soya bean production.

Seed

Production of seed has been adequate in the last five years. The only challenge is the high costs of production which affects the price at which the farmer procures the seed. The cost drivers in production of seed are labour and utilities. Views from the stakeholders revealed that Government support in production of seed is in the form of inspection and certification. Further, the government facilitates importation of raw materials earmarked for research and development.

Chemicals

Views from the stakeholders revealed that several dealers participating in the importation of chemicals are importing generic products that provide insufficient levels of efficacy in weed and disease control. Inefficient weed and disease control raise production costs and decrease yields. This impacts the competitiveness of local farmers.

High cost of compliance

Seed movement across the borders is difficult. Regulation has created too much bureaucracy. Government institutions like AMA, plant quarantine, national biosafety, and Ministry of Agriculture get involved in issuance of import licenses and inspection thereby increasing seed shipment cost. The bureaucratic administration of the regulations coupled with high transaction costs involved are impeding the development of the soya bean value chain.

More so, compliance cost is exorbitant. For example, Fertilizer and Farm Feeds Regulatory (FFRI) Institute require a license for every fertilizer outlet. AMA requires every company trading in fertilizer to register for a fee. The registration used to be valid for 3 years, but it has been shortened to 2 years.

Table 3:
Examples of compliance fees that Fertilizer and chemical producers face

Regulator	Licensing	Cost of registering a product	Transport cost
FRRI	N/A	$300 initial registration fee for a chemical product. In addition, they charge $50 as an annual fee for renewal of registration.	N/A
FRRI	$200 fertilizer distribution license per outlet per year	$75 initial registration fee for a fertilizer product. In addition, they charge $75 as an annual fee for renewal of registration.	For officers to visit the outlets for compliance inspection. This is a hidden cost.
AMA	$200 annual fertilizer merchant fee		
EMA	$672 flat license fee for distribution of hazardous commodities per outlet per year		

Source: Interviews with stakeholders

Separately, EMA demands annually a flat fee license of $672 for every outlet that distributed fertilizer. The major challenge with EMA charge is that some of the outlets are not as profitable to be charged such high licensing fees. Further, it becomes burdensome for some fertilizer companies with nearly 50 outlets dotted around the country.

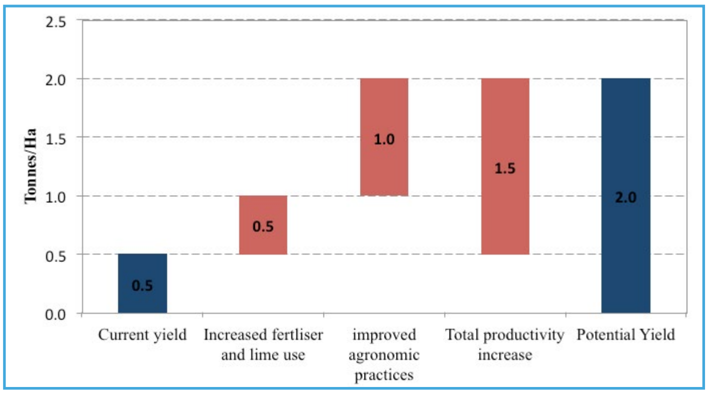
ii. Production

This soya value chain node has been identified by most stakeholders as the weakest. Some of the challenges the farmers face includes limited skills on farm management, economic decline, infrastructure, weak government support, competition from other crops and imports among other factors which are elaborated in this section.

Lack of knowledge on good crop management Soya bean yields are extremely sensitive to agronomic practices (particularly: management of soil conditions, timing of planting, spacing of rows, weeding, pest and disease management and timing of harvesting). A high standard of management of the crop is required to maximize yields per hectare[12]. Generally, commercial farmers have very good agronomic practices compared to their small holder counterparts. Varying production practices explain differences in yield whose average is 1.8 MT/ha among commercial farmers and 0.5mt/ha for the smallholder farmers (TechnoServe Zimbabwe (2011), see Figure 7).

Technoserve (2011) highlighted that improved agronomic services, will result in improved yield at farm level for smallholder farmers, they stressed that increased fertiliser and lime use will increase soya bean yield by 0.5 tonnes per hectare whilst improved agronomic practices by small holder farmers results in an increase in soya bean yield by an additional tonne per hectare. Thus, overall increased fertiliser use and improved agronomic practices will increase soya bean competitiveness[13].

Figure 7:
Smallholder farmer productivity improvement's scenario



Source: Techno Serve (2011)

Farmers lack knowledge about the physiology of the crop to guide them on how to manage it; appreciation of the plant population where poor germination is sometimes affected by inadequate moisture levels; depth of planting and irrigation requirements; time of planting to maximize on yields; weed and disease control; spacing and seed varieties most suitable for their farming regions. Further they lack knowledge on soil testing and lime use and rhizobium. In addition, farming systems have changed. Farmers used to practice crop rotation in production of maize, wheat and soya bean in Mashonaland west and central, the then prime area for soya bean production. However, the current farming system has turned to be more maize centric missing out on the advantages that crop rotation with soya bean brings in disease control and nitrogen fixation leading to low yield. The shift to maize-centric practices is because of current policies which create incentives for farmers to favour maize production over other crops.

The fact that 90% of the farmers use retained seed and do not apply the recommended agronomic practices on chemical use contribute to low yields. Farmers do not buy and use certified seed but rather retained seed. Certified seed is produced under supervision of experts and meets minimum standards and is more resistant to diseases as compared to retained seed. Use of retained seed leads to

12 http://www.cfuzim.org/~cfuzimb/images/vatsoyapaper.pdf
13 http://www.technoserve.org/files/downloads/technoserve-bmgf-zimbabwe.pdf

weak demand in certified seed leading to a disrupted input supply chain. Farmers cite high cost of seed as the inhibiting factor to purchase and use of certified seed whilst seed companies cite low demand. Affordable and innovative finance mechanisms are required to enable farmers to purchase certified seed that improves yield. These could include contract farming arrangement which avail seed on credit, warehouse receipt linked input support packs as well as the inclusion of soya seed in government backed input loan programmes e.g. Command Agriculture. There is need to ensure such programmes do no crowd out private sector participation to facilitate strengthening of the value chain.

Skills deficit is yet another challenge in Zimbabwe. An experienced farmer on irrigated land can expect to achieve an average yield of at least 2.2 tonnes per hectare. The highest national average yield recorded since 1980 was 2.280 tonnes per ha in 1999. The highest yields by individual farmers recorded in Zimbabwe in the past have been between 3.5 and 4 tonnes per hectare. The current low average national yields are to a large extent due to a skills deficit amongst the majority of soya bean producers[14]. Views from the stakeholders revealed that the new farmer cannot compare with the one that existed before land reform, they had the history of soya bean production in terms of skills, knowhow, well mechanized, access to irrigation infrastructure and modern technology. Moreso, the new farmer has no resources and the gap between him and the old farmer is very wide. Investment in training is a critical component of building competitiveness of the sector. Such training can be supported by Agritex, processors and other offtakers of soya bean to ensure consistency in quality standards of the crop.

Cost of doing business and access to credit

High costs of doing business. Major cost drivers in soya bean production include cost of inputs such as fertilizer, seed, herbicides, fuel and labour, all resulting in low yields as farmers cannot adequately procure them. For example, the cost of fertilizer is higher than that obtaining in the region. Cost of utilities also drive prices of inputs. Consultations with stakeholders revealed that fuel tax in Zimbabwe at 26% is higher than regional comparators like Zambia which has a rate of 9%. Soya bean is a labour intensive crop, hence high cost of labour, threatens the viability of soya bean production; erodes profit margins and competitiveness of the crop. Other costs the farmer faces are Rural District Council levies, repairs to roads, fences, and farm worker houses, Environmental Management Agency Licenses and the cost of maintaining fire guards, etc.[15].

License and permit compliance procedures also hinder competitiveness in the soya value chain. Currently, there are too many regulatory offices (for licensing and permit issuing) involved in the importation of seed including AMA and Ministry of Agriculture. Moreso, seed importation requires an import permit that is valid for just 3 months regardless of seeds' lengthy procurement procedures.

COST OF BORROWING MONEY IN ZIMBABWE IS HIGHER THAN ITS REGIONAL COMPETITORS

28%

AVERAGE LENDING RATE IN ZIMBABWE

10.2%

AVERAGE LENDING RATE IN BOTSWANA

9.5%

AVERAGE LENDING RATE IN ZAMBIA

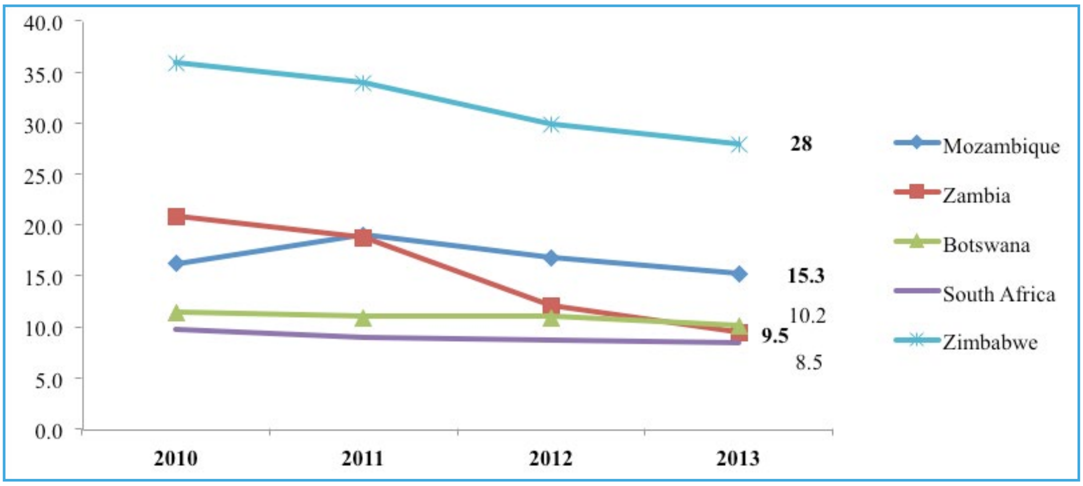
8.5%

AVERAGE LENDING RATE IN SOUTH AFRICA

14 http://www.cfuzim.org/~cfuzimb/images/vatsoyapaper.pdf
15 http://www.cfuzim.org/~cfuzimb/images/vatsoyapaper.pdf

Limited access to affordable lines of credit. Generally, farmers lack access to affordable lines of credit. SNV (2016) highlighted that smallholder farmers do not have access to financing windows. The cost of borrowing money in Zimbabwe is generally higher than its regional comparators (see Figure 8). In 2013, whilst average lending rate was 28% in Zimbabwe, that of Botswana, Zambia and South Africa was 10.2%, 9.5% and 8.5% respectively. Although efforts have been made to reduce it, stakeholders still consider cost of borrowing quite onerous.

Figure 8
Average Lending Rates, % 2010-2013



Source: IMF International Finance Statistics; the Economist Intelligence Unit as adopted in ZEPARU (2014)

Moreso, the agricultural sector is perceived as high risk. Farmers lack collateral, are associated with high non-performing loans and consequently banks become risk averse reducing credit available to the agriculture sector. Other issues relate to lack of knowledge of production cycles by financial institutions as evidenced by untimely or slow disbursements of loans as well as lack of knowledge of bank lending processes resulting in farmers not applying for funds far enough in advance for required disbursement. Soya bean yield is sensitive to planting seasons and if missed it negatively affects the farmers yield.

Contractors are not attracted to dry land soya bean production given the recurrent mid-season droughts that often threaten crop yield. In cases where they set up irrigation equipment, sink boreholes and construct dams, it may take 5 years before they recoup the capital invested. There is therefore need for a longer-term partnership that pays both the farmers and the contractor equitably.

Unsupportive regulatory environment

The current regulatory and policy environment does not support increased local soya bean production in the short, medium and long term[16]. Examples include VAT on soya bean. Soya bean is rated at 15 % VAT in Zimbabwe's customs and tariffs handbook. This is unlike in the case of other primary agricultural products like vegetables, fruits, maize, wheat, rice, sugar beans and sorghum that are zero rated. Thus, a farmer producing soya valued at least $5,000 exceeds the VAT registration threshold and must register and charge 15% VAT for soya bean sold. This negatively impacts on soya bean production and subsequently the whole value chain as it eats into the marginal profits of the farmer hence a disincentive for continued production and locks the country into import reliance. Even if the farmers are to pass it on to the consumers,

16 http://www.cfuzim.org/~cfuzimb/images/vatsoyapaper.pdf

they cannot afford increasing the prices further given the cheaper imports from countries like Zambia.

Irrigation infrastructure

Most farmers have challenges accessing appropriate irrigation infrastructure. In fact, use of irrigation equipment is 90% for commercial farms with challenges of old equipment and power outages (TechnoServe , 2011). Smallholder farmers solely rely on rain fed agriculture and are often at risk of mid-season droughts.

Weak support services

The provision of quality extension services is very weak. Agritex are under-resourced- in numbers, training and transportation to visit the farmers and provide the much-needed technical support (TechnoServe, 2011). Consultation with stakeholders revealed that agronomic services required in soya bean production are only extended to contracted farmers with seed houses providing limited technical services to the farmers.

Low public investment in soya bean production Soya bean production received limited budgetary allocations. Over the years, agricultural financing has been maize centric. Future plans to fund soya bean production exist however under the Command Soya Programme. Moreso, agricultural value chains financing envelopes such as the AGRIBANK $10 million facility need to be roped into soya bean value chain.

Poor farm mechanisation

Commercial farmers are highly mechanized (although 50% of the equipment requires upgrading) as compared to smallholder farmers with little or no equipment (TechnoServe,2011. Consultations with stakeholders revealed that limited access to appropriate and affordable harvest equipment particularly for small scale producers leads to harvest losses as soya tends to crack pods if harvested late. There aren't as many combine harvesters in Zimbabwe exerting pressure on the farmers who rotate maize with soya bean.

Competition from other crops receiving public investment

Soya bean faces competition from other crops such as maize. Consultations with stakeholders revealed that low production of soya bean in the last season is explained by farmers' shift into maize production driven by the favourable maize price of $390 to the farmers coupled with input support they received for the crop. The comparative increase in return on maize production resulted in fewer takers for soya bean given that it is easier to grow maize than soya. Soya yields are generally lower than maize yields (some maize varieties can yield up to 12 tonnes per ha) and requires less application of herbicides. Price of soya bean has always been double that of maize until maize price was set at $390 leading to a reduction in the price differentials. The cost of soya production per hectare is very high at about $550/ha accompanied by low yields thus making the crop unattractive.

Increased chicken and soya bean product imports

It was revealed through the consultations that there is over abundant competitively priced soya bean in the region. Soya imports from Zambia are landing in Zimbabwe at $250-$300/ton, half the local price of $500 which is more or less the break-even cost of production. Therefore, processers and other buyers find it cheaper to import soya bean than buying locally. Stakeholders highlighted that imports of chicken also contributed to dampened demand for stock feeds by poultry producers and consequently soya beans from local producers. There have been allegations of illegal imports of chickens which are competing with local produced chickens. To the extent that these imports of chickens adversely affect viability of local producers they also indirectly undermine the competitiveness of the soya value chain. Furthermore, high imports of crude oil further reduce demand for locally produced soya bean as well as the supply of soya cake.

Side marketing

Lack of honesty and integrity on contract farming always jeopardizes the farmer. The law is not adequate to safeguard side marketing (see section 7a for further details).

Poor policy implementation

Government's intention to support soya bean farming is expressed in Zimbabwe Agriculture Investment Plan (ZAIP) policy document. Its focus is on enhancing production, competitiveness and commercialisation of agricultural commodities that include soya bean through building the capacity of Zimbabwean farmers, service institutions, and private sector. Among other issues, ZAIP aims to build capacity for reviving production of irrigated wheat and soya beans, as rotational crops, to provide the raw materials for processing and the by-products for blending of livestock feeds (GoZ 2013). Constrained fiscal space has not allowed the government to realise some of these objectives. ZAIP expires in 2018 but has not been fully implemented.

Lack of market information and other issues

These relate to poor communication between value chain actors, high costs of accessing market information. Due to lack of market information on the part of farmers, unscrupulous intermediaries buy the produce at a very low price reaping the farmer. Local consolidation of soya crop from small holder farmers is very low in Zimbabwe hence it becomes unviable for the farmers to transport their small produce to better markets.

Desired production level to meet the national demand will be difficult to meet in the face of these challenges. Plans are however in place to set up an MOU (between?) to protect soya bean production.

iii. Processing

Unavailability of raw materials

Unavailability of raw materials for processors has been the major challenge highlighted by stakeholders. This has been exacerbated by lack of buying points to aggregate raw soybean volumes from smallholder production. Zimbabwe requires 134,000mt of soya to produce cake. Low soya bean production is a huge challenge as this translates to high stock feed costs particularly to the poultry, beef, piggery and dairy industries. This renders the livestock industry uncompetitive compared to neighbouring countries like Zambia and South Africa that are recording surplus production in soya bean. Processors have had to import cheaper crude oil from South Africa to sustain their operations, but this has not been easy with the scarcity of foreign currency.

Obsolete equipment

Despite efforts in investing in state of the art processing equipment, the industry still faces challenges in refurbishment of obsolete equipment some of which is more than 30years old. High cost of plant equipment particularly for some players except for Surface Oil Investment Private Limited and Wilmar, and scarcity of local supplies of specialised equipment lead to the use of outdated technology and old machinery as well as inconsistent cake and protein content.[17]

Lack of access to affordable finances

Processors highlighted high costs of production including input costs and utilities especially energy. The use of the strong currency has also been impacting on competitiveness of the processors.

17 http://www.tropicalsoybean.com/sites/default/files/The%20Soybean%20Agri-Processing%20Opportunity%20in%20Africa_ACET.pdf

Table 4: Non-Residential Tariff of Power by Level of Consumption (US Cents)

Commercial Level of Consumption (kWh) per Month   Industrial Level of Demand

Country	450	900	2 500	5 000	10 KVA	100 KVA
Mozambique	9.0	8.0	7.3	7.3	4.7	5.1
South Africa	11.4	7.7	4.7	4.7	2.7	2.7
Zambia	5.1	4.4	3.8	3.8	2.3	2.5
Botswana	7.7	7.2	6.8	6.8	3.3	4.0
**Zimbabwe	12.72	12.72	12.72	12.72	9.83	9.83

Source: ZEPARU (2014)

Weak linkages with other segments of the value chain particularly production.

Regulatory issues

Cooking oil is among products that government earmarked for fortification. However major challenges lie in the cost implication to the move. First is the scarcity of foreign currency to import the fortificants given that there is limited capacity for them to be produced locally. Second is the need for investment in appropriate technology for the fortification process. All these will render our products uncompetitive at a time the country is making huge efforts to ease the cost of doing business to increase export competitiveness of locally produced goods.

Stakeholders are of the view that Government protectionist policies are key drivers of growth for the processing. Once we grow more soya bean the scope for producing more cooking oil and soya cake is high. The main advantage boosting local production of soya beans is the strengthening of manufacturing capacity in the soya value chain as well as employment creation. There is need to investigate the potential of inclusion of the soya value chain in Government initiatives to drive locally produced products.

Liquidity crunch

Low foreign currency inflows over the years versus a huge import bill led to unavailability of foreign currency on the local financial market, much needed by processors. Access to foreign currency currently attracts a premium which increases costs for processors thereby reducing competitiveness.

iv. Soya bean marketing

High transportation costs, and poor infrastructure are key challenges that affect the retailing of soya bean and its products.

Table 5

Summary of challenges along the soya bean value chain

Input supply	Soya bean production	Processing
• Non-availability of inputs • Heavy reliance on imports • High cost of inputs • Non-reliable rail transport leading to high logistical costs • High cost of compliance • Bureaucratic procedure in movement of soya seed across borders	• Lack of knowledge on good crop management • Limited lines of credit and high costs of doing business • Irrigation infrastructure • High input costs • Weak support services • Lack of market information • Low public investment in soya bean production • Poor farm mechanisation • Competition from other crops • Increased soya bean products and chicken imports • Regulation • Side marketing	• Unavailability of raw materials • Obsolete equipment • Lack of access to affordable finances • High costs of production • Weak linkages with other segments of the value chain • Stiff competition from imports • Regulatory issues

b. Legal and policy issues

Marketing of soya bean and soya bean products

Through Statutory Instrument (SI) 140 of 2013, Agricultural Marketing Authority (Grain, Oilseed and Products) it is a statutory requirement that buyers, brokers, contractors, processors and traders of Grain and Oilseed Products be registered with the Agricultural Marketing Authority. The same regulation also requires that all purchase of contract and non-contract grains and oilseeds be registered. SI 140 of 2013 requires the standard classification and quality of grains oil seeds and products[18]. Thus, merchants and processors are required to pay USD1000/ year with AMA for them to be able to purchase and import soya bean in the country. Furthermore, producers of animal feed must be registered with the Fertilizer, Farm Feeds and Remedies Institute (FFRI) under the ministry of agriculture.

Importation of Soya bean

Statutory Instrument 8 of 2015 (SI 8/2015) on Food and Food Standards (Import and Export) regulations requires that those who wish to import grain in the country should meet the following requirements that is the grain should go through a pre-shipment inspection from the Plant Quarantine Services (PQS) to establish if the imported grain is free from pests and diseases. Mandatory requirements for grain importers prescribe that grain should be fumigated and the shipment should be accompanied by a fumigation certificate and a Phyto-sanitary certificate[19]. Thus, importers will have to pay USD 50 fee with the Plant Protection Department every time they wish to import. Fumigation and Phyto-sanitary certificates to prevent the international movement of particular pests are mandatory for all countries under the WTO Sanitary and Phytosanitary Agreement.

On the other hand, there are also customs procedures that must be followed for the Importation of Grain into the country and this includes an importer obtaining a permit from the Ministry of Agriculture Mechanization and Irrigation development (MAMID) which outline and include quantity and type of grain to be imported. The import permit will be issued on the recommendation of AMA outlining that there is need to import soya bean. The import permit costs USD70 and is valid for a 3-month period. Furthermore, the importation of grain and soya bean related products is subject to various tariffs (Table 5).

Table 6
Customs Duty and VAT charges in the SADC and COMESA region

	Customs Duty			VAT	SURTAX		
	General	COMESA	SADC	VAT	General	COMESA	SADC
Soya bean seeds whether e broken or not	5	2	0	15	0	0	0
Other soya bean whether broken or not	5	0	0	15	0	0	0
Soya bean cooking oil	40	0	0	0	15	2	0
Expoxidised soya oil	10	5	30	15	15	0	0
Oil cake and other solid residues	5	0	0	15	0	0	0

Source: Moyo S et.al (2014)

18 SI 140/2013 http://veritaszim.net/sites/veritas_d/files/SI%202013-140%20-%20Agricultural%20Marketing%20Authority%20%28Grain%2C%20Oilseed%20and%20Products%29%20By-laws%2C%202013.pdf

19 Statutory Instrument 8 of 2015 (SI 8/2015) on Food and Food Standards (Import and Export) regulations http://www.cfuzim.org/~cfuzimb/images/si815foodregs.pdf

Genetically Modified Organisms (GMO) regulation

The Government of Zimbabwe has a longstanding policy against the production and consumption of genetically modified (GM) crops for human and animal feed based on the potential threat that genetically modified organisms (GMO) pose to the local environment. The country is a signatory to the Cartagena Protocol on Biosafety to the Convention on Biological Diversity which it ratified in 2005. The protocol seeks to protect biological diversity from the potential risks posed by genetically modified organisms resulting from modern biotechnology. The government established the Biosafety Board through the National Biotechnology Authority Act [Chapter 14:31] supported by Statutory Instrument 20 of 2000 on Biosafety Regulations, to approve the safety of imports of genetically modified grain and grain products. The production and consumption of genetically modified soya bean varieties is restricted if not prohibited in Zimbabwe[20]. The government has adopted a precautionary approach were a threshold level of 1 % for technically unavoidable presence of GMOs in food and feed is allowed. Thus, products with less than 1% GM traces are not considered GMOs[21]. Techno Serve (2011) and industry players have highlighted that the ban on GMO crop production and imports have resulted in Zimbabwe's soya bean cake being less competitive against GMO soya bean cake which is usually 10% cheaper than non-GMO, hence resulting in reduced input costs in the production of stock feeds. In the absence of GMO technology, Zimbabwe needs to find ways to significantly reduce production costs to gain competitiveness in a market that trades GMO soya products. In addition, non-GMO soya markets are a growing trend globally. Countries such as Brazil produce non-GMO soya bean which attracts a premium on global markets. A soya bean strategy targeting such markets could help increase viability of Zimbabwe's soya value chain and offset the lower yields expected in non-GMO production.

c. Support Services

Support services for soya bean production are mainly provided for by the government and the private sector. The Government of Zimbabwe provides support service to soya bean farmers through the Ministry of Agriculture Mechanization and Irrigation Development; the ministry provides policy support as well as operational support. In this regard the government formulated the Comprehensive Agriculture Policy Framework covering the period 2012 to 2032. The policy intends to achieve a prosperous, diverse and competitive agriculture sector, ensuring food and nutrition security that significantly contribute towards national development. The policy targets US$36.1 billion to support various agriculture activities which include crops, livestock, irrigation and development, mechanization and agriculture support services. Crop production is expected to account for an estimated 77.03% of the long term budgetary requirements. Soya bean production has been allocated on average 3.8% of financial support towards crop production, an indication that the government of Zimbabwe is not prioritizing soya bean production despite it being a strategic crop (Table 6). Several policy documents exist that attempt to address soya production. There is need for a comprehensive strategy that streamlines the objectives of the multiple soya policy documents and facilitates coordinated implementation.

20 National Biotechnology Authority ACT, http://www.vertic.org/media/National%20Legislation/Zimbabwe/ZW_National_Biotechnology_Authority_Act.pdf

21 http://archive.kubatana.net/docs/legal/calr_law_development_bulletin_issue_02_130507.pdf

Table 7
Agricultural Sector Budgetary Requirements for (Medium to Long Term)

	Year					
	USD '000					
	2012	2013	2014	2015	Mid Term	Long term
Crops	**1,505,197**	**1,029,882**	**1,326,250**	**1,576,736**	**4,438,065**	**27,807,197**
Maize	*23.9%*	*35.9%*	*28.7%*	*24.7%*	*33.8%*	*23.8%*
Wheat	*1.5%*	*3.6%*	*3.5%*	*4.7%*	*4.1%*	*4.6%*
Small Grains	*4.3%*	*6.6%*	*5.5%*	*5.1%*	*6.5%*	*5.0%*
Tobacco	*26.3%*	*39.0%*	*32.7%*	*32.5%*	*39.3%*	*31.3%*
Cotton	*14.4%*	*23.3%*	*19.0%*	*16.1%*	*21.7%*	*16.1%*
Soya bean	*1.8%*	*3.5%*	*3.5%*	*3.9%*	*3.9%*	*3.8%*
Sugar	*6.6%*	*11.7%*	*9.9%*	*8.3%*	*10.9%*	*8.0%*
Horticulture crops	*4.0%*	*6.2%*	*6.6%*	*7.6%*	*7.5%*	*7.3%*
Production of minor crops (beans, cassava, rice ground nuts, Bambara nuts)	*0.0%*	*0.1%*	*0.1%*	*0.1%*	*0.1%*	*0.1%*

Source: Government of Zimbabwe (2014) Comprehensive Agriculture Policy Framework

Extension services

Provision of extension services is mainly provided for by the agricultural technical and extension services (AGRITEX) whose mandate, is to provide technical and advisory services, regulatory services, farmer training, food technology (including post harvesting processing and product development) dissemination of technologies and provide market oriented extension for sustainable farming. Soya bean farming by smallholder farmers is mainly constrained by the lack of technical knowledge.

The usage of the recommended input in appropriate quantities is very low among smallholder farmers. Soya bean is a relatively new crop for many smallholders, thus initiatives to bridge the knowledge and experience gap is key to enhancing production of the crop by smallholder farmers. As previously alluded, smallholder farmers adopt poor agronomic practices and inadequate usage of inputs[22]. Inevitably this has undermined soya bean production by these farmers, despite the immerse potential that exists to produce soya bean by capacitated small holder farmers. Extension services and incentives for crop production have mainly been maize centric. Similar emphasis, incentives and investment in extension services need to be extended to production of, other crops including soya beans[23]. Government supported extension services are however constrained by inadequate resources and personnel, with current extension worker: farmer ratio of 1:300 considerably high hence hampers effective knowledge transfer[24].

On the other hand, extension services by the private sector are mainly commodity-based extension which put much focus and emphasis on cash crops such as tobacco, cotton, sugar cane and horticultural products.

Access to Finance

Soya bean production in Zimbabwe has largely been financed by contractors mainly cooking oil producers and stock feed manufacturers. However, SNV (2011) noted that smallholder farmers interested in soya bean production do

22 http://www.technoserve.org/files/downloads/technoserve-bmgf-zimbabwe.pdf

23 The agricultural extension system in Zimbabwe, http://www.fao.org/docrep/005/AC913E/ac913e05.htm

24 http://tasai.org/wp-content/uploads/Zimbabwe-brief-final.pdf

not have access to finance, hence only small scale and large commercial farmers are able to access finance for soya bean production. The contractors have been pursuing contract farming arrangements, targeting specific farming groups with inputs provision. The main challenge with contract farming has been side marketing, failure to repay the inputs advanced and fulfilling contractual obligations.

Research and Development

Private seed houses are actively engaged in the development of different soya bean varieties, thus there are about 10 varieties of soya bean seeds available on the market from three seed houses. There are estimated 7 active breeders for soya bean seeds, 6 private and one government institution. One private firm is estimated to control 67% of the domestic soya bean seed market (TASAI; 2015). Furthermore, the Government of Zimbabwe through the Ministry of Agriculture; Grasslands Research Institute is involved in the production and development of the critical inoculant (Rhizobium) in the production of soya bean. Rhizobium is critical in the growing of soya bean as it reduces the amount of Ammonium Nitrate (AN) fertiliser required to grow a hectare of soya bean. Approximately, 100 grams of inoculant can be used instead of 4 bags of AN fertiliser.

Marketing

The lack of a vibrant market, particularly at the farm gate level, affects and reduces the viability of soya bean production (Moyo S et.al 2014). The market for soya bean is not as organised as markets for tobacco and cotton. The trade in soya bean is regulated by the Agricultural Marketing Authority through Statutory Instrument (SI) 140 of 2013 which seeks to protect farmers from being exploited and duped by unscrupulous merchants. However, besides the Grain Marketing Board (GMB), there is no centralized buying point for soya beans, farmers must approach individual processors and buyers with their crops which increases transaction costs and reduces competitiveness of soya farming. Resuscitation of farmers' associations could assist in aggregation and collective marketing of soya bean, improving access to raw materials by processors and organised markets for farmers.

Access to appropriate harvesting technology
The soya bean crop is harvested when the pods are mature (brown or dry). Leaving the crop in the field for too long makes the pods too dry and the beans may shatter during harvest. Most farmers usually suffer post-harvest losses due to poor handling of the produce at harvesting times, hence harvesting requires appropriate equipment such as combine harvesters for large farmers. Smallholder farmers need to be trained on harvesting techniques and equipped with appropriate technology that is consistent with their scale of production. The degree of losses incurred depends on the harvesting technique and the efficiency of the technology used. In Zimbabwe most of the commercial crop is harvested with combine harvesters. Some farmers with access to a large pool labour resort to harvesting by hand. It should also be noted that the harvesting technology available is beyond the reach of most farmers hence the need for sourcing or development of appropriate technology to reduce losses during harvesting. Boosting production of soya beans will also create business opportunities for the engineering and steel value chain to produce harvesting machinery and hay balers. Inclusion of locally engineered harvesting technology as part of the Command Soya Bean programme could facilitate increased efficiencies and hence competitiveness of the value chain.
Also given that rhizobium requires refrigeration and a cool environment, this limits its use by farmers without refrigeration facilities, prejudicing such farmers of the nitrogen fixation benefit opportunity to increase their yield potential. However, the government can develop the required cold chain by equipping some AGRITEX offices with refrigeration and use their extensive network to distribute the inoculant to all soya bean farmers.

d. Opportunities

Soya bean exhibits huge potential as a driver of an inclusive industrialization agenda. This is supported by potential factors highlighted below.

i. Availability of arable land

There is enough land available to meet demand as most of the land previously planted with soya remains unused *(TechnoServe, 2011)*. For example, hectarage allocated for soya bean production fell by 34.2% from 60,650ha in 2000 to 39,935 ha in 2016 (AMA, 2016). This could translate to around 151,625 MT of soya bean if the country were to utilize the hectarage for the year 2000 assuming an average yield of 2.5mt/ha.

ii. Sufficient supply of seed though farmers lack funding to access them

There is sufficient supply of seed, but farmers lack funding to procure adequate supplies. According to SNV, farmers need 100kg of certified seed per hectare.

iii. Highly educated and sophisticated farmers who only need input support and short-term training

Farmers in Zimbabwe are educated and sophisticated and can farm soya effectively given credit, inputs and training (TechnoServe, 2011). Views from the stakeholders revealed that Zimbabwe exhibits willing and able growers. Basic skills to produce 1 tonne/ha exist. Farmer capacitating programmes need to be a continuous process bringing in new concepts and new faming technics in line with changes around the globe.

iv. Regional and international export opportunity

Local manufacturers have capacity to produce up to 20 million litres of cooking oil per month, which is almost double the national requirement.[25] Zimbabwe used to export soya bean to regional countries but lost that opportunity. The country can strategize on regaining its export market but needs to be competitive. Further, we need to take note that other countries scaled up production of soya and its products hence the country needs to brace for the competition on the regional markets by addressing production costs, yields and standards requirements for target markets.

v. Rising demand for soya

Availability of a ready market and a supply gap that is filled in by imports is a huge opportunity for soya production in Zimbabwe. What is needed is to boost production as we scale down on imports of soya meal and crude oil to stimulate local demand for locally produced products. Further, demand for soya is going up both locally and regionally driven by poultry and piggery, dairy and beef. Simply processing soybean into oil and cake does not offer very large returns but conversion of soybean protein to poultry meat is a key opportunity for value addition.[26] In 2016 for example, the total broiler meat production, inclusive of informal production, was estimated at 118,000mt, with a 70% contribution from the smallholder sector (LMAC, 2017). This translates to about $330.4 million when sold at the average whole sale price of $2.80/kg or $413 million when sold at an average retail price of $3.50/kg. In this regard increasing the viability and productivity of soya beans will trigger multiple value chains in the food processing and livestock industries.

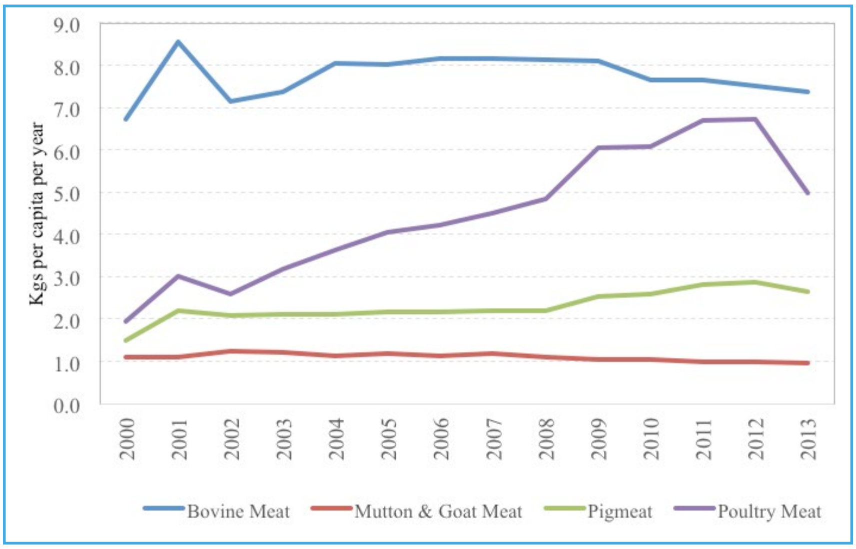
The growth of the local markets has mainly been in the small-scale poultry production. Further, urbanization and the up surge in the middle class increased the demand for protein. Poultry is the cheapest source of meat based protein compared to beef and pork whose prices have gone up significantly. Hence there has been a growing consumption of poultry relative to other sources of animal protein (Figure 9).
Capacity utilisation in poultry is 75%. There is huge untapped potential since per capita consumption of chicken in Zimbabwe is low (9kg) compared to that of other countries which is around 35-40kg.The livestock industry is poised for growth and soya is a major protein source hence there is scope for higher demand for soya bean.

25 http://www.financialgazette.co.zw/cooking-oil-industry-regains-market-after-import-ban-mulls-corporate-farming/

26 http://www.tropicalsoybean.com/sites/default/files/The%20Soybean%20Agri-Processing%20Opportunity%20in%20Africa_ACET.pdf

As of 2016 it is estimated that consumption of poultry meat and products in Zimbabwe ranges around 8.6 kgs per capita and 48 eggs per year, thus rising incomes and growing populations increase scope for consumption of poultry meat and products hence translating into high demand for feed and subsequently soya bean.

Figure 9
Trend in Meat consumption Zimbabwe (2000-2013)



Source: FAO Food Balance

Stakeholders were of the view that if the oil expressers and stock-feed producers fail to absorb locally produced soya beans the potential for exporting soya bean in the region is also high provided our exports are competitively priced. Lowering the cost of production, increasing productivity and soya production volumes is key to achieving export competitiveness.

STOCK FEED MANUFACTURING IS CURRENTLY NOT AT FULL CAPACITY

POTENTIAL FOR 1.5 MILLION TONNES ANNUALLY

CURRENT PRODUCTION 530,000-540,000 MT/YEAR

However, stock feed manufacturing is currently not at full capacity. The sector has the capacity to produce 1.5 million tonnes/year, but current production is between 530,000 to 540, 000mt/year. Performance of dairy and beef farming which is still to recover fully is a key driver of the demand for stock feeds. Broiler producers produce between 112,000 to 114,000mt of meat per year while the country produces around 48 million dozen of eggs /year. Some stakeholders observed that there is growing interest in Zimbabwean poultry by the Chinese which induces further demand for soya based or enriched stock feeds. Consultations made with stakeholders revealed that Zimbabwe's annual production will serve just a meal for the Beijing population (around 22 million) implying a huge market opportunity for Zimbabwe.

Production of competing oil crops like cotton increases competition for oil expressing but soya cake remains the dominant ingredient in the production of poultry stock feeds. In 2016, about 323 tonnes of cottonseed hulls and 532 tonnes of cottonseed cake were used as a raw material by the stock-feed manufacturers. While cotton seed is a source of high protein for feed, it is not suitable for poultry, as it contains a substance called gossypol, which is an anti-nutrition factor. As a result, feed from cotton cannot be used for poultry and pigs, even though it is used for cattle feed. While it is possible to engage in some transformation to remove the gossypol, the costs involved would not be worth it as alternative sources such as soya exists which are even cheaper. This also limits demand for cotton cake as poultry together with piggery would constitute the bulk of the animal feed industry

For example, National Foods estimates that out of the 150,000 tonnes per year of feed that the company produces, about 53% would be for poultry, 40% for beef and dairy while the remaining would be for other feeds. At Agrifoods and Profeeds, food for ruminants only constitutes about 30% and 20% respectively of the total feed production, with the bias being towards non-ruminants, especially poultry. This stock-feed demand pattern underlines the need to invest more in promoting and boosting production soya bean a key component in stock feeds.

vi. Growing population

Zimbabwe's population is growing and soya bean being a food security crop gives it scope for increased demand. The 2012 national census estimated the country's population at 13.01 million[27] and the UN projected the country's population at 15.97 million[28] in 2016.

vii. Soya bean value addition yet to be exploited

Opportunities for processing of soya bean into diversified products are yet to be explored in Zimbabwe. The manufacturing sector is likely to take soya on board given that it has multiple uses. As high as 78% of the expressed product is cake that can be converted to diverse industrial products. New technologies can be introduced to smallholder farmers to encourage oil pressing and use of soya bean as a food security crop. Lessons from South Africa and Brazil demonstrate that establishing policies supportive of the domestic processing industry and soy oil production can boost competitiveness on global soya markets, save and generate foreign exchange, key objectives for Zimbabwe. Using such domestic processing focused strategies, Brazil trebled production between 2000 and 2017 to 102million MT and increased exports to China alone from US$537.67 million in 2001 to US$14.39 billion in 2016.

viii. Command Agriculture

This Government initiative provides cheap inputs and a guaranteed market. Although it is a short term measure it will go a long way in boosting soya bean production. A gap exists however in support for harvesting equipment. A more sustainable programme needs to be rolled out to boost soya bean production and value addition in Zimbabwe. A long term local content policy to support the development of a comprehensive strategy for locally produced soya bean and by-products is required.

ix. Opportunities in R&D in seed varieties

Consultations with stakeholders revealed that local seed houses have some of the best seed varieties in Africa. Although the basic structure is there, plenty of opportunities in R&D still exist especially those geared towards enhancing yield.

x. Non-GMO policy

The Non-GMO creates niche markets for Zimbabwe given the growing health concerns among consumers around the globe on GMO foods. Japan, European Union and China are some of the niche market Zimbabwe can consider. Japan for example, uses only non-GMO soya bean for direct human consumption of which more than 80% are imported from US, Canada and China (Yamaura, 2011). The EU is another market for non-GMO soya bean. This is explained by the Europe's growing appetite for meat products from animals fed non-GMO feed which has created a rapid demand for non-GMO soybean meal[29]. Tillie and Rodríguez-Cerezo

27 http://www.zimstat.co.zw/sites/default/files/img/National_Report.pdf

28 http://data.un.org/CountryProfile.aspx?crName=ZIMBABWE

29 http://www.non-gmoreport.com/articles/millenium/soybeanmealtrading.php

(2015) further highlighted that the demand for non-GM soybean is relatively high in the EU, compared with other parts of the world. At least 10% of the soybean equivalent imported into the EU would be non-GM. This means that, at a minimum, the EU would import about 0.96 million tonnes of non-GM soybeans and 1.95 million tonnes of non-GM soymeal, i.e. about 3.4 million tonnes of non-GM soybean equivalent.[30] The EU sources it non-GMO soya bean from countries like Brazil and the US. Given that 80% of the soya bean area is planted with GMO varieties, Zimbabwe can exploit its duty free and quota free access to the EU through the Interim Economic Partnership Agreement.

xi. Potential in employment creation

Huge potential in employment creation lies in exploiting the value chain right from input supply, production and processing as well as downstream effects when stronger linkages are created between the segments of the value chain and when the soya value chain is linked to livestock value chains like poultry, dairy, beef and piggery.

xii. Good climatic conditions for soya bean

Although Zimbabwe experiences drought, soya bean is mainly grown in regions 1 and 2 vast water bodies which can be used to boost production through irrigation.

xiii. Good processing infrastructure

Zimbabwe made significant investments in processing and is highly efficient in solvency extraction.

30 https://ec.europa.eu/transparency/regdoc/rep/10102/2016/EN/10102-2016-61-EN-F1-1.PDF

4. Soya Value Chain Strengthening

a. Enhance agriculture competitiveness

Improving agronomic practices

Following the land reform program there has been a gradual shift in land ownership as well as the structure of area under soya bean cultivation. The shift resulted in soya bean farmers emerging in categories that have low yields, thus whilst the area under soya bean cultivation declined by 33.9% between 2001 and 2010, production also declined by more than 59.3% during the same period and this was due to shift in production from high yield to low yield (Table 7).

Table 8

Trend in area under soya bean cultivation by farmer categories

	2000		2001		2005		2010		2015	
	Area (h)	Yield (kg/h)	Area (h)	Yield (kg/h)	Area (h)	Yield (kg/h)	Area (h)	Yield (kg/h)	Area (h)	Yield (kg/h)
LSCF	55,022	2,405.3	51,859	2,472	10,642	2,016	3,014	2,022	1,787	1573. 6
SSCF	180	816.7	1,400	1,200	577	518	486	358	273	297. 5
A2 Farms							21,582	1,780	16,362	1160. 3
A1 Farms							7,837	1,173	17,214	912. 2
Resettlement farms	700	800.0	750	1,200	24,278	1273.3	486	358	2,467	630. 9
Communal areas	4,748	497.7	10,000	1,000	6,374	637.1	8,883	369	6,052	434. 9
Production (MT)	**135,417**		**140,793**		**56,730**		**57,328**		**41,768**	

Source: ZimStats

Thus, there is need to capacitate the new and emerging soya bean farmers to boost yield and improve soya bean production.

Comparative analysis of rate of return on Soya bean and competing crops

According to SNV (2016), the major soya beans producing areas, are also areas compatible with the production of maize as well as tobacco. Given that maize is a strong cultural crop with regards to food security, soya bean production has been given lower priority than maize. Furthermore, government's intervention and support for crops that compete with soybeans for production capacity (land, inputs and labour) has dis-incentivised farmers from growing soybeans as inputs are subsidized and/or markets are guaranteed for competing crops. For example, in the 2016/17 the government of Zimbabwe through the Special Maize Programme *(Command Agriculture)* gave a guaranteed price of USD390/tonne and provided inputs for maize production making soya bean less attractive, thereby reducing the land cultivated from 39,935 hectares in 2015/16 to 21,561 hectares in 2016/17 (GoZ:2017).

Table 9
Current production scenarios and required breakeven prices

Maize		Soya bean			
Target yield (t/ha)	3	1.5	2	2.5	3
Current Estimated selling price ($/t)	390	570	570	570	570
TOTAL VARIABLE COSTS (TVC)/ ha	995.60	1025.56	1131.50	1190.70	1296.64
Break-even prices	331.87	683.70	565.75	476.28	432.21

Source: Authors own calculations

Get the price right for soya bean

Given that the greatest contributor to input costs for soya bean production is fertiliser and lime, targeting reduction of costs in these inputs would significantly boost agricultural competitiveness. Government intervention in the marketing of competing crops has made it less attractive to farm soya bean, given a guaranteed price of USD390/tonne for maize in the 2016/17 agriculture season. Thus, consider a viable incentive structure and a competitive price for soya bean as this is crucial for soya bean farming to be viable in the country. There is need to adjust the price difference between the price of soya bean and its competing crops considering the potential yield differences of the crops.

Furthermore, at commercial level, relatively high costs of production for soya bean production have resulted in farmers preferring maize production due to better gross margins and low required break-even price. Thus, under the current scenario for producers of soya bean to achieve the same break-even price with maize producers must increase their productivity level or government needs to intervene in the sector by reducing the cost of production. The table below simulates the various production and yield costs for soya bean production. It shows that a combination of improved yield and input costs will result in reduction in the required breakeven price increasing the gross margin for soya bean production making it attractive for production.

Table 10
Simulated production costs and yields for soya bean production

	Yield levels (t/ha)			
	1.5	**2**	**2.5**	**3**
Baseline Scenario				
Total variable costs ($/ha)	1025.56	1131.50	1190.70	1296.64
Breakeven price($/t)	683.70	565.75	476.28	432.21
Scenario 1 :5% Input cost reduction				
Break-even price($/t)	649.52	537.46	452.47	410.60
Scenario 2: 10% Input cost reduction				
Breakeven price($/t)	615.33	509.18	428.65	388.99
Scenario 3: 20% Input cost reduction				
Breakeven price($/t)	546.96	452.60	381.02	345.77

Source: Authors own calculations

b. Enhance Inclusive Industrialization

Soya bean is used in the production of human food and animal feed; hence it has the potential to spur inclusive industrialization in Zimbabwe. The Lima Declaration: Towards inclusive and sustainable industrial development Resolution (GC15/res.1 of December 2013) by the United Nations Industrial Development Organisation

(UNIDO) with focus on the small and medium-sized enterprise sector, micro-industries and other forms of community-based entities, stressed that industrial development should encompass enhancing productive capacities in a way that:[31].

- supports the structural transformation of the economy;
- encourages economic growth and the creation of decent jobs;
- enhances productivity and development,
- transfer and absorption of technology on mutually agreed terms,
- infrastructure and technological innovation;
- advances trade and development,

Downstream increased soya bean production is estimated to have the potential to increase the demand for soya bean inputs which also has the potential to spur industrialization. To achieve the envisaged production of 200,000 tons of soya bean at an average yield of 2tonnes/Ha to satisfy the requirement for stock feed manufacturers, this will require 100,000 hectares of land to be planted from the current hectarage of 21,561 hectares. This will lead to an increase in demand for the various agriculture inputs by more than 300% thereby increasing production as well and employment in the related agrochemical industries as follows:

INCREASED SOYA BEAN PRODUCTION AND YIELD HAVE THE POTENTIAL TO INCREASE THE INCOMES OF

35,000

SMALLHOLDER FARMERS BY...

USD138

PER ANNUM

Table 11
Simulated input demand at the envisaged national demand

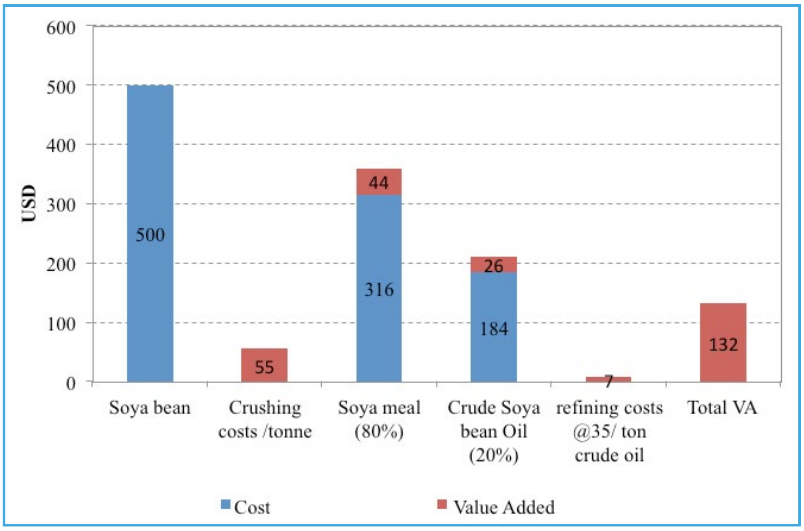
	Unit/ ha	Current (2016/17)	Required
Hectarage (ha)	**1**	21,561	100,000
Labour (labour days /ha)	8.5	183,269	850,000
Seed (kg/ha)	100	2,156,100	10,000,000
Fertilizer and Lime			
a. Compound L (kg/ha)	250	5,390,250	25,000,000
b. Agric Lime (kg/ha)	250	5,390,250	25,000,000
Herbicides:			
a. Lasochlor (litre/ha)	3.5	75,464	350,000
b. Igran (litre/ha)	2.2	47,434	220,000
Insecticide: Endosulfan 35MO *(litre/ha)*	1	21,561	100,000
Fungicide: Shavit or Punch Xtra *(litre/ha)*	1.5	32,342	150,000

Source: Authors own calculations

Increased soya bean production and yield have the potential to increase the incomes of 35,000 smallholder farmers by USD138 per annum (Techno Serve; 2011). On the other hand, soya bean processing also has the potential to encourage economic growth through value addition at each stage of the value chain. A tonne of soya bean processing can yield an additional 26.4% in value through soya bean cake and soya bean crude oil (Figure 10).

31 https://www.unido.org/fileadmin/user_media_upgrade/Who_we_are/Structure/Policymaking_Organs/Lima_Declaration_EN_web.pdf

Figure 10
Value Addition for a tonne of soya bean



Source: Authors own calculations

Soya bean products are estimated to contribute about 30% of the national stock feed raw material requirement of which an estimated 69.3% of feed production is destined for poultry production. This has been attributed to the increase in poultry production and consumption. However, the current poultry feed production has been highlighted as being inadequate to meet local demand/needs. It is estimated that on average a bird consumes 3 kgs of feed during the entire 6-week production (SMA; 2017).

Small scale poultry sector has huge potential for growth and employment creation according to industry players an estimated 65% of poultry production in Zimbabwe is conducted by small scale producers of which 70% are women.[32]

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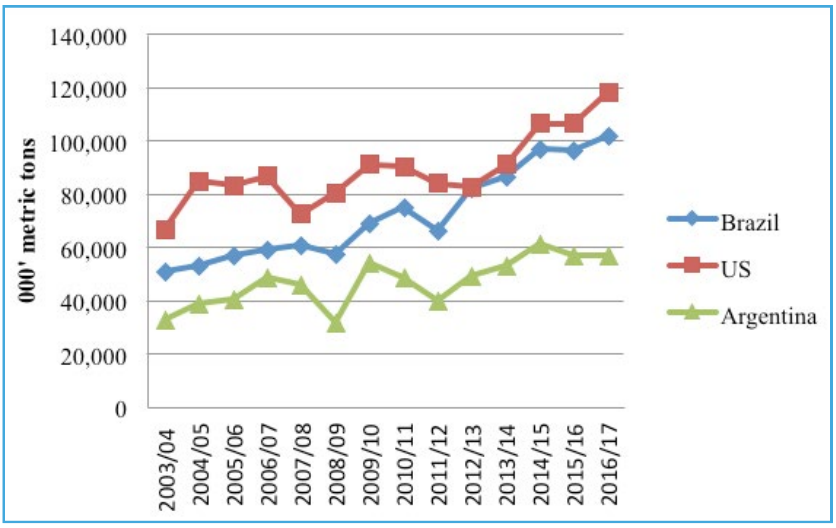
32 https://www.newsday.co.zw/2017/07/17/womens-bank-housed-posbs-unused-banking-halls/

5. Lessons learnt from other countries

World overview

Figure 11

Soya bean production by the world's 3 largest producers between 2003 and 2016



Source: https://apps.fas.usda.gov

The US is the largest world soya bean producer followed by Brazil and Argentina (see Figure 11). The three countries produced 82% of the world soya bean in 2016/17. World total imports of soya beans reached 136.96 million tonnes. China and EU are the chief soya bean importers gobbling 62.8% and 10.1% of the world imports respectively in 2016/17. China crushed 86.5 million tonnes of soya after importing 86 million tonnes making it the world's largest soya meal producer. Ninety seven percent of the produced meal was consumed domestically. Major exporters of soya meal are Argentina, Brazil and US contributing 84.3% of total world exports. Major soya oil producers are China, US, Argentina, Brazil and the EU. However, China chiefly produces the oil for the domestic market with the other four serving the export market. China's appetite for soya bean has been rising quite significantly from 59.87 million tonnes in 2012/13 to 86 million tonnes in 2016/17 mostly driven by a strong protein feed demand for its booming farm aquaculture production, pork and dairy[33].

Import for soya bean is expected to rise to 93 million tons. Urbanization, rising incomes, and the new two-child policy in China have contributed to growth in dairy consumption and growing consolidation and modernization of the industry[34].

The US is the largest world soya bean producer followed by Brazil and Argentina (see Figure 11). The three countries produced 82% of the world soya bean in 2016/17.

33 https://apps.fas.usda.gov/psdonline/circulars/oilseeds.pdf
34 https://apps.fas.usda.gov/psdonline/circulars/oilseeds.pdf

a. South Africa

On average, soybean production in South Africa is between 100,000 and 800,000 tons per annum at an average yield of 1.7 to 2 tons per hectare under dry land conditions (DAFF, 2016). The level of production was well above the domestic consumption needs between 2009 and 2016 (DAFF, 2016). This relatively high level of production in the Sub-Saharan African context is reflective of a highly developed agro-processing sector with substantial poultry production, and is also a target export market for regional producers such as Zimbabwe and Zambia[35]. South Africa's rising yields in soya bean production as in Figure 4 were because of a favourable agricultural policy environment backing the commercialisation and use of agricultural biotechnologies, which have facilitated a smooth transition of commercial farmers from the production of traditional grains to soybean production and to be able to rotate soybeans with other grain crops to maximise profits (Dhlamini et al, 2013).

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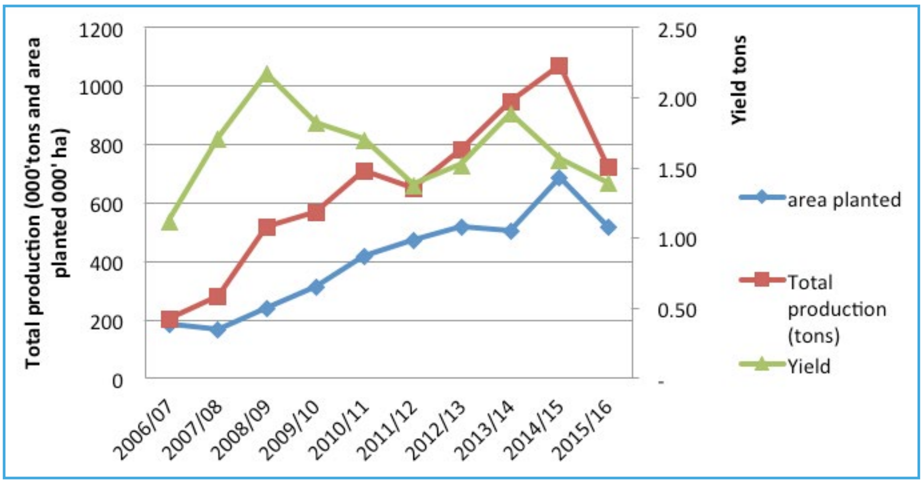
Figure 12
Soya bean production, area planted and yield between 2006-2016



Source: (DAFF, 2016)

The increase in demand for meal and soybean oil is mainly as result of rising income levels as well as the improved crushing capacity (DAFF, 2016). Livestock is the largest agricultural sector in South Africa comprising beef and dairy cattle as well as poultry and pigs and is highly dependent on animal feed produced from grains and oilseeds[36]. Increase in crushing capacity is explained by government financial support through the Industrial Development Corporation (IDC). In 2012, the IDC approved R76,4 million to fund Russell Stone Protein's Bronkhorstspruit crushing facility and has assisted various other developers to invest in new green-field soya-bean processing in South Africa (Dhlamini, 2015), a key lesson for Zimbabwe in strengthening the value chain.

35 http://www.tropicalsoybean.com/sites/default/files/The%20Soybean%20Agri-Processing%20Opportunity%20in%20Africa_ACET.pdf
36 http://agbiz.co.za/uploads/AgbizNews/15115_Grainpublication.pdf

South Africa's soya bean value chain is more sophisticated than those in Sub Saharan Africa. It is made up of input suppliers (seed, fertilizers, herbicides, insecticides, inoculants, mechanisation and irrigation equipment), producers (mainly commercial farmers), aggregators and traders (ensure that there is a ready market for soya bean produce and that processors have reliable supply for their inputs), processors (process raw soya beans into meal, oil or soya bean based foods for human consumption) feed manufacturers (use soya bean meal produced by processors as an input for animal feed mainly poultry), as well as beef, pork and fish industries, (Dhamini et al, 2014).

South Africa's agricultural industry operates in a free market and the primary producers are thus price takers[37]. Local soya bean price is mainly influenced by the rate of increase in South American soya bean production, the Chinese demand for imported soya beans, marine freight rates, and the value of the rand to the US dollar (DAFF 2016).

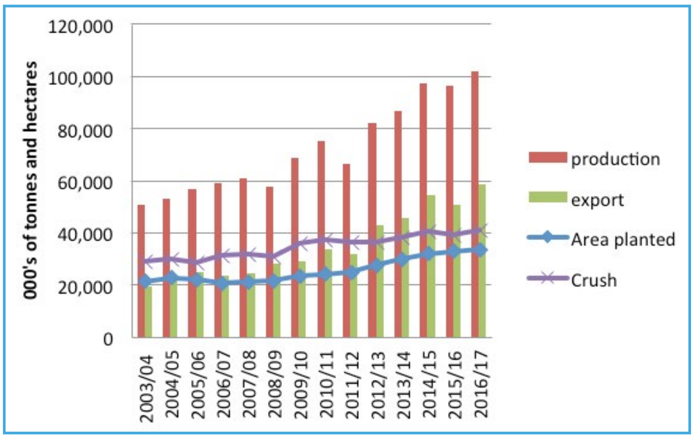
Some of the lessons that Zimbabwe can pick from the South African case include the relatively low cost of production (see Appendix 2) along the value chain; more integrated segments of the value chain; a value chain that supports farmers through provision of a reliable market. For example, as cited by some stakeholders in Zimbabwe soya bean sector, the cost of capital in South Africa is relatively lower (less than 10%) than that in Zimbabwe (15%). Further, the processors crush soya into cake thereby supporting livestock value chains. In the case of Zimbabwe however, the bulk of the cooking oil is produced from crude oil imports leaving local livestock having to fill in the cake gaps through imports. In addition, producers are highly experienced and highly mechanized with government making significant investment in crushing capacities.

b. Brazil[38]

Competitiveness in commodity markets is influenced by resource endowments and agro-climatic conditions, as well as the efficiency of institutions, the adequacy of infrastructure, the impact of policies, and the structure and magnitude of input costs (Meade et al, 2016). Vast pieces of land have remained a major long term economic strength for Brazil. While other competitors like US and Argentina face a challenge in land expansion for soya bean production, Brazil does not have that constraint. The Government's promotion of the soya bean sector has resulted in sustained soya bean area expansion predominantly by new land being earmarked for soya bean production. High yields are being recorded in this area where large scale farmers apply full suite modern input technology and achieve significant economies of scale.

Production has nearly trebled, from around 35 million tons in 1999/00 to 102 million in 2016/17. The average yield between 2008 and 2014 was 3.3 t/ha (Balieiro, 2015). This growth was underpinned by growing demand from China, as well as new soya bean varieties that allowed for production to expand into additional areas of the Cerrado and the Amazon.

Figure 13
Brazil Soya bean production, export and crush between 2003 and 2016



Source: (USDA, 2016b)[39]

37 http://agbiz.co.za/uploads/AgbizNews/15115_Grainpublication.pdf

38 This section largely borrows from: https://www.ers.usda.gov/webdocs/publications/40339/15075_wrs013f_1_.pdf?v=41057

39 http://usda.mannlib.cornell.edu/usda/fas/oilseed-trade//2010s/2016/oilseed-trade-12-09-2016.pdf

Post forecasts 2016/17 soya bean production is estimated at 103 million MT, an increase of three percent compared to the current season. The 2016/17 planted area is forecast to increase to 33.7 million hectares. The slower pace of area growth compared to the last five years is attributed to higher production costs and economic/political challenges in Brazil. Soya bean exports for the 2016/17 marketing year are forecast at 57 million MT based on strong demand by China. Due to export demand and new biodiesel mandates, soya bean meal and oil production is forecast to increase[40].

Every year soya bean plays a larger role in Brazilian exports and is currently the most important commodity in Brazilian agribusiness. According to International Trade Centre (ITC) data, soya bean exports contributed 10.4% to Brazil's total exports. The country rode on China's increasing appetite for soya as reflected by Brazil's rising soya beans exports to that country from US$537.67 million in 2001 to US$14.39 billion in 2016[41].

The soya sector has a long history of direct/indirect government support dating back to the 1960s and 1970s. These policies included publicly funded agricultural research and development, guaranteed minimum price supports, production and marketing credit programs, agricultural input production and use subsidies, public infrastructure programs, and supportive energy and taxation policies. In addition, several national programs oriented toward other crops (e.g., wheat, coffee, and sugar cane) also indirectly promoted soya bean production.

The government had various reasons for its special treatment to soya bean. Primarily, like Zimbabwe, it wanted to save and increase foreign exchange. With the rapid increase in Brazilian population and the corresponding demand for food, vegetable imports began to account for a significant proportion of the limited foreign exchange. By the late 1960s, the GOB saw increased domestic soya bean production as a means of displacing soya bean oil imports. By establishing policies supportive of the domestic processing industry and soy oil production, the GOB also hoped to encourage exports of value-added agricultural products, particularly soya bean meal. Growing international demand for protein feeds further encouraged this strategy. Secondly, the Government aimed to hold down domestic food prices and improve diets. Soya bean oil was one of the four most important food items for low- to middle income families, and was very influential in the calculation of Brazil's consumer price index. As a result, soya bean oil prices were critical to national food policy in Brazil's highly inflationary environment. Third, the soya bean industry was viewed by the GOB as one of the principal engines for stimulating growth in the agricultural processing and input industries. An abundant supply of cheap soya bean was needed to fuel the processing sector's growth, while expanded plantings would benefit the input industry. A final motive for supporting soya bean production was the preservation of territorial integrity. Brazil's military government saw most of its vast land areas as essentially uninhabited.

A series of government interventions that were implemented as alluded to above are outlined hereunder.

Publicly Funded Agricultural Research and Development. Brazil's national network of agricultural research and experiment stations—EMBRAPA (Brazilian Agency for Research on Agriculture and Animal Husbandry)—working closely with private agricultural research groups, has played a critical role in the expansion of field crop and livestock production from the temperate South into the tropical Center-West. Until the 1980s Brazilian soya bean production was concentrated in the traditional farming regions in the south of the country including the states of Rio Grande do Sul, Santa Catarina, Paraná, and São Paulo[42]. There were no seed varieties adaptable to drier parts of the country and their associated soil types.

40 https://www.fas.usda.gov/data/brazil-oilseeds-and-products-annual-1
41 ITC Trademap
42 https://www.nature.org/ourinitiatives/regions/southamerica/brazil/explore/brazil-china-soybean-trade.pdf

Through high investment in developing new soya bean varieties, as well as different planting techniques, production expanded into the Cerrado and Amazon basin regions from 1997 resulting in a geographical shift in soya bean production. The new variety flourishes in the tropics' shorter day length and mild, wet climate. Under optimal conditions, Brazil's tropical soya bean produces yields of 4.7 to 5.4 metric tons per hectare, compared with Brazilian national average yields of about 2.5 tons per hectare.

Uniform National Price Support and Energy Pricing Policy- Just prior to the planting season each year, the GOB announced support prices—i.e., minimum price guarantees—for primary crops, including soya beans. To shore up crop production, particularly in the Center-West, national commodity support prices were set uniformly for the entire country despite the generally lower farm gate prices in more remote areas. This uniform support price policy remained in effect until February 1994 for corn and February 1995 for soya beans.

The soya bean sector also benefited from influential programmes that all explain increased soya bean production. These included the National System of Rural Credit; Wheat Policy; Coffee Eradication Program and the Fuel Alcohol (ProAlcool) Program. Expansion of soya bean production was further aided by global dynamics like a surge in global demand from growing population and rising income. This was combined with a series of weather-related crop shortfalls in major grain and oilseed producing countries and a drawdown of global stocks, generated historically high international market prices for most major commodities. Additionally, Japan provided technical assistance to increase soya bean production on marginal frontier land. Further, incentive was given by the US soya bean export embargo in 1973, which artificially raised world soya bean prices until it became profitable for even the most inefficient producer to grow soya bean[43].

43 https://www.nature.org/ourinitiatives/regions/southamerica/brazil/explore/brazil-china-soybean-trade.pdf

Input use also grew rapidly. For soya bean alone, application rates have shown steady growth over the last several decades. Following the reduction and/or elimination of import barriers on agricultural inputs during the 1990s, imports of agricultural inputs and their use increased dramatically.

Brazil's Soya Bean Processing Industry - In Transition Favored by fiscal incentives and highly subsidized rural investment credit, Brazil's soya bean crushing sector and agricultural input sector both underwent rapid growth during the 1970s and 1980s. Large soya bean-only crushers replaced small multiple-product crushers, and industrial technologies shifted from inefficient mechanical presses to state-of-the-art hexane extraction. This occurred with the help of government subsidies from the National Economic and Social Development Bank (BNDES).

Brazil is already using soya bean as an alternative source of bio fuels. The proportion of soya oil used for biodiesel production is growing rapidly as it is an efficient source of energy[44]. For every unit of energy consumed in the production of biodiesel, 3.4 units of energy are produced. The comparable efficiency factor for ethanol is about 1.6 and only 0.88 for petroleum Biodiesel production in 2015 was 3.94 billion liters and the domestic industry has the capacity to produce 7.3 billion liters per year[45]. The most important raw material for biodiesel in 2015 was soya bean, accounting for 77 percent (or 2.7 million MT of soya bean oil) of all biodiesel produced in the country, followed by animal fats (19 percent) and cotton seed oil (2 percent).

Players in the country's soya sector include global corporations that tend to have vertically integrated commodities trading and processing operations, and process soya bean as part of a broader oilseed portfolio: e.g. ADM, Cargill, and Louis Dreyfuss. These players will often be

44 https://www.nature.org/ourinitiatives/regions/southamerica/brazil/explore/brazil-china-soybean-trade.pdf

45 USDA (2016) Oilseeds and Products Annual. Record Crop and Area Despite Economic Challenges https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Oilseeds%20and%20Products%20Annual_Brasilia_Brazil_4-1-2016.pdf

involved in raw soya bean production in many key markets, with ADM and Cargill in particular involved in the cultivation of a substantial share of the US and Brazilian crop[46]. In Zimbabwe, there is no investment in agriculture sector by MNC, therefore pointing to the need to unlock the land value through resolving property rights issues.

Consultations with stakeholders revealed that Brazil provides export incentives to soya farmers for hitting certain production targets. Further it rides on value chain financing, highly mechanized farms and strongly linked value chain players.

c. Nigeria

Nigeria's soya bean industry has grown in response to rapid growth in demand from the domestic poultry sector, which produced 257,000 tons of poultry meat in 2009 and is estimated to be growing at approximately 30% per year. Growth in demand for human consumption, principally in breakfast and baby foods, mixed with traditional foods such as gari to increase protein content, and as a substitute for meat and fish in the form of 'soy cheese' or wara, is also an important driver of demand.

As a result, Nigerian production of soya bean has increased from 429,000 tons in 2000 to 574,000 tons in 2009.

Soya bean processing has also increased. A key enabler has been investment in research and development to improve the productivity of the crop by developing high yielding, early maturing varieties with other good agronomic traits, and organized demand promotion through media, local hospitals, clinics and community-based organizations to educate consumers of the benefits of soy consumption and good practices in cultivation.

Source: http://www.tropicalsoybean.com/sites/default/files/The%20Soybean%20Agri-Processing%20Opportunity%20in%20Africa_ACET.pdf

46 http://www.tropicalsoybean.com/sites/default/files/The%20Soybean%20Agri-Processing%20Opportunity%20in%20Africa_ACET.pdf

d. Zambia

Zambia is a largely self-sufficient player in soya bean production and processing with demand largely driven by a fast-growing poultry sector (TechnoServe, 2011a). Excess crushing capacity makes the country a regional exporter of cake. Production is dominated by commercial farmers (85%) characterised by high use of inputs, use of irrigation and relatively high yields of over 2.9 tons per hectare[47]. However, small scale farmers have increased their production of soya beans[48].

Zambia's national demand is 230,000mt making the country a net exporter of soya cake[49].
The size of the domestic cake market was 90,000mt in 2009/10 and is expected to continue rising to 194k MT by 2020, driven by a rise in demand from poultry from 65k MT in 2009/10 to 140k MT in 2020 (TechnoServe, 2011a).

Processors include oil expressers and integrated feed manufacturers who are vertically integrated into livestock production.

Zimbabwe can pick several lessons from Zambia's soya bean value chain. These include more organized and capacitated players; free supply of raw water which is not the case for Zimbabwe (ZEPARU, 2014); relatively cheaper nitrogenous fertilizers. In addition, the Zambian climate is more favourable with a longer season suitable for soya bean production than Zimbabwe's. More so, it has skilled and experienced farmers whom Zimbabwe exported during the land reform programmes. The country restricts importation of GMO soya bean.

47 http://www.tropicalsoybean.com/sites/default/files/The%20Soybean%20Agri-Processing%20Opportunity%20in%20Africa_ACET.pdf
48 http://www.renapri.org/wp-content/uploads/2017/01/IAPRI-Booklet_2016.pdf
49 http://www.renapri.org/wp-content/uploads/2017/01/IAPRI-Booklet_2016.pdf

Table 12

Summary of lessons learnt from other countries

Brazil	Nigeria	South Africa	Zambia
• Vast pieces of land have remained a major long term economic strength for Brazil • Long history of government support through research and development, guaranteed minimum price supports, production and marketing credit programs, agricultural input production and use subsidies, public infrastructure programs, and supportive energy and taxation policies. In addition, several national programs oriented toward other crops (e.g., wheat, coffee, and sugar cane) also indirectly promoted soya bean production. • Production of Non-GMO that has appealed to EU and Asian markets • Export incentives to farmers that produce beyond certain targets • value chain financing, highly mechanized farms, well linked value chain players	• investment in research and development to improve the productivity of the crop by developing high yielding, early maturing varieties with other good agronomic traits, • organized demand promotion through media, local hospitals, clinics and community-based organizations to educate consumers of the benefits of soy consumption and good practices in cultivation.	• Free market operation • Crushing and processing industries drive soya demand • Relatively highly developed agro processing sector with well-integrated players e.g. input suppliers, aggregators and traders, as well as processors that ensure adequate supply of soya bean • Relatively low costs of production • Highly experienced and highly mechanized farmers • Low cost of capital	• Fast growing sector largely drives the demand for soya • Crushing capacity exceeds local demand making Zambia a key exporter of cake to the region including to Zimbabwe • Integrated feed manufacturers are also livestock producers • Restricts imports of raw GMO • Free supply of raw water to farmers • Nitrogenous fertilizers are cheaper than in Zimbabwe climate more favourable with longer season than in Zimbabwe • Highly skilled and experienced farmers whom Zimbabwe exported after land reform

6. Success stories from the other agriculture subsectors in Zimbabwe

a. Tobacco value chain

Tobacco marketing in Zimbabwe is controlled and regulated by the Tobacco Industry Marketing Board (TIMB). The board as set by an act of Parliament, the Tobacco Industry and Marketing Act, Chapter 18:20. TIMB oversees all activities related to tobacco production, marketing, registering farmers, auction floors, contracting firms, processors and exporting and importing firms. TIMB is thus responsible for the classification of all tobacco sold at auction and contract floors, and hence it requires that all tobacco should be brought to the floor for classification. After classification tobacco buyers can proceed with the buying process.

The marketing of tobacco was previously done through the auction system prior to the year 2004 when a dual marketing system was adopted. The dual system involves the auction system and the contract farming thus all tobacco is sold either through the contract system or auction. The production and marketing of tobacco under the contract system, exposed farmers to indebtedness due to lack of a pricing formula in their contracts which some farmers have perceived as unfair, leading to side marketing of the crop.

However, the TIMB have come up with regulations to prevent side marketing of tobacco grown under contract farming. TIMB guidelines on contract farming require that contractors should purchase from a contracted grower only that tobacco produced under the contract. Thus, any purchases or sale of contracted tobacco outside the agreed framework attracts a fine.

TIMB requires that on entering into a contract farming agreement for the production and marketing of tobacco, the contractor will provide inputs and/or finance a grower to produce agreed hectares of tobacco whilst the farmer will undertake to deliver the agreed output on an agreed timeline. The guidelines also state that the contractor should purchase from a contracted grower only tobacco produced under the agreed contract based on an agreed grade-price matrix provided for by the TIMB classification system. The price should cover production costs and include a profit margin for the contract grower. In order to prevent side marketing and prevent the exploitation of farmers the TIMB requires that if the agreed price is lower than the minimum price paid for the same tobacco at the auction floors, the grower shall be paid the higher average price prevailing at the auction floors at the time[50].

TIMB requires that on entering into a contract farming agreement for the production and marketing of tobacco, the contractor will provide inputs and/ or finance a grower to produce agreed hectares of tobacco whilst the farmer will undertake to deliver the agreed output on an agreed timeline.

50 Procedures for The Sale of Flue-Cured Tobacco Under the Dual (Contract and Auction) System In 2016, Tobacco Industry and Marketing Board (TIMB)

TIMB have a production technical committee that oversees the orderly production and marketing of tobacco in Zimbabwe. The committee includes representatives from tobacco merchants, farmer organisation, TIMB, Tobacco Research Board and the Reserve Bank of Zimbabwe. At the smallholder level there is also the Smallholder Commercial Production Committee affiliated with the Zimbabwe Tobacco Association whose main objective is improving tobacco production by the small holder tobacco sector. The committee helps in the implementation of agreed programmes and provides feedback to growers on industry-related issues. They also provide members with market information as well as the provision of extension services on all aspects of tobacco production[51]. Furthermore, the Tobacco Industry is also supported through Research and Development by the Tobacco Research Board (TRB), through its two main research stations. The institute develops tobacco seed varieties and development of efficient farming techniques that have reduced costs and improved yield. They also provide tobacco farmers with technical and extension services.

The institutional arrangement within the tobacco value chain have seen orderly production and marketing of tobacco in Zimbabwe resulting in an increase in tobacco production buoyed by contract farming arrangements, with contracting farming contribution to tobacco production rising from 23% in 2004 to 76% in 2014 (Figure 14). Thus, the contract farming also resulted in an increase in tobacco farming by small scale and communal farmers by 447% from 7,300 tonnes in 2010 to 34,859 tonnes in 2015 (Zimstat; 2015)[52].

CONTRACT FARMING CONTRIBUTION TO TOBACCO PRODUCTION ROSE FROM...

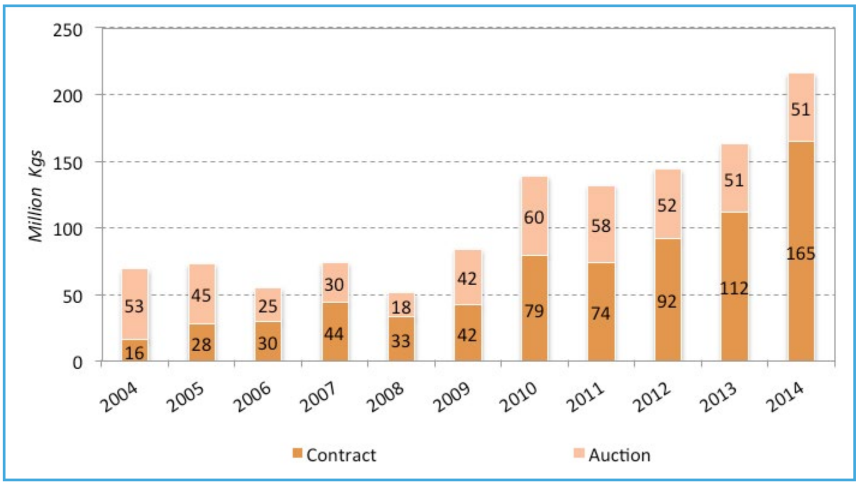
23%

IN 2004 TO...

76%

IN 2014.

Figure 14
Tobacco Deliveries by marketing arrangement 2004-2014



Source: TIMB;2015

Lessons for the Soya Bean Value Chain

1. Coordination of production and marketing activities among players along the value chain farmers, merchants and processors under the auspices of the TIMB Tobacco production technical committee which involves stakeholders in the tobacco value chain.

51 http://www.fctobacco.com/index.php/about/small-scale-development, http://siteresources.worldbank.org/EXTMULTIDONOR/Resources/Findings1-Agriculture.pdf

52 http://www.zimstat.co.zw/sites/default/files/img/publications/Prices/Fact_2015.pdf

2. Farmer capacitating through:
   a. engagement in contract farming and provision of key inputs in the production of tobacco
   b. provision of extension services to contracted farmers through offering training programs and hosting of demonstration fields to educate farmers on proper agronomy practices.
3. Communal farmers are capable of undertaking cash crop farming on a small-scale commercial level with the appropriate support.
4. There is need for the development of a national Soya Bean Research Institute to support and develop the soya bean industry in Zimbabwe through provision of technical services as well as the development of new varieties and efficient farming techniques to increase soya bean yield.

b. Cotton value chain

The Government of Zimbabwe through the then CMB (Cotton Marketing Board) used to be the major financier of small holder cotton farmers through grants and credit guarantees through the then Agriculture Finance Corporation (AFC) now Agribank. Through the Cotton Marketing and Control Act (Chapter 18:07) the CMB was solely responsible for the marketing of cotton, however this institution was later privatized and became the Cotton Company of Zimbabwe (Cottco). This resulted in the deregulation of the cotton marketing industry through Statutory Instruments 8 of 1991 and 22 of 1992 resulting in several players coming on board in the cotton marketing. The marketing deregulation was accompanied by the removal of subsidies under the ESAP programme. Financial institutions were expected to extend credit to the farmers who in turn did not have any collateral security. The cotton ginners then came up with scheme to provide inputs to farmers, and the contractors would recover their loan advanced from the crop sales. Most of cotton production in Zimbabwe is produced under contract farming through input funding arrangements by various ginners and merchants under the auspices of the Cotton Ginners Association (CGA). Contractors supply production inputs (seed, fertilizers and chemicals) to contracted farmers on loan as well as provide extension services.

Prior to the start of each season the Cotton Marketing Technical Committee which includes contractors, AMA, Farmers representatives and the Department of Agricultural Research and Extension Services (AGRITEX) hold consultative meetings to agree on the input package to be advanced to the farmers. Contractors are also required by AMA to declare their intended volume of seed cotton purchase and their investment in inputs funding[53]. However, the contract farming method exposed farmers to indebtedness as they were bound to fulfil their contracts by delivering the agreed output of which most farmers failed to do so. Cotton farmers have engaged in side marketing, due to perceived low prices offered by the contracting firms. In order to curb and address side marketing, players in the cotton industry lobbied government to come up with cotton marketing regulations and this resulted in the promulgation of Statutory Instrument on Agricultural Marketing Authority (Seed Cotton and Seed Cotton Products) Regulations {Statutory Instrument 142” of 2009 (SI2009)}, which attempted to bring sanity to the sector by governing the orderly production and marketing of cotton. The statutory instrument made amendments to the Cotton Marketing and Control Act by requiring the registration of players in the cotton marketing industry and prohibiting players who have not funded cotton growing from buying cotton. Thus, buyers in the cotton industry can only buy cotton from those individuals’ farmers whom they have financed. Section 37 of the Cotton Marketing and Control Act requires the licensing and registration of persons who intends to buy seed cotton, lint or cotton seed with the AMA. A number of statutory instruments that have been introduced to amend the Cotton Marketing and Control Act to make the regulations more effective in addressing side marketing these include Statutory Instruments 63 of 2011 and

53 https://www.icac.org/getattachment/mtgs/Plenary/74th-Meeting/Details/Documents/Country-Statements/Zimbabwe_Report_2015.pdf

SI147/2012. Thus, under the current regulation contractors are required by AMA to sign contracts with individual growers specifying the area supported by the contractor and volumes expected. A common database for input distribution is developed and centrally stored by AMA to avoid multiple contracting by farmers to various contractors. The database is used by all cotton buyers during the marketing season to ensure contractors buy from their contracted farmers[54].

BOX 2
Challenges in Cotton Contract Farming System in Zimbabwe

The cotton sector in Zimbabwe is considered to be relatively well regulated and organized with a well-developed contract farming system despite facing challenges of output 'side-marketing', whilst on the other hand it is characterized by poorly priced input supply system. Price conflicts have however been characteristic of the cotton contract farming, as prices offered by contractors tend to be lower than the prevailing market prices at harvest resulting in some farmer's side marketing contracted commodities to other traders. This resulted in "price war" emerging between some new buyers and the traditional firms over the prices paid to contract and non-contract farmers producing cotton resulting in some legal battles among the parties concerned. Between 2012 and 2014 there have been price impasses between buyers and growers, with latter withholding their produce in the context of volatile international markets.

Source: Moyo et.al (2014)

Lessons for the Soya Bean Value Chain

1. Licensing of players in the cotton sector value chain by the AMA to participate both in the production and marketing of seed cotton. AMA is the regulator in Zimbabwe's agricultural sector and is by law mandated to ensure fair and orderly marketing of seed cotton and prevention of side marketing to non-contractors, a practice that threatens the growth of the sector.
2. Coordination of production and marketing activities among players along the value chain farmers, merchants and processors through the establishment of the Cotton Marketing Technical committee.
3. Farmer capacitating, contracted farmers are provided with inputs and extension services to ensure quality production of seed cotton by farmers as well as monitoring farming practices.
4. In the cotton sector there is an established marketing arrangement were there are networks of buying centres from were cotton from the contracted farmers is purchased, personnel from the contracting firms under the auspices of the Cotton Ginners Association are stationed at these depots to ensure there is no side marketing of the crop.
5. Government should provide strong contractual enforcement and punitive measures to prevent side marketing, it should ensure that buyers should only buy from contracted farmers to prevent farmers from side marketing[55].

c. Dairy value chain

Rife issues that affected growth of the sector led to players agreeing to levy themselves with an ultimate goal of reducing milk and milk product imports. In 2013, Dairy stakeholders formed a value chain platform - Zimbabwe Dairy Industry Trust to promote, advance and develop production of milk and dairy products in Zimbabwe. The institution involves ZADF (farmers), dairy processors and Dairy Services and Department of Livestock Production and Development (DLPD). They identified lack of

54 Ibid

55 Cotton Ginners Association (CGA). Versus. Sino Zimbabwe Cotton Holdings; HC 4842/10. http://www.zimlii.org/zw/judgment/harare-high-court/2010/.../hh_172_10_doc_19446.doc

dairy cow numbers as well as farmer capacity as key constraints to achieving milk self-sufficiency and boost processor capacity utilisation in Zimbabwe. They set up a revolving fund based on the levels of milk import and this fund was earmarked for boosting local milk production. The Dairy sector proposed to Government to levy 10 cents per litre import surtax on liquid milk imports to contribute to a revolving fund to finance diary heifer imports and capacity building activities. The proposal was accepted, and the industry has started to import heifers and sexed semen to improve reproduction (Sukume, 2016). The funds are further earmarked for trained and well experienced farmers so as to maximize value. Soya producer can take a leaf from this model. Given the high level of crude oil import ($92.1 million, see Figure 2) a soya import levy can be charged to generate the fund to support local production to reach competitive levels.

d. Horticulture value chain

Quite a number of lessons can be learnt from the horticultural value chain. Firstly, the sector recently developed a horticultural strategy aimed at resuscitating and revitalizing the value chain. Secondly, it has a clearly spelt out road map[56] with four broad goals identified as follows:

i) Commercially driven value chain alliances that offer fair returns and include small holders.
ii) Improved and sustainable productivity for competitive farmers & VC stakeholders
iii) Affordable and accessible finance and investment for development impact.
iv) Comprehensive and accessible support services aligned to Value Chain Alliances' needs.

The soya bean value chain therefore needs deliberate and practical interventions that launch the value chain on the path of recovery.

56 Government of Zimbabwe (2016) Horticulture *& Associated Crops Sector Roadmap Value Chain Alliances and Policy for Zimbabwe, Government of Zimbabwe, Harare*

7. Policy measures to support revival and growth of the soya bean value chain

a. Contract farming and frameworks to avoid side marketing

The greatest risk in contract farming is default by either party to the agreement. Contracting firms may default on their obligation by failing to deliver the appropriate inputs /services at correct time and in adequate quantities. Furthermore, contracting firms may refuse to accept the produce at the agreed price or arbitrarily raising expected standards at the marketing season.

With regards to farmers/producers the risk emanates from failure to produce and deliver agreed commodities as specified in the contracts either through omissions or commission especially through side marketing to avoiding repayment of credit[57]. There are number of contract farming methods namely:

a. ***centralized model;*** involves a centralized processor and/or packer buying from a large number of small farmers.
b. ***Nucleus estate model;*** is a variation of the centralized model where the sponsor also manages a central estate or plantation. The central estate is usually used to guarantee throughput for the processing plant.
c. ***The multipartite model;*** involves a variety of organizations, frequently including statutory bodies. Can be developed from the centralized or nucleus estate models.
d. ***The informal model;*** is characterized by individual entrepreneurs or small companies. Involves informal production contracts, usually on a seasonal basis. Involves greater risk of extra-contractual marketing.
e. ***The intermediary model;*** involves sponsors in subcontracting linkages with farmers to intermediaries.

However, the appropriate model that can be recommended for soya bean production in Zimbabwe is the Multipartite Model. The model tends to focus on strategic crops with national significance in Zimbabwe's case soya bean. This model involves a number of stakeholders namely the government,

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57 http://www.fao.org/fileadmin/user_upload/contract_farming/presentations/Contract_farming_van_Gent.pdf

statutory bodies, private companies, and farmer and related business membership organizations. This model requires significant government involvement especially to ensure contracts are upheld. The government's role is to provide a legal framework to contractual parties by ensuring appropriate laws and an efficient legal system, provision of arbitration and dispute resolution services and executing of contract farming default penalties, In this case the government should expand the scope of Statutory Instrument (SI) 79 of 2017, Agriculture Marketing Authority *(Command Agriculture Scheme for Domestic Crop, Livestock and Fisheries Production)* Regulations, 2017 which only focuses on contracting farming agreement between the government and contracted farmers but should also include civil contracting agreements between farmers and private sector players

The government should ensure security of tenure for newly resettled farmers for contractors to fund production with confidence and reliability that financed farmers will not be displaced of their land.

Institutional framework

There is also a need to revitalise and capacitate the Oilseeds Marketing Technical Committee (OMTC) under AMA which comprises of various stakeholders along the oilseed value chain. The committee was promulgated through SI 140 of 2013 Agricultural Marketing Authority (Grain, Oilseed and Products). However, the Oilseeds Marketing Technical Committee has not been effective in lobbying and overseeing the production and marketing of soya bean as well as the administrative difficulties of pooling and coordinating its production. There is need for a private sector-led institutional arrangement in the soya bean value chain. In the cotton sector all contractors are obliged under SI 142/2009 to provide all the necessary inputs to farmers and fully finance the crop produced by farmers that they contract. In return, contracted farmers are required to deliver their crop to the contractors and those found in breach of the contract would appear before the Cotton Marketing Technical Committee (CMTC). The Committee, is charged with ensuring both merchants and farmers honour their contracts[58]. The role of the CMTC is also complimented by a private sector led organisation the Cotton Ginners Association. There is also need for awareness and sensitization on the importance of fulfilling the contractual obligation and among stakeholders in the soya bean value chain as this will promote trust and transparency.

Provision of Soya bean inputs

Contractors should timeously provide an aggregated and priced input starter pack for soya bean with all required inputs for farming. Timely disbursed inputs will allow farmers to plant within the expected timeframe as well as achieving the intended output and yield.

Pricing model

The prices of soya beans are mainly determined by market forces of supply and demand. Thus, the uncertainty regarding price levels in contract farming usually lead to mistrust and feeling of exploitation between farmers and contracting private sector players. There is therefore need to develop a a transparent pricing system that allows farmers to make informed decisions about which crops to grow. This might involve announcing a minimum pre-planting price among others.

Under contract farming, contractors use various models for prices that are paid to farmers but consider market price. For instance, some processors used to pay farmers prices based on the Chicago Board of Trade plus a margin for soya bean produced under contract farming. These prices were adjusted for market variations depending on the number of companies that are also buying soya beans. Other players offer farmers prices based on prevailing regional prices. Coordination and setting up local storage facilities to enhance district level soya bean aggregation from small holder farmers is key to enhance viability of soya bean farming in remote areas.

58 http://siteresources.worldbank.org/EXTMULTIDONOR/Resources/Findings1-Agriculture.pdf

b. Inclusive industrialization

Capacity building

Farmers

Producing at 1.3mt/ha is unviable and will promote continued soya bean imports. Yet this money could be channeled towards soya bean production to unlock the potential of the whole value chain. The following interventions can be considered to increase soya bean production. There is still scope to increase yield as farmers are yet to exploit genetic potential of the seed they use.

Impart technical skills to the farmer. In order to consolidate the gains of land reform, farmers need knowledge on good agronomic practices, farm management and financial management among other issues. Application of soya pesticides, herbicides and fungicides for disease and weed control is highly mechanised and requires know-how. Capacitation of farmers associations and Agritex could assist in ensuring farmers receive training in good agronomic practices. Furthermore, tax incentives could be extended to contractors that provide training to farmers and meet set target yields.

Farmers also need **input support** such as seed, and fertilizer given that soya bean is an intensive crop which requires much seed per hectare as compared to competing crops like maize. Hence costly seed compromises the seed population planted by the farmers and their productivity. Furthermore, farmers need to take farming as a business and to invest in knowledge acquisition to scale up their productivity soya farming.

Rhizobium factory needs to be capacitated as a pack of rhizobium costing only $5 can effectively produce same results as 4 bags of top fertilizer costing $140. Therefore, uptake of rhizobium has potential of reducing fertilizer cost by $135 per hectare.

Soya and wheat rotation are the most resilient where soya can be harvested in time to catch up with wheat planting rotation.

Extension officers

There is need to strengthen technical services to assist farmers. The continuous training-of-the-trainer programme is critical to keep abreast with the ever-changing technologies.

Agribusiness personnel

Agribusiness personnel from financial institutions need training. They need to know when to release the loans as this impact on farmers' yields if disbursements are not made on time. Furthermore, agro-chemical dealers need training on how to properly advise farmers on the use of the agro-chemicals.

Conclude the land ownership issue

The land must be the farmer's. The investor/contractor needs to have confidence that A1 and A2 farmers are the bona fide owners of the farm. There is need for stronger and bankable offer letters that guarantee security of land tenure and unlock the much-needed lines of credit to boost farm production.

Enabling investment environment

Examples from Brazil highlight that the integration of agricultural MNCs e.g. Cargill, boosted production and marketing of soya bean for the country. Creating an environment conducive for investment by:

a. Streamlining agricultural policies related to soya into one comprehensive strategy;
b. Providing export incentives for investors in the soya value chain to facilitate production of excess bean;
c. Ensuring policies that safeguard property rights of investors are established and adhered to.

Optimize land use

Despite the vast pieces of arable land for soya bean production, Zimbabwe still imports soya bean and its by-products. There is therefore need to optimize the land that is under cultivation in addition to increasing the area under soya bean production. Targeting 100,000 ha.

Supporting and strengthening soya bean production base

Set up production hubs in the high potential areas. The production hubs will avail the smallholder farmers with access to inputs, extension services and marketing outlets (SNV, 2016). Moreso, the revival of the Zimbabwe National Soya Bean Commodity Association is highly recommended.

Promote soya bean production

Soya is a strategic crop and futuristic and has international linkages. Zimbabwe's agricultural sector should diversify along soya bean production. This can be done through engagement of smallholder farmers, individual commercial farmers, group farmers and corporate farming in areas best suited for soya bean production. There is need to mobilise smallholder farmers into growing soya bean. Priority in the first years should not be on their yield as they will be learning the ropes. What is important is building stocks. Introducing a starter pack programme with all the requisite inputs like seed, fertilizer, rhizobium, herbicides and fungicides could be a good initiative. Farmers would need technical support in the form of training, farm visits, management and advice. There is also need for policy and regulatory frameworks to support expansion of soya bean production.

While soya can be introduced to smallholder farmers, there is need for sensitivity to yield on large scale production given the high cost of production if the venture is to be profitable. Soya bean needs huge tracts of land. It's a volume business that increases economies of scale thereby lowering production cost. There is therefore need to promote corporate farming by leasing land from institutions like Prison, ARDA and individual farmers that are underutilized. Further, utilizing university and agricultural research land for soy growing could reduce the gap in production (TechnoServe, 2011). Zimbabwe has no capacity to meet processors demand for soya in the short to medium term. What is practical therefore is to improve availability of soya by first satisfying stock feed demand. Increased soya production will enable faster growth of livestock and processing industries, creating additional jobs in these sectors (TechnoServe, 2011).

Increase Farm mechanisation

Farmers need mechanisation support to boost production. Manual harvesting can continue on small harvest while farm mechanisation can be introduced as production is scaled up. New varieties can now go for 28 days beyond harvest time before the soya bean splits, thereby giving the farmer time to harvest. India has appropriate technology for smallholder farmers and this gives scope for Zimbabwean engineers to invent farm equipment that suits smallholder players.

While every farmer may want to own a tractor, it is best for small holder farmers to share farm implements where possible.

Enhance access to finance

Create a Soya fund that could be retained for, R&D, farmer capacity building, infrastructure such as shades, storage facilities and irrigation. SNV (2016) suggested brokering funding not only for farmers but for chain actors. These should be set-up as two separate financing windows but with mutual feedback mechanisms (SNV, 2016). There is need for financial institutions to **reduce cost of money to unlock working capital for value chain players.** Furthermore, **growers need to be naturally registered and pay levies to back their operations**. AMA is currently registering farmers and charging them $1 but that fund is not going towards farm operations.

Invest in infrastructure development

There is need for the government, private sector and individual farmers to invest in sustainable irrigation systems through adoption of green energy to mitigate against drought and unreliable hydro power supply.

Prioritize public investment along the soya value chain

Public investment should address whole value chain in order to boost competitiveness.

Incentivize the soya bean value chain

The weakest link is the farmer. There is need to support the farmer by providing affordable inputs, a ready market and a guaranteed viable price. Further, there is need for incentives on farm and institutional research. Farmer needs input subsidies, affordable utilities. Incentives need to be introduced right through the value chain. Processors of soya bean need support in the form of access to inputs and finance.

Institutionalize soya bean value chain

Players in the soya value chain are fragmented and therefore need to be more organized and coordinated. This calls for creation of sound institutional arrangements that govern production and marketing of soya bean. In the short-term, the re-establishment of a national soy association could allow industry players to agree on a coordinated approach for increasing production *(TechnoServe, 2011).*

Institutionalization can take a further step by formation of a structure that involves all farmers unions, agricultural colleges, Ministry of Agriculture, Mechanisation and Irrigation Development, soya bean contractors among others. These would need to regularly meet and deliberate on the operations of the value chain. The previous task force was chaired by the Permanent Secretary in the Agriculture Ministry with Agritex as a convener and UZ Soil Science Department as the Coordinator of the task force. This structure has to be formalized and governed by a constitution. It has to be strong and approach the Agriculture Ministry to influence policy.

Further, there is need to set up soya bean research and development institution with a mandate of research, promotion of soya bean value chain. It has to be run by scientists. While it can be quasi government, it has to have some degree of autonomy like the way SIRDC operates.

Institutional arrangements before the land reform

There used to be an Oil Producers Association within the commercial farmers union which needs resuscitation. This subcommittee used to support value chain research and development. It had a policy that compelled farmers to retain only 20% of their seed requirement and purchase 80% from seed houses. That way, the sector promoted research and development in seed production. Retention of seed these days starves the seed houses of the much-needed fund for R&D. Moreso, the subcommittee had an extension department supporting commercial farmers in soya bean production in agronomy and pathology. Further, there used to be clubs where farmers would meet and interact and exchange notes on soya bean production. Resuscitation of structures like these will go a long way in assisting the whole value chain in ensuring high soya bean production much needed in oil, cake and human food consumption.

Source: Views from stakeholders

Restrict soya product importations

Incentive to venture into soya been production on the part of the processors is not there as long as they can import cheaper crude oil. Neither is there incentive to contract farmers into expensive soya production if imported soya lands cheaper than the locally produced soya bean. There is therefore a need to ban or increase tariffs (which go into the soya fund) on soya imports during the period when farmers are ready to offload the soya bean on to the market to allow it to be moped up (between May to November) and then open the borders only when there is a deficit. Another way would be to introduce the quota system of mixing local purchases to imports in order to mop up locally produced soya bean first then open up the borders to cover the deficit. Adoption of any one option needs the buy in of all soya value chain actors.

This will save the scarce forex that is allocated for soya product imports and redirect it to soya bean production.

Research and development to backstop the soya value chain

Continuous improvement of seed quality and R&D for high yielding varieties is key on the part of research institutions. There is therefore need to link research institutions to farmers, processors, policy making and NGOs.

Enhance ease of doing business

Improving ease of doing business to reduce costs of production and improve competitiveness of the players in the soya bean value chain. In the short term, costs and tenure of license for importers of soya bean seed need to be reviewed to reduce red tape and promote ease of doing business. In order to support resuscitation of the local industry however, government should consider introduction of a soya import levy. Funds for the levy will be put into a revolving fund to provide cheap capital accessible for soya farmers and processors.

Pricing of energy and raw water suppliest of armers and agro-processors need to be reviewed to facilitate agricultural competitiveness in Zimbabwe. Comparison with regional countries highlights Zimbabwe's utilities are generally high. For example, raw water in Zambia and Botswana is free while Zimbabwe's communal, A1 and commercial farmers are charged $4.50; $5.00 and $6.82 per 1 million litres of raw water respectively. Table 4 of this report further highlights the huge cost differentials between Zimbabwe and its neighbouring countries on power. High domestic utilities add to the high cost base of local producers making them uncompetitive on both local and regional markets as is currently prevailing with Zimbabwe's agricultural output.

Put in place a strong contract farming legal framework

Unlike in other subsectors like tobacco and cotton, there is no contract farming framework governing soya bean. There is a need for a strong and effective contract farming legal framework to avoid side marketing. The framework needs to penalize both parties to the contract on an equal basis in case of default. This will go a long way in restoring confidence in soya bean contract farming.

Speeding up the conclusion of the national contract farming framework in the agricultural sector is of paramount importance as it will guide players in the various subsectors.

Niche market

Non-GMO policy creates niche market opportunities for Zimbabwe and needs to be upheld. Players in the Soya bean value chain can leverage of the positives emanating from this policy position.

Promote soya bean utilisation at the household level

Sustainability of soya bean production will partly be based on its contribution to household food and nutrition security and increased income to the smallholder farmers. These farmers will be attracted to producing soya if they see its socio-economic value. Policy-makers have a role to play in supporting/incentivizing initiatives to stimulate general demand, especially for human consumption of soya bean. Smallholder farmers need to process the soya bean into various products at the farm gate to add value to the crop and maximize profits.

Public private partnerships

There is scope for complementary initiatives from Government and private sector within the context of private and public partnership in supporting the strengthening of the soya bean value chain.

Soya bean aggregation

Use of collection points to relieve the constraints of market access for farmers

- Farm soya output may be too small and expensive to transport to the market. In the 1990s when small holder farmers were roped in soya ban production, their produce was pooled at collection points and was sent to the market in 30 tonne batches that were sold under one invoice. There is need to facilitate strengthening of farmers/ commodity associations to aggregate and collectively market soya on behalf of farmers.

Government support to the agricultural sector through appropriate policies

Agricultural policies to be synchronized - Firstly there is need for government to inculcate a culture of policy implementation in order for the country to realize the intended goals set in those policies. The life span of ZAIP for example is nearing to an end but the Plan has never been implemented. There is need to factor in the implications of a crop policy on the rest of other crops. For example, maize price intervention by government is not sending the right signals to other crops like soya. The huge price difference between soya bean and maize has adverse effects on the poultry value chain as farmers shy away from producing the much-needed protein crop in favour of maize production. The country needs a balanced crop mix. Stakeholders suggested the need to rationalize and clarify mandates of GMB and AMA to avoid duplication and make them more fit for purpose in supporting the farming community and the agro-processing industry. Thirdly, land reform converted bigger farm units into smaller ones therefore the country's agricultural policy direction should tilt towards smallholder farm support.

Livestock command is highly welcome and must be supported. Given its strong linkages with the soya bean value chain particularly on poultry, dairy, beef and piggery; it will provide an expanding and guaranteed market for soya bean production. Furthermore, China has expressed its interest in supporting the command soya by providing a ready market. In fact, Zimbabwe's annual poultry production can be consumed in a one lunch meal by Beijing population alone. Thus, there is huge scope of not only poultry exports to China but soya cake and cooking oil into the region.

Command Soya - a value chain approach - Given that the key driver for soya production is the processing industry, there is strong need for a value chain approach to the command soya programme. Facilitating access to harvest equipment and improved processing technology for example can increase throughput from soya production to be offtaken and utilized efficiently in value added processes. An import levy on current soya imports can assist in funding such programmes until they reach sustainability.

Local content policy for domestic soya processing. Promote soya bean value addition

Lessons from South Africa and Brazil highlight that a focus on the domestic processing industry is the key that unlocks and boosts soya production and strengthens the value chain. There is need for the government of Zimbabwe to support local processors through local content incentives that stimulate domestic soya bean production and local value addition.

Lessons from South Africa and Brazil highlight that a focus on the domestic processing industry is the key that unlocks and boosts soya production and strengthens the value chain.

Opportunities lie in create new industries such as biodiesel, ink, candle (burns longer), adhesives, lubricants. This even increases the chance of the crop being funded by new players. There is however, need for policy makers and value chain actors to share a common understanding of local production and consumption potential for the full range of key soya bean and soya bean-related products, and develop an approach that can foster the development of the soya value chain.

Table 13
Summary of Recommendations and timelines

	Short to medium term intervention	Medium to long term intervention
Institutional arrangement	Significant government involvement in • provision of legal framework, ensuring contracts is upheld. • Coordinating production.	Revitalize and strengthen the Oil seed marketing technical committee/Private sector led institutional arrangement.
	Restrict soya bean imports during the harvesting period (between May and November).	Establish a soya bean fund to finance soya bean products.
	Promote PPP in soya ban production through contract farming. Engagement of formalized institutions such as institutions of higher learning, churches and government department with large tracks of land in soya bean contract farming.	Finalize Contract Farming framework to promote PPPs in the production of soya bean.
Capacity building	Strengthen extension services to promote soya bean production among smallholder farmers.	Establish a soya bean research institute to support long term soya Research & Development. Results in continuous improvement in farming techniques and seed varieties.
	Set up production hubs in high potential areas.	Ensure security of tenure to unlock potential funding and credit
	Provision of input starter packs to promote small holder soya bean production.	
	Farmer training on soya bean production and processing at household level.	Promote soya bean value addition increases demand for soya bean hence increases the chances of crop funding by new players
Pricing	Announcement of a pre-season purchase price for soya bean	Establish a price determination mechanism for contract farming to ensure transparency
Infrastructure and support services	Coordination of local buying points in collaboration with GMB and commodity brokers to aggregate deliveries by smallholder farmers.	Refurbishment and upgrading of technology used at the state-owned rhizobium factory.
	Ensure inputs are affordable and readily available.	Farmer mechanization to support production, provision of irrigation equipment and motorized equipment.

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Appendix 1

Each of the dimensions in the diagnostic tool used by UNIDO seeks to collect information on a number of parameters as detailed in the table below.

Table 14
Diagnostic dimensions and parameters

1. Mapping	1.1 Product
	1.2 Value chain actors and their functions
	1.3 Flow of product and end-markets
	1.4 Business interactions
	1.5 Service provision
2. Sourcing of Inputs and Supplies Logistics	2.1 Primary product characteristics
	2.2 Characteristics of primary producers and input providers
	2.3 Contractual arrangements
	2.4 Logistics
	2.5 Infrastructure and transport facilities
	2.6 Communication
3. Production Capacity and Technology	3.1 Production capacity
	3.2 Technology
	3.3 Knowledge use
	3.4 Costs and margins
	3.5 Innovation
4. End-markets and Trade	4.1 End-product characteristics
	4.2 Consumer demand
	4.3 End-buyer perspectives
	4.4 Marketing and trade capacities
	4.5 Standards
5. Governance of Value Chains	5.1 Actor domination
	5.2 Participation in and distribution of value addition
	5.3 Cluster concentration
	5.4 Type of governance
6. Sustainable Production and Energy Use	6.1 Use of materials
	6.2 Energy use
	6.3 Use of water
	6.4 Effects on bio-diversity
	6.5 Emissions
	6.6 Waste management
7. Value Chain Finance	7.1 Financial attractiveness
	7.2 Financial risks
	7.3 Norms and practices
	7.4 Availability of financing
	7.5 Financing gaps

8. Business Environment and Socio-political Context	8.1 Business environment
	8.2 Product and trade regulations
	8.3 Public and private service provision
	8.4 Social and cultural context

Appendix 2: List of Interviewee

	Stakeholder interviewed	Name of the Institution
1.	Mr. S Muchena- Commodities Specialist and Mr. K. Munyanyi- Livestock Economist;	Zimbabwe Farmers Union
2.	Mr. I. Muchuchu- President	Stock feeds Manufacturers Association
3.	Mr. J. Nyagweta- Technical Services Manager and Mr. R. Gurira –Distribution and Export Manager	Zimbabwe Fertilizer Company
4.	Mr. T. Musarara- Chairman	Grain Millers Association
5.	Mr. S. Zawe- President	Zimbabwe Poultry Association
6.	Dr. H. Mushoriwa- Soya bean and Legumes Global Programme Lead at SEEDCO Research Station, Arcturus	SEEDCO
7.	Mr. J. Tevera- President	Zimbabwe commercial Farmers Union
8.	Dr. C. Sukume,	Livestock and Meats Advisory Council
9.	Prof Mpepereki	Dept. of Soil Science, University of Zimbabwe
10.	Mr. S. Madondo Acting General Manager	Olivine Industries
11.	Dr. Kutywayo	DRSS
12.	Mr. Busisa Moyo- President	Oil Expressers Association

Appendix 3: Producer price framework for dry Land Soybeans for the Production Year 2017-18 In South Africa

Produsent prys raming vir droëland SOJABONE vir die / Producer price framework for dry land SOYBEANS for the		PRODUKSIEJAAR 2017-18 PRODUCTION YEAR 2017-18				
Huidige Produkprys op plaas vir beste graad / Current product price for the best grade (R/TON) (Safex min bemarkingskoste/marketing cost)		4,761.00	Rand/ton			
Beplanningsopbrengs / Estimated yields (ton/ha)	1.5	1.8	2.0	2.5	3.0	3.5
Bruto produksiewaarde / Gross production value (R/ha)	7,141.50	8,331.75	9,522.00	11,902.50	14,283.00	16,663.50
Direk Toedeelbare veranderlike koste / Direct Allocated Variable costs (R/ha)						
Saad / Seed	1,144.83	1,144.83	1,144.83	1,144.83	1,335.64	1,335.64
Kunsmis / Fertilizer	1,832.50	1,832.50	2,083.50	2,083.50	2,491.00	2,993.00
Kalk / Lime	-	-	-	-	-	-
Brandstof / Fuel	617.21	627.62	638.03	653.15	668.26	677.68
Reparasie / Reparation	496.16	498.00	499.84	503.51	507.19	510.87
Onkruiddoders / Herbicide	857.10	857.10	857.10	857.10	857.10	857.10
Plaagdoder / Pest control	225.40	225.40	225.40	225.40	225.40	384.30
Insetversekering / Input insurance	139.26	162.47	185.68	232.10	278.52	324.94
Graanprysverskansing / Grain hedging	378.67	380.73	403.02	413.49	464.16	518.66
Kontrakstroop / Contract Harvesting	-	-	-	-	-	-
Oesversekering / Harvest insurance	271.38	316.61	361.84	452.30	542.75	633.21
Lugspuit / Aerial spray	-	-	-	-	-	-
Losarbeid / Casual labour	50.00	-	-	-	-	-
Droogkoste / Drying cost	-	-	-	-	-	-
Verpakking en Pakmateriaal / Packaging and packaging material	-	-	-	-	-	-
Produksiekrediet rente / Interest on production R/ha	315.66	317.38	335.96	344.68	386.93	432.36

Produsent prys raming vir droëland SOJABONE vir die / Producer price framework for dry land SOYBEANS for the		PRODUKSIEJAAR 2017-18 PRODUCTION YEAR 2017-18				
Totale Direk Toedeelbare veranderlike koste / Total Direct Allocated Variable Cost (R/ha)	6,328.16	6,362.63	6,735.20	6,910.05	7,756.95	8,667.75
Totale Oorhoofse koste / Total overhead cost R/ha	2,106.42	2,106.42	2,106.42	2,106.42	2,106.42	2,106.42
Totale Koste per ha voor fisiese bemarking R/ha / Total cost per ha before marketing cost R/ha	8,434.58	8,469.05	8,841.62	9,016.47	9,863.37	10,774.17
Totale koste per ton voor fisiese bemarking R/Ton / Total cost per ton before marketing cost R/Ton	5,623.05	4,839.46	4,420.81	3,606.59	3,287.79	3,078.34
Totale bemarkingskoste / Total marketing cost R/ton	59.00	59.00	59.00	59.00	59.00	59.00
Verwagte minimum Safex prys SONDER wins/ Expected minimum Safex price, WITHOUT profit	5,682.05	4,898.46	4,479.81	3,665.59	3,346.79	3,137.34
Safex prys / Safex price - May 18	4,820.00	4,820.00	4,820.00	4,820.00	4,820.00	4,820.00

Source: http://www.grainsa.co.za/upload/report_files/GSA-17-18-Oos-Vrystaat-begroting-Eastern-Free-State-budget.xls

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