Technical Report:

Soybean Value Chain

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Executive Summary

Soybean is a critical crop which makes up 54% of the global oilseed market; its production is dominated by the USA, Brazil and Argentina and demand is dominated by the USA, China and Europe. While much of Southern Africa shares similar agro-climatic conditions to Argentina and Brazil and has a similar amount of land that could be planted with soybean (most of which is currently completely uncultivated), the region produces less than 1% of the total global output, compared with 46% for Brazil and Argentina.

The soybean industry is well established in Southern Africa, with total production of 861k MT in 2010 and demand of 2M MT. Production and demand are dominated by South Africa, though Zambia, Zimbabwe and Malawi are also significant producers. Production is dominated by commercial farmers (who made up 84% of production in 2010), though this varies significantly by country, as smallholder production dominates in Mozambique and Malawi. Demand is dominated by soybean cake for the poultry industry and soybean oil for human consumption. Demand is expected to continue, reaching 3.5M MT by 2020.

Although soybeans are well established in the region, there is significant variation in the industry across the region, and the soybean value chain has a number of weaknesses, which vary across countries:

- Production practices across the region are generally poor (with the exception of commercial farmers in South Africa and Zambia), with low input use (due to high prices, a lack of finance, poor availability and regulations, particularly a ban on GMO seeds outside South Africa), limited irrigation (outside Zambia) and poor agronomic practices (particularly among smallholder farmers)
- The processing industry is rapidly expanding as processors are often backward integrated from animal feed manufacturers (particularly in Zambia and Malawi) or oil processors (particularly in South Africa) who are securing inputs for their core activities; however feed and food safety must be improved
- Smallholder farmers find it difficult to obtain the right price for their product and often struggle to reach the market or find storage
- The policy environment is challenging, with trade restrictions, a lack of regional harmonization, support for competing crops, unclear land tenure rules and insufficient investment in infrastructure
- The finance required to increase the land under cultivation and invest in irrigation systems and new mechanization is difficult to obtain and expensive
- The support services needed for smallholder production vary significantly across the region, with reasonable support from NGOs in Malawi, Zimbabwe and Mozambique, but poor support in Zambia, South Africa and DRC

These challenges reduce the profitability of the crop and the land cultivated with soybeans. However, by working to overcome these challenges, the industry could double production by 2020, generating US$217M in increased income and raising the household annual incomes of over 400,000 smallholder farmers by between US$30 (for smallholders who already grow soybeans but who will see an increase in productivity) and US$300 (for smallholders new to soybean production). The industries in South Africa, Zambia and Zimbabwe are expected to generate the majority of additional income as they grow rapidly from a large base. However, smallholders in Malawi will see the most benefit, as they
dominate production (with 160,000 smallholders benefiting), followed by Zambia (124,000), Zimbabwe (70,000) and Mozambique (52,000).
1. Background

The Southern Africa Trade Hub (SATH) works to increase international competitiveness, intra-regional trade and food security in the Southern Africa Development Community (SADC) region, through supporting progress on the SADC regional integration agenda and increasing the trade capacity of regional value chains in selected sectors.

Selection of the most appropriate regional value chains for technical assistance and support was a priority task for the project, focusing on value chains that have the potential to not only increase competitiveness, trade, and food security, but are also relevant regionally.

Soybean is an important crop with a well-established and growing global market. Global production is over 250M MT in 2010, rising at a compound annual growth rate (CAGR) of 4.4% between 1991 and 2010. The area harvested over the period grew at a CAGR of 3.2%. Soybean comprises about 54% of the world’s total oilseed production; soybean meal dominates the international protein meal market and soybean oil is second after palm oil in the international vegetable oil market.

![Figure 1: Global soybean production and area under cultivation (USDA-FAS)](image)

Production is dominated by the USA, Argentina and Brazil, which, together, account for around 81% of world soybean production. Consumption is dominated by China, the USA and Europe, which, together, make up 61% of soybean meal demand and 56% of soybean oil demand. The rapid growth in global soybean production and demand is expected to continue as Asian markets continue to increase demand for soybean (driven by China) and the increase of soybean oil for biodiesel production continues (particularly in the USA).
Table 1: Soybean production and consumption, 2010, % (USDA-FAS)

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<tr>
<th>Country</th>
<th>Production (World)</th>
<th>Consumption (World)</th>
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<tr>
<td></td>
<td>Soybean %</td>
<td>Meal %</td>
</tr>
<tr>
<td>USA</td>
<td>35</td>
<td>20</td>
</tr>
<tr>
<td>Brazil</td>
<td>27</td>
<td>15</td>
</tr>
<tr>
<td>Argentina</td>
<td>19</td>
<td>17</td>
</tr>
<tr>
<td>China</td>
<td>6</td>
<td>26</td>
</tr>
<tr>
<td>EU 27</td>
<td>N/A</td>
<td>6</td>
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Agro-climatic conditions are favorable to soybean production in Southern Africa, a region that has enough land available for soybean cultivation to rival the production in Brazil and Argentina, yet the region accounts for less than 1%\(^3\) of total global soybean production.

The soybean value chain was selected in terms of its growth-potential and capability to benefit as many smallholders, small enterprises and the poor, as possible. The selection of the soybean value chain was also premised on its capacity to be scaled-up or replicated in other countries, given similarity within the respective agricultural economies. Given the economic and climatic diversity within the region, SATH decided to focus on facilitating regional value chain strengthening in Zambia, Malawi, Mozambique, South Africa, and Zimbabwe given their similarities and well established industry linkages.

This report will focus on a comprehensive review of the soybean value chain. This review will:

- Provide the status of the soybean value chain in the region and identify the differences in the production practices and technologies across SADC countries;
- Analyze the opportunities and constraints facing the various value chain actors, players and stakeholders; and,
- Uncover relevant operational as well as policy issues impeding soybean value chain competitiveness and profitability, by country, and then aggregate them to determine the best approaches to address them across the region.

The review will focus on understanding productivity gaps, factors blocking development and expansion of the different channels within the value chains, and identify hurdles and problems leading to increased costs, risks, uncertainties and inefficiencies that hinder competitiveness. The review has been informed largely by the Bill and Melinda Gates Foundation (BMGF) supported TechnoServe Regional Soy Study, which in turn drew upon a South African Soybean Value Chain study conducted by the National Agricultural Marketing Council (NAMC). The information was supplemented with desk research and interviews with industry role players in the region.

This review presents an analysis of the internal and external sector dynamics and driving forces, and how these impact soybean production and processing within the SADC region. A vision statement for the soybean sector is proposed, followed by key recommendations for SATH involvement.
SADC's regional soybean value chain comprises all economic activities related to production, storage, trading, processing and consumption of soybean grown in the region, as well as international imports and exports.

The soybean value chain, as outlined in the figure below, is made up of the following participants:

- **Input suppliers**: Soybean production requires a wide range of inputs, from seeds, inoculant and lime (at planting), to fertilizer and herbicide (during the growing season), to irrigation systems and mechanization. Input suppliers are required to ensure the availability of these inputs at a reasonable cost.

- **Producers**: These are the commercial and smallholder farmers who produce the soybeans. There is significant variation between countries, with smallholders dominating in Malawi, Mozambique and DRC while commercial farmers dominate in South Africa and Zambia, with a more even split in Zimbabwe.

- **Aggregators and traders**: Traders ensure that the producers have a ready market for their soybeans and processors have a reliable supply for their inputs. Traders can either import soybeans to meet processor needs or aggregate domestically produced volumes; those that specialize in aggregating domestic volumes are called Aggregators.

- **Storage**: In commercial production systems, soybeans are typically stored in silos after harvest until they are needed by the processors. Outside South Africa and Zimbabwe, publicly available storage facilities are generally poor (although they are improving in Zambia). As a consequence, most production from smallholders is stored on-farm, under poor conditions, with significant economic losses from spoilage and quality deterioration.

- **Processors**: These process the raw soybeans into meal, oil or products for human consumption.

- **Feed manufacturers**: These use the soybean meal produced by processors as an input for animal feed for the poultry, beef, pork and fish industries.

- **Consumers**: The final consumers include the animal production industries for use in animal feed and the retail industries or food relief agencies that use processed soybeans for human consumption.
Figure 2: Soybean value chain in Southern Africa
2. Soybean Demand in Southern Africa

Soybeans are used to satisfy three separate markets: soybean oil, soybean cake (both low fat cake and full fat cake) and soybean products for human consumption, with the first two dominating. The demand for soybeans is driven by oil and low fat cake, with the market constrained at the lower of the demand for each.

The demand for soybeans is well established and growing rapidly in the region with total demand for soybeans in 2010 at 2M MT\(^6\).

This overall demand is driven by soybean oil, which stood at 2.1M MT in 2010\(^5\), primarily from South Africa (1.3M MT), with Mozambique, Zambia, Zimbabwe and Malawi following with 0.2M MT each.

The high demand in South Africa is a result of the dominance of their economy in the region. Despite this, the dominant oil in South Africa is sunflower oil, with soybean oil seen as a cheaper alternative; palm oil is becoming an increasingly important competitor, with imports from Asia taking hold during the peak soybean prices of 2008.

Palm oil is the main competitor in the DRC, reflected in the very low demand for soy oil in the country across the rest of the region.

The demand for soybean cake in the region stood at 2.0M MT\(^6\) in 2010, constraining the overall demand for soybeans in the region. The demand in each country is also constrained by the demand for cake, with the exception of South Africa, where the demand is 0.3M MT greater than oil.

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\(^1\) Includes demand from South Africa, Zambia, Zimbabwe, Malawi, Mozambique, Angola, DRC only
Demand is dominated by the poultry industry (1.5M MT\textsuperscript{vii} in 2010), which uses both low fat cake and full fat cake as an important source of feed. The pork, dairy and aquaculture industries also use soybean cake as a source of feed.

Soybean demand for human consumption, usually in the form of flavored textured vegetable protein (TVP), was a small portion of the total demand, less than 0.1M MT\textsuperscript{viii} in 2010. Several companies in the region produce TVP products and demand is growing on the back of increased consumer acceptance and reasonable protein price points. A far greater use of soybean for human consumption is for Corn Soy Blend (CSB), driven by UNICEF and World Food Programme (WFP) purchases\textsuperscript{2}. CSB normally forms part of feeding programs and is supplied to vulnerable groupings such as children, lactating women and the infirm. In South Africa, around 600 MT of CSB is produced monthly and is comprised of 75% maize, 24% extruded soybean and vitamins. CSB operations exist in Zambia (3), Malawi (4), Zimbabwe (1) and Mozambique (1). CSB in the region must comply with the regional regulations on GMO; thus, in most countries, CSB must be produced from non-GMO corn and soybean. CSB manufacturers must comply with food safety standards and HACCP protocols. Compliance with these standards is problematic as the requisite technical expertise may not be available. Failure to comply, unless there is a condonation (which is rare), results in the rejection of the consignment.

The demand for soybeans is expected to grow to 3.5M\textsuperscript{3x} MT across the region by 2020 with South Africa continuing to dominate demand.

Growth projections based on a triangulation between the perspectives of experts in the soybean industry and in industries that use soybean, growth projections for the main users of soybeans, historic growth, and projected GDP and population growth

Figure 5: Demand for soybean cake in selected SADC countries, 2010, '000 MT (TechnoServe, 2011)

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Growth will be attributed to demand for soybean cake by the poultry industry, which is expected to more than double in all countries in the region. The growth in poultry demand is itself driven by the increased demand for meat, as incomes rise and urbanization intensifies. As poultry is typically the cheapest meat available, it will benefit quickly from increased meat consumption. Soybean will also benefit from this expanded demand as it has no natural competitors as a source of protein in poultry feed; both sunflower and cotton cake tend to be too fibrous and low in protein.

Demand from piggeries, aquaculture and human consumption will also grow, but from a much lower base.

The preferred meal for the animal feed industry (particularly poultry) is full fat meal which must either be processed specifically for the industry or reconstituted from oil and cake. It

\textsuperscript{2} These products are variously called CSB, Unimix, and Ready to Use Therapeutic Foods (RUTF).

\textsuperscript{3} Growth projections based on a triangulation between the perspectives of experts in the soybean industry and in industries that use soybean, growth projections for the main users of soybeans, historic growth, and projected GDP and population growth.
USAID Southern Africa Trade Hub

has a limited shelf life (around three weeks) and therefore cannot be easily imported or traded within the region, requiring it to be locally made or purchased from imported soybeans.

Demand for soybean oil will grow more slowly due to increased competition from palm oil. As palm oil is considerably cheaper than soybean oil (by over 20% in some countries), it could significantly reduce demand for soybean oil. As standalone processors must be able to sell both the soybean meal and oil to be profitable, this decline in soybean oil demand would, in the long term, damage their profitability and could reduce their willingness to process soybeans. However, there is already sufficient excess demand for soybean oil in most countries in the region to absorb the increase soybean oil that will result from the increased soybean processed to meet the demand for soybean cake over the next 10 years, even as palm oil demand grows.

Figure 6: Projected demand for soybean cake in selected SADC countries, 2020, '000 MT (TechnoServe, 2011)
3. Soybean production in Southern Africa

Soybean production

Soybean production in the region stood at 861k MT\textsuperscript{v} in 2010, with South Africa dominating the industry with 588k produced in 2010. Zimbabwe was previously the second largest producer in the region, but total production has fallen to 30% of its 2001 level following land reformation and economic crisis. Zambia is currently the second largest producer in the region; followed by Malawi (where production has grown due to yield improvements following the government led Input Subsidy Program). Mozambique has seen rapid increases in production in the last 3 years as the crop has been promoted by the government and NGOs.

84%\textsuperscript{xii} of SADC soybean production is by commercial farmers. However, the split between commercial and smallholder farmers varies significantly from country to country with commercial farmers dominating in South Africa (where they make up 98% of production), Zambia (85%), Angola (70%) and Zimbabwe (65%), while smallholder farmers dominate in the DRC (100%), Malawi (95%) and Mozambique (94%).

This level of production is substantially below the region’s agro-climactic potential. South America, which has a similar area of land with similarly favorable conditions, produces 57% of the world’s soybeans; Southern Africa, by contrast, only produces 0.2% to the total global output\textsuperscript{xii}.

This low output is partly caused by the low yields in the region: the average yield is 1.55 MT/ha, compared with an average yield in Argentina of 3.4 MT/ha\textsuperscript{viii}. However, this regional average masks significant variation. Commercial farmers typically achieve significantly better yields (2.6 MT/ha in Zambia, 1.9 in South Africa, 1.8 in Zimbabwe) while smallholder farmers rarely achieve more than 1.0 MT/ha (and smallholder yields in Zimbabwe are as low as 0.5 MT/ha). Lower yields reduce overall production directly (through lower output per ha cultivated) but, more significantly, reduce the area planted with soybeans as the crop becomes less profitable. This second driver has a more significant impact on overall production levels.

This variation is the result of differences in agro-climactic conditions, agricultural practices and the availability and affordability of inputs and services.

Yields in South Africa are typically lower than in Zambia and Zimbabwe as South Africa has less attractive conditions for soybeans and, in particular, less rainfall.

Commercial yields are much higher than smallholder yields as commercial farmers tend to have better agronomic practices, more irrigation (especially in Zambia), and a higher use of herbicides and fertilizers. This is driven by a combination of greater awareness, better access to financing and a greater priority put on the crop (as smallholders focus their efforts on their staple food crop, typically maize).
Yields across the region were relatively stagnant in the recent past with the exception of Malawi, which saw a 10% p.a. yield increase (between 2005 and 2010) as smallholder farmers benefited from the government’s Farm Input Subsidy Program (which benefited all smallholder crops, not just soybean) and Zimbabwe, which saw a 25% (commercial farmers) to 50% (smallholder farmers) fall in yields due to the land reform process and economic crisis.

Area planted with soybean

Soybean is planted on 555k ha in the region. South Africa dominates with 311k ha planted, with Zambia, Zimbabwe and Malawi following with between 62k and 75k ha. This is a small proportion of the land that is suitable for soy production but that is currently not productively used for agriculture in the region. Zambia, for example, has 33m ha of land that is suitable but that is not cultivated; similarly, DRC has 65m ha of available arable land and Mozambique has 7m ha available. However, Malawi is land constrained (due to its high population density and the fact that most arable land is already cultivated), as is South Africa (as most of the arable land is already cultivated with other crops). Botswana and Namibia have little suitable land due to their low rainfall and lack of access to water for irrigation. This available land is not used for agriculture for a number of reasons:

- Financing is not available for commercial farmers to bring it into use profitably
- Smallholder farmers are not able to increase the area they cultivate as they lack the mechanization required and are therefore limited by the amount of labor they have available; staple crops are prioritized and only grow soy as a secondary crop
- Even if commercial or smallholder farmers were to start producing on this land, the infrastructure is not sufficient to make the produce accessible to the markets at a competitive cost
- The political environment is not considered stable enough for long term commercial farming investments (e.g., in DRC and Angola)

Costs and profitability of soybean production

The cost of soybean production varies significantly across the region based on the yields achieved (as much of the cost is fixed per ha, and therefore reduces proportionately per MT as yields increases) and the use of inputs.
For example, a dry land commercial farmer in South Africa achieving a yield of 2MT / ha produced 1MT of soybean at a cost of $364 per MT\textsuperscript{xviii} in 2010. The primary inputs (seed, fertilizer, inoculant, fungicide and pesticide and lime) made up 39% of this cost, with other direct costs (including contracting plant, spray, air spray, harvester, diesel, precision farming) made up another 26%, with 23% of fixed costs.

A dry land commercial farmer in Zambia would expect to have an average yield of 2.1 MT / ha, producing at a cost of US$450 per MT\textsuperscript{xix}.

This higher cost is largely reflected in the higher input costs (with the exception of seeds) and higher costs of transportation and cultivation (largely due to higher fuel prices).

An irrigated commercial farmer in Zambia would expect to have an average yield of 3.5 MT / ha, producing at a much lower cost of $349 per MT\textsuperscript{xx}. Irrigated farms have higher fixed and finance costs than dry land farms as the irrigation systems require a significant initial investment (and typically require heavy financing).
Conversely, the production cost of a smallholder farmer in Zambia who uses fewer inputs and relies on manual labor is $386 per MT, of which only $101 is a cash cost (assuming a yield achieved of 0.9 MT / ha). At this cost, because they typically obtain significantly lower farm gate prices than commercial farmers, smallholders would consider soybean production unprofitable if they allow for all costs. As they focus only cash cost, it is considered an attractive crop.

The profitability of soybean production in the region is marginal and depends on the relative price of soybeans and the competing staple crops (typically maize).

Commercial producers consistently make a profit only when yields exceed 3 MT; however they base the area they cultivate with soybeans on their expectation of the relative profitability of maize and soybean, which is, in turn, based on their expectations of maize and soybean prices at harvest. In addition, commercial farmers often consider the rotational benefits of growing soybean (the increase of nitrogen in the soil) as this reduces their input costs for their next crop; for example, this makes soybean a popular rotational crop with winter wheat in Zambia.

Commercial farmers in South Africa tend to be profit with lower yields than elsewhere in the region as they are closer to the markets and benefit from better infrastructure, leading to lower transport costs and, therefore, higher farm gate prices.

Smallholder farmers across the region are consistently able to make a profit on a cash basis as they use very few inputs with a cash cost. However, they do not make a profit

![Cost of soybean production - irrigated commercial farmer in Zambia achieving 3.5 MT / ha yield (TechnoServe, 2011)](image1)

![Cost of soybean production - smallholder farmer in Zambia achieving 0.9 MT / ha yield (TechnoServe, 2011)](image2)
when all costs (including their labor costs) are taken into account – labor costs typically make up 70% of the total costs as all of the cultivation is carried out manually (including land preparation, planting, weeding and harvesting). In addition, smallholders do not always take into account the rotational benefits of growing soybean as they are not always aware of the benefits of increased nitrogen in the soil.
4. Soybean trade

The region is a significant net importer of soybean products, importing over 1M MT\(^{\text{iv}}\) p.a. of soybean equivalent\(^4\) in soybean cake and a similar amount in soybean oil. South Africa is the largest net importer, importing over 950k MT of soybean equivalent soybean cake and 750k MT of soybean equivalent in soybean oil (or ~90% of demand). Zimbabwe (~30k MT of soybean equivalent), Mozambique (~25k MT) and DRC (~10k MT) also import large volumes of soybean cake. Angola is the only other significant importer of soybean oil from outside the region (~95k MT). Most of these imports come from Argentina (typically 75% to 100%); Brazil is the second largest exporter into the region. However, India also exports beans into countries which restrict imports of GM beans (e.g., Zimbabwe).

Declines in trade with Argentina and Brazil from 2007 onwards reflect taxes imposed on exports by Argentina, the strengthening of the Real in Brazil and a decline in soy oil imports from the region. Oil imports (high value) have declined in part as a result of a rapid rise in oil production in South Africa (a compound annual growth rate of 20% (2005-2010) as well as imports of cheaper palm oil into the region\(^{xxiv}\). A complex interaction between external pricing, increased local production and product substitution has resulted in this trade decline.

Trade within the region is limited to less than 110k MT\(^{xxv}\). The main trade flows in 2010 were:

- imports of soybean cake and raw soybeans into Zimbabwe from Zambia and Malawi and some soybean oil from South Africa (totaling ~90k MT soybean equivalent)
- imports of soybean cake and raw soybeans into DRC from Zambia (~10k MT)
- imports of soybean cake and oil into Mozambique from South Africa and Malawi (~8k MT)

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\(^4\) ‘Soybean equivalent’ refers to the amount of raw soybean required to produce 1 MT of cake and 1 MT of oil respectively; this is based on the assumption that processing 1MT of raw soybean produces 80% cake and 18% oil. In other words, 1 MT of meal requires input of 1.25 MTs of soybean, and 1 MT of oil requires input of 5.56 MTs of soybean.
5. Production methods

Use of inputs

Soybean can be grown with very few inputs – some smallholder farmers grow it using only the seed. However, to grow it well, soybean requires appropriate use of seeds, lime, fertilizer, inoculant and herbicide. In addition, effective large scale cultivation requires mechanization and irrigation.

The supply for most inputs is available across the region (with the exception of inoculant, which is difficult to obtain outside South Africa). However, they are rarely accessible to smallholder farmers as they are either not available close to the farmers or too expensive.

Use of inputs – seeds

Although seed availability is good across the region, the quality of the seed used varies significantly.

In the region only South Africa currently permits the use of GM seed. GM crop production has substantially increased yields and reduced costs in major soybean producing countries such as the US, Argentina and Brazil. Also referred to as transgenic crops, GM technology contributes to:

- Reduced cost through a reduction in inputs (fertilizer, pesticide and energy for farm operations)
- Improved average yields by reducing yield variability (which increases average yields by up to 20%)
- Improved feed quality
- Increased production levels, thus improving food security and reducing environmental impact

As a result, GM adoption rates have been the highest for any new technology across all forms of agriculture. In South Africa, 90% of the soybean crop is GM.

Although yields in countries that do not permit GM seeds can be higher than yields in countries that permit the use of GM seeds, the difference is due to the different agronomic conditions and practices in each country. South Africa, for example, has lower yields than Zambia despite its use of GM seeds (90% of soybean seed in South Africa is GM), but this is driven by the fact that conditions in South Africa are drier and the use of irrigation is lower than in Zambia.

GM seed is offered by Pannar, Monsanto/Dekalb, Capstone, Pioneer, Sensako, Advance Seed, GWK and Senwes. The primary suppliers of non-GM seed are Zamseed and Seed Co.
Commercial farmers in South Africa who use GM seeds purchase new seed every season as this is typically part of the terms of their purchase contract with seed producers. This creates a large market for seed companies, stimulating research into new varietals. Non-GM seed can be recycled for up to 4 seasons without a significant yield deterioration (assuming the seed is stored suitably), reducing the potential market for seed companies. While commercial farmers typically recycle the seed for no more than 4 seasons (and store it well), smallholder farmers typically recycle seeds for longer than 4 seasons, reducing their yield (especially as the seed is not stored in optimal conditions) which further reduces the size of the market for seed companies. As a result, there is little innovation in new seed varietals, with most of the research led by government research departments or NGOs. Seed Co Zimbabwe has, however, recently concluded an agreement with a Brazilian seed company to develop non-GM seeds in the region.

Use of inputs – inoculant

Inoculant is widely available in South Africa, supplied primarily by Stimuplant and Soy Grower. It is also widely used by commercial farmers (as the soil has a shortage of nitrogen fixing bacteria and so requires inoculant for soy production). Outside South Africa, however, inoculant is less readily available. The Soil Productivity Research Lab (SPRL) in Zimbabwe produces it (with support from N2Africa), but it is not available regionally as the cold chain required to transport it is not available. Even if was available, there is little awareness of the importance of inoculants among smallholder farmers and the less experienced commercial farmers across the region (with the exception of commercial farmers in Zambia, who import inoculant from South Africa). As a result, usage is low across the region outside South Africa and commercial farmers in Zambia.

Use of inputs – lime and fertilizer

Fertilizer and lime is widely available across the region. Fertilizer is supplied by a number of companies, including Omnia, Sasol, Kynoch, Foskor and Yara while lime is typically supplied by a number of local companies (due to its low production cost and high transport cost). Commercial farmers widely use fertilizer and lime, and are increasingly moving to precision farming which involves soil testing and blending fertilizer types to suit the specific needs of the soil. CHC Commodities from Zambia is constructing a fertilizer blending plant in Beira, Mozambique in order to blend fertilizers to order for specific soil conditions. However, smallholder farmers rarely use fertilizer and lime except where it is provided through input subsidy programs for staple crops (e.g., the Farm Input Subsidy Program in Malawi); this is due to a lack of knowledge about what fertilizers to use, a lack of sufficient cash to purchase, a lack of testing equipment and poor availability of the right types of fertilizer and lime.

Use of inputs – herbicide

Herbicides are widely supplied across the region. South Africa is well supplied with Round-Up (which is suitable for Round-Up Ready GM seeds) by Syngenta. Agrachem, Crop Serve and Farmers Barn supply herbicide in Zambia, a number of suppliers including Windmill, Zimbabwe Fertilizer Company and Citchem supply Zimbabwe, the Chemical Marketing Company supplies Malawi and the other countries in the region rely on imports from within the region.
Commercial farmers use herbicides widely, reducing their labor costs and improving their average yields. Smallholder farmers, however, do not typically use herbicides in order to reduce the amount of labor involved in soybean cultivation. This is largely because herbicide is not typically available at an affordable price in rural areas. Smallholders typically do not have the cash required to purchase herbicide even when it is available, and farm input financing is difficult to obtain and expensive.

**Use of inputs – contract farming**

There are increasing efforts to improve smallholders’ access to inputs through hub and spoke schemes – a commercial farmer contracts soybean production from surrounding smallholders and provides the inputs required. If the challenges associated with this could be resolved, it could significantly improve smallholder yields. (The primary challenge is the enforceability of the contract to sell the soybeans back to the commercial farmer and not to a trader).

Contract farming is being developed in Zambia, Zimbabwe and Malawi, but still represents a small proportion of production.

**Mechanization**

Mechanization is crucial for large scale cultivation of soybeans as the planting, growing and harvesting periods are relatively short and it enhances efficiency in planting, fertilizer application and harvesting. The amount and cost of labor required to produce soybeans on a large area without mechanization would be prohibitive for commercial farmers and not available to smallholder farmers who wish to expand their acreage.

Mechanization is widely used by commercial farmers across the region. The equipment used in South Africa and Zambia is of good quality; however, the equipment used in Zimbabwe is old and of poor quality due to the economic crisis in the country. Equipment is available across the region, but financing costs makes it expensive to obtain even for commercial farmers.

Smallholders have very little access to mechanization as the amount of land available to them does not justify the expense of investing in equipment, and they typically lack the financing required. There are a number of efforts to provide communal tractors, but these have not typically been successful. Various NGO’s and development agencies such as the Swiss Development Corporation are promoting initiatives aimed at mechanization for smallholders, predominantly around land preparation. A government led initiative in northern Mozambique is, for example, trialing the use of Chinese hand tractors. The contract farming models noted above could also be used to provide mechanization to smallholder farmers.

**Irrigation**

Irrigation has the greatest impact on the size and consistency of yields – well irrigated fields can have double the yields (irrigated land can consistently achieve yields of 3.5 MT / ha). However, irrigation is not widely used outside Zambia, which partly explains Zambia’s higher average yield. Irrigation was previously widely used in Zimbabwe, but the land resettlement program led to the irrigation systems being sold for scrap or falling into disrepair, and a lack of credit in the country means farmers have not been able to repair the systems.

While irrigation systems are widely available across the region, they are not typically used as they represent a costly investment, with financing expensive and difficult to obtain.
Where irrigation is used, it is typically used only by commercial farmers; smallholder farmers lack the financing and knowledge required to irrigate their land.

**Agronomic practices**

Soybean yields are very sensitive to the agronomic practices carried out during cultivation. The timing of the planting, spacing of the rows, weeding, pest management and timing of the harvesting are all critical practices.

Agronomic practices vary significantly across the region. Commercial farmers typically follow good practices, particularly among experienced farmers in Zambia; newer commercial farmers in Zimbabwe, however, have less experience and poorer practices.

Smallholder farmers typically have poor practices due to lack of knowledge and experience (with a few exceptions, for example among experienced and well trained smallholder farmers in Zimbabwe). Soybeans are also a lower priority crop than the staple food crops and, as a result, whenever there is a pest outbreak a timing overlap in the planting or care of soybean and the staple crop, smallholder farmers focus on the staple crop.
6. Access to Markets

The market for soybeans is fairly transparent for well-informed producers. There are a number of commodity exchanges in the region, including SAFEX (which offers CBOT soybean futures and options as well as South African Rand futures and options contracts allowing price risk management) in South Africa, ZAMACE in Zambia and Malawi’s ACE. Prices available on ZAMACE and Malawi ACE are reasonably well correlated with prices on SAFEX, with large deviations driven more by local conditions than market distortions; however, as the volumes traded are relatively low, the prices tend to be volatile. In addition, there are a number of large traders in the region (e.g., Cargill, CHC Commodities, Olam, and Export Trading) who provide price transparency for the larger producers. The prices on these national exchanges and offered by the large traders are typically in line with international prices (adjusted for transport costs).

Commercial farmers are therefore able to use these exchanges to determine the best price for their produce and either supply to traders or negotiate effectively with processors who then supply the produce directly.

Smallholder farmers typically do not have access to this information and, rely on local brokers and traders to purchase their soybeans for resale to processors. Given the low volumes and lack market price information, they are in a poor negotiating position and are typically price takers. As a result, the price they receive is often as little as half of the market price.

There are increasing efforts to improve the price received by smallholders through the use of hub and spoke systems (where commercial farms act as the aggregators and pass on a higher price to the smallholder), direct purchasing by processors (e.g., by Gett Ltd. In Mozambique), purchases by farmer associations (e.g., IKURU in Northern Mozambique) and government led aggregation (e.g., purchases by the GMB in Zimbabwe). These aggregation programs, especially those of public sector aggregators, are often held back by a lack of cash available to the purchasers, leading to significant delays in payments reaching the farmers (seen most recently in Zimbabwe in the 2010 season).

In addition, some traders (e.g., Olam, Export Trading) have created a distributed aggregation system, with many small depots in the production areas that will either receive goods delivered to them or will arrange for transport and collection in their immediate area. The combination of a dispersed warehouse system and ready cash for procurement ensures that these companies receive the volumes they require.

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5 These contracts are currently only available for South African delivery points. SAFEX does intend expanding delivery points in the region on Dollar Based contracts
6 Many of the soybean trades are traded alongside ZAMACE and ACE, though registered on the exchange
7 Export Trading have 672 depots in Mozambique, Malawi and Zambia
7. Storage

Oil seed storage poses a problem within the region. Other than in South Africa, storage facilities are generally poorly managed and in need of infrastructure upgrades.

South Africa has 17 million Mt of silo storage that is regulated through the Grain Silo Industry and the Grain Handling Organization of South Africa (GOSA). The storage sector is also serviced by the Grain Training Institute (GTI), the Grain Quality and Arbitration Service (GQAS) and the Pest Management Academy. The Agricultural Research Council has a Stored Grain and Oil Seed Research Unit that facilitates research in storage methodologies and pest and fungal contamination. Silos are owned by private sector by companies such as Afgri, Kaap Agri, NWK, Senwes and TWK. The silos are generally serviced by rail sidings, though road freight suffers from a failing rail network. The regional rail networks is generally degraded through lack of investment, further compounded by the poor availability and quality of bulk transport wagons. There is also a trend towards on farm storage to obviate market price volatility and reduce storage costs at private sector silos.

Namibia, Zimbabwe and Zambia also have silo storage available. In Zimbabwe, the silos are owned by the parastatal Grain Marketing Board (GMB). These silos are generally degraded and require substantial investment to restore functionality. In certain instances, the silos have been leased to the private sector and been refurbished. In Zambia, silos are owned by the Food Reserve Agency (FRA, a parastatal) and are also in need of refurbishment. Namibian silos are owned by the private sector.

This situation is changing as South African companies such as Senwes and Afgri and local traders such as CHC Commodities are expanding and refurbishing storage facilities in the region, focusing initially on Zambia.

The bulk of storage in the region is warehousing for bagged oil seed. Bagging does not pose storage problems (as long as the moisture content is not too high) other than an increased handling cost. Prolonged (more than two years) storage may result in rancidity and a reduction in protein content.

8 SATH plans to do a warehouse mapping assessment in Zambia to determine the current state of warehouse infrastructure. If successful this assessment will be replicated elsewhere in the region.

9 As part of SATH work on the regional Grain value chain, an assessment of support services to the storage industry will be assessed and interventions, if required, will be developed. It is likely that a warehouse management training program will be developed in this regard.

10 Soybean moisture content should be around 13%.
8. Soybean processing

Soybeans can be processed in a variety of ways, depending on the required product (oil and cake, full fat cake, extract for human consumption) and the scale of the facility. The table below outlines the main processing methods.

<table>
<thead>
<tr>
<th>Process</th>
<th>Primary Product</th>
<th>Secondary Product</th>
<th>Use</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crushing</td>
<td>Full fat soy cake</td>
<td>None</td>
<td>Animal feed ingredient</td>
<td>Process involves crushing the soybeans into a cake without removing the oil</td>
</tr>
<tr>
<td>Chemical/solvent extraction</td>
<td>Oil</td>
<td>Low fat soy meal</td>
<td>Oil for human consumption, meal for animal feed; typically required very high volumes to be economical</td>
<td>Process involves crushing the beans into thin flakes, then percolating these with a hexane solvent to extract oil from the meal/cake</td>
</tr>
<tr>
<td>Pressing (Mechanical Extraction)</td>
<td>Oil</td>
<td>Low fat soy meal</td>
<td>Oil for human consumption, meal for animal feed; typically economical at low to medium volumes</td>
<td>Process involves the use of continuous screw presses to expel oil from the beans</td>
</tr>
<tr>
<td>Extrusion</td>
<td>Textured Vegetable Protein (TVP)</td>
<td>Byproduct</td>
<td>Food ingredient</td>
<td>Process that raises the temperature of the high-oil cake enough to denature the inhibitory enzymes (does not expel oil)</td>
</tr>
<tr>
<td>Micronizing</td>
<td>TVP</td>
<td>Byproduct</td>
<td>Food ingredient</td>
<td>Process which uses infra-red heating to denature inhibitory enzymes in soybeans, producing soy flour which is then extruded into TVP shapes</td>
</tr>
<tr>
<td>Fermentation</td>
<td>Soy sauce</td>
<td>N/A</td>
<td>Food ingredient</td>
<td>Process that ferments soybeans with specific moulds, water and salt to produce a paste which, when pressed, produces soy sauce</td>
</tr>
<tr>
<td>Cooking/Grinding</td>
<td>Soy milk</td>
<td>Okara</td>
<td>Human Consumption</td>
<td>Process that raises the temperature of beans to dry them, crushes them and then mixes the output with water to produce milk</td>
</tr>
</tbody>
</table>

Table 2: Soybean processing methods

As most soybeans are processed to produce oil and low fat cake, mechanical and solvent extraction are the main processing methods, with solvent extraction becoming increasingly dominant due to its lower cost when processing large volumes.

In solvent extraction, the soybeans are cracked to remove the hull and then rolled into full-fat flakes. The rolling process disrupts the oil cells, facilitating solvent extraction of the oil. After the oil has been extracted, the solvent is removed, and the flakes are dried, creating defatted soy flakes. Most of the defatted soy flakes are further processed into soybean meal for animal feed.
Total processing design capacity in the region is 2.5M MT\textsuperscript{xxvi}, with South Africa dominating (1.9M MT) followed by Zimbabwe (360k MT), Zambia (125k MT) and Malawi (95k MT).

Processors must be able to sell both the meal and oil and operate at over 90% utilization to be profitable; however, this is often not the case as processors have low utilization and often are not able to sell the oil (e.g., in northern Mozambique, where Gett Ltd. is unable to find a market for the oil produced).

It is difficult to obtain accurate estimates of processing costs. However, processing using solvent extraction is ~US$10 per MT, while mechanical extraction can range from US$15 - US$20 per MT. However, these costs assume that the processing capacity is fully utilized; given the high level of fixed costs in the processing industry, low utilization levels lead to a significant increase in processing costs.

The actual throughput was only 765k MT\textsuperscript{xxviii} in 2010. This is because the design capacity is typically used for other oilseeds or is not used to maximum efficiency as it is operated to secure inputs for feed manufacturers who have backward integrated into processing.

**Figure 15: Soybean Solvent Extraction Flow Chart**

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In South Africa, for example, sunflower oil is the dominant seed oil and uses the same processing capacity as soybean oil. Therefore, most of the design capacity is used for sunflower oil processing. While it is difficult to obtain information on the utilization of processing plants in South Africa, it is clear that less than 30% of the capacity is used for soybean oil.

In Zambia, Zamanita (part of the Zambeef group) is the dominant processor; its focus is on securing inputs for its poultry business, and therefore accepts low utilization. Nutrifeeds and Novatek have recently entered the market (to serve their own stock feed needs) and Zamanita is setting up a new solvent extraction plant in Luanshya – capacity is expected to grow by 25% in the next 1-3 years. This pattern is seen in Mozambique (with Gett Ltd. Processing soybeans to meet their stock feed requirements) as well as Malawi (CP Feeds).

Processors in Zimbabwe are currently operating at very low utilization (as low as 10%) because they were designed for the high production levels seen in 2000 – 2002 and have suffered with the decline in production following the land reform and economic decline of the country.

Despite the relatively low capacity utilization (averaging 70% in Zambia, 66% in Malawi, 20% in Zimbabwe), 1.6 Mt of new processing capacity is planned for the region. Of this, 1.3 Mt is planned for South Africa (where the low capacity utilization rates are somewhat misleading as capacity at many of these plants is being utilized for sunflower oil extraction). This is being installed in anticipation of further industry growth in the region.

The Animal Feed Industry

The animal feed sector is the main driver of the soybean value chain. Global feed production is estimated to have increased by 8% between 2005 and 2008 and volumes have increased by an average of 5% per annum in South Africa. The animal feed sector comprises primary producers (crushing soybean for full fat soy cake) and blending/mixing plants. The blending/mixing plants either use full fat soy cake (usually in vertically integrated operations) or defatted soy meal as their primary soy ingredient in feed. The soy component is mixed/ blended with maize, vitamins, fish meal, molasses and bran. Animal feed producers are vertically integrated into a poultry/piggery/feedlot operation or a stand-alone operation supplying those industries.

In South Africa, there are in excess of 60 balanced feed manufacturers. These manufacturers are supported or serviced by 80 companies (premix manufacturers, raw material suppliers, equipment manufacturers and laboratory services). The number of firms operating in the region is estimated in excess of 100.

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11 SATH is currently undertaking an identification and mapping exercise of all feed manufacturing firms in the region.
9. The Policy Environment

While the policy environment in South Africa is broadly supportive of soybean production, the policy environment in other countries does not support the industry.

*Seed policy*

The restriction on GM soybeans in most countries in the region reduces average yields and increases the variability of yields; this leads to more uncertainty in the profitability of the crop and therefore reduces its attractiveness to farmers.

In addition, the certification of new seeds is complex and cumbersome. Each country in the region requires independent approval of all new seeds, a process which takes between 3 to 5 years in each country. This lack of harmonized seed approval processes mean that seed companies view the region as a number of small markets (each of which requires separate approval) rather than a single large market, reducing the range of seeds available and the amount of research and development carried out for the market. This has been partially addressed by the new SADC seed harmonization protocol which will allow seed to be traded within the region if it has been released in two SADC Member States. The next phase of this process is the establishment of a SADC Seed Center in Zambia to commence implementation of the protocol.

*Competing crops*

Across the region, governments provide support for crops that compete with soybeans for production capacity (land, inputs and labor). This disincentives farmers (particularly smallholder farmers) from growing soybeans as inputs are subsidized and/or markets are guaranteed for competing crops. For example, government support for maize in Zambia and Malawi makes soybean less attractive, thereby reducing the land cultivated with soybeans and the level of care for the crop during times of stress (e.g., during pest outbreaks).

*Trade policy*

Although the region has, in theory, free trade in soybeans, this rule is not applied consistently in all countries. For example, Zambia frequently sets administrative restrictions on soybean exports (based on lobbying by the poultry feed market) in an opaque way that does not allow farmers to plant based on export market potential. They therefore plant only to meet the domestic market, neglecting potential export to South Africa. Malawi has also imposed a similar administrative ban in 2010.

This reduces production in the region and increases reliance on imports.

*Land reform*

The land reform process in Zimbabwe contributed to a significant decline in production as new farmers with little experience took over previously well managed land.

In addition, the planned land reform in South Africa has discouraged some commercial farmers from investing in their land (e.g., to increase irrigation) due to the uncertainty over the terms and timing of the land reform.

Some countries are, however, encouraging production with positive land reform – Mozambique has simplified the process of registering land for commercial production in an effort to encourage commercial farming.
10. Infrastructure

The transport infrastructure outside South Africa is unreliable, costly and there are frequently long distances between production areas and demand centers. For example, in Mozambique, where the production is in the north and center, demand is predominantly in the South. Transporting 1 MT of soy to the demand centers costs US$150\textsuperscript{12} per MT, while in South Africa, this cost is only US$20 per MT\textsuperscript{xxx}. This often makes domestically sourcing soybeans costly and unreliable, encouraging large traders and processors to import soybeans. It also increases the cost of imported inputs at the production areas, often making them unaffordable (particularly to smallholder farmers).

In addition, border crossings are slow and unreliable, sometimes taking days to complete. This significantly adds to the costs and hassles of trade within the region.

\textsuperscript{12} Based on the lowest cost transport option practically available, typically road
11. Market Organization

The regional soybean industry is well organized, with a number of associations across the value chain working to improve the efficiency of the industry and protect the interests of their members.

**Input industry organizations**

The seed trade is well organized with both national bodies (South African National Seed Organization-SANSOR, Zambian Seed Trade Association-ZASTA, Seed Trader Association of Malawi-STAM and Tanzanian Seed Trade Association-TASTA) and a regional body, African Seed Trade Association (AFSTA), playing a self-regulatory role to develop and advise government on seed policy. They have played a major role in driving the seed harmonization process in SADC.

The South African fertilizer industry is self-regulated by the Fertilizer Society of South Africa (FSSA), a member of the International Fertilizer Association. There do not appear to be regional umbrella bodies.

**Producer organizations**

Each country has at least one farming union (with the exception of DRC). For example, Zambian Farmers are represented by the Zambia National Farmers Union, and farmers in Mozambique by the National Farmers Union of Mozambique. In some countries, there is more than one union; Zimbabwe, for example, has the Commercial Farmers Union which represents established commercial farmers, the Zimbabwean National Farmers Union representing the newly resettled commercial farmers, and the Zimbabwe Farmers Union which has a broader base.

These farmers unions typically represent farmers for all crops, not specifically soybean, but they usually have oilseed commodity associations. They protect the rights of their members, train farmers and provide additional services (e.g., farming as a business management support).

These farmers unions are supported by a number of NGOs that support smallholder farmers, providing training, subsidized inputs and technical advice. These include CLUSA, N2Africa, TechnoServe and DAP.

**Feed Manufacturing Industry organizations**

The South African feed sector is served by the Animal Feed Manufacturers Association (AFMA) who guides the industry through voluntary industry standards (which works in conjunction with government regulation focused on feed safety and good manufacturing processes (GMP’s)). Feed safety is critical for food safety and is a public health issue. Potential feed contamination may stem from mycotoxins, salmonella and dioxins. There is currently no coordinated feed safety association in the region and feed safety is, consequently, not well regulated. The feed industry outside South Africa would be well served by industry associations who would be in a position to introduce feed standards and advocate for sensible industry regulation. As both the food and feed industries expand in the region, food and feed safety will become a critical issue in both local demand and cross border trade. The world trend toward more stringent HACCP controls and the inclusion of animal feed in the Codex Alimentar underpins this initiative. Processor

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13 The regulation only applies to those companies that are members of the respective bodies. Not all seed companies are members of the associations.
competitiveness is also enhanced as a result of food and feed safety initiatives resulting in a more efficient industry and reduced consumer pricing\textsuperscript{14}.

\textit{Soybean industry associations}

There are a number of associations dedicated to promoting the entire soybean industry in the region. The Protein Research Foundation promotes soybean production in South Africa, Soy in Southern Africa promotes human consumption of soybeans in the region and the recently created Sub-Saharan Africa Soy Alliance (SSASA) promotes increased production across the entire region, with a mission to see the region produce more than 1.5M MT of soybeans p.a.

\textsuperscript{14} In the poultry industry, feed makes up between 65-70\% of the cost of production.
12. The SATH Vision

Soybean production in the region could double by 2020 to meet growing national demand and increased trade within the region, creating $217M increased income in the region and raising the incomes of 400,000 smallholders by $30 - $300 p.a. This is based on the analysis below.\textsuperscript{xxxii}

Demand for soybeans will grow rapidly in all countries over the next decade, driven by rapidly increasing demand for poultry\textsuperscript{15}; demand growth will be the most rapid in Mozambique (14% p.a.), followed by Zambia (9%), Malawi (8%), Angola and DRC (7%) and South Africa and Zimbabwe (5%)\textsuperscript{xxxii}. South Africa will dominate the absolute growth as it already has the largest demand in the region. This increase in demand can support a significant increase in production in all countries.

In addition, there is scope for Zambia and Zimbabwe and, in the longer term, Mozambique and DRC to increase production to export soybeans to South Africa and displace imports from South America. All of the countries in the region have the potential to produce soybeans at a price that is competitive against imports from South America. For example, both Zambia and Zimbabwe could export soybeans to South Africa at a 10%\textsuperscript{16} discount to landed soybeans from Argentina, provided that steps are taken to resolve transport and infrastructural constrains. This saving would be reliant on being able to acquire large enough volumes to keep transport and aggregation costs low.

Even at today’s demand levels, South Africa could absorb all of the additional soybeans that would be produced if the other countries in the region increased production by 6 times.

To completely meet their own, and South Africa’s demand in 2020, the entire region would have to increase production by over 400%. This would require an increase in the area under cultivation from the current 555k ha to 2.3M ha, or an increase in average yield across the region from 1.6 MT/ha to over 6.4 MT/ha, or some balance between these two. For example, if the region was able to increase average yields from 1.6 MT/ha today to 2.6 MT/ha in 2020 (75% of Argentina’s current average yield), the required increase in land under cultivation would be 840k ha.

The required increase in land under cultivation is below the total amount of total uncultivated suitable land in the region. However, as noted above, this is not evenly spread across the region; South Africa and Malawi may be unable to satisfy the increased land requirements without significant yield improvements due to pressure from competing crops.

While the region could increase production to satisfy all of its demand in 2020, the region should target a doubling of production by 2020. This increase would generate an additional $217M annual income across the region (spread across the entire value chain) and lead to increased incomes for 400k smallholders across the region, with incomes rising by between US$30 and US$300 each p.a.

\textsuperscript{15} Feed sales to the broiler industry in South Africa have a CAGR of 4% (2005-2010) while sales to the broiler breeders have CAGR of 9% for the same period (Animal Feed Manufacturers Association - AFMA)

\textsuperscript{16} The actual attractiveness of regionally source soybeans will depend on the administrative costs of acquiring and transporting the soybeans and on the time it takes to move the soybeans from the producers to the processors
13. Challenges to Achieving the SATH Vision

The industry will need to overcome a number of challenges to achieve the SATH vision. The key challenges are outlined below; this is not a comprehensive list, nor is it prioritized as the priority in each country will differ, as will the specific activity required to overcome the challenge. However, this list is intended to allow industry stakeholders to identify the key issues that it must address as it grows.

**Increasing Productivity and Area Planted**

If the total soybean production is to increase rapidly, both the yield must be improved and the area planted with soybean must be increased. This will require:

- Improved access to all inputs (ranging from improved seed varietals, inoculant, herbicide, fertilizer and lime) for smallholder farmers across the region
- Improved practices, including better land preparation, planting, cultivation and harvesting and application of inputs (including through soil testing)
- Increased irrigation to reduce variability in yields
- Increased use of mechanization by smallholders to increase the land that can be cultivated

**Improving market efficiency**

As production rises, it will be crucial to ensure that the increased soybean volumes reach the market and that the producers receive a fair price. This will require:

- The market must be made more efficient to ensure that all farmers have access to price information and reduce the margin extracted by traders and brokers
- Soybean produced by smallholders must be aggregated more efficiently to make working with smallholders more attractive to processors and international traders
- The risks associated with soybean production (yield variability, price variability) must be reduced by creating risk mitigating products (e.g., insurance products, contract farming, futures contracts)

**Improving storage**

- The quality of storage facilities across the region must be improved to increase the volume that reaches market, ensures a stable supply for processors and allows farmers to get the best price for their produce

**Access to Finance**

- Access to finance must be improved to allow commercial farmers to invest in irrigation systems, increase the area under cultivation, and enable smallholders to purchase better inputs

**Processing**

- Food and feed safety must be improved (e.g., through HAACP, GMP) to ensure that market requirements for soy feed and food products are met

**Policy**

A number of policy improvements are required to ensure the region is able to operate effectively as a single market, to encourage investment in land under cultivation and to promote the soybean market.
- Implementation of the SADC Seed Harmonization protocol, which would increase access to improved seeds, and stimulate research and development in new seed varieties to improve yields
- Restrictions on trade within the region should be removed, enabling surplus countries in the region to target the South African market
- Clarification and simplification of land tenure rules to allow long term investment in commercial farming
- The restriction on GMO seeds outside South Africa removed to allow the region to access the most advanced seeds, thereby reducing the variability of yields and reducing the cost of other inputs (e.g., herbicides)
- Border crossings should be made more efficient to reduce the costs and delays associated with trade within the region
- Infrastructure must be improved to reduce the cost and risk associated with trade within the region
- Enforcement of levying duties and tariffs on imported palm oil, so that it competes fairly with soybean oil

SATH, as a regional USAID project, will not necessarily undertake activities to resolve each of these challenges. Instead, SATH will contribute toward achieving this vision through activities that address challenges specific to soybeans, through interventions that support all SATH strategic value chains (e.g. storage, finance), and finally through the trade facilitation and trade policy work that supports trade and transport in the SADC region.
14. Key Recommendations

The following key recommendations focus on SATH activities that specifically support intermediate results of the project.

SATH interventions in the soybean value chain should focus on:

- Enhance productivity and increase area planted
- Improve storage infrastructure and management
- Improve feed/food processing efficiency and safety
- Increase market efficiencies
- Increase access to and lower cost of finance

These interventions should be undertaken in partnership with key stakeholders, and in consultation and collaboration with the Sub-Saharan Africa Soy Alliance (SSASA), a recently established apex organization that will serve the interests of all soybean value chain actors in the region\(^\text{17}\).

Many of the proposed SATH activities in legumes are cross-cutting with the cereals and cotton value chains.

**PRODUCTIVITY ENHANCEMENT AND INCREASING AREA PLANTED**

SATH should focus its productivity interventions on access to irrigation equipment, mechanization and improved seed in the region. Yield improvements, utilizing improved seed, irrigation and mechanization are possible in Zambia, Zimbabwe, Malawi and Mozambique. With increased productivity and profitability, a greater amount of land will be planted with soybean. Productivity initiatives will address:

- IR 1.3 Alignment of Regional Agricultural and Other Standards with International Standards
- IR 2.1 New Trade Linkages Established and Greater Competitiveness in Staple Foods and Other Strategic Value Chains
- IR 2.2 Enhanced Private Sector Capacity to Trade and Comply with Regional and International Market Standards, including Agricultural Standards
- IR 2.3 Increased Use and Availability of Financial Products and Services for Trade and Investment
- IR 2.4 Increased Use and Availability of Trade Related ICT Products

**Irrigation and mechanization**

SATH should support access to and increased utilization of irrigation equipment and mechanization through a combination of trade show activity and financial initiatives. These initiatives should focus on the NAMPO Harvest Day in South Africa extending to upgrading capacity of regional agricultural trade shows. Appropriate trade shows in the US should also be included in the program.

\[^{17}\text{SATH supported the launch of SSASA with TechnoServe and facilitated the participation of regional value chain actors at the launch. SATH will continue to support SSASA initiatives in establishing a sustainable regional soy commodity based association promoting the production, trade and processing of soy.}\]
SATH should facilitate access to the trade shows, utilizing local service providers (LSPs) to enhance sustainability in the long term. LSP’s could provide training to the participants in order to maximize benefits at the trade show. SATH financial specialists should research and develop a program to link participants to appropriate financial instruments in order to finance purchases at the trade shows.

SATH should also approach irrigation and mechanization suppliers and work with them to develop an appropriate regional financial package to enhance their competitiveness and affordability. This activity could be enhanced by focused regional trade missions and business linkage programs to link suppliers with potential clients.

**Seed Harmonization and Trade**

SADC has concluded a seed harmonization protocol that allows for the release of seed in a third country, should that seed be released in two other SADC countries. This has the effect of hastening access to improved varieties in the region. This protocol will also enhance trade within the region as it will reduce the cost of releasing new seed varieties in each country. Current implementation status of the protocol is uncertain and SATH should research the process in order to obtain a better understanding of the status and what steps SATH could take to support implementation of the protocols with SADC Member States.

SATH should support strategic interventions to promote, expand and enhance the seed trade in the region. Activities in this regard should include:

- Leading seed trade delegations to areas of production opportunity as well as facilitating participation of regional delegations to agricultural trade shows such as the NAMPO Harvest Day in South Africa,
- Facilitating investments in localized seed breeding and multiplication
- Promoting investment in appropriate seed storage methodologies and structures.

**GMO - Biotechnology in SADC**

SATH should work with producers to improve their ability to advocate with SADC governments. Initial focus should be on establishing the costs/benefits of GMO technology, benchmarking transgenic legislation, regulation, and institutional capabilities, working to improve the efficiency of public and private sector bio-safety institutions and regulations, and encouraging the introduction of confined trials.

Given the sensitivity of GM, the initial focus, should be on GM cotton as it is not a politically-sensitive staple food crop. It is expected that as GM cotton is accepted in the region, GM food crops such as soybean will follow.

**Services (extension, finance, storage) provided through sub-contracting and hub/spoke farming systems**

SATH should analyze existing commercial farming sub-contracting relationships and develop a strategy to promote their improvement and expansion. In these relationships, services such as extension, financing, and storage are provided on an embedded or fee-based basis.

**Production Risk Mitigation**

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18 Seed release procedures may take up to 4 years in any one country.
SATH should analyze production risk mitigation instruments (crop/weather risk insurance, improved weather forecasting services, etc.) and encourage the commercially sustainable provision of these services in the region.

**IMPROVING STORAGE INFRASTRUCTURE AND MANAGEMENT**

SATH should focus on improving storage and storage management in order to provide a foundation for effective trade on a “sight unseen basis” and reduce post-harvest loss. Improved storage also enables more cost-effective aggregation of smallholder production.

SATH should commission an assessment of storage availability (volume and location), infrastructure status and management capability in one country, preferably Zambia, to determine further interventions in the sector. Existing regional service providers should be identified and leveraged in a program developed to respond to key constraints in the sector. It is likely this program would include investment promotion, grain handling and storage management training.

Storage initiatives will address:

- IR 1.3 Alignment of Regional Agricultural and Other Standards with International Standards
- IR 2.1 New Trade Linkages Established and Greater Competitiveness in Staple Foods and Other Strategic Value Chains
- IR 2.2 Enhanced Private Sector Capacity to Trade and Comply with Regional and International Market Standards, including Agricultural Standards
- IR 2.3 Increased Use and Availability of Financial Products and Services for Trade and Investment

**IMPROVE FEED /FOOD PROCESSING EFFICIENCY AND SAFETY**

SATH should focus on introducing new technologies and Good Manufacturing Practices (GMP’s) to the food and feed industries in the region in order to make the industries more efficient users of soybean, enhance competitiveness and ensure food and feed safety. SATH initiatives in this regard would align with Feed the Future objectives of ensuring reliable sources of quality food.

SATH should engage with the American Soy Association’s (ASA) World Initiative for Soy in Human Health (WISHH) and the Animal Feed Manufacturers Association (AFMA) to facilitate access to new technology and GMP’s. Food and feed safety initiatives will address:

- IR 1.3 Alignment of Regional Agricultural and Other Standards with International Standards
- IR 2.1 New Trade Linkages Established and Greater Competitiveness in Staple Foods and Other Strategic Value Chains
- IR 2.2 Enhanced Private Sector Capacity to Trade and Comply with Regional and International Market Standards, including Agricultural Standards
- IR 2.3 Increased Use and Availability of Financial Products and Services for Trade and Investment
- IR 2.4 Increased Use and Availability of Trade Related ICT Products

**WISHH**

WISHH could support SATH activities relating to soybean human consumption through the promotion of new technology, equipment and manufacturing processes and the provision of industry based technical training. Primary focus for human consumption should be on the Corn Soya Blend (CSB) and Ready to Use Therapeutic Foods (RUTF) industries as they serve the most vulnerable communities. WISHH should continue to promote and expand the use of SoyCows and VitaGoats, equipment that manufactures soymilk, to enhance the localized uptake of soybeans as well as serve to improve village and community level nutrition.

**AFMA\(^\text{19}\)**

AFMA, the apex organization of South African Animal Feed Manufacturers, should be assisted to establish a regional footprint in order to bring about improved manufacturing processes and enhance feed safety in the region. A regional association will also allow for the interchange of technical and trade information enhancing competitiveness and price discovery for feedstock and finished product. SATH support should include:

- Compiling a verified and data rich regional database of all animal feed manufacturers, maize and wheat millers and oil crushers\(^\text{20}\).
- Conducting GMP audits at 6 regional animal feed manufacturers to determine regional training and equipment requirements to bring about GMP compliance.

WISHH will also facilitate access to new technology in the animal feed sector through training, factory visits and targeted technical assistance to enterprises in the region. These initiatives should be provided under the auspices of AFMA in order to strengthen and enhance the value of membership of a regional feed association.

**INCREASE MARKET EFFICIENCY**

SATH should facilitate the improvement of price discovery mechanisms in the region as an instrument to enhance producer incomes leading to an expansion of production. Risk mitigation will play a key role in the commercialization of commodities in the region. Price discovery and risk mitigation initiatives will address:

- IR 2.1 New Trade Linkages Established and Greater Competitiveness in Staple Foods and Other Strategic Value Chains
- IR 2.2 Enhanced Private Sector Capacity to Trade and Comply with Regional and International Market Standards, including Agricultural Standards
- IR 2.3 Increased Use and Availability of Financial Products and Services for Trade and Investment

\(^{19}\) Cross Cutting Activity. Soybean and Maize.

\(^{20}\) Maize, wheat and oil processors are included as they provide feedstock to the animal feed sector. This database will also be utilized as a foundation for activities in the cereals value chain.
• IR 2.4 Increased Use and Availability of Trade Related ICT Products

*Market Information System*

SATH should facilitate the establishment of a web-based, commercial Market Information System (MIS) that would provide key price and market data for the key staple commodities, and possibly offer a trading platform for goods and services. Further assessment will be required to determine best practices and select a commercially sustainable approach and methodology.

*Support to Commodities Exchanges*

Commodity Exchanges are potentially an important part of the regional trading infrastructure for soy and other staple commodities, offering a transparent, safe means to buy and sell. SATH should provide support to the regional commodities exchanges (including ZAMACE, Malawi ACE) in their restructuring and expansion activities. Particular emphasis should be placed on enhancing the volume of trade through the exchanges. Improving storage practices at the warehouses holding traded stocks is also a key aspect of this support.

*Price Risk Mitigation*

SATH should assess how existing and potential price risk mitigation techniques such as fixed price off-take agreements, futures and put/call options, and minimum/maximum price contracts can provide price risk mitigation services to farmers, traders, and processors.

*INCREASE ACCESS AND LOWER COST OF FINANCE*

SATH should develop mechanisms to lower the cost of finance for soybean value chain players in production, storage, transport, processing. Key counterparts will include Export Credit Agencies (e.g., Export Credit Insurance Corporation), Development Finance Institutions (e.g., Industrial Development Corporation), captive corporate financial entities (e.g., John Deere Finance) and commercial banks.
15. Conclusion
The SADC region soybean industry has the potential to generate significant economic output, improve livelihoods and increase regional trade. While there are a number of challenges to overcome if this is to be achieved, these challenges can be addressed and the industry can deliver on its enormous potential.

SATH will contribute toward achieving this potential by:

- Designing and implementing soy-specific objective activities,
- Designing and implementing general activities that support all SATH strategic value chains and intermediate results, and,
- Coordinating on trade facilitation and trade policy activities that support regional trade and transport in general.

SATH, as a regional USAID project with limited resources, will not necessarily undertake activities to resolve each of the challenges noted above, but will work closely with USAID Missions and other stakeholders in the region to ensure coordination, information sharing, and positive synergies.

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