



Ministry of Foreign Affairs

REPORT AGRO-HUB PRE FEASIBILITY STUDY IN NORTHERN ZAMBIA

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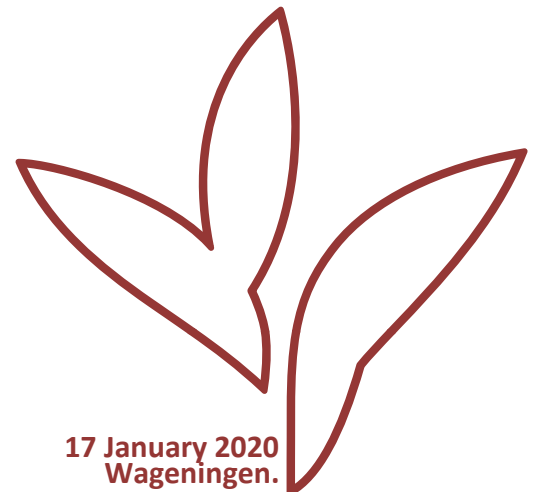
REPORT

AGRO-HUB PRE FEASIBILITY STUDY IN NORTHERN ZAMBIA





Delphy

Agri
Pro
Focus



17 January 2020
Wageningen.

"*Agriculture* is our
WISEST
pursuit, because it will,
in the end, contribute
most to **REAL WEALTH,**
 **good morals, &**
HAPPINESS."
- *Thomas Jefferson*

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1 Introduction

The establishment of an agro-hub in Senga Hill, Mpulungu or Mbala districts was proposed as one of the development interventions during a RVO financed roundtable meeting held in Mpulungu in 2017. The Northern Province of Zambia has abundant land available for commercial large and small scale production. In these three districts, agricultural production is predominantly taking place at a small scale.

The hub should provide an integrated approach to development and cover multiple functions, such as:

- Provide access to quality inputs
- Facilitate trade of outputs
- Promote good technical practices
- Collect and disseminate local and indigenous knowledge
- Provide training and supervision to farmers.

A correct execution of this activities will help to increase the total agricultural production and offset as other successful agro-hub examples have shown¹. Besides, to provide the right inputs and knowledge, will facilitate farmers (especially the more financially insecure smallholders) to gain or maintain access to high value markets.

An agro-hub could enhance both local and regional market integration with neighbouring country markets. Over the last decades Zambia has achieved rapid growth in fresh vegetables exports². Alongside the European market, export opportunities are available in the Great Lakes Region^{3,4} which after the end of conflicts is experiencing new economic growth though the market presents great differences between countries.

With this pre-feasibility study, we aim to provide a strong base of information on the local value chain, challenges, opportunities and partners to support further steps in the development of an agro-hub in the northern district of Zambia.

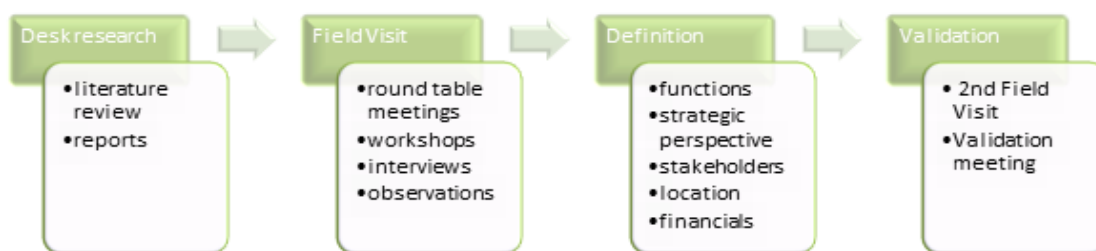
The specific objectives are the following:

1. **Selection and analysis of high potential value chains** on which to focus when developing the agro-hub concept.
2. **Identification of the possible functions and functioning of the agro-hub** with regard to the needs of the value chains. This includes an overview of possible locations and management structure
3. **Identification of possible Locations of the Agro-hub** which minimises the average production cost, including transport and handling.

4. Identification of potential partners
5. Rough quantification of investment and operational costs.
6. Identification of potential funding instruments.
 - a. Selection of applicable investment programs
 - b. Identify requirements of those instruments.

1.1 Methodology

The study has mainly been performed as a desk research. In total 2 field visits of each 1 week have taken place within the context of this study for interviews, round table meetings and consultations with stakeholders as several experts of the Districts, NGOs, private sector organizations, public institutes and traditional leaders. Annex 1 presents a list of interviewees. Additional interviews by Skype or phone has been done for validation of the outcomes. The approach is visualized in the scheme below:



Most of the activities have been performed in the Netherlands and has been based as much as possible on recent (< 10 years) reports and literature. Older sources have been used exclusively where more recent information was not available. The methodologies used for each research objective are described below.

a. Selection and analysis of the value chains.

The selection was done among crops already present in the region, as introduction of additional crop could prove to be a long and complex process. For this study, the choice has been to focus on at least one staple crop (maize or cassava) and a 'cash' crop.

A quick-scan of a few value chains have been performed based on interviews with stakeholders at different levels of the value chain for the different crops, this has been complemented with a review of the available literature. The information about the staple crops has been organised in scorecards based on the methodology described by Schneemann & Vredeveld. Hereby, different qualitative criteria have been assigned a value from 1-5 (5 being the best score) based on the available information⁵. Since this is a very time-consuming process the cash crops have been scanned by means of a swot analysis.

b. Possible functions of the Agro-hub

The possible functions of an agro-hub have been based on the current functioning of the selected value chains and the needs mentioned during the interviews and on the literature. After defining the challenges encountered by different stakeholders, these have been linked with possible solutions consisting of services ideally offered by the agro-hub.

c. Possible Locations

Possible locations have been defined mainly based on field visits and interviews with the district representatives.

For ranking the potential sites, we have used the scorecard method to value and compare the selected sites on various parameters which are important for potential investors. Based on experiences in similar baseline studies for agro business parks the valuation of an Agro-hub is based on 3 pillars (Figure 1) :

- **Physical Features of the site;** in this pillar is looked at the accessibility of the site (infrastructure as roads, power, water), geographical features, available land, impact on environment etc.
- **Availability of Market Economic drivers;** this pillar is analysing the position of the site in the agriculture value chain, presence of SME farmers (within 1 hour walk), presence of Commercial Farmers (within 1 hour drive), availability of staff/workers, pricing of the site etc.
- **Public and Social Environment;** analysing the interest and support of local government and public institutes, the soft influences from third parties (chief) and the social and economic impact of the Agro-hub.

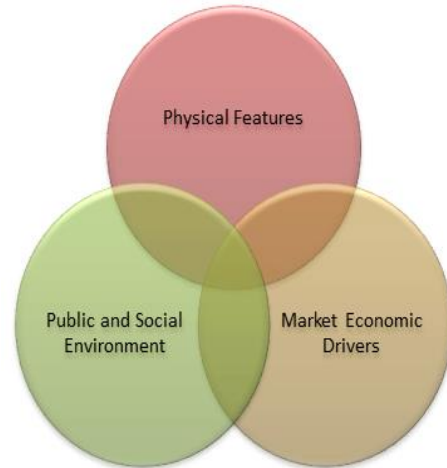


Figure 1. the three pillars of the location evaluation

In the baseline study each pillar has the similar maximum score of 33.3%. It is noted that the pillars could get different scores in a second phase, depending on the preferences of the parties involved. Each of the parameters got a score on a scale from 1 to 5, whereby 5 is the maximum (best) score. At the end all scores are counted and the best sites can be ranked. In Annex 2 the full scorecard of all selected sites is presented.

d. Possible Partners

Possible partners have been identified during the interviews and the field visits. For privacy reasons this report presents only a general overview of the potential partners and their role as relating to the agro-hub. A separate document has been created with an overview and can be made available in consultation with RVO.

e. Identification of possible funding instruments.

- a. Selection of applicable investment programs.
- b. Identify requirements of those instruments.

2 The Northern Province

The Northern Province is predominantly an agricultural area with 75 - 80% of the population being active in farming. It has available water and soils that are favourable for the growing of most types of crops. The average annual precipitation is usually above 1,000 mm, spread over one rainy season from October to March. During this period there is no need for any irrigation, while in the dry season (April to October) shallow-rooting crops require additional irrigation to grow. This water is sourced usually from overland flow rather than boreholes, for example irrigation water for the commercial potato farmers of Saise farming Enterprise in Senga Hill is from the Chambeshi River system. In this season livestock farmers also depend completely on surface water (river, well, lake). The level of competition for water between farmers and farming activities (e.g. crops, livestock) during the dry periods is not known.

Table 1. Average District Rainfall Data for Mbala (2011).
Source: Luwingu DSA, 2012

Month	Rain days	Rainfall (mm)	Cum. Rainfall (mm)
January	19	162.4	162.4
February	18	334.6	497.0
March	10	219.0	716.1
October	3	9.0	725.1
November	16	196.5	921.6
December	14	136.7	1,058.3

This is a rich area for biodiversity, however, last decades due to population growth the pressure on natural resources has also increased. The use of firewood and charcoal to fulfil all energy requirements and the traditional farming system of shifting cultivation has led to significant deforestation, as forests have been depleted due to excessive tree-cutting. As a result, environmental degradation is on-going, and continues to threaten livelihoods. There is high depletion of fish stocks due to poor fishing methods particularly in the Lakeshore area. Agriculture also plays an important role in this process, as natural areas are cleared to make space for crop and livestock production⁶. Increasing the efficiency of agriculture on already converted land can therefore play an important role in maintaining natural area and the related ecosystem services.

The area includes Mpulungu which is the main access to the Great lake region and which includes Zambia's only port. Synergies with the development of this port should be considered when developing the agro-hub.

2.1 Livelihoods

According to national statistics, and as constated during the field visits, 70-85% of the households are engaged in farming activities, to which both men and women allocate their labour.

There are three major categories of farmers in Zambia, defined in terms of the land area cultivated by each farmer.

- **Small-scale farmers:** the vast majority. Farmers belonging to this group usually cultivate less than 5 ha, use few external inputs, and consume most of their produce, occasionally entering the market to sell any surplus. The hand hoe is the predominant means of cultivation.
- **Medium-scale farmers** cultivate between 5 and 20 ha. They use improved seeds and fertilizers and sell most of their production. These farmers commonly use a combination of manual, animal draft power and tractors.

- **Large-scale commercial farmers** plant over twenty ha annually. These farmers apply high levels of purchased inputs and use oxen or machinery for farm operations. They produce almost exclusively for direct market sale or feed their grain to livestock kept on the farm. Large-scale farmers make up only 4% of farm households, but cultivate 22 per cent of all cropped land⁷.

2.2 Agricultural produces

2.2.1 Livestock

The Northern Province has a relative small numbers of livestock per household, mainly consisting of cattle, goats, sheep, pigs and chicken. The numbers of heads for each species as resulting from a survey in 2017⁸ are represented in Table 22. Poultry are the most prevalent livestock owned by households across the zone, with about 70% of the households keeping them^{6,9}. However, exact numbers for poultry are not available. Although not forming part of the study scope, it is worth mention farmers around Lake Chila have started venturing into aquaculture projects. Besides, aquaculture farming is undertaken in Mpulungu. It is supported by the government.

Table 2. Numbers of various types of livestock in the Northern Province in 2017. Although poultry numbers unknown, we expect about 70% of the households to keep poultry⁸.

	Number	% of national total
Cattle	48,241	1.3%
Goats	210,389	6.1%
Sheep	3,777	2.3%
Pigs	44,708	4.5%
Poultry	Unknown	Unknown

2.2.2 Crops

Based on the field survey, cassava is the most grown crop followed by mixed beans and Maize. At a national level, the Northern Province has also the highest production of beans. A common rotation for farmers is constituted by cassava followed by beans, maize and groundnuts. Besides the main crops the area presents good condition for the growing of perennial crops such as coffee or avocados, but also vegetables.

Table 3. 2017/2018 Crop Forecast Survey Results (based on observations during field visits) and some of the market prices.

Crop	Number of household growing this crop	Area planted (ha)	Area expected to be harvested (ha)	Expected production (MT)	Market Price Kwacha / Ton (source: farmprices.co.zm)
Cassava		102,159		1,195,266	
Maize	115,656	91,936	84,453	238,971	1,700
Mixed beans	86,847	47,261	45,434	31,648	6,000
Groundnuts	100,138	28,503	2,7198	23,243	
Millet	53,213	16,400	16,125	14,775	

Rice	12,551	9,854	9,316	12,723	
Sweet potatoes	28,721	6,163	6,057	21,124	
Soya Beans	16,524	5,656	5,488	5,314	4,100
Bambara nuts	10,824	1,582	1,501	1,739	
Sunflower	3,604	1,203	1,157	902	1,900
Sorghum	1,316	244	222	197	
Irish potato	444	185	185	1,544	
Sugarcane	369	149	149	3,162	
Burley tobacco	452	96	96	23	
Popcorn	67	13	13	26	
Pineapples	52	13	13	3	

2.3 Markets and transport infrastructure

a. Local Market

The local market for agricultural produces is quite limited as the majority of the population is engaged in farming activities. Trade does take place, often in an informal manner. Local markets are often associated with low profits due to low produce prices in the face of high input costs, given that most of the inputs are sourced from urban markets⁶. However it is noted that selling locally can translate into higher profits especially when the relatively cheaper transport costs is factored into the equation (short distance equates into lower transport costs). Another factor is the availability of import produce. For instance, it is reported that during the 2018/2019 harvest season there was relatively higher demand for locally produced maize as crop failures in traditional maize growing areas of southern and central Zambia compelled commodity traders to relocate to northern Zambia.

b. Domestic Market

Lusaka, Kabwe and the Copper belt are important offset areas for staple crops (e.g. maize) with little to no production and very high consumption¹⁰. Lusaka, one of the country's most densely populated urban centres (more than 1.7 million inhabitants) presents better opportunities for market expansions. The Kasumbalesa border post on the Zambian Copperbelt border with Southern DR Congo serves as a market for horticulture products (e.g. tomato) grown in Mbala. There are opportunities in utilizing the already existing connections in the fact that many trucks that deliver goods (e.g. sugar or cement) from Lusaka and the Copperbelt to Mpulungu port return empty due to absence of backloads. This factor renders transportation from Mpulungu/Mbala to Lusaka on trucks relatively cheap and can be leveraged to build local agriculture that capitalizes on this factor, especially considering that this area is one of the main offset markets for maize and cassava.

Currently the only connection with the Northern District is constituted by the Great North Road. By land, the travelling time between Mbala and Lusaka is about 10 hours, likely more when travelling with larger transport vehicles. This is acceptable for well-storable staple crops, but might constitute a problem when dealing with more sensitive, high-value produce. A railway connection exists between Kasama and Kapiri Mposhi but is in a state of disrepair. In addition, transshipment from road to railway and back can increase total transport costs.

c. Regional Markets: The Great Lakes

Export opportunities are available in the Great Lakes Region which after the end of conflicts is experiencing new economic growth^{3,4}.

However, a recent study about trade possibilities around the lake Tanganyika highlights the unpredictability of the exports in this region, with large fluctuations in volume of traffic over both long and short periods of time¹¹. Reasons include lack of diversification, volatile market conditions in importing countries, trade policies. Another issue is the variable import/export barriers on staple crops e.g. maize issued by Zambia and by the confining countries, to regulate flows of staple crops in relation with national food security. This mostly affects maize but has previously affected wheat exports.

With a good current and potential agricultural production area within its vicinity, Mpulungu port could be used to export agro-products to the Great Lakes region. This port mainly connects with Bujumbura, Eastern Congo region and South East Tanzania. However, heavy investments need to take place in the maritime facilities to broaden the scope and depth of exports. While bulk and break bulk cargo exports are already undertaken through the port, efficient use of this port would require investment in infrastructure and storage facilities for up to 52.4 million \$^{12,13}.

d. EU and Middle East

In Mbala there is a Military Airport which, if opened to commercial and civilian aircraft would facilitate the export of commodities. However, this requires engagement by the government, which is currently non-committal about opening the airport for civilian use.

Another possibility for export through air-freight is Songwe airport (Tanzania), though the additional travelling time and import in Tanzania might pose additional challenges to the export.

The availability of air-bound transportation would enable access to further, more profitable markets for high value crops, such as Europe or the Middle East. Over the last decades Zambia has achieved rapid growth in fresh vegetables exports² e.g. green beans. However these higher value markets present challenges especially to the smallholder farmers due to high production standards for out growers. The requirements include changes in type and quality of inputs used in production (usually to less toxic chemicals) and absence of pests and diseases prohibited by the importing countries. Vegetables marketed through this chain must be third party certified as meeting standards (e.g., Global GAP, Tesco supermarket's Nature's Choice or Sainsbury's' supermarket's Farm to Fork). Which standard the farmer(s) obtain certification against depends on the market supplied. In addition, the vegetables must be accompanied by a phytosanitary certificate issued by a competent authority in the country of origin guaranteeing absence of prohibited pests². However these stringent import rules only apply to markets in Europe or the middle-east and not to most regional markets within Africa.

3 Selection of value chain

While selecting value chains with a market potential for investment is key to the success of any commercial activity, it is also important to consider the local food security context of Zambia and of the Northern region. While Zambia is a net exporter of Maize, the main staple crop, issues of distribution and accessibility (among others) undermine the availability of enough quantity of food for the population, particularly the rural one. In Zambia the number of people estimated to be at risk of food insecurity has risen from 210,000 in 2013 to nearly 960,000 in the 2018/19 consumption year. Indicators of malnutrition such as child stunting and mortality have been the highest in the Northern Region, suggesting that much has to be done to address the food security issue¹⁴.

On the other hand, caloric intake it is not sufficient to support a healthy lifestyle without a sufficiently diversified diet which provides all main nutrients. High quality, safe and nutritionally rich crops should complement production of staples to offer opportunities to diversify the dietary intake. This has also come to the attention of the local government. As in the past policies have been highly targeted on maize as ‘main staple’ crop, the current political environment seems to be opening towards diversification within agricultural systems¹⁵. Diversification also makes sense from an economic point of view. Nutritious foods such as vegetables, fruit or pulses are usually more profitable than staple crops and to diversify among different crops increases resilience against shocks such as extreme climate events or market fluctuations.

Based on these considerations, this study addresses the matter of agricultural and economic development in the Northern region from the perspective of nutrition-sensitive, resilient and profitable food systems that can contribute to food security locally and country-wide while providing investment opportunities.

To achieve this, two focus value chains have been selected: one staple-crop value chain and one cash-crop value chain.

3.1 Staple crops

Maize and cassava are the main staple crops in Zambia. The expected population growth in the region suggests opportunities to produce these crops for domestic consumption as demand for both crops is expected to increase overtime. The following sections summarize relevant information on Market growth, competitiveness, profitability, institutional influence and inclusiveness which are afterwards combined in the scorecard.

Market Growth

Maize demand is expected to increase over the upcoming 30 years (Figure Fout! Verwijzingsbron niet gevonden.) and the crop also plays an important role for aid programs; however the need of this type of transactions fluctuates a lot, depending on the regional needs. Maize prices in Zambia have also shown extreme fluctuations (from 185 to 309 USD/MT between 2017 and 2018) which make it a very difficult sector to forecast.

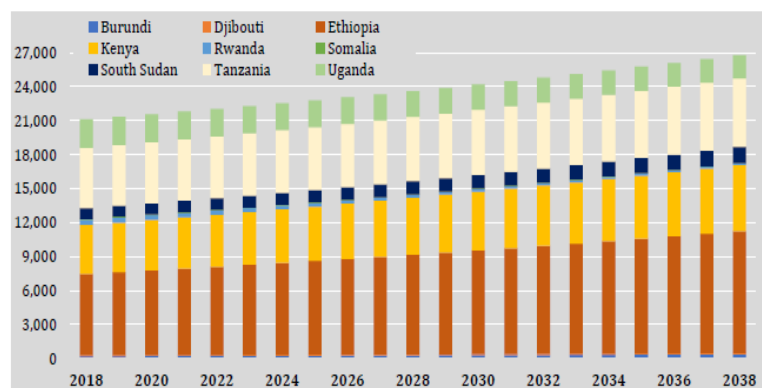


Figure 2 Predicted demand for Maize in 2018-2038 (MT)¹⁶

At the same time, cassava consumption also shows an upward trend. At regional markets, Africa has the greatest growth potential for the use of cassava as human food, but also feed and industrial products. According to interviews, with high or fluctuating prices of maize in the previous years, an increasing amount of consumers in Zambia has started switching to cassava as staple food, currently multiple processors are interested in working with cassava.

Competitiveness

According to World Bank & WFP (2019)¹⁶ Zambia can be considered to have a comparative advantage for Maize yields within the great lakes region. In 2016 Zambia was the most important source of maize imports around the Lake Tanganyika. However, maize production is mostly located in the Copperbelt and in the southern areas, with relative lower production in the Northern Province (Figure **Fout! Verwijzingsbron niet gevonden.**). For cassava the advantage compared to other surrounding countries is unknown in literature. There are reported cases suggesting that there is an (informal) flow of cassava at least towards the Democratic Republic of Congo, which would suggest some form of comparative advantage, however this has not been widely researched.

At national level the Northern Province presents a comparative advantage compared to other Zambian regions in the production of cassava, as it is the second highest producing province after Luapula province¹⁷. Southern areas of Zambia like the Copperbelt barely produce cassava due to the climatic condition and therefore cannot compete in the production of cassava but only provide markets. For Maize it is interesting to consider the climate developments expected in the upcoming decades which will penalize production in the currently main producing areas. The Northern Province is expected to suffer much less from consistent changes in rainfall and with the right adaptation measures (Climate Smart Agriculture) could prove to be very valuable for national food security. Cassava is more draught resistant than maize, however maize resilience to climate extremes can also be improved by introducing appropriate agronomic measures and the right varieties

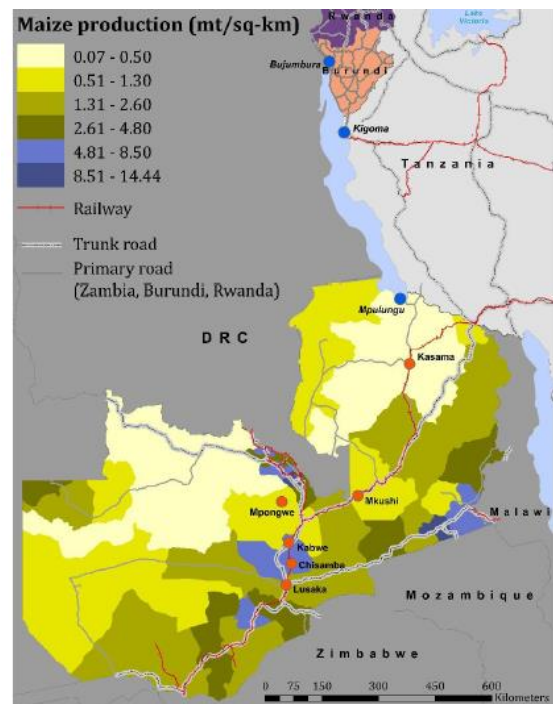


Figure 3. Maize production intensity in Zambia (World Bank and WFP 2018)

Profitability

Maize buyers offering cash are favoured by producers compared to deferred payments offered by the Food Reserve Agency (FRA). However, private sector credit buyers have trouble competing against FRA partly because of the perceived reliability of the latter. These dynamics suggest that there is still space to increase maize production and productivity to serve the private sector. Interviews with representatives of the private sector involved in maize production and processing, revealed that maize is perceived as a profitable crop with a high potential also for smallholders¹⁴. Cassava is also reported as safe and profitable, especially after value addition.

Institutions

As a result of the high consumption rate across the country, maize's marketing system and trade flows are far more complex than those of any other staple food. A high level of government

intervention also occurs in maize markets, further complicating the marketing system¹⁰. An example is the inference of the Food Reserve Agency (FRA).

While there are some established millers in the Northern Province, it is still a challenge to secure the sustainable quantities for business considering that government is the primary buyer of maize through the FRA. All levels of traders face competition with the FRA as maize purchasers on the market, although not all experience it as a problem.

Cassava is a much less ‘political’ crop with less pronounced market distortions in the value chains. For cassava opportunities can be seen in the national and international diversification plans promoted by the Zambian government and other international institutions. Being cassava an alternative staple for maize it is getting more attention as a substitute in agricultural systems. However, it is not yet clear what programmes concretely support this process¹⁵.

Inclusiveness

For both crops there is evidence of SME being involved in the value chain.

Particularly cassava could benefit starting entrepreneurs it is a crop which is being rediscovered as marketable staple. Almost all smallholder farmers in the area grow this crop but only occasionally commercialize it when opportunities arise. To increase market opportunity would therefore benefit a large share of the population.

3.1.1 Results of the scorecard

Based on the abovementioned information, for crops considered as ‘staples’ the scorecards resulted in the following scores:

1. Results of the scorecard evaluation for the potential staple crops

Criteria -->	Economic			Institutional		Social	TOTAL
Crop	a. Sector growth potential	b. Competitiveness	c. Profitability	a. Evidence of willingness to invest	b. Enabling policy and regulatory environment	a. Inclusiveness	
Maize	4.0	4.5	4	4	2.5	3.5	3.8
Cassava	4.7	4	4	4	3.5	4	4.0

As it can be seen there is only a slight difference between the two crops and the main shortcomings of maize compared to cassava are given by the state interventions on the value chain. At the same time, cassava, being so far a less developed value chain has a huge growth and development potential.

As general remark: both crops would be suitable for a marketable and social business plan, however the study will focus more on cassava. Additional information on the maize value chains can be found together with the complete scorecards in Annex 3.

3.1.2 Cassava value chain

Cassava is the second most grown staple crop in Zambia¹⁸. Overall, cassava is largely grown by small scale farmers, 35.5% and 32% of who are found in Luapula and Northern provinces respectively. Cassava is grown mainly in Mpulungu with a production cycle of 2 to 4 years depending on the variety planted.

The majority of the cassava commercialized (equivalent raw - projected per year) in Zambia is demanded by animal feeds (69%, while demand for food is 20% and non-food industrial uses is demanding 11% of the total raw cassava). Of the total, approximately 140,000 Mt of raw cassava are commercialized in the three main open markets in Zambia (Soweto, Lusaka and Nakadoli in Kitwe). However, there is not available information about the proportion of this raw cassava sent to export and sold as raw in the main markets most cassava exports will be informal. It is exported in dry form¹⁹. Because dried cassava can store for 6 to 12 months, it generally transits longer distances than fresh cassava and through more complex marketing chains.

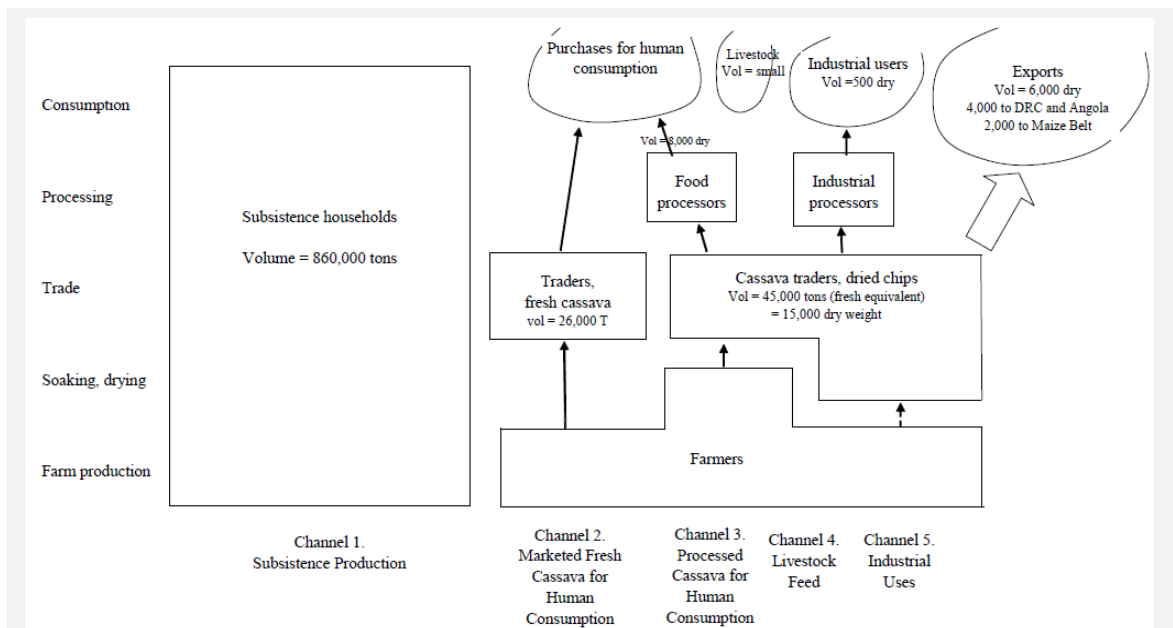
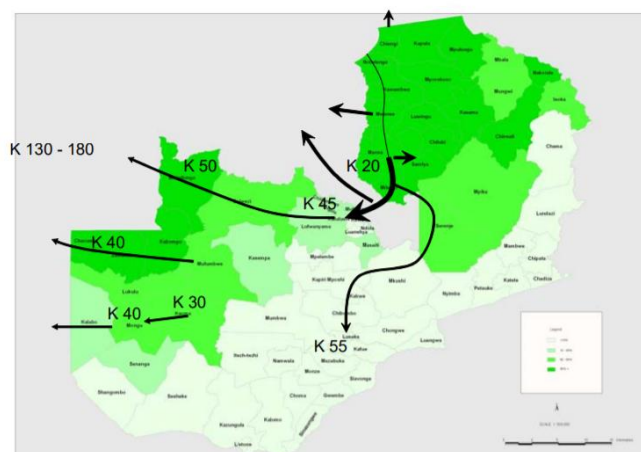


Figure 4. Distribution channels in Zambia's cassava belt and dual (maize-cassava) staple zone²⁶

There is currently no bulk uptake and as such the key market is the open market. Some traders from Burundi and Congo come to buy semi processed cassava in the Northern region. The greatest potential market for cassava short term might be domestic consumers in the Great Lakes Region countries. Tapping export markets in a significant manner will require supply chain optimization including establishment of support infrastructure such as bulk storage facilities.

Breweries and mining are very dynamic potential markets for commercial cassava. Mining companies require 9000 MT starch annually and are not able to source it locally¹⁷. From interviews with processors the message is that demand is rapidly outgrowing the supply. While farmers are not aware of this there is a need to increase the supply by for instance optimizing and coordinating the farming practices and inform farmers.



1 .Wholesale market prices listed in 1000 Kwacha per 50kg bags (source: FSRP market monitoring as reported by Haggblade 2016)

While until 2018 Zambia Breweries was the main buyer of cassava it is expected that demand will grow rapidly over the next few years. Some actors influencing this process have been mentioned during the interviews:

1. There is the new ZongKai Ethanol Plant Chibombo ([link](#)) which is expected to use 100,000 MT/year of dry Cassava Chips.
2. The Sunbird Ethanol Plant in Kawambwa is under construction and expected to be commissioned in 2021.
3. There is PremierCon Starch Company under construction.
4. Multibillion production and processing facility for copper in North-western province owned by First Quantum Minerals (Trident Mine, Kalumbila). This facility has a smelter that uses cassava starch for copper processing. According to local sources circa 50,000MT of cassava starch is imported from Australia monthly. Must be noted that this number largely differs from the previous figure, so there is not complete clarity on this topic.
5. There is evidence of Chinese companies looking to import cassava chips.

3.2 Cash crops

When looking at cash crops annual crops are to be preferred over perennial in a starting phase, unless already present in the region.

Perennial crops require a long term investment requirement. While crops like avocados, coffee and cashew could provide high revenues, this only happens after a certain investment time. There is evidence of local stakeholders engaging in these value chains and synergies could be found in a second moment with these crops by the design of e.g. agroforestry systems. Intercropping annual crops with perennials would enable the farmers to wait for the perennial crop to become productive. Private companies such as Olam or Seise farming could than become very relevant in collaborating on these crops as they are involved in these value chains.

Due to the higher risk relating to the long term investment, to initiate a project on these value chains would require a more in-depth feasibility study to really capture the local market dynamics at all scales, specifically in relation to perennial crops. A role that the hub could play in any case would be to research the design of systems including perennial and annual crops, to support decisions of later steps.

Among the annual beans would appear to be a valuable candidate as they have the some of the highest revenues among the main crops. Besides it is a crop with beneficial effect in a crop rotation and that can easily be combined with one of the staples. While soy bean are a much requested crop, other types of bean promise higher incomes if properly marketed. An example is green beans, which have in the past been marketed to Europe as fresh produce for high prices. Engaging in this value chain would require services of coordination to connect producers to the markets and to ensure quality meets the requirements for export.

Follow-up research should identify a few specific varieties of beans, as one of the current challenges in marketing beans is the large variation in varieties.

Below, a SWOT analysis is presented for the beans value chain in relation to a marketable business plan in the Northern region.

STRENGTH	WEAKNESSES
- highest gross margin of U\$ 465.8 per hectare over six widely grown food crops	- As a result of the mixed varieties grown finding a sustainable market for beans still remains a

<p>in Zambia²⁰</p> <ul style="list-style-type: none"> - only third in line to tobacco and cotton in terms of returns per unit of land²⁰. - Northern province is one of the largest producers of beans in the country, accounting for 62% of the total production - N-fixer (very suitable for rotation and soil health management) - Positive impact on food security. - Locally grown - Accessible for farmers at all scales. 	<p>major challenge.</p> <ul style="list-style-type: none"> -Limited input access and financial constraints -Seeds are recycled -Limited knowledge by farmers on improved growing techniques.
OPPORTUNITIES	THREAT
<p>The demand for beans is expected to significantly increase in tandem with increasing population and expanding cities²⁰</p> <p>The fact that consumption per capita is higher in East and Central Africa also means that those regions offer higher demand for beans that can be tapped by Zambian exporters</p>	<p>-Bean consumption in Zambia is low, 10 kg per capita per year, which is in contrast to 40-60 kg per capita of bean consumption in Eastern and Central Africa.</p>

3.2.1 Mixed beans value chain

Over the past decades, there has generally been a surge in the production of the crop across African countries and this could be attributed to the realization of the potential benefits that the crop offers at both household and national level. For instance, the crop is slowly but steadily undergoing transformation from being a traditional subsistence crop to being market-oriented. Approximately 40% of production is marketed at a market value of over US\$ 452 million annually. In the case of Zambia, the demand for beans is expected to significantly increase in tandem with increasing population and expanding cities. This offers income generating opportunities to both farmers and traders in view of the prospective surge in demand. For instance, producers could realize improved revenue as the crop has the highest gross margin of US\$ 465.8 per hectare over six widely grown food crops in Zambia, it is only third in line to tobacco and cotton in terms of returns per unit of land²⁰.

In Zambia beans rank second after maize in food security especially in the North Western and Northern Provinces where they are consumed at least weekly or twice a week. However, common bean consumption in Zambia is low, 10 kg per capita per year, which is in contrast to 40-60 kg per capita of bean consumption in Eastern and Central Africa. Maize dominates caloric intake among Zambians, accounting for 57% of daily caloric consumption, and an estimated annual per capita consumption of 150kg²⁰, however different companies are looking at (soy) beans as a staple to provide better nutritional values in food.

The Northern Province is one of the largest producers of beans in the country, accounting for 62% of the total production and with up to 80% of the farmers able to produce surpluses. According to the 2017/2018 crop survey, it is estimated that there are 7,141 farmers in Mpulungu and 30,966 farmers in Mbala that are growing beans. There are various kinds of varieties grown such as the red & black strips beans, white and yellow beans, white beans, large whitish marked beans,

kidney beans and sugar beans. Birachi (2012) provided a ranking on the most relevant areas for bean production, ranking the Northern Province as first.

Region in Zambia		rank	
Northern Province	Mpolokoso, Kasama, Mbala, mpika, Luapula	1	sufficient rainfall, a tradition as part of the farming system, availability of land, cash/culture if growing, good soils
North Western	Solwezi, mumilunga	2	good markets, good soils, rainfall
Eastern	Lundazi, Chipata, Katete	3	good markets

Angola, Botswana, South Africa as key export markets for Zambian beans. Tanzania can export to Kenya, Sudan and Democratic Republic of Congo. This implies that need exists in that market that can also be satisfied by Zambia. Local beans prices in Zambia, Malawi, and Tanzania exceed import parity prices.

On average a good number of beans producers participate in markets near to their homesteads and few cover long distances in selling beans²¹. Most of the beans are bought at relatively low prices by vendors from other provinces. Lusaka province provides the largest demand for beans. Presently the beans are sold in its raw form with the most basic processing being grading and sorting. This is manually done ²¹.

3.3 Challenges (=opportunities)

From the previous analysis of the different value chains, the following general challenges have been extrapolated. These can be considered as common to all selected value chains, however the specific characteristics may vary for each crop.

1. Erratic weather patterns (climate change)

The effects of climate change and variability such as flash floods and prolonged dry-spells in high food production areas continue to threaten food availability. This negatively affects the rural agricultural households by lowering their harvest, income, and consequently food access.¹⁴

Currently in the Northern Region, most agriculture is rain-fed, implying extreme dependence from the changing rainwater patterns. Research has shown that yields tended to fluctuate from one year to another depending on the amount of rainfall. Vulnerability to climatic fluctuations is a major constraint for all crops, even for draught-resistant crops such as cassava. This involves high risks for farmers, who cannot predict their yield, but also processors and traders that depend on the raw materials.

Among the range of Climate-Smart Agricultural practices, crop diversification into legumes, commercial horticulture, agroforestry, and strategies of reducing post-harvest losses seem most promising in achieving welfare and sectorial development goals. However, adoption of CSA seems constrained by inadequate access to finance, input and output markets, and capacity building²².

e. Post-Harvest Losses²³

Small-scale traders typically store their maize for short periods near the household in cribs or under tarps, or at rented storage space at the market. Most smallholder farmers lack adequate storage and as a result often sell their produce at harvest time when prices are at their lowest levels. Most commercial farmers have adequate on-farm storage facilities that can store products for extended

periods of time¹⁰. Large-scale traders tend to have sufficient storage. Large-scale traders typically have storage space located in Lusaka or the Copperbelt area, where they sell their supplies¹⁰. The table below provides an estimate of the post-harvest losses for the main crops over in the past few years¹⁶. As it is visible, the losses for crops range from 25% to 45%. Particularly, staple crops (maize, cassava) present the highest losses.

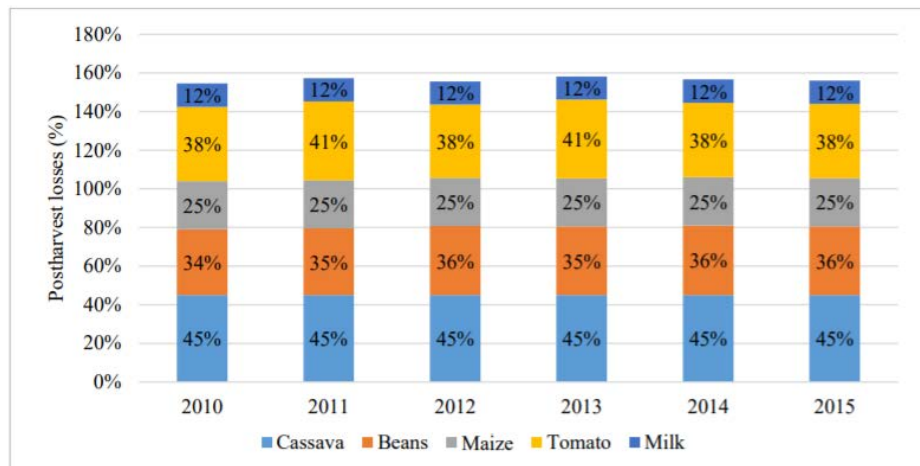


Figure 5. Post-harvest losses per crops in Zambia¹⁶

For cassava it has been reported that there is a gap in the capacity of the farmers to dry the cassava in the rainy season. This process is usually done in the sun, but that is very hard during this season. Creating a mean for farmers to dry cassava would contribute to the stability of supply throughout the seasons. Similarly, storage of cassava in dedicated spaces is limited, contributing to increased post-harvest loss due to pests and diseases. Most existing storage capacity is reserved for maize. It is government owned and meant to store maize for the strategic food reserve.

Additional issues related to the limited availability of adequate storages for maize, cassava, beans and other staple crops different issues arise:

- a. Farmers sell their produce at harvest times when prices are at lowest levels
- b. Inconsistent supply; buyers cannot always find the producers as supply tends to be inconsistent.
- c. Sanitary issues.

f. Labour constraint

Table 4 shows an overview of the farm utilisation by the farmers interviewed, highlighting an average land utilisation of around 26%. As the size of the farms shows, these farms belong to a medium to large-scale farmer group, which has a clear potential to achieve commercial farming. However the maximum area cultivated is 12 ha. This is consistent with the results by Sitko and Chamberlin (2015)²⁴, who noticed a similar pattern in multiple farms in Zambia: as the area

Table 4. Land Utilisation by smallholder farmers (source: focus group discussion Vyamba, 7 farmers)

Sampled Farmer	Total land owned (ha)	Area Cultivated (ha)	% Utilisation
Farmer A	24.0	12.0	50%
Farmer B	45.0	9.5	21%
Farmer C	14.0	6.5	45%
Farmer D	7.5	3.5	21%
Farmer E	15.0	2.5	17%
Farmer F	40.0	4.0	10%
Farmer G	20.0	6.5	33%
Average	23.6	6.4	28%

of land ownership increases the share of land that is utilized for crop production declines substantially.

This pattern of land use suggests that medium-scale farmers lack the capacity, the incentives, the inclination, or some combination of the three to bring more of their land into use. In the case of the Northern Province of Zambia this is reported for both cassava and beans value chains. The availability of cultivation equipment such as ploughs and tractors could facilitate farmers in production.

Available literature suggests that only 8 to 10% of the cassava crop is currently marketed, and that more efficient production methods are required to lower production costs, to make cassava viable as a commercial crop^{17,25,26}.

g. Limited access to (quality) inputs and financing

Farmers experience overall limited input access, due to supply but also due to financial constraints. In the bean value chain this is particularly felt as the farmers use both improved and recycled seeds. This is partially due to the lack of availability of quality seeds, but also due to financial constraints, especially for the smallholders. Due to lack of capital, farmers recycle the seeds thereby reducing the quality and lowering production⁶.

Agriculture financing is not available. Most commercial banks operating locally have ceased to offer it. Where possible, this financing mostly benefits commercial farmers with small scale farmers not qualifying. Double digit interest rates are a norm. Current interest rates are north of 20%.

The vast majority of farmers in the Northern Province are the small scale farmers, of which also a large part is poor households. The spendable income of these farmers for qualified production inputs and support are very limited and strongly depending on the sales (prices) and payment of the produce. Thus, the offered supportive facilities and services of the agro-hub need to be aware of the financial constraints at farmer's level. It is recommendable to investigate this more in detail in the feasibility study by mean of a smallholder survey.

h. Market access

The local market is quite limited for raw materials as the majority of the population is engaged in farming activities. The market for agricultural produce is fragmented and dominated by small scale commodity traders; however there are some organised commodity traders. For the selected crops, most farmers produce surpluses, but are not directly linked to (whole-) sale markets or customers. They currently have no means to sell all their produce against a good price²³.

The most potential national market seemed to be Lusaka, however travelling time between Mbala and Lusaka is about 10 hours. This is acceptable for well storable staple crop but might be a problem for more sensitive crops. Poor road infrastructure remains a hindrance to trade. Also international trade to the Great Lakes region, EU and Middle East is facing challenges in accessibility of the Northern Province.

Because of Zambia's reliance on imported inputs and physical position as a landlocked country, transport costs mean that commodities with a relatively low value to weight ratio such as maize, soybeans, and cassava are unlikely to compete in global export markets. Closer to home, however, Zambia does begin to enjoy a competitive advantage. Because Zambian agriculture has not

developed to the stage of producing regular surpluses and because many neighbours produce the same commodities, such advantages are often short-lived, but could perhaps be developed over time particularly with respect to feed ingredients, cassava, and possibly even maize.

For mixed beans, a specific challenge in finding a sustainable market comes from the fact that mixed varieties are grown, making it difficult to ensure consistent supply.

i. Export policies

International trade presents multiple challenges, among others: a number of trade barriers affect imports and exports, such as high regulatory costs associated with obtaining permits and trade certificates (such as phytosanitary permits or export permits for maize), and government subsidies and intervention in the market such as the Food Reserve Agency (FRA) and the Farmer Input Support Programme (FISP)²⁷.

j. Lack of knowledge and information.

This component strongly relates to all the previous limitations as lack of knowledge and information hinders activities at all levels of the value chains.

There is a widespread lack of information both at the supply and demand side on availability, prices and quality of the agricultural produce. Middle men are not always transparent and the lack of understanding on price mechanism makes farmers suspicious about the price they are getting. Agricultural extension services are limited or absent resulting in sub-optimal production methods. Some issues of primary importance is the lack of knowledge on phytosanitary measures and integrated pest management which are much needed to improve production, reduce harvest losses but also facilitate export. Another example (from the bean value chain) is the lack of knowledge on the importance of improved seeds. This is highly dependent on the level of education of the farmers, as it has been found that farmers that had received training were less likely to recycle seeds²¹. For cassava farmers are also largely unaware of the existence of improved varieties.

Other issues are the lack of knowledge on general agricultural produce handling, storage and processing, good agricultural practices and climate smart practices.

k. Power supply

Zambia experiences a large power deficit. This deficit is expected to increase as the rainfall becomes more erratic, hindering the production of hydropower, while the need for energy rises due to industrialisation. This is a problem at multiple levels as electricity is required for cooling facilities, infrastructures and processing plants. Power is also a major issue for far for commercial farmers using irrigation.

Depending on the on crop profitability it is possible to use electricity generators to irrigate or other alternative energy sources. Solar is used to extract water from underground sources to a water tank. This system is used for small scale farm production (irrigated). A solar water pump including panels can be bought locally for no more than US\$1600, however for many stakeholders it is challenging to access the credit to invest in solar.

This issue is a general constraint when starting commercial activities in the area and should be well looked into for follow up activities

4 The Agro-hub

The strategic proposition of the role and function of the Agro-hub forms the foundation of the pre-feasibility study. The exploration of the Agro-hubs' functions results in a mental representation of the design and the proposition of the Agro-hub, but also creates awareness on the (pre)conditions, challenges and an exploration of the stakeholders for the hub.

Defining the strategy of the Agro-hub is an iterative process. Based on the desk research, the outcomes of the field visits and identification of potential for Dutch investors the strategic functions of the Agro-hub have been sketched. The following chapter aims to give direction, to inspire and to serve as a guideline for partners, stakeholders and other beneficiaries with the aim to identify a structure in which Dutch investors may be interested.

4.1 The Role of the Agro-hub

The potential functions of the Agro-hub have to be a result of its value proposition, the so called role of the Agro-hub within the agricultural value chain of the Northern Province. This is defined as follows:

An Agro-hub is a networked innovation system of agro-production, processing, logistics, marketing, training, and extension services, located in a District Municipality. As a network it enables a market-driven combination and integration of various agricultural activities and rural transformation services. The Agro-hub has the aim to facilitate the Northern Zambian agricultural value chain to strengthen its position as regional food producer and food supplier and to improve its performance in agriculture.

4.2 Functions of the agro-hub

In the previous chapter, two potential value chains have been selected and analysed to extrapolate possible functions of the Agro-hub. Challenges are great but so are the opportunities for the Agro-hub to fulfil the needs of the farmers and involved partners in the agricultural value chains. Figure **Fout! Verwijzingsbron niet gevonden.** shows how the challenges have been matched with possible functions of the agro-hub, these are organised in 5 main blocks:

- 1) Aggregation and coordination
- 2) Rental of equipment
- 3) Storage and cooling
- 4) Input market and credit supply
- 5) Training, support and demonstration

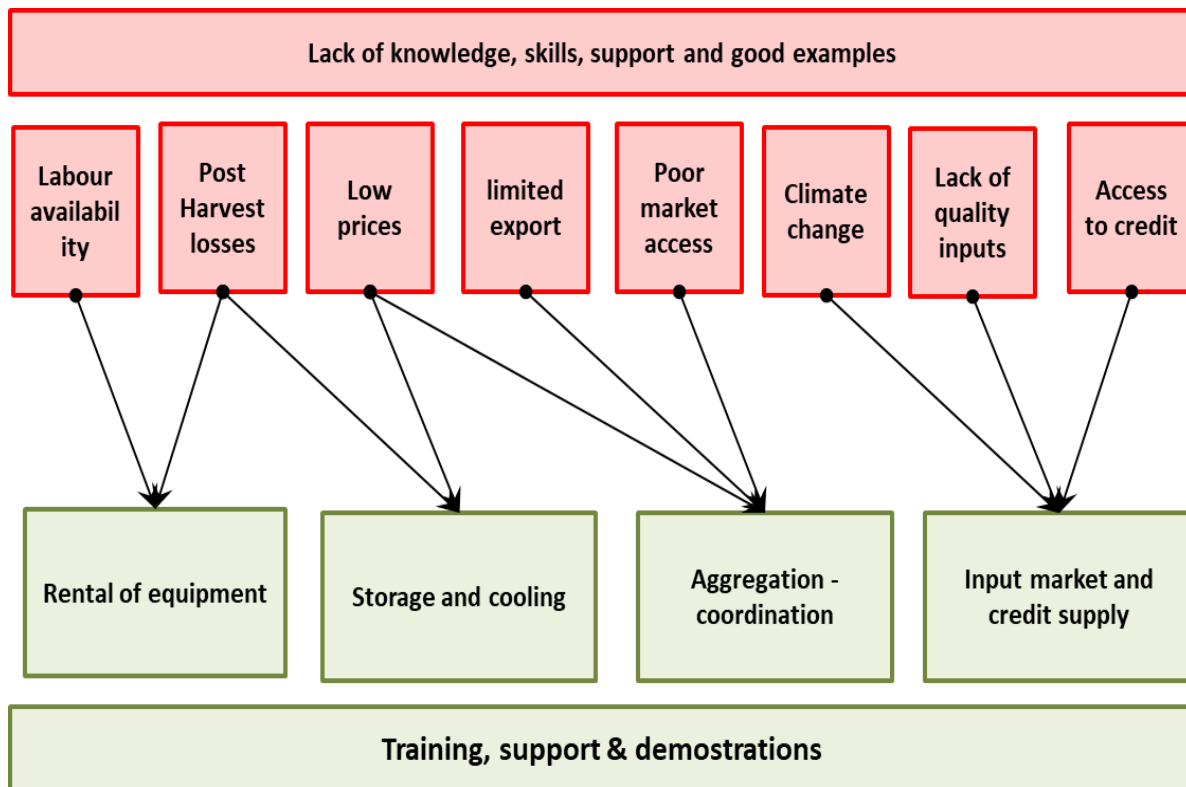


Figure 6. Possible functions of the agro-hub linked with the challenges identified in the previous chapter.

1. Coordination and aggregation:

- i) Linking and contracting rural, urban and international markets through contracts
- ii) Acting as an aggregation facility releasing (bulk) produce to urban markets based on seasonal trends. Particularly for cassava available literature suggests that only 8 to 10% of the cassava crop is currently marketed. There are opportunities in the processing of cassava into glue, starch, flour etc. based on the bulk and already established production system, however, numerous investment attempts to process cassava in different forms have failed in the past²⁶. Therefore different offset markets and processing facilities need to be identified and accessed.
- iii) Providing market information feedback, using latest information and communication technologies
- iv) Quality control for human consumption and animal feed as results suggest that toxicity is among the largest obstacles to development of large-scale production, along with certainty of supply. Especially current cassava processing technologies are most inefficient and under unsanitary conditions. The hub can guarantee good quality and safety of the aggregated bulk, therefore facilitating sales and export processes.
- v) Promote the creation and strengthening of sector associations. This might have a positive impact on production and marketing by:
 - (a) Decrease the cost of hired labour through collaboration.
 - (b) strengthen farmer-buyer linkages
 - (c) promote the use of contractual arrangements to assure certainty on prices and volumes received/delivered.²⁸

2. Rental of equipment for farming and post-harvest handling

As inefficient farming practices and lack of labour for farming activities are mentioned as some of the main challenges to transform cassava and beans into commercial crops the hub could provide rental of machinery ^{25,26}. This can involve mechanisation for on-field activities (plough, tractor...) but also improved processing equipment (graters, presses and driers) for initial post-harvest handling. In cassava, one of the main challenges of farmers in the wet season is related to drying cassava chips. A drying facility buying fresh cassava and selling dried chips to processors could provide support to the farmers, reduce post-harvest losses and ensure consistent provision of bulk quantities to processors.

To really support the value chain all these facilities need to be run by trained staff, well aware of the phytosanitary and hygiene measures required to avoid the spread of sicknesses among the different plots and storages supported by the hub.

3. **Input and credit access:** The hub could host a market place for input providers (partners) to sell their product. Fertilizers and seeds can be purchased on location, while receiving the appropriate information by well-trained sales staff. For the bean value chain this should go coupled with the selection of a few varieties to facilitate aggregation and market access. Varieties could be tested in a demo plot belonging to the hub, to further demonstrate the results of the use of quality inputs.

As credit is a major constraint, the agro-hub could have in this a facilitating role by providing the inputs on credit and receiving an affordable premium on the payback. There is a need for the development of financial tools appropriate for a more efficient production, processing and marketing (for example, improved access to finance might have beneficial results on farming practice as well as on productivity, with the investment in machinery for farmers and processors). In other projects, similar tools have been developed for smallholder farmers to facilitate the access to microcredit in order to purchase inputs. Agro-wallet is an example of this, but there are multiple mobile-banking systems that could provide useful in this sense. Synergies can be looked for with local phone companies.

4. Storage and cooling

Interviews highlight different views about the need for central storage point, according to some, there is already enough storage capacity (for example, one of the interviewed parties had a large underutilized storage space in Mbala) especially considering that the government had built multiple storage facilities (however focused on maize. On the other hand, other interviews highlighted the need for storage and aggregation point. This suggests that the availability of storage is highly variable and not all districts might have access to it. Therefore, if provision of storage becomes one of the activities of the agro-hub, careful mapping of the storage need and availability should take place during the feasibility phase.

5. Research, demonstration and training

A major improvement can be made in production levels, quality and therefore income for the large group of smaller to medium sized farmers who now often operate without knowledge of improved technologies and practices. By showing the production results in a demonstration

location the hub will challenge growers to improve their production and give investors insight in the economic performance in horticulture. At the same time research can be performed in this location to further improve the growing methods and adapt new technologies to the specific local context. An example of this could be testing different Climate Smart practices or intercropping with perennial crops.

A combination of research and training might prove useful in promoting the use of cassava in animal feed but also human food by providing the required formula and dealing with food safety. For both cassava and beans training is also required in the selection, use and handling of new and traditional varieties. This specific target might touch upon both food and safety standards and farming practices.

Irrigated farming, soil health and sustainable use, agro-ecology, integrated pest management and business planning are also valuable topics for training and much needed for improved production in the region.

4.3 A value chain approach

The Agro-hub is to function in a way that promotes the processes alongside the value chain. In this sense the functions in relation to the different steps of the value chain are illustrated by the image below.

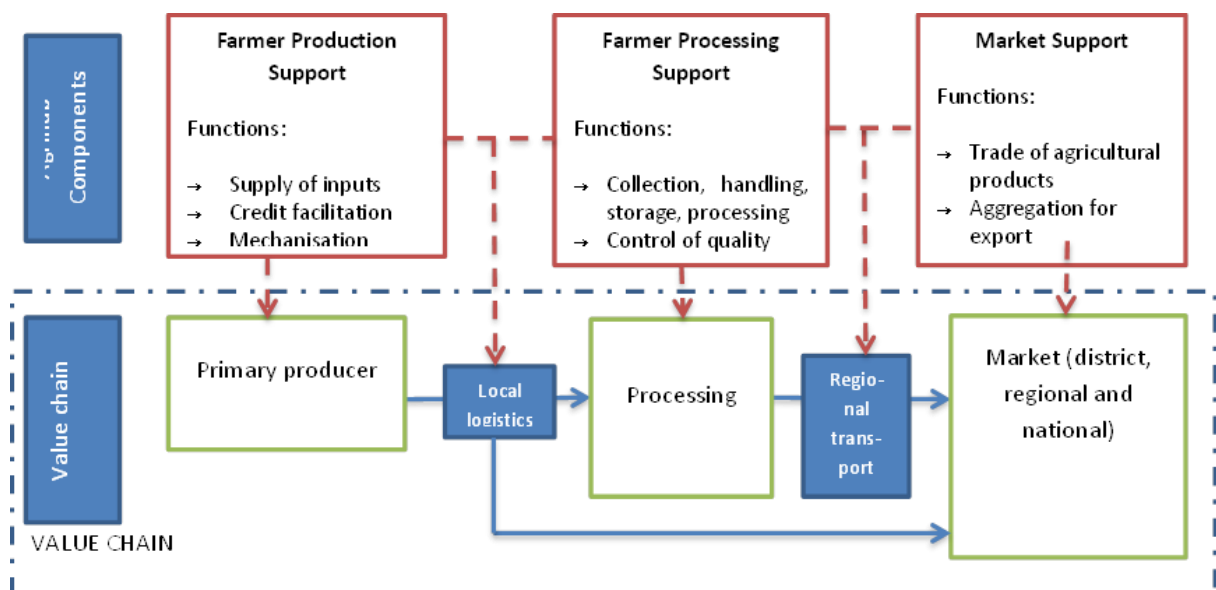


Figure 7 Functions of the Agro-hub in a value chain context

Besides the services described above, the hub should enable sustainable sourcing of bulk crops by organizing the local logistics (see: coordination and aggregation) and organizing transport. Part of the income streams of the hub could be based on these activities.

Local logistics and regional transport.

Accessibility of the area is one of the main constraints in trading. However, if bulk quantities are consistently and sustainably sourced it becomes easier to look for cheap transport options. While commodities with a relatively low value to weight ratio such as maize, soybeans, and cassava are unlikely to compete in global export markets, chances increase when focussing on regional and local

market. This is particularly true when the costs for transportation could be reduced by mean of alternative transport channels.

A study by World Bank and WFP (2019) illustrates the possible transport cost savings if the current common road routes are substituted by an inter-modal route that utilizes the Lake. The estimated transport cost savings are substantial on all the key routes from Zambia to Burundi, Rwanda, South Sudan, and Uganda.

When looking at regional trade, synergies with Mpulungu port could therefore enhance the competitiveness of the traded crops. Currently, the transported volume of agricultural commodities by boat is limited compared to raw materials. The main transported agricultural products are commodity goods as maize, cassava and sugar for Burundi and DR Congo. The port has no capacity for fresh goods; the vessels are not equipped with climate controlled storages.

Strengthening of the infrastructure of Mpulungu port and increase the storage capacity could complement the establishment of an agro-hub.

The Case for Climate-Smart Agriculture

Any intervention dealing with strengthening of agricultural value chains should involve careful consideration on environmental sustainability of the agricultural practices. In a context of changing climate a combination of a growing food demand, declining yields, vulnerability to climate change and poor soil health and lack of adequate extension services makes the conventional agricultural system unsustainable. Besides, the changes in temperatures and rainfall patterns will further challenge production. Climate smart agriculture (CSA) could offer some solutions. This is described by the FAO as “agriculture that sustainably increases productivity, enhances resilience (adaptation), reduces/removes GHGs (mitigation) where possible and enhances achievement of national food security and development goals”. The concept was first introduced in 2009 and it has gained increased interest over the past decade by scientists and policy makers.

In short, CSA integrates the effect of (future) climate change in maintaining food security as in many parts of the world climate change will have negative effects on food production. The three pillars are illustrated in the image below:



Figure 8 The three pillars of climate smart agriculture, FAO (2011)

The agro-hub could play an important role in introducing climate smart practices in the agricultural value chains by providing trainings and demonstrations but also by developing systems that profitably increase the resilience of local agriculture. Business approaches involving CSA are gaining

increasing attention within different development programs and it is worth looking into it during the follow-up.

4.4 Validation the Strategic Framework for the Agro-hub

While the agro-hub is likely to involve or incorporate other existing businesses (e.g. processors, farms, service providers) the hub will also need to be financially self-sustaining. The business model Canvas is used for validation the strategic framework for the Agro-hub. This tool is developed by Alexander Osterwalder & Pigneur in 2010. The business model Canvas is a powerful tool to map your business on a transparent and clear way, to scrutinise the coherence and to communicate the essentials. In this specific case the Canvas Start-up business model is used. This model differs a little from the standard Canvas business model because the starting point of this model is a new business or business development.

In the figure below the business model has been designed for the Agro-hub:

PROBLEM	SOLUTION	UNIQUE VALUE PROPOSITION	UNFAIR ADVANTAGE	CUSTOMER SEGMENTS
Inconsistent supply of agricultural products and inputs	Production Support, Processing Support, Market Support	Networked innovation system of agro-production, processing, logistics, marketing, training and extension services, located in a District Municipality	One stop shop for farmers and processors	Local commercial farmers Distributors (local and international) of agricultural inputs Traders, processors, Knowledge institutes, Extension services, ZARI
Lack of quality standards				
Access to Markets	KEY METRICS		CHANNELS	
Lack of knowledge and skills on cultivation techniques	# Farmers (SME, Medium scale, commercial) Type of agriculture Value Chain design		Shops, Storage facilities, processing facilities Training Centre, Demonstration Fields	

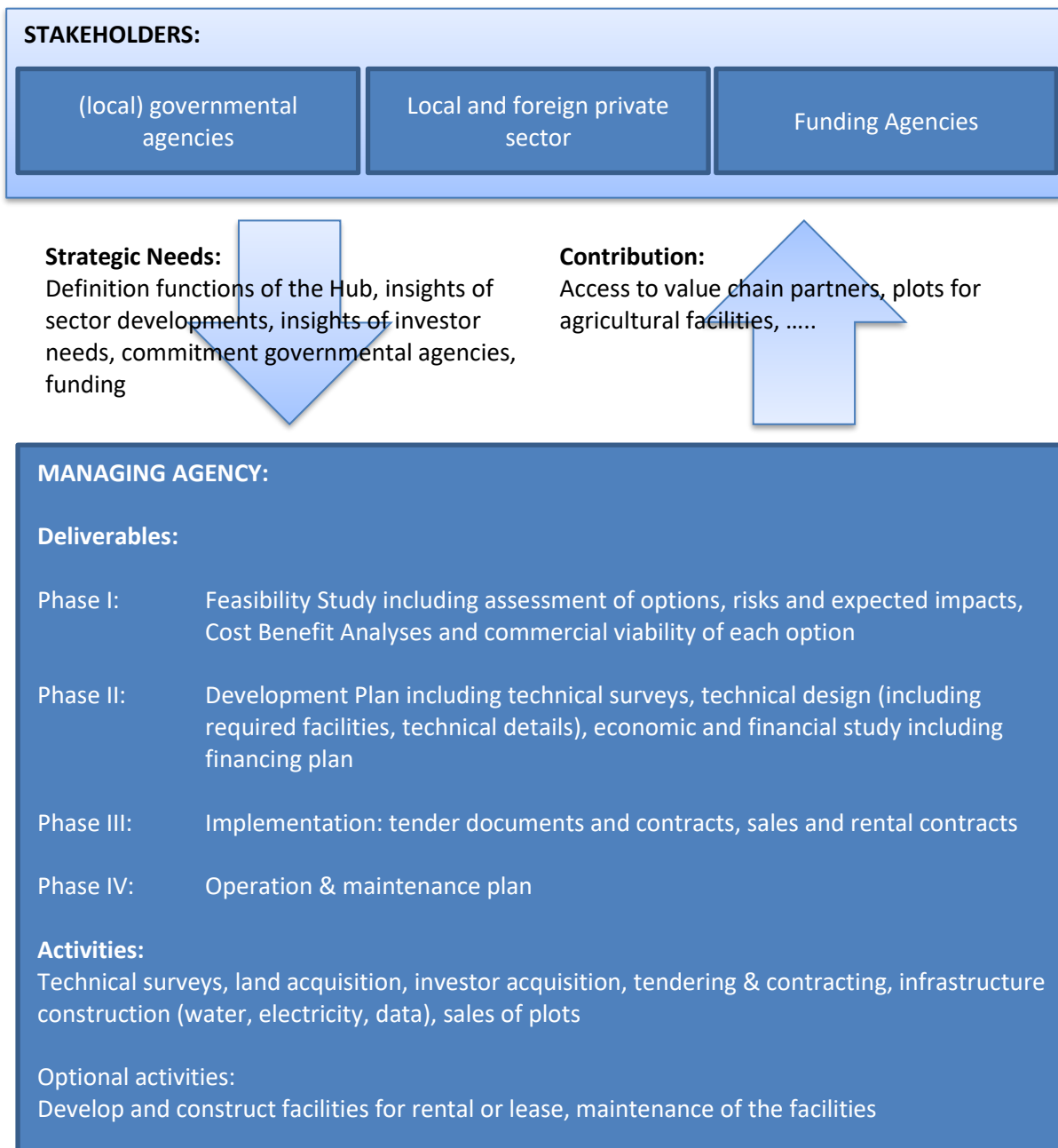
Figure 9. Business model canvas designed for the agro-hub

The balance between the challenges of the agricultural value chain and the offered functions is essential for the sustainability of the Agro-hub. The main and unique role of the hub is to acquire, maintain and act on developments at farmers' level but also on the market needs of agricultural products and keep its position as facilitator of strengthening the value chain. Continuously monitoring and evaluation of its function and offered services and products on the hub is not just the responsibility of local government or the private sector. However, it is the responsibility of good cooperation and collaboration between governmental institutes (Ministry of Agriculture, food safety

authorities, land development agencies, Chambers of Commerce, local authorities etc.) and regional, (inter)national private sector partners in the agricultural value chain. In the development of the management and organizational structure will be attention for that form of collaboration.

4.5 Management & Organization

The operation model to implement the Agro-hub is recommended to be a so called Managing Agency operation model. The managing agency may entail any well capacitated, resourced and skilled agro-entrepreneurs along the value chain. The role of the Managing Agency can be visualized as follows:



The role of the Managing Agency in the development phase is:

- Develop the Development Plan including Financial Plan
- Identification, coordination and management of legal procedures
- Identification and acquisition of investors (local or foreign)
- Coordination and management of funding
- Acquisition of land
- Preparation and coordination of tender and contract procedures for infrastructure construction
- Coordination of construction activities
- Planning, coordination and management of budget
- Contract investors
- Stakeholder consultations and management of Stakeholders interest and expectations

Depending on the vision of consortium, the Managing Agency can also construct facilities on the Hub for rental purposes.

The major functions of the Managing Agency as the agro-hub is operational are:

- Securing and undertaking basic maintenance to the agro-hubs facility
- Securing contracts with private and public institutions
- Facilitate the payment of maintenance and services fees to the municipality

Potential partners in the Managing Agency

To coordinate the foreseen development of the agro-hub, the Managing Agency preferably should be founded by a (group of) local and international private sector partners. In the field visits not a single private sector partner is identified to be the lead partner or owner of the Managing Agency. There are several private sector partners interested in the development of the agro-hub, mainly locally. The interest of international private sector partners is limited due to the unfamiliarity with the region.

4.6 Identification of the potential locations/sites



The district representatives of Mbala, Kasama, Senga Hills and Mpulungu are interviewed. All the districts have shown their interest because of economic development and farmer development in their districts. The districts foresee for themselves a facilitator role in the development of such a hub. The districts can facilitate with governmental wings such as Ministry of Agriculture & Commerce. The districts agree that the private sector should be involved in the running of the agro-hub to ensure that the intervention is sustainable.

In the table below for each of the districts, the potential sites with amount of land, location and other contributions to agro-hub are shown.

Figure 10. The area of interest and the possible locations

Potential sites	Amount of land, location and other contributions for agro-hub
Kasama	The Kasama District has land available either on title deed or traditional land. There is also a designated area in Kasama for industrial related development. However the Kasama District indicated that the size and type of available land depends on the specifications on the infrastructure and investment needed to be made. Given the specification the relevant stakeholder would hold a meeting to define the location
Mbala	<p>Mbala District has 4 different plots for the Agro-hub available:</p> <ol style="list-style-type: none"> 1. Size: 1,902 hectares available. Along the Nakonde road, 18 kilometre from the Central Business district of Mbala. Access road: both tarmac and gravel and Power lines are close by. 2. Size: 2,500 hectares available. Along Zombe road to the border of Tanzania (East Africa), 12 kilometre from the Central Business District of Mbala. Access road tarmac and power lines are close by. 3. Size: 5,000 hectares available. 15 kilometre radius from Central Business District of Mbala. Access road both gravel & tarmac. Power lines are close by. 4. Size: 250 hectares available. 5 kilometres from Central Business District. Access road both tarmac & gravel. <p>On the other contribution towards the hub, at the moment they indicated land & labour. They shall hold a meeting with other stakeholders to try estimate other contributions depending on the outcome of the feasibility study.</p>
Mpulungu	<p>(Nearby the port). The location of the site has not been indicated by the District representatives yet.</p> <p>Mpulungu district representative offer similar commitment as Mbala</p>
Senga Hills	So far one site is along the Nakonde road about 18 km from the District Administration area. Additional sites are yet to be identified. On the contribution towards the agro-hub they indicated land & labour.
Chief Chinakila (Senga Hill/Mbala)	<p>The proposed location by the Chief is far from the agricultural activities in Mbala, Kasama and Senga Hills and therefore not easy accessible for farmers in these regions. Also the access of the site is concerning because of the quality of the roads. He does oversee the land in Senga Hills. His territory covers part of Mpulungu, Senga Hills and Mbala.</p> <p>On the contribution towards the agro-hub the chief indicated land & labour.</p>

The different locations have been scored according to the method described in the Methodology chapter: the full scorecard can be found in Annex 2.

Table 5. Scorecard for the different locations.

Plot	Max. Score	Kasama	Mbala				Mpulugu	Senga Hills	Chief Chinakila
			a.	b.	c.	d.			
Weighted Score Physical Features	3,3	2,7	2,7	2,8	2,7	2,7	2,7	2,7	1,5
Weighted Score Market Economic Drivers	3,3	2,7	3	3	3	3,3	2,3	2,3	1,7
Weighted Score Public and Social Environment	3,3	2,7	2,7	2,7	2,7	2,8	2,7	2,5	2,3
Total Weighted Score	10	8	8,3	8,5	8,3	8,8	7,7	7,5	5,5
Ranking		2				1	3		

The top-3 of possible locations demonstrates all capable governmental institutes and a well-developed local road network. Some of them have their unique qualifications such as the presence of a port with access to international markets or an airport. The common understanding is that the agro-hub need to facilitate the agricultural value chains in strengthening their economic and sustainable position and thus has to be settled near the farmers. The centre of agriculture in the Northern provinces is Mbala; many commercial and SME farmers are concentrated in this district and also agro related activities are concentrated in Mbala yet. Thereby the local government is willing to assist in the selection of accessible location (nearby the main road, access to water and electricity). Therefore is recommended to start the agro-hub in Mbala, however it must be noted that depending on the focus of the hub (defined in later stages) the balance could shift, e.g. due to stronger commitment of partners in the different areas.

5 Mapping of stakeholders and potential partners

Development of agro-hubs is complicated due to the various and large number of stakeholders whereby public and private sector has to collaborate on local, regional and national level. In this pre-feasibility study is concentrated on identification of the various stakeholders and their interest and contributions. In the feasibility phase the strategy on engagement of the stakeholders has to be determined based on the final selection of partners.

Based on the field visits and value chain analysis we have identified as main groups of stakeholders for the development of an agro-hub in the Northern Province in Zambia:

1. Public agencies in the districts Mpulungu, Mbala, Kasama and Senga Hills
2. Local Private Sector partners in the Northern Province
3. NGO's
4. National public institutes in Zambia
5. Current agricultural projects in the Northern Province
6. International (Dutch) governmental institutes
7. Dutch private sector partners
8. Educational Institutes
9. Funding Agencies of Bodies

Stakeholder group	Impact	Influence	What is important to the stakeholder	how could the stakeholder contribute	how could the stakeholder block	Strategy on engaging the stakeholder
Public Agencies in the Districts	high	high	economic and farmer development	facilitate the agro-hub with their network, financial	not supportive	Engage closely and influence actively
Local Private Sector Partners	high (SME) medium (commercial)	high	sustainable businesses, consistent supply	off take of inputs, trainings and offer agricultural goods	not supportive	Engage closely and influence actively
NGO's	medium	medium	farmer development	provide market linkages and bring in relevant partners	not participating	monitor
National Public Institutes	low	high	economic development and farmer development	financial support	no political commitment	keep satisfied
Current projects in the region	medium	medium	strengthen and sustain their project	commitment linkages		

International (Dutch) governmental agencies	low	medium	economic development and development of business partnerships NL - Zambia	financial and access to Dutch network	lacking opportunities for Dutch investors	keep satisfied
Dutch Private sector partners	low	low	sustainable business development offset market	access to Dutch technologies, knowledge and skills	lacking sales possibilities	keep satisfied
Educational institutes	medium	medium	farmer development	access to knowledge, skills and capacity building	lacking number of students	keep satisfied
Funding Agencies	low	high	funding	access to capital/funds	no return on investment	Keep satisfied.

Stakeholder mapping and potential partners have been described further in Appendix 1. This is a separate document, which can be provided upon request.

6 Financial Aspects

6.1 Financial sustainability

Estimate of the actual costs of implementation could not be achieved in this study, due to the highly explorative approach to the research. Actual costs need more research locally, also including mapping of the existing services (e.g. cost of storage vs. price of renting the available ones).

Costs and benefit components for the development and operation of the agro-hub have been identified. In the table below for the several stages the cost and benefit components are mentioned:

Phase	Cost and Benefit Components
Development	<p>Development Costs Components:</p> <ul style="list-style-type: none"> → Full Feasibility Study → Technical Design & Tender procedure → Land acquisition → Land preparation (removal buildings, bushes, stones and levelling) → Construction of road infrastructure (improve main road network, construction side roads) → Construction of water ways (fresh water, collection of rainwater, water recycling) → Construction of power infrastructure → Construction of green areas (environmental sustainability!) → Construction and maintenance of multi-company buildings/offices → (eventual) construction of storage facilities → Purchase of machinery <p>General Costs Components:</p> <ul style="list-style-type: none"> → Project management → Publicity and promotional costs → Funding/financing costs <p>Benefit components:</p> <ul style="list-style-type: none"> → Sales of business plots
Operation	<p>Operational costs:</p> <ul style="list-style-type: none"> → Management and staff of the Agro-hub Operation Agency → Maintenance cost of the agro-hub and buildings <p>Benefit components:</p> <ul style="list-style-type: none"> → Annual contribution of stakeholders → Lease or rental fees for business plots → Lease or rental fees for the multi-company buildings/offices

The financial sustainability model of the agro-hub will differ slightly from one agro-hub to the agro-hub influenced by various factors which range from nature of infrastructure, quantities produced and number of subscribers to the agro-hub. The financial sustainability model would seek to ensure that:

- The agro-hub is stable and develop growing revenue streams for the project beneficiaries
- That revenue streams entails sales of aggregated primary produce, inputs and value added products and use of facilities
- Project beneficiaries will contribute percentage of the sales proceeds for the maintenance of the facilities
- There is an expanding range of capital funding options supported by strong capital finance risk management
- There is a sustained excellence in financial management on the part of the project managing agency

6.2 Financial tools

The table below illustrates the different funding instruments that appear to be useful to finance a feasibility or implementation phase of the hub. The different institutions and their programs and possible synergies are also introduced.

Table 6. Potential funding instruments for the Agro-hub

Name	Provider	Hub Phase:	Budget	Type of investment
Building Prospects	FMO, Dutch government	Implementation	< €10 million	<ol style="list-style-type: none"> 1. Minority shares in equity investments 2. Investments in dedicated infrastructure investment funds 3. Early stage equity for new project development
Development Accelerator/ Project Development fund	FMO, Dutch government	Feasibility	Undefined, up to 50% of total project budget	Advances project costs needed to advance early stage projects
Export credit	FMO	Implementation	Undefined – contact required	For Dutch businesses and strategic government projects
Origination Facility	DFCD	Feasibility	Undefined – contact required	-
Land use facility	DFCD	Implementation	Undefined – contact required	-
Impact Cluster	RVO	Implementation	50% co-financing, <€200.000	5< Dutch companies and / or knowledge institute. Activities in top-sectors (agribusiness)
SDGP	RVO	Implementation	€500.000 – €3million	The public-private partnership (PPP) consists of a maximum of 6 partners, at least one of whom is a NGO or knowledge institution, a private company, a government organization.

				The applicant must be a Dutch organization.
DRIVE	RVO – Ministry of foreign affair	Implementation (possibly feasibility)	€5million – €60million	The project makes a demonstrable contribution to private sector development in the country. Compliance with the OECD guidelines for international corporate social responsibility (IMVO) for multinational companies. (...) follows in the text
DHI	RVO	Feasibility - implementation (demonstration)	50% co-financing €25.000- €200.000	Within 3 yr. the expected export must be at least 5 times the grant amount.

FMO Funding instruments:

FMO is the Dutch entrepreneurial development bank. Since 2017 Agro-food is one of the three main sectors for investment by FMO. The focus lies in the investment that supports the growth of local businesses. Usually the application needs to come from the project owner (so no private consultants). There are different programs possible within FMO.

Building prospects

Building Prospects (formerly known as Infrastructure Development Fund, IDF) was established in 2002 by the Dutch government and FMO with the primary goal of supporting private sector development. In poor countries, agribusiness is generally the most important sector, seen as the driving engine out of poverty. A thriving and efficient agribusiness sector needs infrastructure, with access to energy and water, but also to logistics and transport. The effects of climate change can already be felt and the poor are most vulnerable. Building Prospects aims to build a portfolio with a gender and a climate scope.

Development Accelerator/ Project Development fund

These are two FMO programs with similar focus and functioning. The facility is open for early stage projects in the food, water, education, health, and climate segments in low- and middle-income countries.

The programs co-finance up to 50% of the project costs needed to advance early stage projects. This can be either through analysing and identifying the needs and potential of a project, assessing the feasibility of a project, or supporting the procurement process.

Beneficiaries of the funds can either be Dutch businesses or project sponsors (public or private) in emerging markets. Once the project is successful, repayment of the advance is required.

Export Credit

Export finance and investment products to support commercially viable (Dutch) businesses and strategic government projects that contribute to the Sustainable Development Goals.

Dutch Fund for Climate and Development

If the investments are climate-smart, then the Dutch Fund for Climate and Development may also be of interest, especially if the measures are climate adaptation. The DFCD is managed by a pioneering consortium of Climate Fund Managers (CFM), World Wide Fund for Nature Netherlands (WWF-NL)

and SNV Netherlands Development Organisation, led by the Dutch Entrepreneurial Development Bank, FMO.

A substantial allocation of the Dutch Fund for Climate and Developments' investments is reserved for the Organisation for Economic Co-operation and Development's Development Assistance Committee (OECD DAC) Least Developed Countries (LDCs) and other Netherlands development cooperation priority countries.

The fund is divided in three facilities. For the purpose of agro-hub establishment, two facilities seem most relevant:

1. Origination Facility (WWF, SNV Netherlands)

Positioned exclusively for project identification and (pre-) feasibility development activities with a cross DFCD thematic sub-sector focus.

2. Land Use Facility (FMO)

Targets investments that have graduated from the Origination Facility in sectors relating to agroforestry, sustainable land use and climate resilient food production.

Especially for a hub focussing on climate-smart practices this seems a promising partner/funding agency. It is worth mentioning that a meeting has been set up by DFCD with the local Dutch Embassy representative to discuss opportunities in Northern Zambia, which would suggest interest.

Rijkdienst Voor Ondernemenschap (RVO)

Drive/D2B

The focus is on projects in the sectors: Food Security, Water, Sexual and reproductive health and rights (SRHR) climate.

Together with Develop2Build, DRIVE is a Ministry of Foreign Affairs programs for supporting development-relevant public infrastructure in selected countries. Most of the countries on the D2B list are 'least developed countries' (LDCs), while the DRIVE list also includes low middle-income countries and high middle-income countries.

Other important differences are the target group, the phase of the project and the financing. DRIVE is open to companies that want to participate in a tender for the realization of public infrastructure. Subsidies, guarantees and loans are provided after an intake and assessment procedure, if both the companies and the projects meet all DRIVE requirements.

The D2B subsidy is granted to local authorities for the development of project plans for public infrastructure with high development relevance. RVO.nl identifies D2B projects, in consultation with, among others, the Dutch embassies on the D2B list.

Drive requirements:

- You are an entrepreneur and you want to be eligible for an assignment to carry out a public infrastructure project in one of the DRIVE countries.
- The project scope amounts to a minimum of € 5 million and a maximum of € 60 million.
- The project makes a demonstrable contribution to private sector development in the country. By improving the business climate, local entrepreneurship grows and employment and productivity increase. It enables people in the country to provide for their own livelihood.
- When implementing the project, you must comply with the OECD guidelines for international corporate social responsibility (IMVO) for multinational companies. These guidelines make clear what the Dutch government expects from companies in their international activities.
- The project fits within the policy objectives of the country or region in question.
- The project meets the needs of the intended end users.

- The project is sustainable in the broadest sense of the word.
- Your company has demonstrably expert, reliable, stable and financial capacity to carry out the assignment.

Impact Cluster:

This is a program with which Dutch companies can realize their international ambitions in a public-private partnership.

Some requirements:

- The cluster consists of at least 5 companies and / or knowledge institutions that are established in the Kingdom of the Netherlands (the Netherlands, Sint Maarten, Aruba and Curaçao).
- The PIB application is aimed at positioning Dutch business within the Top Sectors (Agribusiness).
- The companies visibly demonstrate that they are willing to carry out specific activities at their own expense and how they want to do this.

DHI program

The DHI programme can provide grants to Dutch companies preparing to export or invest in foreign markets. DHI focuses on small and medium-sized enterprises from the Kingdom of the Netherlands that have an interest to do business abroad. SMEs that want to invest develop a business project or demonstrate their technologies, capital goods or services in a foreign country can apply. DHI is a grant programme of the Dutch Ministry of Foreign Affairs and is managed by RVO, the agency of the Government of the Netherlands.

DHI can subsidize up to 50% of the project budget (60% when applications are implemented in fragile states and focus countries). The remainder must be financed by the applicant. The minimum grant amount that can be requested is EUR 25,000, so the study or demo project budget must be at least EUR 50,000. The maximum grant is EUR 200,000 for demonstration projects, EUR 100,000 for feasibility studies and EUR 100,000 for pre-investment studies.

Within 3 years the expected export must represent an amount of at least 10 times the subsidy amount. For feasibility projects in DGGF countries (Zambia is one), this is 5 times the grant amount.

SDGP

Zambia is one of the countries belonging to the SDGP country list.

The SDG Partnership facility (SDGP) aims to help achieving SDGP 2, 8 and 17 in developing countries.

During the second tender (December 2019), public-private partnerships (PPP) could submit projects that contribute to one or more of the following focus areas:

- Nutritional value;
- Sustainable value chains;
- Sustainable and climate-resilient food production systems;
- Better work and income for youth and women.

The updated focus areas are not yet known, however it can be expected to be similar.

Requirements:

The public-private partnership (PPP) consists of a maximum of 6 partners, at least one of whom is a:

- NGO or knowledge institution
- A private company, and
- A government organisation (preference of local government).

The applicant must be a Dutch organisation.

African Development Bank

The overarching objective of the African Development Bank (AfDB) Group is to spur sustainable economic development and social progress in its regional member countries (RMCs), thus contributing to poverty reduction.

One of the areas of special emphasis for the AfDB is ‘agriculture and food security’ as strengthening agriculture and food security through an integrated value chain approach can improve the livelihoods of Africans who live in rural areas. The bank invests in rural infrastructure (such as rural roads, irrigation, electricity, storage facilities, access to markets, conservation systems and supply networks), to support countries increase agricultural productivity and competitiveness.

This sounds very promising in relation to the development of an Agro-hub. Interviews have brought up different AfDB programs that would be suitable for synergies with the Agro-hub.

1) **Transport Infrastructure - Integrating Africa** ²⁹

AfDB’s goal is to help countries integrate better by supporting multiple efforts. These include among others: (a) Sustainable water resource management through trans boundary water resource management and water conservation projects, as an approach to maximise natural resources in a sustainable manner. (b) Increasing connectivity - expanding road, rail, port, and air links. (c) Improving the business environment for cross-border trade.

Besides the bank is involved in the strengthening of the North-South Corridor which includes linking the Copperbelt to the southern ports in South Africa. Together with its adjacent spurs, the corridor services eight countries – Tanzania, DR Congo, Zambia, Malawi, Botswana, Zimbabwe, Mozambique, and South Africa.

These projects could be indirectly or directly linked to the hub through the upgrading of Mpulungu port or the roadways.

2) **Agriculture – Feed Africa** ³⁰

Feed Africa’ focusses on infrastructure to drive agricultural transformation, investments on cross-border agricultural corridors, linking production and markets for agricultural goods as well as strengthening processing capacity, include youth and women friendly agricultural finance models.

For the cassava and horticulture sector, some objectives are mentioned that are in line with the Agro-hub activities:

- Improved marketing capacity for processed products such as starches and ethanol (i.e., create new sources of demand)
- Reduced post-harvest losses by increasing access to better low-cost on-farm storage methods for fresh cassava as well as off-farm technologies (such as refrigeration, deep freezing, waxing, chemical treatment, and other methods)
- Investment in large-scale, industrial processing corridors to increase capacity for creating cassava value-added products
- Establish trade corridors to meet regional demand
- Develop SME agribusinesses and large-scale partnership with the private sector to support aggregation and distribution (e.g., marketing outlet)

Private Enterprise Program Zambia (PEPZ)

The Private Enterprise Programme Zambia (PEPZ) works with the Zambian private sector to support profitable business growth, Food and Agriculture being one of the focus areas.

The local Food and Agriculture Sector Lead expressed interest in keeping involved in this project as it looks very compatible with PEP activities. Currently the PEP is expected to enter in a 2nd phase of the duration of 6 years and nationwide, if the Agro-hub process starts within this range of time there would be possibilities of collaboration. In the Northern region the PEP provides co-funding to private SME to help them establish, usually around an aggregation point. Since in rural areas there are not a lot of services available, these companies are very diverse, like e.g. telephone service providers. This could support SME-partners of the Agro-hub in the establishment of activities there.

In Kasama they mainly support companies growing soy, maize, beans and cassava. These companies have out-growers in the more extended region.

EU Delegation in Zambia

The EU delegation in Zambia was mentioned during the interviews as one of the possible interesting parties to involve in a possible implementation phase of the agro-hub. The EU delegation is said to have development budget available, however it is not clear if this can be used for a feasibility study. It would surely be advisable to take contact for later phases.

7 Take away messages

- Value Chains selection:** Due to time constraints, only a limited amount of value chains could be analysed, implying this is a possible selection, but not the only option for follow up. It must be mentioned that the study has been focussing on crops, while opportunities are also available in the livestock value-chains.

The most promising value chains identified are the ones of cassava and beans. Additional *market research* has to be done and existing market channels (example is dried cassava for Burundi and Congo) should be taken along and professionalized. The bean value chain needs to be standardized by selecting few profitable varieties on which to focus. Perennial crops such as coffee or avocado should be integrated in a second moment in the activities of the hub.

Challenges identified for the value chains are: Lack of storage, Climate change, Export, Power supply, Labour constraint, Lack of knowledge/improved technologies, Limited access to credit and quality inputs, Limited access to markets and infrastructures.
- Agro-hub concept:** The Agro-hub has been defined as *‘a networked innovation system of agro-production, processing, logistics, marketing, training and extension services, located in a District Municipality. As a network it enables a market-driven combination and integration of various agricultural activities and rural transformation services’*.

The agro-hub should have 5 main functions targeting the core challenges of the value chains:

 1. Aggregation and coordination
 2. Rental of equipment
 3. Storage and cooling
 4. Input market and credit supply
 5. Training, support and demonstration

The operation model to implement the Agro-hub is recommended to be a so called Managing Agency operation model.
- Production and transport infrastructure** are strongly interconnected; a productive agricultural system requires a healthy transport sector and vice versa.

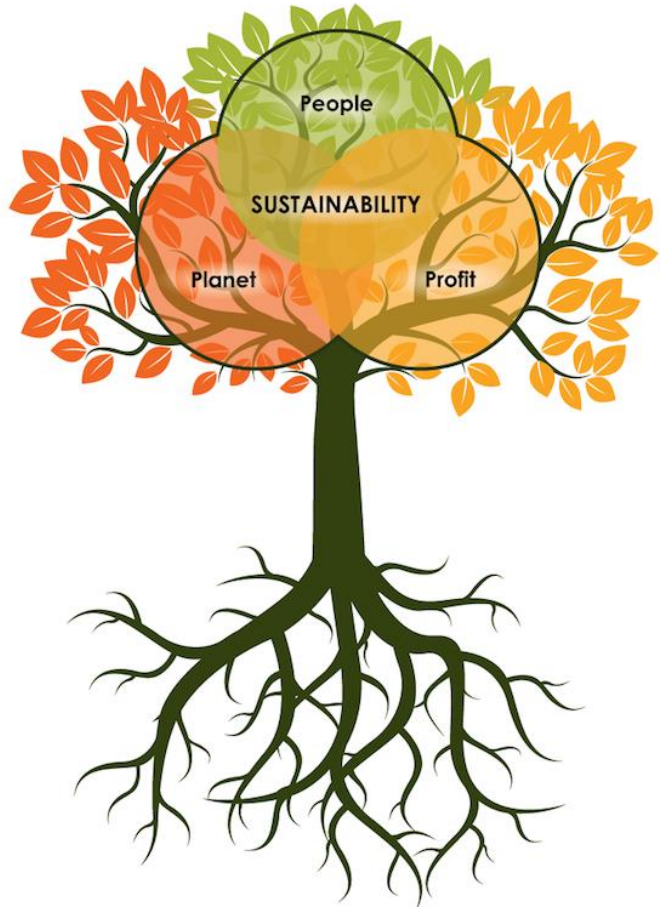
One of the main challenges for success of the agro-hub is the accessibility of the Northern Province (long travel time from Lusaka). This hinders not only the development of trade connections for agriculture produce to the national market (mainly Lusaka) and international markets but also the (inter)national supply of agriculture inputs and support to the Northern Province. Further study should look at the concrete possibility of collaboration with Mpulungu port, transportation companies or the local airport and find opportunities to collaborate with projects looking at reviving the transport sector. In general improved accessibility of the northern would create better business opportunities to the (inter)national markets
- Climate Smart Practices.** Any agricultural activities within the hub should promote climate-smart practices, to enhance climate adaptation and decrease the financial threats by land degradation. A wide range of practices is available and can be introduced with the selected crops. This aspect of the hub should be stressed in following activities.

- **Location.** While the current preferred location is Mbala this could be redefined in a second moment depending on the partners committing. The scorecard needs to be refilled after selecting the relevant partners and market channels, with a differentiated weight for each of the pillars.
- **Stakeholders.** **Given the diverse and complementary challenges within the value chains, a consortium of specialized partners would seem the best option for further development of the project, however** “ownership” of the agro-hub is crucial; the lead partner(s) must feel responsible and must full commit for the success of the hub. As the Dutch stakeholders are unfamiliar with the market features and potentials of the region, the lead partner should ideally be a Zambia- based company. Locally, there is interest among processors in being involved in the project; however there is the need to identify committed partners.
Most of the international stakeholders interviewed has never visited the region (for Zambia their focus is more on the Copperbelt region) and thus unknown with its potentials of the region. The organization of a **trade mission** to the region could assist the international stakeholders in their mind set of the Northern Province.
- **Funding.** There are multiple funding instruments that could be suitable for a feasibility and implementation phase. Next phases of development require also commitment from the local government (Local District and national). The agro-hub must be supported by local government to ensure economic sustainability. The involvement of local government realizes commitment and responsibility in a sustainable project development. The preferred location for the agro-hub is in the centre of agriculture in the Northern Province, the Mbala District. The location nearby the Central Business District is the best location, due to mainly its economic drivers (availability of staff, available agriculture value chain infrastructure and presence of farmers). However, a strong commitment and involvement of Mpulungu port could make Mpulungu relatively more attractive. The governmental institutes in Mpulungu are also supportive (like the ones of Mbala) and willing to partner in an Agro-hub. They foresee a similar role as Mbala district in the availability of land and mobilization of the private sector.

8 Recommendations

We recommend to contribute to the development of the Agro-hub in a way that is not only technically adequate and farmers needs driven, but also takes into consideration long-term sustainability, while facing global challenges like population growth, food security and climate change.

To achieve this, it is of fundamental importance to integrate the three P's of development: people, planet and profit. It is recommended to do that by developing a design around the needs of the users (people), the so called Human-Centred design approach. At the same time, to try to minimize the negative impact of agriculture on the surrounding environment, while ensuring the introductions of appropriate, climate smart technologies that contribute to climate adaptation and mitigation (planet). This goes paired with the development of social entrepreneurship and a sound businesses that will enable the hub to stay financially viable (profit).



We recommend following the next paths for the development of an agro-hub in the northern province of Zambia:

1. *Follow-up (full feasibility) study.*

A follow-up study focussing on the agro-hub in Mbala should consider

a. **Production**

- i. Local market dynamics for the selected value chains
 1. Detailed method of production (and main challenges)
 2. Prices of production and market price
 3. Destination market
- ii. Design of a agronomic model for production (rotation, climate-smart practices ...)

b. **Selection of partners** of which at least:

- i. One local lead partner
- ii. At least one transport organisation (port, airport or on-land transportation)
- iii. Input providers
- iv. A local district Governmental organisation
- v. (an NGO / research institute)

- c. Selection of **precise location**, including area, coordinates, soil and water sampling.
 - i. Inventorisation of already available infrastructure (e.g. pre-existing storage facility) in the surrounding
- d. Based on the previous: creating a full Business Proposition for the Agro-hub.
- e. Quantification of Costs

2. Improve the accessibility of the region.

One of the main challenges for developing the agriculture sector in the Northern Province is the accessibility of the region. The best way to enter the region is the main road from Lusaka to Mbala. Although the quality of the road is fine, the travel time is at least an 8-10 hour drive which is quite long for fresh agriculture produce. Supposedly this is also the main reason why the region is hardly familiar by international investors. The accessibility can be improved by (for example) the commercialisation of the military airport in Mbala or a railway network. Involvement and commitment of the local and national Zambian government is important for changing the infrastructure. A holistic approach to infrastructure development (both physical and institutional infrastructure) can support improved food security and nutrition status through improved access to food production input and output markets, better sanitation, healthcare, and education.

3. Promote the opportunities in the Northern District to international agribusiness-companies.

The interviews with the Dutch private sector learn that most of them are not familiar with the opportunities of the region. Most important reason is that they were not aware of the agriculture potential of the region. To create more awareness of the Northern Province can be done in several ways. The most efficient one is to organize a trade mission to the region and let the participants experience themselves the opportunities of region.

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Annex 1: LIST OF INTERVIEWS

Round Table Meetings with District Offices:

Mpulungu: Mr. Mhanza Higfrens Dr. Jackson Mayondy Ms. Linda Namwinga Ms. Beauty Kasandra Mr. Michael Sikazwe Mr. John Mwanza Mr. James Chilufya Mr. Lawrence Kaliwanda	District Planner Vet Surgeon Stenographer Assistant DMDO Chamber of Commerce District Agriculture Coordinator Socio Economic Planner --
Mbala: Ms Majory Mwale Mr. Joseph C. Kanyamtila Ms. Jane Mugala Mr. Munthali W. Hastovo Mr. Stuart Sikazwe Mr. Willard Makklelele Ms. Floreance Kuna Dr. Stephen Tembo Ms. Chansa Musonda Ms. Memory Chisha Mr. Christopher Mengo Siawe Mr. Kedrick Sichombe	District Commissioner
Senga Hills: Mr. Henry Daka Mr. Kelvin Banda Mr. Kingford S. Kalembwe Mr. Sydney Chipili Mr. Kanbonda Katowa	DACO DLT District Secretary DPO --

Interviews with Public Institutes

Zambia Agriculture Research Institute (ZARI) - Misamfu Regional Research Centre	Mr. Kennedy K. Muimui	Program Officer, Bean Breeder
Zambia Bureau of Standards	Mr. Peter Hanchanyain	Program Officer
Zambia Development Agency	Mr. Martinet S. Malyo	MFEZ Manager
RVO	Mr. Derk Bonthuis	

Interviews with NGO's

World Vision	Mr. Alex Nkhoma	Development Facilitator
	Mr Spriano	Lead Farmer

Musika	Mr. Jephthah Chanda	M&E Officer
Private Enterprise Programme Zambia	Mrs Claire van der Kleij	Food and Agriculture Sector Lead

Interviews with Chief

Mbala District	Chief Chinaluka

Interviews with Private Sector

Regitech Soya Processing Industries Ltd, Kasama	Mr. Daniel M. Bwalya	Managing Director
Export Trade Group (ETG), Mbala	Mr. Edgar Chimodzi	Location Manager
Livestock Cooperative, Mbala	--	Chairman
Katito Farming Ltd, Mbala	Mr. Simon Brown	General Manager
Saise Farming Enterprises Ltd, Mbala	Mr. Adrian Conradeie	General Manager
Port of Mpulunga	--	Manager Operations
Olam Northern Coffee Corporation Ltd, Kasama	Mr. Lewis Ngosa	SESRO
Affiance Group Corp (Australian Investment Group)	Mr. Charles Kamwi	Executive Director Legal & Strategy
Holland Greentech	Mr. Bram de Vries	Business Developer
Small Scale Farmers	7 Small Scale Farmers in Vyamba	
Seba food	Gaurav Vijayvargiya	
Kemiko Ltd	Michael Mpundu	commercial director
Cereal milling and farms	Patrick Katema	

Interviews with Funding Agencies

FMO	Mrs. Nienke Uil	Senior Business Developer
RVO		

Annex 2: General information

This section provide an overview of the agricultural products and their value chains in the northern province, including the main limitations and challenges within this chains.

The Northern Province is predominantly an agricultural area with 75 - 80% of the population being active in farming. Mbala is the current centre of agriculture in the Northern Province, it has available water and soils that are favourable for the growing of most types of crops. The average annual precipitation is usually above 1,000 mm, spread over one rainy season from October to March. During this period there is no need for any irrigation, while in the dry season

Table 7. Average District Rainfall Data for Mbala (2011).
Source: Luwingu DSA, 2012

Month	Rain days	Rainfall (mm)	Cum. Rainfall (mm)
January	19	162.4	162.4
February	18	334.6	497.0
March	10	219.0	716.1
October	3	9.0	725.1
November	16	196.5	921.6
December	14	136.7	1,058.3

(April to October) shallow-rooting crops require additional irrigation to grow. This water is sourced usually from overland flow rather than boreholes, for example irrigation water for the commercial potato farmers of Saise farming Enterprise in Senga Hill is from the Chambeshi River system. In this season livestock farmers also depend completely on surface water (river, well, lake). The level of competition for water between farmers and farming activities (e.g. crops, livestock) during the dry periods is not known.

This is a rich area for biodiversity, however, last decades due to population growth the pressure on natural resources has also increased. The use of firewood and charcoal to fulfil all energy requirements and the traditional farming system of shifting cultivation has led to significant deforestation, as forests have been depleted due to excessive tree-cutting. As a result, environmental degradation is on-going, and continues to threaten livelihoods. There is high depletion of fish stocks due to poor fishing methods particularly in the Lakeshore area. Agriculture also plays an important role in this process, as natural areas are cleared to make space for crop and livestock production⁶. Increasing the efficiency of agriculture on already converted land can therefore play an important role in maintaining natural area and the related ecosystem services.

In the area of Mbela, but also in the rest of the district the availability of physical capital, transport, energy and telecommunications infrastructures are limited, hampering real economic growth. Poor road infrastructure remains a hindrance to trade.

Households and livelihoods

According to national statistics, 70-85% of the households is engaged in farming activities, to which both men and women allocate their labour. However during our field visit, we noticed that almost all families are undertake farming activities.

There are three major categories of farmers in Zambia, defined in terms of the land area cultivated by each farmer. *Small-scale farmers*, who are the vast majority, cultivate less than 5 ha, use few external inputs, and consume most of their produce, occasionally entering the market to sell any surplus. The hand hoe is the predominant means of cultivation. *Medium-scale farmers* cultivate between 5 to 20 ha. They use improved seeds and fertilizers and sell most of their production. These farmers commonly use a combination of manual, animal draft power and tractors. *Large-scale commercial farmers* plant over twenty ha annually. These farmers apply high levels of purchased inputs and use oxen or machinery for farm operations. They produce almost exclusively for direct market sale or feed their grain to livestock kept on the farm. Large-scale farmers make up only 4% of farm households, but cultivate 22 per cent of all cropped land⁷.

The average size of farms in the area of Mbala is 4 hectares with the majority of poor households owning less than 1 hectare of land. Within smallholder families the average household counts 7 members. As it is often the case in SSA, labour has an important contribution to the livelihood of the family. In some cases the poor households cultivate the wealthier households' land where the contract is based on the production attained (normally gets paid after production) or workers are allocated a portion of land as a payment for agricultural farming contracts⁶.

The main source of cash income among households in the zone is the sale of agricultural produce. However, this is an unpredictable source of cash due to delay in payments, especially when companies delay in buying and paying the products. Charcoal and firewood selling and trading and selling of livestock to neighbouring districts and to Tanzania are also important livelihood activities.

Agricultural labour activity is highest during the wet seasons, when labour is needed in rural areas for cultivating and harvesting. The majority of the poor perform agricultural labour within the village and in areas close to their village. During the dry seasons, agricultural labour opportunities are limited.

Levels of food insecurity are highest for the rural community during the rainy seasons, especially during the months of March-June and October-January, when cereal and livestock production levels are at their lowest. Travel to town centres is difficult at this time, due to agricultural labour demands and poor road conditions caused by heavy rainfall.

Annex 3: SITE SELECTION

Additional information about locations

1. Mbala

It is the agriculture centre of the Northern Province. Due to its geographic position in the Northern Province and the local climate conditions the district is interesting for high value crops and agriculture activities. Many large commercial farmers are settled in this district but there are also a huge number of SME farmers active. Mbala has a good transport network connecting it to other towns in the Northern Province. Mbala is strategically positioned as a transit town as it is a gateway to Mpulungu which is a border town between Zambia and Tanzania. The road network is well planned in the sense that there is a main road running through the Central Business District with other smaller roads branching off to give access to neighbourhoods. There is also access to good water and electricity. In Mbala is also a military airport. This airport is still closed for (international) air freight. The transformation into a commercial airport could boost the economy of the Northern Province and thus the strategic position of Mbala in regional economic development. However, it has been previously mentioned that this is not planned in the foreseeable future. The facilities of the airport are equipped for international air freight. The whole Northern Province is lacking on accessibility from cities such as Lusaka (8-10 hour drive) and thus also international accessibility. It is recommended to the Mbala district to realize the transformation of the airport into a commercial one. The identified site is 5 kilometres from the Central Business District and accessible via tarmac and gravel roads. The available size of the site is 250 hectares which is quite large for an agro-hub and thus offers enough opportunities for expansion and increase.

The market economic drivers have a maximum score; many SME but also commercial farmers are active in the Mbala district. While there are a lot of agriculture activities around Mbala, there are already various value chain partners (input suppliers, processing industry) settled and active. Mbala town is one of the biggest in the province, however unemployment is a challenge. For potential clients / investors on the Agro-hub, that is an opportunity.

The Mbala District representatives can contribute to the Agro-hub as follows:

- mobilization of farmers
- (extension) staff can help in trainings
- facilitation of the production
- availability of land

There is much economic activity in the area, which means that the district must be capable to manage the development of an agro-hub in their District.

2. Kasama

Kasama has a good local road infrastructure and is the entrance of the Northern Province when driving from Lusaka to Mpulungu. However, the distance from Kasama to Mpulungu is still another 2 - 3 hour drive. When the Agro-hub is established in Kasama, the facilitation function is not facilitating the farmers (especially SME farmers) from especially Mpulungu. The travel time to Kasama is too long. Kasama also has a small domestic airport (with a gravel runway) which is not equipped for freight air transport.

The local government is well organized and its officers seemed to be very capable. The government sees it self-playing the facilitator role with the relevant government wings such as Ministry of Agriculture and Commerce. They also foresee the collaboration with the private sector organization as a necessity for successful development of the Agro-hub.

There are a limited number of large commercial farmers active in Kasama. However, Olam Coffee has several plantations and also Regitech (medium commercial farm) is representative in the region. The agricultural value chain is however limited represented in Kasama (compared to Mbala).

3. Mpulungu.

The economic driver of Mpulungu is the port in Lake Tanganyika. The port is the access to international markets in Tanzania, Burundi and DR Congo. The Manager Operations of Mpulungu Port is interviewed on the formal trade on the Lake. The transported volume of agricultural commodities by boat is limited compared to raw materials the main transported agricultural products are commodity goods as maize, cassava and sugar for Burundi and DR Congo. The port has no capacity for fresh goods; the vessels are not equipped with climate controlled storages. For the commodity agricultural value chain the port of Mpulungu is interesting. Currently the port is not equipped for collection of agricultural commodities. Recently the World Food Program has recommend actions to trigger the revitalization of Lake Tanganyika transport corridor. Strengthen the infrastructure of Mpulungu port and increase the storage capacity of maize nearby the port are recommended in this study. The storage facility of maize nearby the port can strengthen the position of the agro-hub.

Also Mpulungu has a good road infrastructure. Their governmental institutes are supportive and willing to partner in an Agro-hub. They foresee a similar role as Mbala district in the availability of land and mobilization of the private sector.

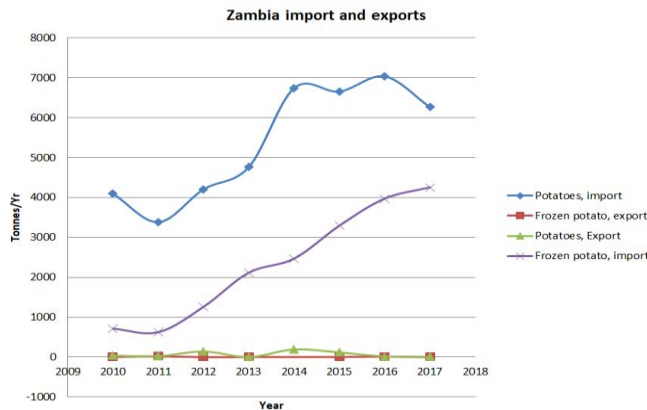
Plot	Max. Score	Kasama	Mbala				Mpulugu	Senga Hills	Chief Chinakila
			a.	b.	c.	d.			
Physical Features									
- accessibility (roads, quality of the roads)	5	4	4	5	4	4	4	5	2
- access to (fresh) water	5	3	3	3	3	3	3	3	1
- access to power lines	5	4	4	4	4	4	4	3	1
- available land	5	5	5	5	5	5	5	5	5
Total Score Physical Features	20	16	16	17	16	16	16	16	9
Weighted Score Physical Features	3,3	2,7	2,7	2,8	2,7	2,7	2,7	2,7	1,5
Market Economic Drivers									
- # Small Holder Farmers (< 1 hour walk)	5	5	5	5	5	5	5	5	5
- # Medium Scale and commercial farmers (< 1 hour drive)	5	3	4	4	4	5	2	2	1
- availability of staff / workers	5	4	4	4	4	5	4	4	3
- available agriculture value chain infrastructure	5	4	5	5	5	5	3	3	1
Total Score Market Economic Drivers	20	16	18	18	18	20	14	14	10
Weighted Score Market Economic Drivers	3,3	2,7	3,0	3,0	3,0	3,3	2,3	2,3	1,7
Public and Social Environment									
- interest of local government	5	5	5	5	5	5	5	5	3
- capability of the local government	5	3	4	4	4	4	3	2	2
- soft influences	5	3	3	3	3	3	3	3	5
- social and economic impact	5	5	4	4	4	5	5	5	4
Total Score Public and Social Environment	20	16	16	16	16	17	16	15	14
Weighted Score Public and Social Environment	3,3	2,7	2,7	2,7	2,7	2,8	2,7	2,5	2,3
Total Weighted Score	10	8	8,3	8,5	8,3	8,8	7,7	7,5	5,5
Ranking		2				1	3		

Annex 4: SCORECARDS and CROP SELECTION

Assessment and scoring of the sector: MAIZE			
Economic	Score	Underlying data for the score	Source
a. Sector growth potential			
1. Prospects for market growth	5	There is prospect for market growth, however this is very dependent on among others regional developments. Large fluctuations in prices and production make it difficult to market maize consequently	World Bank and WFP report (2018), interviews with private stakeholders (farmers, millers)
2. Unmet local or export market demand	4	a. Locally. Farmers considering maize as a safe investment, indicates the capacity to offset the crop. FRA government organisation plays a role in this.	Interviews
		b. The great lake region is not food secure, with multiple country in a deficit for staples. This creates opportunities for Zambian maize c. Unpredictable agricultural trade policies and government interventions in maize markets makes exports uncertain.	World Bank and WFP report (2018) A STAPLE FOOD PRODUCER IN ZAMBIA (2012), agrivision
3. Scope for import substitution	3	The total supply is more than adequate to meet the estimated total annual requirements However, the challenge is how to ensure proper food distribution within and across households, communities, or regions.	(1)World Bank and WFP report (2018). (2)Mofya-Mukuka et al 2018
b. Competitiveness			
5. Comparative advantage (local market)	4	Climate in the northern region is more beneficial in terms of rainfall (especially in a changing climate).	interviews
6. Comparative advantage (export)	5	Zambia has higher production per capita and per ha than limitrophe countries, however still well below potential growth.	World Bank and WFP report (2018)
c. Profitability			
8. Level of net profits by commercial enterprises in sector	4	Experienced as a safe crop by commercial producers and processors, perception on profitability varies among interviewees	interviews
INSTITUTIONAL			
a. Evidence of willingness to invest			
9. Evidence of private sector having plans for investment in the value chain	5	a. There is evidence of private sector producers interested in taking part of the value chain, however it has not been clearly stated a clear amount of investment.	interviews with farmers and processors
10. donors/support organisations are willing to collaborate/invest	3	While no commitment has been made, maize is one of the target crops for many programs targeting food security.	interviews
b. Enabling policy and regulatory environment			
11. Low susceptibility to adverse trade policy	1	Being maize a 'political crop' maize is the most susceptible crop to adverse trade policies and market inference by the state	(1) IAPRI 2018, maize outlook, (2) interviews (3) World Bank & WFP 2019
12. sector promotion policies and regulations are in place and enforced	4	Incentives are there to support maize production, especially for the producers, however at processor level the FRA provides competition	(1) IAPRI 2018, maize outlook, (2) interviews (3) World Bank & WFP 2019
SOCIAL			
a. Inclusiveness			
13. Potential to engage starting entrepreneurs	4	There is evidence of SME being involved in this value chain.	interviews
14. Potential impact on local food security	3	The total supply is more than adequate to meet the estimated total annual requirements However, the challenge is how to ensure proper food distribution within and across households, communities, or regions.	(1)World Bank and WFP report (2018). (2)Mofya-Mukuka et al 2018

Assessment and scoring of the sector: CASSAVA			
Economic	Score	Underlying data for the score	Source
a. Sector growth potential			
1. Prospects for market growth	5	There is prospect for market growth, however this is very dependent on among others regional developments. Large fluctuations in prices and production make it difficult to m	World Bank and WFP report (2018), interviews with private stakeholders (farmers, millers)
2. Unmet local or export market demand	5	a. At national level, many consumers have increased cassava use as staple to replace maize, since the price was very high and fluctuating over the previous years	Interviews
		b. The great lake region is not food secure, with multiple country in a deficit for staples.	World Bank and WFP report (2018)
		c. Cassava demand is increasing due to the construction of ethanol plans	interviews
3. Scope for import substitution	4	At national level, many consumers have increased cassava use as staple to replace maize, since the price was very high and fluctuating over the previous years. Besides to use cassava for biofuels can imply huge savings on the millions of foreign exchange Zambia spends on the importation of fuel.	interviews
b. Competitiveness			
5. Comparative advantage (local market)	5	Climate in the northern region is more beneficial in terms of rainfall (especially in a changing climate). In other areas cassava does not do as well so the area has authomatically an advantage in production it is not known now competitive zambia is	interviews
6. Comparative advantage (export)	3	compared to the directly surrounding countries (Congo is a larger producer of cassava) However, the informal trade towards congo suggests that there is unmet	interviews, field visits
c. Profitability			
8. Level of net profits by commercial enterprises in sector	5	Experienced as a safe and profitable crop by commercial producers and processors	
INSTITUTIONAL			
a. Evidence of willingness to invest			
9. Evidence of private sector having plans for investment in the value chain	5	a. There is evidence of private sector producers interested in taking part of the value chain, however it has not been clearly stated a clear amount of investment.	interviews with farmers and processors
10. donors/support organisations are willing to collaborate/invest	3	While no commitment has been made, maize is one of the target crops for many programs targeting food security.	interviews
b. Enabling policy and regulatory environment			
11. Low susceptibility to adverse trade policy	3	Cassava is less susceptible than maize to import restrictions	
12. sector promotion policies and regulations are in place and enforced	4	Incentives are there to support maize production, especially for the producers, however at processor level the FRA provides competition	(1) IAPRI 2018, maize outlook, (2) interviews (3) World Bank & WFP 2019
SOCIAL			
a. Inclusiveness			
13. Potential to engage starting entrepreneurs	5	There is evidence of SME being involved in this value chain. Particularly starting entrepreneurs being cassava a crop which is being rediscovered as staple. Almost all smallholder farmers grow this crop but only occasionally commercialize it when opportunities arise.	interviews
14. Potential impact on local food security	3	Cassava is already the main staple in the area, however to invest in the value chain could significantly increase the incomes of many smallholders in the area.	interviews

Irish potato is grown in the region by smallholders and by few commercial farmers who cultivate seed potato. There is relatively little information available on this value chain in Northern Zambia, however, potato can be considered as a generally high value crop with great potential for the internal market.



STRENGTH	WEAKNESSES
<ul style="list-style-type: none"> - High value crop - Suitable for rotation with maize and beans - Durable, can be shipped for longer times 	<ul style="list-style-type: none"> -Need for increased phytosanitary knowledge (link) -The commercial stakeholders interviewed so-far in the area are not interested in promoting this value chain with farming SME, due to increased risk of contamination. -Limited access to inputs and limited knowledge by smallholders
OPPORTUNITIES	THREAT
<ul style="list-style-type: none"> -Trend in demand is sharply increasing and it is expected to keep raising or maintaining over the upcoming years. -There is a case for import substitution as Zambia is a net importer of (frozen) potato -Government wants to promote sourcing of potatoes nationally - New processing facility to produce French fries expected to commence operations (in 2019) - link. 	<ul style="list-style-type: none"> - Import requirements are less strict than export requirements to neighbouring countries. -South Africa is competing with potato from Zambia making the market unpredictable.

Soy^{31,32}

The Northern region of Zambia is one of the main producers of soybean at national level. This product is much wanted for the upcoming market of nutritional products, but also for oil production.

STRENGTH	WEAKNESSES
<p>While most production is near processing in Central, Lusaka, Copperbelt and Southern, most smallholders are in Northern and Eastern</p> <p>Compared to other countries in the region, Zambia has ideal soybean growing conditions</p>	<p>Despite a strong market and sufficient processing capacity, soy is a marginally attractive crop for commercial farmers due to a high cost base, poor transport infrastructure and an uncertain export policy; it is not an attractive crop for smallholders as they lack inputs, expertise and a market</p> <p>Challenges are poor soils aggravated by low</p>

Zambia is a neat soybean exporter	fertilizer use, poorly developed agricultural advisory services and farmers' inability to access favourable input and outputs markets. Main
OPPORTUNITIES	THREAT
<p>There is the potential to improve the lives of 133k smallholders by improving the soy value chain</p> <p>Currently the closest competitor for the raw materials is processing soy into oil, which could be another offset market.</p>	<p>Low prices due to high yields have been reported.</p> <p>Climate change (particularly relating to rainfall) is likely to highly affect this crop.</p>

Annex 5: TAX INCENTIVES ZDA

Incentives for the Agricultural Sector include;

- Company income tax for the sector is reduced to 10% instead of standard rate of 35%.
- Guaranteed input tax claim for 4years prior to commencement of production for VATable agricultural businesses.
- Zero rating of taxable agricultural products and supplies when exported except maize.
- VAT deferment on importation of some agricultural equipment and machinery.
- Farm improvement allowance of 100% on fencing, brick or stone wall and an allowance of K20,000 for farm dwelling occupied by farm workers
- Farm works allowance at 100% for the full cost of stumping and clearing, works for prevention of soil erosion, boreholes, wells, aerial and geographical surveys and water conservation.
- Dividends paid out of farming profit are exempt from tax for the first 5 years the distributing company commences farming.
- Development allowance is given for any person who incurs expenditure on the growing of rose flowers, tea, coffee, banana, citrus trees, or other similar plants or trees. An allowance of 10% of such expenditure shall be deducted in ascertaining the gains or profits of that business.
- A wear and tear allowance of 100% on implements, machinery, and plant used in farming and agro processing.

While the general tax incentives include;

- Import VAT relief for VAT registered businesses on imports of eligible capital goods (VAT deferment).
- Zero rate of VAT on export of taxable products.
- Guarantee of VAT refund within 30days of lodgment of adequately supported claims within 30days of submission of the claim.
- Relief of VAT on transfer of business as a going concern.
- Equal treatment of services for VAT irrespective of domicile of supplier (reverse VAT).
- Cash accounting for VAT for members of the Association of Building and Civil Engineering Contractors (ABCEC).
- Voluntary registration for compliant businesses whose turnover is below K800,000.00 per annum subject to conditions stated above.
- Registered businesses allowed claiming 90% of input VAT paid on diesel.
- Exemption from VAT, the interest component of finance leases.
- VAT relief on input tax paid for purchases made by registered suppliers subject to given conditions.
- Income from non-traditional exports is taxed at a reduced rate of 15% (and 10% for farming and Agro-processing).
- Exemption from income tax for collective investment schemes under the income tax Act to the extent that the income is distributed to the participants in the collective investment scheme.
- Zero rate specified supplies to Public Benefit Organizations to provide tax relief.

- No withholding tax on interest earned by individuals from savings or deposit accounts held with financial institutions such as banks or building societies.
- The income of any company whose shares are listed on Lusaka Stock Exchange (LUSE) in the 1st year of its listing, has its income taxed at a rate which is 2% below the applicable company income tax rate.
- A company listed on LUSE and sells a 3rd of its shares to indigenous Zambians in the year of listing, has its income taxed at a rate which is 5% below the applicable company income tax rate.
- 0% Customs Duty on machines -tools (including presses) for working metal by forging, hammering or die stamping: machine tools (including presses) for working metal by bending, folding, straightening, flattening, shearing, punching or notching: presses for working metal or metal carbides.
- 0% customs duty on ceramics, concrete, asbestos – cement or like mineral materials or for cold working glass.
- 0% customs duty on tools for working in the hand, pneumatic, hydraulic or with self - contained electric or non-electric motor.
- 0% customs duty on machinery and apparatus for soldering, brazing or welding, whether or not capable of cutting.
- 0% customs duty on machine tools for working any material by removing of material by laser or other light or photon beam, ultrasonic, electro discharge, electro-chemical, electro - beam, ionic beam or plasma are processes water.
- Investors carrying on manufacturing or electricity generation business in rural areas, Multi-facility Economic Zones (MFEZ) and industrial parks are entitled to some incentives. Further investors who invest not less than US\$500,000 in the MFEZ or a priority sector or product under the ZDA Act enjoy among others: Zero percent Customs duty rate on raw materials, capital goods, machinery including trucks and specialized motor vehicles for five years.

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