



DEVELOPMENT OF A HORTICULTURAL FRESH PRODUCE SUPPLY CHAIN IN MALAWI

Report on a Scoping Mission (September 2013)

Abstract

SPAR Malawi has recently opened its first supermarket store in Lilongwe, Malawi. In the coming years SPAR Malawi will expand the number of stores in both urban and rural centers.

For the supply of horticultural fresh produce SPAR Malawi realizes that investments are required to source the right volumes and quality from growers in Malawi. A scoping mission by an expert from Wageningen UR in the Netherlands highlights the main investments required in terms of capacity building and facilities for cultivation, harvesting, handling, packing and transportation. In addition suggestions are made on funding and implementation through a public-private partnership involving partners of the Seed2Feed network in the Netherlands.

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Scoping Mission for the development of a horticultural fresh produce supply chain in Malawi

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Executive summary

With the rapidly increasing market share the supermarkets in Malawi provide great opportunities for the local vegetable growers. However, the increasing standards and supply requirements also imply considerable challenges and a risk of exclusion from the upcoming fresh produce market opportunities. Currently the required range and quality of vegetables are not consistently available and the supermarket sector rely heavily on imported fresh produce from South Africa. SPAR Malawi now wishes to explore the requirements and possibilities of setting up more efficient and effective horticultural supply chain arrangements in Malawi, so that increasing volumes of fresh produce can be sourced from local horticultural growers.

Through its franchise arrangement with SPAR International and its contacts with the ‘Seed2Feed’ initiative of Rabobank Foundation, Wageningen University & Research, AGRA and Greenport Holland, SPAR Malawi has a strong link with the horticultural sector in the Netherlands. Wageningen UR, as one of the founding members of Seed2Feed, assisted SPAR Malawi with the assessment of needs and potentials for the development of a viable horticultural fresh produce supply chain in Malawi. This included also the assessment of capacity building and technological needs and possibilities for cooperation with the Dutch horticultural sector. Towards the end of September 2013 a scoping mission was organised which resulted in the development of a new investment project for which support from public and private sector partners is being sought.

The main goal of the proposed project is to start the first market driven production and supply initiative of high quality fresh vegetables through which the growing supermarket sector in Malawi can be supplied throughout the year with fresh produce. To this effect SPAR Malawi will take the initiative to develop the country’s first distribution centre for fresh produce which will coordinate the demand and supply in terms of product quality and quantity. This distribution centre will be established as an independent profit-oriented business supplying both the SPAR Malawi as well as other supermarket outlets in Malawi. The distribution centre for fresh produce will provide the foundation for the development of improved supply chain arrangements involving horticultural growers (both groups of organised smallholders and semi-commercial growers) who are committed to producing and supplying high quality fresh produce as their main income-generating business activity.

The establishment of a distribution centre and related supply chain arrangements for high quality year round supplies of fresh produce to the supermarket sector will require the support of a number of national and international partners. In addition to SPAR Malawi this may include SPAR International, national and international knowledge institutes (Wageningen UR and Bunda College), national farmer support organisations (Self Help Africa), international seed companies (e.g. RijkZwaan and East West Seed), AGRA and Rabo Bank. Together the partners will ensure that by the end of the project the following will have been achieved:

- Establishment of an economically viable distribution centre for high quality fresh produce supplying a growing number of supermarkets in Malawi
- Groups of smallholder growers and several commercial growers are integrated with the distribution centre’s supply chain arrangements as main suppliers
- Standards for sustainable production of vegetables in line with the quality and food safety requirements of the supermarket sector are established and adopted by the growers

- The growers will have reliable access to quality seeds and other essential inputs necessary for the cultivation and supply of quality fresh produce
- Feasible financing arrangements are in place for growers and other supply chain partners to ensure that funding of viable investments in seasonal inputs and capital investments necessary for protected cultivation and supplementary irrigation.

The total investment in infrastructure, capacity building and institutional development is estimated at USD 2.75 million. More than 50% can be mobilised through private sector contributions (equity and debt funding), but the remainder (USD 1.25 million) is required in the form of grant funding (cash or in-kind contributions). Without this grant element the investment project in the Malawi fresh produce sector will not be feasible.

1. Introduction

1.1 Background

Since the mid-1990's there has been a rise in supermarkets in Africa which has been made possible amongst others by increasing urbanisation and a rise of middle class consumers. Whereas initially the supermarket chains were more or less exclusively found in the capital cities and other large urban conglomerates, the supermarket stores are now also increasingly found in the smaller towns and poorer areas. Through adaptation of their formats and introduction of efficient procurement and distribution systems, supermarkets in East and Southern Africa are no longer targeting merely the high-end niche markets, but are becoming mass market merchandisers that supply consumers in all segments of society. This implies that supermarkets tailor their offering also to the poorer shoppers. In addition to the (imported) luxury consumer goods, also staple food items and an increasing number of locally produced goods are sold through the supermarkets¹.

The expansion of supermarkets in Southern and East Africa is mainly driven by South African retailers such as Shoprite, Pick 'n Pay and Woolworths. The number of South African supermarket stores in Namibia, Zambia, Botswana, Nigeria and Angola is growing quickly. A similar trend has started in Malawi, one of the poorest countries in Sub-Sahara Africa. In addition to a number of locally owned retail chains, Shoprite has opened several stores in the main urban centres in the country and in 2012 also the first SPAR supermarket has opened shop in the capital Lilongwe. SPAR Malawi is owned and managed by local investors under a franchise agreement with SPAR International in the Netherlands. The number of supermarket stores in Malawi will continue to rise in the coming years (see chapter 2 for details).

For their supplies of fresh produce SPAR Malawi and other supermarkets wish to source as much as possible from local horticultural producers. However, selling to supermarkets appears very far from business as usual for the vegetable growers in Malawi. The scale of procurement is larger and more coordination is required between growers, intermediaries and retail chains to ensure that the required volumes are consistently available. Also, the supermarkets are more demanding in terms of quality and safety standards. With the rapidly increasing market share the supermarkets provide great opportunities for the vegetable growers in Malawi. However, the increasing standards and supply requirements also imply considerable challenges and a risk of exclusion from the upcoming fresh produce market opportunities.

Currently the required range and quality of vegetables are not consistently available and SPAR Malawi and other supermarket chains rely partly on imports of fresh produce from South Africa or face an under supply. SPAR Malawi wishes to explore the requirements and possibilities of setting up effective horticultural supply chain arrangements in Malawi so that in future it can confidently rely on domestic supplies for the bulk of its fresh produce. The development of such supply chain arrangements requires the investment in capacity building and facilities for the cultivation, harvesting, handling, packing and transportation of the fresh produce.

1.2 Scoping mission

Through its franchise arrangement with SPAR International and its contacts with the 'Seed2Feed' initiative¹ of Rabobank Foundation, Wageningen University & Research, AGRA and Greenport Holland, SPAR Malawi has a strong link with the horticultural sector in the Netherlands. Wageningen UR, as one of the founding members of Seed2Feed, assisted SPAR Malawi with the assessment of needs and potentials for the development of a viable horticultural fresh produce supply chain in Malawi. This

¹ <http://www.raboseed2feed.com/>

included also the assessment of capacity building and technological needs and possibilities for cooperation with the Dutch horticultural sector.

The objective of the scoping mission in September 2013 was to give SPAR Malawi and its partners in the Seed2Feed initiative a clear insight in the requirements for establishing viable horticultural supply chains with local producers supplying the expanding retail sector in Malawi with high quality and safe produce.

The consultant of Wageningen UR assisted SPAR Malawi with the organisation and implementation of a 'Gap-Analysis' whereby the current performance of the fresh produce supply chain was compared with the desired performance based on higher standards of efficiency, quality and safety. As part of this assignment the consultant undertook the following tasks:

- a) Assessment of the qualitative and quantitative demand (current demand, trends) for fresh horticultural produce in the organised retail sector in Malawi
- b) Summarise the existing production and supply arrangements between horticultural producers and the retail sector, including a stakeholder analysis and a supply chain mapping
- c) Describe the current supply chain governance and support services (public and private sector) in the Malawian horticultural sector
- d) Identify capacity building and technological needs in relation to horticultural production, handling, storage and transport
- e) Suggest a viable organisational model for the development and operation of an improved fresh produce supply chain based on higher standards of efficiency, quality and safety
- f) Recommend how Dutch and Malawian partners can effectively participate in the realisation of the horticultural improvement objectives.
- g) Identify sources of funding for the development of a horticultural fresh produce supply chain in Malawi.

This report provides a summary of the main findings and conclusions of the scoping mission which took place in the last week of September and the subsequent discussions with various Dutch organisations in the Seed2Feed network.

2. Demand for fresh horticulture produce in the supermarket sector

2.1 Supermarkets in Malawi

SPAR Malawi is a recent entry in the organised retail sector in Malawi (started late 2011) and currently has one large outlet in the centre of Lilongwe (2650 m²). Despite a 50% devaluation of the Malawian Kwacha and increasing import charges, SPAR Malawi had a relatively good first year (total turnover of Euro 2 million in 2012) with an increasing number of customersⁱⁱ. SPAR Malawi is owned and managed by three local investors. Together they obtained the franchise for Malawi from SPAR International, which provides support with store design, retail formats, management tools, training and advice, etc.

The current supermarket in Lilongwe is SPAR Malawi's flagship store. In terms of lay-out, service and product range this store has introduced a higher quality standard in the Malawi retail sector. Other retail chains had to upgrade their service levels in response to the competition from the new entrant. SPAR Malawi offers the whole range of fresh horticultural produce, including tropical fruits and vegetables as well as temperate products. Most of the produce is sourced locally, but shortages in supply and non-availability of certain products, forces SPAR Malawi to also import certain fruits and vegetables. Below an overview is provided of the fresh produce and some of the processed products available at SPAR in Lilongwe.



Locally produced cabbages



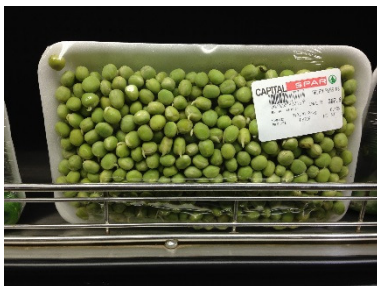
Locally produced tomatoes



Locally produced potatoes, onions and garlic; loose and pre-packed



Pre-packed cauliflower and cucumbers; local produce



Pre-packed fresh peas; local produce



Pre-packed cherry tomatoes; local produce



Imported apples and oranges



Pre-packed salads; imported and local produce



Pre-packed sushi; imported and local produce

SPAR Malawi will expand its number of stores over the coming years. In addition to a large store in each of the four main urban centres in Malawi (Lilongwe, Blantyre, Zomba and Mzuzu), SPAR Malawi sees also great potential for smaller stores (averaging 750m² each) next to other service centres such as petrol stations (SPAR Express) and in the more rural areas (SPAR Rural).

Other supermarket chains in Malawi include the following:

- *People's Co-operative Group (PTC/ METROCASH)*; this group has been in existence for 35 years and has approximately over 100 outlets. These outlets vary in size from 100 to 800 m². The shops are relatively well stocked, but are basic in appearance and design, with little focus on service.
- *Shoprite Checkers*; this is a South African chain that has been in Malawi for over 5 years and has approximately 4 retail outlets, in Lilongwe and Blantyre. They follow a general merchandise format and are one of SPAR's main competitors in all service departments and groceries.
- *Chipiku*; this is a rural wholesale/supermarket group with over 30 years in the market and 75 retail outlets that vary in size. It has recently introduced a premium retail format 'Chipiku Plus' in the big town centres focusing mostly on FMCG dry groceries. They are a low cost and volume retailer.
- *Sana Cash and Carry*; this is a family owned and run business with over 20 years in the market. The group has a number of outlets mainly in urban city centres and some residential sites. Traditionally the store focuses on dry groceries and some fresh lines such as bakery and butchery.

The number of supermarket stores in Malawi has increased significantly over the past few years and this trend will continue in the foreseeable future. The market share of the organised retail sector in the fresh produce market is, however, still small when compared to the sales through the open market. Official data are lacking, but the supermarket sales of fresh produce comprise currently not more than 10-15 % of the total fruit and vegetable market in Malawi. Both in terms of value and volume the market share of the supermarket sector will, however, increase significantly over the coming years.

2.2 Fresh produce sourcing practices

SPAR Malawi aims to source fresh produce as much as possible locally. However, the quality, quantity and range of products required is not always available in Malawi. As a result considerable quantities of fruits and vegetables have to be imported also. Products such as oranges, apples, grapes and more exotic products such as mushrooms are 100% imported. Other products, e.g. Irish potatoes, garlic and cherry tomatoes, are imported from South Africa occasionally during periods when the quality and/or quantity of the local produce is insufficient. Cabbages, carrots, bananas and onion are more or less exclusively sourced locally throughout the year.

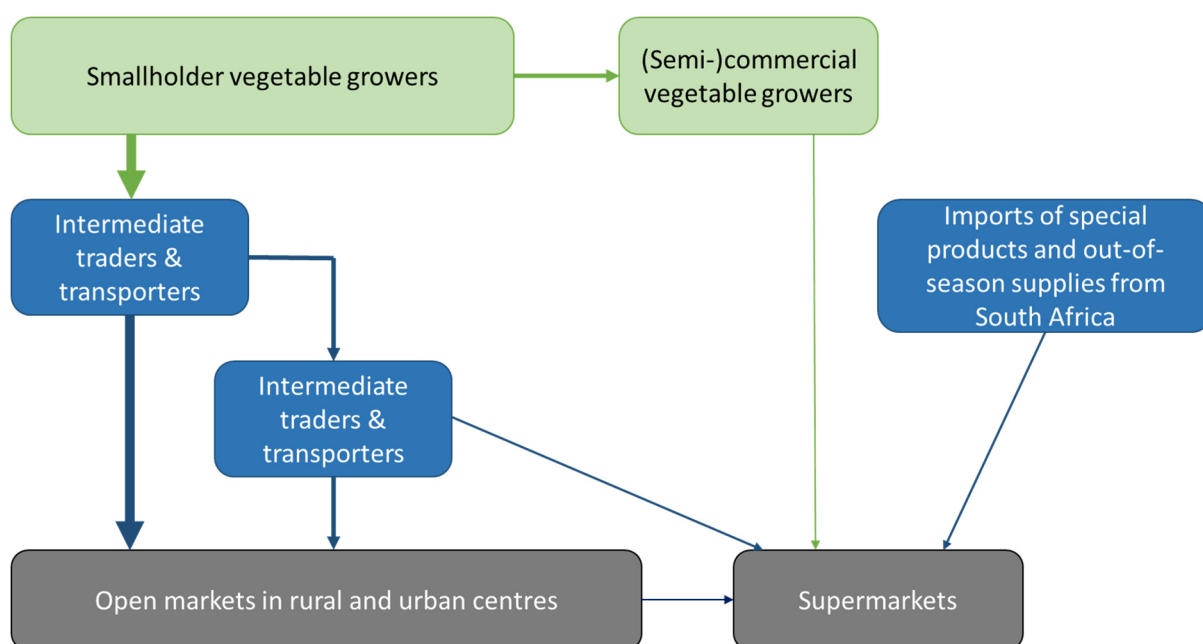
Most of the supermarket stores follow the same sourcing strategy and have predominantly local produce supplemented with some imported products. Exceptions are Shoprite and Chipiku. Both chains rely on imported fresh produce from South Africa and have only a small range of locally produced fruits and vegetables on their shelves. It is understood, however, that in particular Shoprite also wishes to expand its local sourcing of fresh produce.

The supermarkets buy the local produce mainly from four different sources:

- a) Intermediate traders who source fresh produce from local producers or rural traders and offer it on the market; the fresh produce is mainly sourced from smallholder producers or their cooperative organisations who lack market contacts and transport
- b) The vegetable producer in the peri-urban and rural areas; these are usually (semi-)commercial growers who have their own transport and contacts with the procurement officers at the supermarket stores and deliver their own and neighbours' produce to the supermarkets

- c) The vegetable and fruit vendors at the open markets in urban markets; supermarkets supplement their supplies with direct purchases of fruits and vegetables when the supplies from intermediate traders and semi-commercial growers are insufficient.
- d) Imports from South Africa for higher quality and specialty products, including the out-of-season supplies of certain fresh products; imports are sourced directly from South African wholesale and distribution centres.

The main supply chain arrangements for fresh produce supermarket supplies are summarised in the diagram below:



More details on vegetable production and marketing issues are included in chapter 3 below.

2.3 Demand development in the supermarket sector

The demand development for the Malawian supermarket sector is difficult to estimate in quantitative terms. There is no retailers association or public sector agency in Malawi that monitors demand and supply situations in the fresh produce sector. As a basis for the demand estimates the past year's sales of SPAR Malawi have been used as a benchmark. These figures have been multiplied in accordance with the planned expansion by SPAR Malawi in the coming years. In addition a very modest amount is added for the demand requirement for other Malawian supermarkets. This results in a conservative demand estimate for the coming years in the supermarket sector as presented in the table below:

Table 1: Estimated supermarket demand for locally produced fresh vegetables in Malawi								
Products		2014	2015	2016	2017	2018	2019	2020
Tomatoes	ton	25	75	135	165	330	435	435
Carrots	ton	9	27	49	81	119	157	157
Potatoes	ton	20	60	108	180	264	348	348
Onions (red)	ton	10	25	45	75	110	145	145
Green beans	ton	3	7	23	38	55	73	73
Green pepper	ton	6	18	32	52	77	102	102
Apples	ton	20	56	101	169	247	281	281

It should be noted that the table above only includes the most important fresh horticultural products. In reality the range of products is much broader and also includes different kinds of spinach leaves (rape, mustard, Chinese cabbage), chillies, cauliflower, cucumber, broccoli, garlic, water melon, aubergine, lettuce, sweet potato, sweet corn, butternut and pumpkin.

Furthermore, it is also assumed that a number of supermarkets will continue to import fresh produce from South Africa, particularly in the first few years. Quality of local produce and reliability and timeliness of the supplies is often not up to standard for supermarket trade. Quality problems in the supermarket include the following:

- *Ripeness*; there is no uniformity in ripeness of the vegetables, farmers and traders mix unripe, ripe and overripe produce in one box or basket
- *Unsuitable varieties*; shelf life and storability appear no criteria when selecting a vegetable variety for market production
- *Poor storage and handling by supermarket staff*; vegetables lose moisture quickly and are not removed, even if these are wilted or shrivelled²
- *Residues on the products*; including both chemical and non-chemical residues. There are no maximum residue levels set for different agro-chemicals and no tests are done.

SPAR Malawi and presumably also the other supermarkets have difficulties sourcing quality fresh vegetables from their local suppliers. Supplies are not consistent in terms of quality and timeliness. As a result supermarkets cannot always offer the required range of vegetables.

² Please note that this problem was not observed so much at SPAR Malawi and Shoprite where overall quality of service tend to be better.

3. Horticulture production and marketing in Malawi

3.1 Vegetable production

“The horticultural sector in Malawi is small and the potential for horticultural production and marketing still remains unexploited due to several factors outlined later in this report. Disorganised production and marketing are major features of the sector. Essential support services needed to develop the sector are inadequate. Therefore, although horticulture is currently among the fastest growing sectors in most sub-Saharan African countries, in Malawi, the volume of horticultural production is very low and does not exceed 5% of the total agricultural output. Much of this horticultural output comes from smallholder production under subsistence conditions.”ⁱⁱⁱ

This description of the horticultural sector by Mr C. Mwandiri of the Horticulture Development Organization of Malawi (HODOM) was made exactly ten years ago, but still applies today.

The smallholder subsector in Malawi has been the major producer of food crops, especially maize, but it is also responsible for producing around 80% of the horticultural supplies. Smallholder horticultural land often varies from 0.1 to 1.0 hectare per household and is usually located along riverbeds and *dambos* (seasonal flood plains). Where *dambo* land can be used, the smallholder farmers intensively grow vegetables for sale during the dry season. The production period is limited to the time between the receding of floods and the time when the water table drops below the level reached by the shallow wells. In recent years a number of growers have obtained a treadle pump which makes the watering of their horticultural plots during the dry periods more efficient.



Treadle pump for watering cabbages



Shallow well for watering tomatoes



Woman making bundles of spinach leaves after harvesting

In the rainy season, there is competition for labour between staple and horticultural crops. Smallholder growers cultivate also maize, cassava, groundnuts and other food crops during the rainy season (November – April). During the rainy season the pest and disease pressure and wet floodplains make horticultural production in the *dambo* areas difficult. The plots at higher elevations are therefore used for vegetable cultivation during the rainy season and vegetable cultivation in this time of the year is rain fed. Irrigation needed to supplement rainwater is often not available. To ensure a continuous supply of a range of vegetables, the aim should be to produce with supplementary irrigation under both rainfed conditions in the rainy season and in floodplains during the dry season. Smallholders produce vegetables using simple hand tools (hoes, watering cans, knives, trowels, etc.)

Due to a lack of capital and technical know-how there is no proper protected cultivation of vegetables in Malawi. There are a handful of (semi-)commercial vegetable growers in Malawi who cultivate on a slightly larger scale (3 – 5 ha). The work is done by a team of wage labourers and the owner is mainly in charge of the input supplies, production organisation and produce marketing. The commercial growers often also have a few contracted growers from whom they source produce for onward sales to the supermarkets and wholesale agents at the open markets.

The table below^{iv} provides an overview of the main pests and diseases for the different vegetable crops in Malawi. In addition the recommended seed varieties are listed. In practice the choice of seeds is mostly determined by the availability (see also section 3.3 below). The same applies to the application of the recommended pest and disease control practices.

Horticultural crop	Recommended varieties	Common plant health problems	Recommended control measures
Cabbage (<i>Brassica oleracea</i>)	Giant drumhead, Drumhead, Glory of Enkhuizen, Sugarloaf, Copenhagen Market, Ventura	Pests: Aphids (<i>Brevicoryne brassicae</i>), diamond black moth (<i>Plutella xylostella</i>) Diseases: Black rot (<i>Xanthomonas campestris</i>), soft rot (<i>Erwinia carotovora</i>), club root disease (<i>Plasmodiaphora brassicae</i>)	Pesticides: Dimethoate 40EC; Endosulfan 35% or Cypemethrin or Neem Crop rotation, roguing and removal of crop residues Application of lime and use of Flusulfamide 5%SC
Tomatoes (<i>Lycopersicon esculentum</i>)	Money Maker, Marglobe, Heinz, Homestead, Roma	Pests: Aphids (<i>Aphididae</i>), caterpillars, red spider mite, nematodes Diseases: early blight (<i>Alternaria solani</i>), Late blight (<i>Phytophthora infestans</i>), bacterial wilt (<i>Pseudomonas solanacearum</i>)	Pesticides: Dimethoate 20WP; Carbaryl 85WP; tobacco, ash & soap in combination with intercropping with onions Fungicides: Mancozab (Dithane M45) and Matalaxyl (weekly sprays) Crop rotation, roguing and removal of crop residues
Onions (<i>Allium cepa</i>)	Early Texas Grano, De Wildt, Pyramid, Red Creole	Pests: Thrips (<i>Thrips tabaci</i>) Diseases Purple blotch (<i>Alternaria porri</i>)	Pesticides: Actellic (Pirimiphos-methyl 50EC) Fungicides: Mancozab (Dithane M45) or Captan 50WP
Garlic (<i>Allium sativum</i>)	No recommended varieties	Same as for onions (see above) In addition: Onion aphid (<i>Aphididae</i>), white rot (<i>Sclerotium cepivorum</i>) and Pink rot (<i>Pyrenochaeta terrestris</i>)	Same as for onions (see above) Actellic (Pirimiphos-methyl 50EC) Crop rotation and use of Chlorothalonil (Daconil 2787W-75) Mancozab (Dithane M45)
Carrot (<i>Daucus carota</i>)	Nantes, Chantenay and Early Cape Market	Pests: Nematodes (<i>Meloidogyne javanica</i> and <i>M. incognita</i>) Diseases: Alternaria leaf blight (<i>Alternaria dauci</i>) and bacterial soft rot (<i>Erwinia carotovora</i>)	Crop rotation Fungicides: Mancozab (Dithane M45) Crop rotation, roguing and removal of crop residues
Cucumber (<i>Cucumis sativus</i>)	Stono, Gemin, Burpee Hybrid & Improved Telegraph	Pests: melon fly (<i>Dacus curcubatae</i>) and nematodes (as above) Diseases: Powdery and downy mildew (<i>Erysiphe cichoracearum</i> and <i>Pseudoperonosora cubensis</i>) Mosaic virus	Pesticides: Trichlorophon or Fenthion Fungicides: Anvil or : Mancozab (Dithane M45) Control of vectors (aphids and cucumber beetle) with Actellic (Pirimiphos-methyl 50EC)

The largest production costs for horticultural growers in Malawi is chemical fertilisers (MWK 180,000³ per ha). In terms of capital investments a treadle pump is the largest cost (MWK 60,000⁴). Other cultivation costs are seeds, pesticides and fungicides. Here not costs, but availability is the critical issue for growers.

3.2 Supply chain and marketing constraints

The following characteristics are typical of vegetable supply chain arrangements in Malawi:

- The availability of most vegetables fluctuates due to seasonal characteristics. Marketing problems are experienced in periods of abundant production, but high prices can be obtained in periods of low production. Out-of-season cultivation of the most popular vegetables is currently not a viable option. To ensure a more even supply of quality vegetables throughout the year a broader range of improved vegetable seed varieties is required.
- Few horticultural growers grow low volume high value vegetables such as broccoli, cauliflower, asparagus, sugar peas and garlic due to existing low domestic market demand.
- Knowledge of improved production techniques is lacking, hence the development of crop diversification and out-of-season cropping is slow.
- Inputs such as fertilizers, seeds and pesticides are often inadequate, difficult to access and expensive.
- Credit facilities are almost non-existent in this sector.
- Smallholder growers face enormous marketing problems because most of them are not well organised, do not have access to transport and rely mainly on intermediate vendors to buy from their farms. The majority of farmers work strictly as individuals; there are few cooperatives.
- Post-harvest losses of vegetables are very high. Conditioned transport and storage are not available. Handling and packing of the produce are very rough, which leads to further losses in quality and quantity of the fresh produce.
- In the informal sector traders try to prevent the vegetables from wilting by keeping the vegetables wet; the source of water is, however, often contaminated and causes a health hazard for the consumers.
- There is no market information for horticultural produce; market awareness is very low among growers on quality specifications, prices and demand developments in the supermarket sector and other market channels.
- A few commercial vegetable growers are emerging and supplying the supermarkets and main wholesale buyers in the urban areas. In terms of volumes of supplies and quality the commercial growers cannot meet the full demand from the emerging supermarket sector.
- At present, no formal export of vegetables exists, although there is some informal cross-border trade with neighbouring countries. No data is available to substantiate this activity.
- To supplement local production of tomatoes, onions, Irish potatoes and garlic are imported mainly from South Africa and to a lesser extent, Tanzania.

³ Around Euro 335

⁴ Around Euro 112

- Irrigation in vegetable gardens is usually by a watering can or bucket from shallow wells, while pesticide application, if any, is very often done incorrectly. There is no control over pesticide applications and Maximum Residue Levels (MRLs) are not checked by public and private stakeholders in the fresh produce sector.

3.3 Horticultural input supplies and other support services

Input supplies for horticultural growers are poorly developed. The most critical constraint at the moment is the lack of modern seed cultivars with the quality characteristics, pest and disease resistance and high yielding capacities that are required to lift the production to a higher level. Growers obtain their seeds from small-scale input suppliers and the supermarkets in the cities for their seed supplies. The collection of seeds is, however, limited and is often restricted to the most popular types of vegetable (cabbage, rape, Chinese cabbage, tomatoes, onions).



Input supply shop with seeds and several broad spectrum pesticides



Packet of onion seeds (var. Red Creole)



Starke Ayres seeds for sale at a supermarket

Know-how on integrated pest management practices in horticulture is not available. For crop protection purposes the growers rely on a limited range of fungicides and pesticides. Supplies are erratic and only broad spectrum pesticides are for sale. Safety precautions for the grower and the consumer are not always adhered to. The input suppliers are an important source of advice on pesticide application.

Official extension services in Malawi focus mainly on the most important food crops (maize, cassava, sorghum) and cash crops (tobacco, sugarcane) and have little know how on improved horticultural cultivation. The Horticulture Development Organization of Malawi (HODOM) was established under the Ministry of Agriculture and Irrigation more than a decade ago as part of a German supported development programme, but after the external support stopped the organisation has become rather dormant.

Bunda College near Lilongwe has a Department of Forestry and Horticulture under its Faculty of Environmental Sciences where higher education is provided in horticultural production (BSc up to PhD level). This is the only University in Malawi with higher education and research in horticulture. The department has one professor, two associate professors and a total of eleven lecturers in horticultural production, crop protection, post-harvest handling, etc. The college has also facilities for training of input suppliers, growers and others interested in improved horticultural production. Bunda College has its own research and production farm at the campus outside Lilongwe.

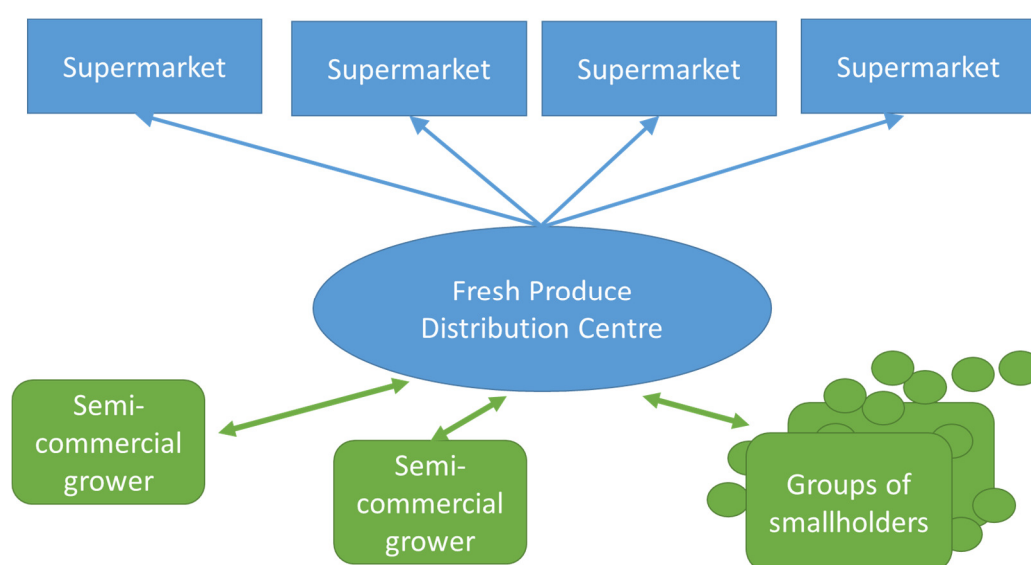
4. Recommended private public partnership

4.1 Objectives

The main goal of the proposed project is to start the first market driven production and supply initiative of high quality fresh vegetables through which the growing supermarket sector in Malawi can be supplied throughout the year with fresh produce. To this effect SPAR Malawi will take the initiative to develop the country's first distribution centre for fresh produce which will coordinate the demand and supply in terms of product quality and quantity. This distribution centre will be established as an independent profit-oriented business supplying both the SPAR Malawi as well as other supermarket outlets in Malawi. The distribution centre for fresh produce will provide the foundation for the development of improved supply chain arrangements involving horticultural growers (both groups of organised smallholders and semi-commercial growers) who are committed to producing and supplying high quality fresh produce as their main income-generating business activity.

The establishment of a distribution centre and related supply chain arrangements for high quality year round supplies of fresh produce to the supermarket sector will require the support of a number of national and international partners. These are listed in the section below. Together the partners will ensure that by the end of the project the following will have been achieved:

- Establishment of an economically viable distribution centre for high quality fresh produce supplying a growing number of supermarkets in Malawi
- Groups of smallholder growers and several commercial growers are integrated with the distribution centre's supply chain arrangements as main suppliers
- Standards for sustainable production of vegetables in line with the quality and food safety requirements of the supermarket sector are established and adopted by the growers
- The growers will have reliable access to quality seeds and other essential inputs necessary for the cultivation and supply of quality fresh produce
- Feasible financing arrangements are in place for growers and other supply chain partners to ensure that funding of viable investments in seasonal inputs and capital investments necessary for protected cultivation and supplementary irrigation.



4.2 Partners

The table below summarises the organisations that may be part of the public-private partnership aimed at establishing high quality fresh produce supply chain. Please note that this is merely an indicative list and that other partner organisations may join.

Partner organisation	Main contribution
SPAR Malawi	<ul style="list-style-type: none">○ Project coordinator and co-investor in the distribution centre○ Establishment and operation of distribution centre (as a separate business entity)
Self Help Africa (SHA)	<ul style="list-style-type: none">○ Support for organisations of smallholder vegetable growers○ Provision of short-term credit to growers for inputs and small capital investments○ Provision of extension services
AGRA	<ul style="list-style-type: none">○ Convening between different partner organisations○ Funding partner
Knowledge institutes: <ul style="list-style-type: none">○ Bunda College○ Wageningen UR	<ul style="list-style-type: none">○ Training of trainers in GAP and food safety & quality (including protected cultivation, integrated pest management)○ Technical assistance on post-harvest handling of fresh produce
Seed Companies: <ul style="list-style-type: none">○ RijkZwaan○ EastWest Seed	<ul style="list-style-type: none">○ Assessing seed requirements and supply of improved seeds for year round supply of fresh produce in Malawi○ Rearing of quality seedlings and improved crop husbandry
SPAR International	<ul style="list-style-type: none">○ Technical advice on supply chain management of fresh produce○ Operational planning and training of staff at distribution centre
Rabo Bank Foundation	<ul style="list-style-type: none">○ Strengthening of producer organisations○ Credit management services

4.3 Proposed initiatives

To achieve the objectives listed above requires upgrading each level of the supply chain, from input supplies and primary production up to the handling, packing and storage of the end produce that will be bought by the consumers in the supermarkets. Interventions are therefore required in four complementary areas:

- Upgrading of the post-harvest handling, processing and delivery to the supermarkets in Malawi; the main aim is to minimise post-harvest losses and to develop transparent and efficient marketing and supply arrangements between the growing supermarket sector and the growers. By introducing a clearer demand articulation in terms of volumes, prices and quality specifications, vegetable growers will be in a better position to tailor their cultivation plans to the needs of the supermarket sector. A new fresh produce distribution centre will be required to organise production and supplies, including the handling and logistics of the fresh produce.
- Upgrading of the cultivation practices in line with the required standards of quality, safety and sustainability of the supermarket sector. Good Agricultural Practices (GAP) are to be developed for the different cultivation systems and introduced through training and supervision of the growers supplying the supermarket sector.

- c) Upgrading of the technical support and input supplies for vegetable growers in Malawi; for the adoption of the GAP the Malawian vegetable growers need to have access to cultivation advice and reliable supplies of improved seeds, production equipment and agro-chemicals.
- d) Upgrading of the capacities of the farmer organisations and improved access to credit; to reduce transaction costs related to input supplies, produce marketing, technical support and credit provision it is essential that vegetable growers are well organised. Service provision and commercial transactions are to be coordinated through a producer organisation.

The development of the fresh produce supply chain for the supermarket sector thus requires a series of interventions and support activities divided in four different work packages. These are summarised below and can form the basis for a future public-private partnership programme.

Work package A: Establishment of a fresh produce distribution centre

The owners of SPAR Malawi intend to establish the first fresh produce distribution centre in Malawi. This distribution centre will be essential for the articulation of demand and the efficient and effective post-harvest handling of fresh vegetables. This distribution centre will be set up and managed as a separate business entity and will supply both SPAR Malawi outlets and other organised retail chains in Malawi. The main functions of the distribution centre will include the following:

- Procurement of fresh produce from (groups of) vegetable growers
- Transport and logistics from field to distribution centre
- Sorting, grading, cleaning and packing of the different vegetables
- Onward sales and distribution of the fresh produce to the various outlets of SPAR and other supermarket chains in Malawi.

Based on a clear estimate of the demand in the supermarket sector the different vegetable producers will be given a clear indication when to cultivate the various types of vegetables. Terms and conditions for supply, payment and quality will be specified in advance. The creation of a fresh produce distribution centre will thus also provide transparency in the market and will enable growers to plan their cultivation in such a way that seasonal shortages or oversupply are avoided.

The first fresh produce distribution centre (600 m²) will have a capacity for handling a total volume of more than 1500 MT of fresh produce per year. The distribution centre will create direct employment for 34

Capital expenditure	No.	Unit costs	Total costs
Land & preparation (acres)	5	\$ 15,000	\$ 75,000
Building (cost per m ²)	600	\$ 600	\$ 360,000
Cooling	1	\$ 90,000	\$ 90,000
Transport			
○ 4.5 ton vehicles conditioned	2	\$ 102,000	\$ 204,000
○ 10 ton vehicle conditioned	1	\$ 116,500	\$ 116,500
○ 4x4 pick ups	2	\$ 59,000	\$ 118,000
○ Forklift	1	\$ 20,000	\$ 20,000
Benches & small equipment	1	\$ 10,000	\$ 10,000
Scales (large)	2	\$ 1,000	\$ 2,000
Scales (small)	6	\$ 600	\$ 3,600
Generator 500 kva	1	\$ 75,000	\$ 75,000
Office furniture	1	\$ 15,000	\$ 15,000
IT equipment (set)	1	\$ 12,500	\$ 12,500
Bar coding	1	\$ 15,000	\$ 15,000
Total capex			\$ 1,116,600

permanent members of staff (see also annex A) who will be trained on the job in quality and food safety management procedures. The distribution centre will be constructed and managed in line with the HACCP standards. The total capital expenditures are estimated at more than USD 1.1 million (see table). From the distribution centre up to the clients' outlets all fresh produce will be kept under

conditioned circumstances. The fresh produce distribution centre will initially handle all popular vegetables that can be produced locally including onions, potatoes, cabbages, green beans, tomatoes, green peppers and carrots. In addition it will handle also imported popular fruit (apples and may be citrus fruit) to meet the supermarkets' demands. At a later stage also other domestically produced fresh fruits and vegetables will be included in the assortment (e.g. pumpkin, cucumber, rape and other spinach vegetables, okra, cauliflower, etc.).

The distribution centre will work with a number of different producer groups and individual commercial horticultural farms in different parts of the country. Only suppliers that follow the recommended cultivation and harvesting practices will be eligible for supplies (see also below).

Work package B: Introduction and adoption of Good Agricultural Practices

Productivity and quality improvement of the primary production process are essential elements of the fresh produce supply chain improvements. Current cultivation practices and recommendations will need to be reviewed and thoroughly improved. This will have to include the complete cultivation cycle and will cover the following:

- Cultivation planning and crop rotations, with due consideration to market demand and soil health
- Variety selection; consideration will have to be given to yield potential, flavour and other quality specifications, perishability, adaptability to seasonal production conditions and resistance and/or tolerance to major pests and diseases
- Seedling raising, including also the construction of raising proper nursery beds, proper shading and hardening of seedlings, uniformity of seedlings, watering and pest and disease prevention
- Soil preparation, fertilisation and transplanting, which will cover the preparation and use of organic and inorganic fertilisers, drainage and water holding capacity of the soils, field bed preparation and time and spacing for transplanting seedlings.
- Crop health management, which will have to be based on integrated pest management (IPM) practices, whereby the use of broad spectrum and preventative pesticides will be banned and the emphasis will be on pest and disease prevention, natural control measures and a minimal use of specific agro-chemicals. The overall aim will be to maximise product quality and safety and to minimise costs of production for the grower
- Irrigation with due attention to irrigation agronomy and the selection and use of the most appropriate form of supplementary irrigation in line with the time and scale of production. For smallholders a treadle pump in combination with a simple drip irrigation system such as shown in the adjacent photograph could be an appropriate solution. Commercial growers could opt for a more sophisticated system with diesel or electric pumps and a larger reservoir, filters and fertigation.
- Harvesting and post-harvest handling, covering different issues, such as pesticide withholding periods, product quality, handling and storage immediately after harvesting, etc.



Smallholder drip irrigation system and tunnel for production of selected crops (example from South Africa)

Standards will have to be developed for the most important vegetables (including at least tomatoes, cabbages, onions, potatoes, green beans and green peppers) after which standard operating procedures for different growers can be determined. Through training and supervision of growers

these GAP will be introduced. The Horticultural Faculty of Bunda College near Lilongwe will be the main local partner for organising and implementation of training-of-trainers programmes and GAP demonstration activities. The horticultural experts will work closely together with the specialists of Wageningen UR and production specialists of international input supply companies and horticultural equipment companies. National and international experts will be jointly responsible for the development of the GAP and training-of-trainers programmes.

Subsequently the same experts will also be charged with the responsibility for designing an efficient and effective system for control and supervision. Currently there is no public or private agency in Malawi that checks quality and safety of the fresh produce. Adherence to the new standards in the supply chain needs to be regularly checked. Initially buying agents of the distribution centre may oversee the correct adoption of the GAP, but in due course this function is to be taken up by an independent inspection agency.

Work package C: Reliable supply of improved seeds and other essential agricultural inputs

The introduction of GAP among vegetable growers will have to coincide with the farmers' access to improved seeds, agro-chemicals and other essential horticultural supplies. Currently the agricultural input dealers do not stock the range of quality seeds, agro-chemicals, irrigation equipment and tunnels/greenhouses required for year-round improved cultivation of vegetables. Horticultural specialists from Wageningen UR, Bunda College and different seed companies and other horticultural suppliers are to develop different equipment and input packages for the Malawian horticultural producers. In cooperation with the Malawian Ministry of Agriculture and Food Security the testing, importation and registration of new seeds and agro-chemicals are to be organised. Furthermore the existing input suppliers in towns and villages in the main horticultural production zones around Lilongwe, Dedza/Zomba and Blantyre are to be trained in the recommended use and application. Thereupon the commercial supply of improved horticultural inputs and production equipment can be set up and rolled out in the main horticultural production regions.

Work package D: Farmer organisation and funding

The cultivation of vegetables is predominantly a smallholder activity. Several NGO's in Malawi provide support to smallholder organisations. Self Help Africa (SHA) in Malawi works with a number of farmer cooperatives that are already involved in the cultivation of vegetables for marketing purposes. SHA provides support in the field of leadership training, group formation, agronomic practices and seasonal credit for input supplies. Through this work package the SHA support to the vegetable growers' organisations can be further extended by:

- Linking them to the procurement agents of the Distribution Centre for production planning, contracting, coordination of supplies and logistical arrangements
- Training the SHA field staff in improved horticultural practices (GAP)
- Coordinating improved input supplies (seeds, agro-chemicals, production equipment) and seasonal credit to facilitate the adoption of the GAP.

External support in the field of cooperative development, horticultural support services and credit provision can be extended to ensure transparent and efficient smallholder involvement in the improved horticultural supply chain arrangements. Overall transaction costs in produce and input marketing, technical support and credit provision will have to be minimised through the operation of the smallholder cooperatives as a viable business entity.

4.4 External support

Based on a preliminary assessment of the available know how and facilities in the Malawian horticultural sector it is recommended that the following external support is mobilised for the implementation of the four work packages outlined above:

	Capacity building support	Expert days	Rate	Materials & other costs	Total costs
1	Horticultural production improvements				
1.1	Development of GAP	50	\$ 1,000	\$ 5,000	\$ 55,000
1.2	Training of Trainers programme	80	\$ 1,000	\$ 25,000	\$ 105,000
1.3	Field level training of growers	20	\$ 1,000	\$ 100,000	\$ 120,000
1.4	Pilot testing & demonstrations	100	\$ 1,200	\$ 250,000	\$ 370,000
2	Supply chain & quality improvements				
2.1	HACCP & traceability procedures	35	\$ 1,000	\$ 25,000	\$ 60,000
2.2	Training of Trainers programme	20	\$ 1,000	\$ 5,000	\$ 25,000
2.3	Staff training and supervision	10	\$ 1,000	\$ 10,000	\$ 20,000
2.4	Certification	15	\$ 1,200	\$ 2,000	\$ 20,000
3	Farmer organisation & credit				
3.1	Cooperative management training	25	\$ 1,200	\$ 6,000	\$ 36,000
3.2	ICS establishment at coop. Level	25	\$ 1,200	\$ 12,000	\$ 42,000
3.3	Credit management and investment planning	25	\$ 1,200	\$ 6,000	\$ 36,000
	sub-total				\$ 889,000
4	monitoring, evaluation & reporting	50	\$ 1,000	\$ 16,000	\$ 66,000
	overall total				\$ 955,000

Please note that the cost estimate for the external capacity building support is merely a rough estimate and that more detailed budgeting is required once the implementation plan is further specified.

5. Economic and financial aspects

The viability of the fresh produce distribution centre and related supply chain improvements has been assessed on the basis of a financial and economic forecast. The estimates are included in annex A and are based on the following major assumptions:

- Volumes of trade are based on the conservative demand estimate included in section 2.3 above
- Product prices (farm gate, import and sales prices) are based on SPAR Malawi's past records
- Capital investments are those listed in section 4.3 above and depreciation costs are as follows: buildings are depreciated in 20 years; transport and machinery has a life span of 10 years, except for the cooling equipment (15 years) and small office equipment, scales, etc. (5 years)
- Staffing levels and salary costs are based on existing standards in the private sector in Malawi

The financial analyses shows that the investment project will not be viable without external grant funding. It is assumed that a total of USD 750 thousand equity funding and a similar amount of debt funding can be mobilised. In addition to this USD 1.5 million of private sector funding another USD 1.25 million of grant funding will be required to ensure financial viability. For further details please refer to the tables in Annex A.

These funding arrangements are to be discussed between SPAR Malawi and the other prospective project partners. The different public and private partners in the Seed2Feed platform as well as local organisations such as SHA Malawi and Bunda College are to be consulted to check their interest and commitment for co-investment and participation.

Annex A: Financial analysis

Production

Malawi Fresh

Units as specified

Year	Unit	2014	2015	2016	2017	2018	2019	2020
Product line 1								
		Tomatoes						
Quantity	ton	0.0	94.0	158.8	183.3	366.7	483.3	483.3
Utilisation	%	0%	80%	85%	90%	90%	90%	90%
Volume	ton	0.0	75.2	135.0	165.0	330.0	435.0	435.0
Product line 2								
		Carrots						
Quantity	ton	0.0	31.8	54.0	90.0	132.0	174.0	174.0
Utilisation	%	0%	85%	90%	90%	90%	90%	90%
Volume	ton	0.0	27.0	48.6	81.0	118.8	156.6	156.6
Product line 3								
		Potatoes						
Quantity	ton	0.0	70.6	120.0	200.0	293.3	386.7	386.7
Utilisation	%	0%	85%	90%	90%	90%	90%	90%
Volume	ton	0.0	60.0	108.0	180.0	264.0	348.0	348.0
Product line 4								
		Onions						
Quantity	ton	0.0	29.4	50.0	83.3	122.2	161.1	161.1
Utilisation	%	0%	85%	90%	90%	90%	90%	90%
Volume	ton	0.0	25.0	45.0	75.0	110.0	145.0	145.0
Product line 5								
		Green beans						
Quantity	ton	0.0	8.8	25.0	41.7	61.1	80.6	80.6
Utilisation	%	0%	85%	90%	90%	90%	90%	90%
Volume	ton	0.0	7.5	22.5	37.5	55.0	72.5	72.5
Product line 6								
		Green pepper						
Quantity	ton	0.0	20.6	35.0	58.3	85.6	112.8	112.8
Utilisation	%	0%	85%	90%	90%	90%	90%	90%
Volume	ton	0.0	17.5	31.5	52.5	77.0	101.5	101.5
Product line 7								
		Apples						
Quantity	ton	0.0	59.2	106.6	177.6	260.5	296.1	296.1
Utilisation	%	0%	95%	95%	95%	95%	95%	95%
Volume	ton	0.0	56.2	101.3	168.7	247.5	281.3	281.3
Production summary								
Tomatoes	ton	0	75	135	165	330	435	435
Carrots	ton	0	27	49	81	119	157	157
Potatoes	ton	0	60	108	180	264	348	348
Onions	ton	0	25	45	75	110	145	145
Green beans	ton	0	7	23	38	55	73	73
Green pepper	ton	0	18	32	52	77	102	102
Apples	ton	0	56	101	169	247	281	281

Revenue

Malawi Fresh

Units as specified

Year	Unit	Opening	2014	2015	2016	2017	2018	2019	2020
Revenue line 1									
Tomatoes									
Volume produced	ton		0.0	75.2	135.0	165.0	330.0	435.0	435.0
Volume unsellable	%		0%	8%	5%	5%	5%	5%	5%
Volume sold	ton		0.0	69.6	128.2	156.7	313.5	413.2	413.2
Selling price per unit	USD		481	481	481	481	481	481	481
Revenue from sales	USD		0	33,458	61,679	75,383	150,807	198,760	198,760
Revenue line 2									
Carrots									
Volume produced	ton		0.0	27.0	48.6	81.0	118.8	156.6	156.6
Volume unsellable	%		5%	5%	5%	5%	5%	5%	5%
Total volume sold	ton		0.0	25.7	46.2	77.0	112.9	148.8	148.8
Selling price per unit	USD		668	668	668	668	668	668	668
Revenue from sales	USD		0	17,153	30,842	51,403	75,390	99,378	99,378
Revenue line 3									
Potatoes									
Volume produced	ton		0	60	108	180	264	348	348
Volume unsellable	%		0%	5%	2.5%	2.5%	2.5%	2.5%	2.5%
Total volume sold	ton		0	57	105	176	257	339	339
Selling price per unit	USD			481	481	481	481	481	481
Revenue from sales	USD		0	27,422	50,649	84,416	123,795	163,217	163,217
Revenue line 4									
Onions									
Volume produced	ton		0	25	45	75	110	145	145
Volume unsellable	%		0%	5%	2.5%	2.5%	2.5%	2.5%	2.5%
Total volume sold	ton		0	24	44	73	107	141	141
Selling price per unit	USD			668	668	668	668	668	668
Revenue from sales	USD		0	15,859	29,309	48,828	71,630	94,432	94,432
Revenue line 5									
Green beans									
Volume produced	ton		0	7	23	38	55	73	73
Volume unsellable	%		0%	5%	2.5%	2.5%	2.5%	2.5%	2.5%
Total volume sold	ton		0	7	22	37	54	71	71
Selling price per unit	USD			668	668	668	668	668	668
Revenue from sales	USD		0	4,747	14,654	24,443	35,815	47,245	47,245
Revenue line 6									
Green pepper									
Volume produced	ton		0	18	32	52	77	102	102
Volume unsellable	%		0%	10%	5%	5%	5%	5%	5%
Total volume sold	ton		0	16	30	50	73	96	96
Selling price per unit	USD			1,070	1,070	1,070	1,070	1,070	1,070
Revenue from sales	USD		0	16,862	32,020	53,336	78,311	103,195	103,195
Revenue line 7									
Apples									
Volume produced	ton		0	56	101	169	247	281	281
Volume unsellable	%		0%	0%	0%	0%	0%	0%	0%
Total volume sold	ton		0	56	101	169	247	281	281
Selling price per unit	USD			1,872	1,872	1,872	1,872	1,872	1,872
Revenue from sales	USD		0	105,281	189,577	315,844	463,273	526,584	526,584
Revenue summary									
Tomatoes	USD		0	33,458	61,679	75,383	150,807	198,760	198,760
Carrots	USD		0	17,153	30,842	51,403	75,390	99,378	99,378
Potatoes	USD		0	27,422	50,649	84,416	123,795	163,217	163,217
Onions	USD		0	15,859	29,309	48,828	71,630	94,432	94,432
Green beans	USD		0	4,747	14,654	24,443	35,815	47,245	47,245
Green pepper	USD		0	16,862	32,020	53,336	78,311	103,195	103,195
Apples	USD		0	105,281	189,577	315,844	463,273	526,584	526,584
Total revenues	USD		0	220,782	408,730	653,652	999,022	1,232,812	1,232,812

Cost of sales

Malawi Fresh

Units as specified

Year	Unit	Opening	2014	2015	2016	2017	2018	2019	2020
Cost of sales items									
Cost of sales item 1			FG Tomato						
Cost per unit item 1	USD		240.50	240.50	240.50	240.50	240.50	240.50	240.50
Cost of sales item 2			FG Carrots						
Cost per unit item 2	USD		334.00	334.00	334.00	334.00	334.00	334.00	334.00
Cost of sales item 3			FG Potatoes						
Cost per unit item 3	USD		240.50	240.50	240.50	240.50	240.50	240.50	240.50
Cost of sales item 4			FG Onions						
Cost per unit item 4	USD		334.00	334.00	334.00	334.00	334.00	334.00	334.00
Cost of sales item 5			FG Green Beans						
Cost per unit item 5	USD		334.00	334.00	334.00	334.00	334.00	334.00	334.00
Cost of sales item 6			FG Green Peppers						
Cost per unit item 6	USD		535.00	535.00	535.00	535.00	535.00	535.00	535.00
Cost of sales item 7			Import apples						
Cost per unit item 7	USD		748.80	748.80	748.80	748.80	748.80	748.80	748.80
Product line 1									
Tomatoes									
Cost of sales item 1			FG Tomato						
Volume per unit produced			1	1	1	1	1	1	1
Volume consumed			0	75	135	165	330	435	435
Cost of sales 1	USD		0	18,086	32,463	39,675	79,372	104,610	104,610
Product line 2									
Carrots									
Cost of sales item 2			FG Carrots						
Volume per unit produced			1	1	1	1	1	1	1
Volume consumed			0	27	49	81	119	157	157
Cost of sales 2	USD		0	9,028	16,232	27,054	39,679	52,304	52,304
Product line 3									
Potatoes									
Cost of sales item 3			FG Potatoes						
Volume per unit produced			1	1	1	1	1	1	1
Volume consumed			0	60	108	180	264	348	348
Cost of sales 3	USD		0	14,432	25,974	43,290	63,485	83,701	83,701
Product line 4									
Onions									
Cost of sales item 4			FG Onions						
Volume per unit produced			1	1	1	1	1	1	1
Volume consumed			0	25	45	75	110	145	145
Cost of sales 4	USD		0	8,347	15,030	25,040	36,733	48,427	48,427
Product line 5									
Green beans									
Cost of sales item 5			FG Green Beans						
Volume per unit produced			1	1	1	1	1	1	1
Volume consumed			0	7	23	38	55	73	73
Cost of sales 5	USD		0	2,498	7,515	12,535	18,367	24,228	24,228
Product line 6									
Green pepper									
Cost of sales item 6			FG Green Peppers						
Volume per unit produced			1	1	1	1	1	1	1
Volume consumed			0	18	32	52	77	102	102
Cost of sales 6	USD		0	9,368	16,853	28,071	41,216	54,313	54,313
Product line 7									
Apples									
Cost of sales item 7			Import apples						
Volume per unit produced			1	1	1	1	1	1	1
Volume consumed			0	56	101	169	247	281	281
Cost of sales 7	USD		0	42,113	75,831	126,338	185,309	210,634	210,634
Cost of sales summary									
FG Tomato			0	18,086	32,463	39,675	79,372	104,610	104,610
FG Carrots			0	9,028	16,232	27,054	39,679	52,304	52,304
FG Potatoes			0	14,432	25,974	43,290	63,485	83,701	83,701
FG Onions			0	8,347	15,030	25,040	36,733	48,427	48,427
FG Green Beans			0	2,498	7,515	12,535	18,367	24,228	24,228
FG Green Peppers			0	9,368	16,853	28,071	41,216	54,313	54,313
Import apples			0	42,113	75,831	126,338	185,309	210,634	210,634
Total cost of sales			0	103,871	189,898	302,003	464,162	578,218	578,218

Operating costs

Malawi Fresh

USD single

Year	2014	2015	2016	2017	2018	2019	2020
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Staff cost assumptions

Annual salary growth - %

0%

Staff position 1

Opening salary - gross monthly USD

Annual salary costs USD

Staff number - head count no.

Staff number fte

DC Manager							
3,500							
42,000	42,000	42,000	42,000	42,000	42,000	42,000	42,000
1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1

Staff position 2

Opening salary - gross monthly USD

Annual salary costs USD

Staff number - head count no.

Staff number fte

Procurement Manager							
1,500							
18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000
1	1	1	1	1	1	1	1
0.5	1	1	1	1	1	1	1

Staff position 3

Opening salary - gross monthly USD

Annual salary costs USD

Staff number - head count no.

Staff number fte

Head of Accounts							
2,000							
24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000
1	1	1	1	1	1	1	1
0.5	1	1	1	1	1	1	1

Staff position 4

Opening salary - gross monthly USD

Annual salary costs USD

Staff number - head count no.

Staff number fte

Administrative Staff							
500							
6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
2	4	5	5	5	5	5	5
1	4	5	5	5	5	5	5

Staff position 5

Opening salary - gross monthly USD

Annual salary costs USD

Staff number - head count no.

Staff number fte

Supervisor							
200							
2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400
2	4	4	4	4	4	4	4
1	4	4	4	4	4	4	4

Staff position 6

Opening salary - gross monthly USD

Annual salary costs USD

Staff number - head count no.

Staff number fte

General workers							
120							
1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,440
8	15	18	18	18	18	18	18
4	15	18	18	18	18	18	18

Staff position 7

Opening salary - gross monthly USD

Annual salary costs USD

Staff number - head count no.

Staff number fte

Drivers							
200							
2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400
2	4	4	4	4	4	4	4
1	4	4	4	4	4	4	4

Staff numbers

Opening staff - head count

Closing number of staff - head count

Staff number - fte

0							
17	30	34	34	34	34	34	34
9.00	30.00	34.00	34.00	34.00	34.00	34.00	34.00

Operating costs - continued

Malawi Fresh

Salary costs

DC Manager	42,000	42,000	42,000	42,000	42,000	42,000	42,000
Procurement Manager	9,000	18,000	18,000	18,000	18,000	18,000	18,000
Head of Accounts	12,000	24,000	24,000	24,000	24,000	24,000	24,000
Administrative Staff	6,000	24,000	30,000	30,000	30,000	30,000	30,000
Supervisor	2,400	9,600	9,600	9,600	9,600	9,600	9,600
General workers	5,760	21,600	25,920	25,920	25,920	25,920	25,920
Drivers	2,400	9,600	9,600	9,600	9,600	9,600	9,600
Additional staff costs	10%	7,956	14,880	15,912	15,912	15,912	15,912
Total staff costs		87,516	163,680	175,032	175,032	175,032	175,032

Start-up expenses

Project management	USD	22,000	22,000	22,000			
Other technical assistance	USD	250,000	439,000	200,000			
Total start-up expenses	USD	272,000	461,000	222,000	0	0	0

Other operating costs

Security	USD	2,000	6,000	6,000	6,000	6,000	6,000
Water & electricity	USD	10,666	32,000	32,000	32,000	32,000	32,000
Fuel	USD	15,000	60,000	60,000	60,000	60,000	60,000
Protective clothing	USD	1,275	2,250	2,550	2,550	2,550	2,550
Advertising & representation	USD	2,000	3,000	3,000	3,000	3,000	3,000
Legal & professional	USD	2,500	2,500	2,500	2,500	2,500	2,500
IT & telecom	USD	1,500	1,500	1,500	1,500	1,500	1,500
Office supplies	USD	2,000	6,000	6,000	6,000	6,000	6,000
Maintenance of buildings	USD	1%	0	3,600	3,600	3,600	3,600
Maintenance of equipment	USD	3%	0	20,448	20,448	20,448	20,448
Insurance	USD	0	5,000	5,000	5,000	5,000	5,000
Bank charges (% of turnover)	USD	0.5%	0	1,104	2,044	4,995	6,164
Packing materials	USD	0	4,000	6,000	9,000	11,700	15,210
Contingencies	USD	3%	1,108	4,422	4,519	4,646	4,779
Total other opex	USD		38,049	151,824	155,161	159,512	164,072

Depreciation

Malawi Fresh

USD single

Year	Unit	2014	2015	2016	2017	2018	2019	2020
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Capital expenditure

	depreciation period							
Land	none	75,000						
Buildings	20 yrs	360,000						
Equipment 1	15 yrs	90,000						
Equipment 2	10 yrs	533,500						
Equipment 3	5 yrs	58,100						
Total capex		1,116,600	0	0	0	0	0	0

Depreciation account

Opening balance	0	44,485	133,455	222,425	311,395	400,365	483,525
Depreciation charge	44,485	88,970	88,970	88,970	88,970	83,160	77,350
Closing balance	44,485	133,455	222,425	311,395	400,365	483,525	560,875

Tangible net book value

	1,072,115	983,145	894,175	805,205	716,235	633,075	555,725
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Depreciation workings

Opening fixed assets	0	0	0	0	0	0	0	0
Buildings	2014	360,000	9,000	18,000	18,000	18,000	18,000	18,000
Equipment 1	2014	90,000	3,000	6,000	6,000	6,000	6,000	6,000
Equipment 2	2014	533,500	26,675	53,350	53,350	53,350	53,350	53,350
Equipment 3	2014	58,100	5,810	11,620	11,620	11,620	5,810	
		44,485	88,970	88,970	88,970	88,970	83,160	77,350

Financing

Malawi Fresh

USD single

Year	2014	2015	2016	2017	2018	2019	2020
Financing assumptions							
Equity issued	375,000	175,000	150,000	50,000			
Grants received	500,000	500,000	250,000				
Debt raised	600,000	150,000					
Debt repaid					150,000	300,000	300,000
Interest rate on debt	8%	8%	8%	8%	8%	8%	8%
Interest rate on overdraft	16%	16%	16%	16%	16%	16%	16%
Interest on cash deposits	4%	4%	4%	4%	4%	4%	4%
Dividend proportion							
	18,949	35,452	41,679	48,030	37,994	11,355	10,463
Equity account							
Opening balance	0	375,000	550,000	700,000	750,000	750,000	750,000
Equity issued	375,000	175,000	150,000	50,000	0	0	0
Closing balance	375,000	550,000	700,000	750,000	750,000	750,000	750,000
Debt account							
Opening balance	0	600,000	750,000	750,000	750,000	600,000	300,000
Debt raised	600,000	150,000	0	0	0	0	0
Debt repaid	0	0	0	0	-150,000	-300,000	-300,000
Closing balance	600,000	750,000	750,000	750,000	600,000	300,000	0
Interest on debt account							
Interest charge	24,000	54,000	60,000	60,000	54,000	36,000	12,000
Interest on overdraft							
Interest charge	0	0	0	0	0	0	0
Interest income on short term deposits							
Interest income	379	1,088	1,543	1,794	1,720	987	436

Taxation

Malawi Fresh

USD single

Year	2014	2015	2016	2017	2018	2019	2020
Taxation assumptions							
Tax rate	35%	35%	35%	35%	35%	35%	35%
Tax creditor days	60	60	60	60	60	60	60
Profit adjustments							
Profit and loss taxation workings							
Profits / (loss) before tax	34,329	-301,475	-230,788	-130,071	54,507	192,498	221,757
Profits before losses	34,329	0	0	0	54,507	192,498	221,757
Losses carried forward	0	0	0	0	-54,507	-192,498	-221,757
Other adjustments	0	0	0	0	0	0	0
Profits liable to corporation tax	34,329	0	0	0	0	0	0
Corporation tax	12,015	0	0	0	0	0	0
Corporation tax account							
Opening balance	0	1,975	0	0	0	0	0
Tax charge in the period	12,015	0	0	0	0	0	0
Tax paid	-10,040	-1,975	0	0	0	0	0
Closing balance	1,975	0	0	0	0	0	0
Losses account							
Opening losses	0	0	301,475	532,263	662,335	607,828	415,330
Increase in losses in the period	0	301,475	230,788	130,071	0	0	0
Losses utilised	0	0	0	0	-54,507	-192,498	-221,757
Closing losses	0	301,475	532,263	662,335	607,828	415,330	193,572
Valuation taxation workings							
Profit before interest and tax	-442,050	-748,563	-422,331	-71,866	106,787	227,511	233,321
Profits before losses	0	0	0	0	106,787	227,511	233,321
Losses carried forward	0	0	0	0	-106,787	-227,511	-233,321
Other adjustments	0	0	0	0	0	0	0
Profits liable to corporation tax	0	0	0	0	0	0	0
Corporation tax	0	0	0	0	0	0	0
Corporation tax account							
Opening balance	0	0	0	0	0	0	0
Tax charge in the period	0	0	0	0	0	0	0
Tax paid	0	0	0	0	0	0	0
Closing balance	0	0	0	0	0	0	0
Losses account							
Opening losses	0	442,050	1,190,613	1,612,944	1,684,809	1,578,023	1,350,512
Increase in losses in the period	442,050	748,563	422,331	71,866	0	0	0
Losses utilised	0	0	0	0	-106,787	-227,511	-233,321
Closing losses	442,050	1,190,613	1,612,944	1,684,809	1,578,023	1,350,512	1,117,191

Profit and loss

Malawi Fresh

USD single

Year	2014	2015	2016	2017	2018	2019	2020
Tomatoes	0	33,458	61,679	75,383	150,807	198,760	198,760
Carrots	0	17,153	30,842	51,403	75,390	99,378	99,378
Potatoes	0	27,422	50,649	84,416	123,795	163,217	163,217
Onions	0	15,859	29,309	48,828	71,630	94,432	94,432
Green beans	0	4,747	14,654	24,443	35,815	47,245	47,245
Green pepper	0	16,862	32,020	53,336	78,311	103,195	103,195
Apples	0	105,281	189,577	315,844	463,273	526,584	526,584
Total revenue	0	220,782	408,730	653,652	999,022	1,232,812	1,232,812
FG Tomato	0	-18,086	-32,463	-39,675	-79,372	-104,610	-104,610
FG Carrots	0	-9,028	-16,232	-27,054	-39,679	-52,304	-52,304
FG Potatoes	0	-14,432	-25,974	-43,290	-63,485	-83,701	-83,701
FG Onions	0	-8,347	-15,030	-25,040	-36,733	-48,427	-48,427
FG Green Beans	0	-2,498	-7,515	-12,535	-18,367	-24,228	-24,228
FG Green Peppers	0	-9,368	-16,853	-28,071	-41,216	-54,313	-54,313
Import apples	0	-42,113	-75,831	-126,338	-185,309	-210,634	-210,634
Total cost of sales	0	-103,871	-189,898	-302,003	-464,162	-578,218	-578,218
Gross profit	0	116,911	218,832	351,649	534,860	654,594	654,594
Staff costs	-87,516	-163,680	-175,032	-175,032	-175,032	-175,032	-175,032
Start-up expenses	-272,000	-461,000	-222,000	0	0	0	0
Other operational expenses	-38,049	-151,824	-155,161	-159,512	-164,072	-168,891	-168,891
Total operating costs	-397,565	-776,504	-552,193	-334,544	-339,104	-343,923	-343,923
Operating profit	-397,565	-659,593	-333,361	17,104	195,757	310,671	310,671
Depreciation	-44,485	-88,970	-88,970	-88,970	-88,970	-83,160	-77,350
Amortisation	0	0	0	0	0	0	0
Profits before interest and tax	-442,050	-748,563	-422,331	-71,866	106,787	227,511	233,321
Interest paid and received	-23,621	-52,912	-58,457	-58,206	-52,280	-35,013	-11,564
Grants received	500,000	500,000	250,000	0	0	0	0
Profit before tax	34,329	-301,475	-230,788	-130,071	54,507	192,498	221,757
Taxation	-12,015	0	0	0	0	0	0
Profit after tax	22,314	-301,475	-230,788	-130,071	54,507	192,498	221,757
Dividends declared	0	0	0	0	0	0	0
Retained profit for the year	22,314	-301,475	-230,788	-130,071	54,507	192,498	221,757

Balance sheet**Malawi Fresh**

USD single

Year	2014	2015	2016	2017	2018	2019	2020
Tangible fixed assets	1,072,115	983,145	894,175	805,205	716,235	633,075	555,725
Intangible fixed assets	0	0	0	0	0	0	0
Total fixed assets	1,072,115	983,145	894,175	805,205	716,235	633,075	555,725
Debtors	0	4,234	7,839	12,536	19,159	23,643	23,643
Stock	0	0	0	0	0	0	0
Cash at bank	18,949	35,452	41,679	48,030	37,994	11,355	10,463
Total current assets	18,949	39,686	49,518	60,566	57,153	34,998	34,106
Creditors	0	-1,992	-3,642	-5,792	-8,902	-11,089	-11,089
Capital expenditure creditor	-91,775	0	0	0	0	0	0
Intangible expenditure creditor	0	0	0	0	0	0	0
Taxation creditor	-1,975	0	0	0	0	0	0
Overdraft	0	0	0	0	0	0	0
Total current liabilities	-93,750	-1,992	-3,642	-5,792	-8,902	-11,089	-11,089
Net current assets	-74,801	37,694	45,876	54,774	48,251	23,909	23,016
Total assets less current liabilities	997,314	1,020,839	940,051	859,979	764,486	656,984	578,741
Equity	375,000	550,000	700,000	750,000	750,000	750,000	750,000
Retained profits	22,314	-279,161	-509,949	-640,021	-585,514	-393,016	-171,259
Debt	600,000	750,000	750,000	750,000	600,000	300,000	0
Total capital employed	997,314	1,020,839	940,051	859,979	764,486	656,984	578,741

Cash flow statement

Malawi Fresh

USD single

Year	2014	2015	2016	2017	2018	2019	2020
Operating profit / (loss)	-397,565	-659,593	-333,361	17,104	195,757	310,671	310,671
Debtors (mutation)	0	-4,234	-3,604	-4,697	-6,624	-4,484	0
Stock (mutation)	0	0	0	0	0	0	0
Creditors (mutation)	0	1,992	1,650	2,150	3,110	2,187	0
Movement in working capital	0	-2,242	-1,955	-2,547	-3,514	-2,296	0
Cash flow from operating activities	-397,565	-661,835	-335,315	14,557	192,243	308,375	310,671
Tangible capital expenditure	-1,024,825	-91,775	0	0	0	0	0
Intangible capital expenditure	0	0	0	0	0	0	0
Tax paid	-10,040	-1,975	0	0	0	0	0
Cash flow before financial cashflows	-1,432,430	-755,586	-335,315	14,557	192,243	308,375	310,671
Interest paid on debt	-24,000	-54,000	-60,000	-60,000	-54,000	-36,000	-12,000
Interest paid on overdrafts	0	0	0	0	0	0	0
Interest received on cash deposits	379	1,088	1,543	1,794	1,720	987	436
Cash flow before financing	-1,456,051	-808,498	-393,773	-43,649	139,963	273,362	299,107
Equity issued	375,000	175,000	150,000	50,000	0	0	0
Grants received	500,000	500,000	250,000	0	0	0	0
Debt issued	600,000	150,000	0	0	0	0	0
Debt repaid	0	0	0	0	-150,000	-300,000	-300,000
Cash flow for the period before dividends	18,949	16,502	6,227	6,351	-10,037	-26,638	-893
Dividends paid	0	0	0	0	0	0	0
Cash flow for the period	18,949	16,502	6,227	6,351	-10,037	-26,638	-893
Cash account							
Opening cash balance	0	18,949	35,452	41,679	48,030	37,994	11,355
Cash movement in the year	18,949	16,502	6,227	6,351	-10,037	-26,638	-893
Closing cash balance	18,949	35,452	41,679	48,030	37,994	11,355	10,463

References

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ⁱⁱⁱ C. Mwandira, "The status of the vegetable industry in Malawi: current and future prospects". In *Vegetable Research and Development in Malawi, Review and Planning Workshop Proceedings*, 28-29 September 2003; organised by AVRDC and the Ministry of Agriculture, Irrigation and Food Security in Malawi

^{iv} Ministry of Agriculture & Food Security (2012); *Guide to Agricultural Production and Natural Resources Management in Malawi*