FEASIBILITY STUDY FOR ESTABLISHMENT OF TWO FRESH PRODUCE DEPOT FACILITIES PER PROVINCE IN SOUTH AFRICA

agriculture
Department:
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National Agricultural Marketing Council
Strategic positioning of South African Agriculture in dynamic global markets

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CHAPTER 1

1. GENERAL INTRODUCTION AND BACKGROUND

Emerging vegetable and fruit producers in South Africa face a litany of constraints, with lack of post-harvest handling facilities being one of those constraints that emerging farmers can hardly resolve without external intervention. The National Agricultural Marketing Council (NAMC) and the Department of Agriculture (DoA) jointly commissioned Mokgongoa Agricultural Consulting (MAC) to conduct a feasibility study on the establishment of two fresh produce depot facilities in each of the nine provinces of South Africa.

The NAMC and DoA jointly view the establishment of key marketing infrastructure as being imperative in giving emerging vegetable and fruit producers a competitive edge. In instances where

emerging producers are well-organised, sharing of market infrastructure and transport could significantly reduce their expenditure and improve gross farm income. The market infrastructure would allow the producers to centrally bring in their produce, subject them to cleaning, managing post-harvest pests, grading, packaging, loading and transporting to fresh produce markets in South Africa and neighbouring countries the prices are good. The proposed depot facilities could also act as points of leverage, where market information, production information and extension services are discharged to the producers.

Marginalised people who entered agriculture for commercial purposes after 1994, face challenges ranging from lack of technical-know, lack of irrigation water, exorbitant prices of inputs, with concomitant high interests rates, and accessibility to markets. In cases where markets are accessible, the produce is not of competitive quality when compared to those from established commercial farmers. Historically, segregation policies in South Africa produced two market economies, namely, the first and the second market economies. The first economy, characterised by well-structured formal markets, had legislative barriers, calculated to ensure that black entrepreneurs marketed their produce in the then homelands. The homeland fresh produce markets also served as the dumping-conduits for produce from commercial farms which did not meet the stringent quality norms of overseas markets. Previously, sophisticated and well-equipped fresh produce markets were strategically located in large cities, particularly near air-ports and harbours in order to allow for transport to export markets.

In 1995, South Africa adopted the Growth, Empowerment and Redistribution (GEAR) Strategy, which sought to portray South Africa as a free market economy. The GEAR was intended to serve as a vehicle to expedite the achievement of the aims of the Rural Development Programme (RDP), which was a landmark policy document to help redress the economic imbalances of the past. Due to the GEAR, various legislative imperatives were promulgated to repeal various marketing structures, which exclusively served the minority White farmers. A large number of legislative frameworks were developed to assist previously marginalised entrepreneurs. Various attempts to establish fresh produce markets in towns which were historically surrounded by homelands, let alone in homeland areas themselves, had not been financially viable.

The GEAR encouraged globalization of trade, with the result that most countries started dumping their heavily subsidized produce into South African markets, forcing the government to respond by crafting various trade barriers. Traditionally, previously marginalized farmers grew fruits and vegetables for subsistence and distribution through household and local markets, which has since changed. Globalization of vegetable and fruit trades demanded improved quality and the meeting of the stringent International Standards Organisation (ISO) norms. In order to comply with the norms, previously marginalized farmers were faced with new challenges, such as lack of post-harvest handling technologies which included the use of more effective cold and/or controlled atmosphere storage facilities and better transport systems. Almost always, these facilities are indispensable if the extended shelf life of the fresh produce commodities are to be insured. The improved technologies would allow more distant and lucrative markets to be penetrated.

Essentially, the political environment represents how organizations try to influence government and how government influences them. The South African government is under pressure to redress the historic imbalances that previously non-franchised indigenous people faced. Since 1994, the government have introduced various politically-motivated interventions, most of which have not achieved the intended political objectives. For instance, the Land Redistribution and Development (LRAD), Comprehensive Agricultural Support Program (CASP), Agricultural Credit Scheme (ACS) which was implemented through the pilot project known as Micro Agriculture Finance Institution of South Africa (MAFISA) – just to list a few, were intended to bring the historically marginalised people into the first economy. One of the major challenges to ensuring the successful implementation of agrarian programmes is the access of the beneficiaries to formal markets throughout the globe.

The issue of post-harvest handling facilities for horticultural products has not been attended to, especially for the emerging farmers. In the past, various homeland governments attempted to solve the problem of perish-ability of horticultural produce through the erection of local markets, which were not successful because the erected structures were not equipped to ameliorate the factors that are responsible for reducing the shelf life of fresh produce. Also, the low prices that farmers received from these markets persuaded most producers to by-pass the local markets to the established national markets, where the demand is almost always high and therefore, the prices are good. In these markets, produce has the opportunity to be sold to local and overseas consumers.

The abolishment of segregated marketing boards in 2001 opened enormous economic opportunities and threats for all races throughout South Africa (DoA, 2004). However, farmers regrouped to form commodity associations, which are mostly still on racial lines. Previously marginalised farmers cannot afford joining highly organised associations of commercial farmers since they cannot afford the exorbitant joining fees and compliance with regard to regulations and quality standards such as ISO and Hazard and Critical Control Point (HACCP) as required by retailers. Legislation promulgated to facilitate the entrance of historically marginalised entrepreneurs into the mainstream formal markets, have had little impact since most infrastructures along the fresh produce chain had been out of reach. The government instituted various interventions, which focused on beefing up entrepreneurial skills through capacity building and various empowerment schemes. However, most of the initiated interventions through various organisations and Sector Education Training Authorities (SETA) initially focused on the production part of the fresh produce chain, with recent efforts focusing on the entire value chain of a given commodity.

Establishment of post-harvest handling technologies in the form of fresh produce depots would reduce post-harvest losses incurred by previously marginalised fresh produce farmers in South Africa. The facilities would confer a competitive advantage for this group of farmers to produce for established fresh produce markets all over the world. The purpose of this study is to investigate and design post-harvest depot facilities with appropriate business models, institutional arrangements, management structures and financial implications of constructing marketing infrastructure in the nine provinces. Properly used, the fresh produce depots would ensure adherence to market procurement standards and therefore, increase volumes of products coming from emerging producers coming to the fresh produce markets.

The NAMC and DoA view the establishment of key marketing infrastructure as being imperative for the survival of the emerging producers. If producers were well-organised, the sharing of market infrastructure and transport could significantly reduce their costs of doing business. Processes of implementation would include NAMC and DoA engaging municipalities and provincial departments of agriculture to source funds and call for construction service providers to begin building the pilot

market depots in priority locations where sustainability is assured before rolling out to other promising district municipalities within provinces.

1.1 Fresh PRODUCE INDUSTRY IN South African context

The horticultural industry of South Africa accounts for nearly one-third of total gross farm income in the country. There are 17 major fresh produce markets throughout South Africa, the largest being the Johannesburg Fresh Produce Market (JFPM), which comprises a 34% market share with a total turnover of nearly 900 000 tons valued at over R 2,0 billion in 2006 (NAMC Section 7 Report, 2006). In 2007, tomato volumes sold at the JFPM were 107 000 tonnes (JFPM Statistics, 2008) at a value of over R300 million. Potatoes, onions, and cabbages were the other major vegetables sold nationwide.

Between 2005 and 2006, gross income from horticultural products increased by 1,3 %, from R20 388 million to R20 648 million. The income from deciduous fruits and citrus fruits decreased by 7,0 and 14,3 %, respectively, while income from subtropical fruit and viticulture increased by 3,9 and 2,0 % to R1 496 and R2 733 million, respectively. Income from vegetable production rose by 13,9 % to R7 229 million. In general, the South African horticultural industry is growing in both quantities produced and prices received.

1.2 SCOPE OF WORK

MAC have taken note of the major objective of the assignment which is to conduct a feasibility study with a view to establish two fresh produce depots with packaging, grading, cold room and storage facilities in each of the nine provinces. The facilities are intended to benefit the emerging producers to increase their volumes to the fresh produce markets and retailers.

Key activities in undertaking the study included to:

(a) Identify two target areas/district in each of the provinces, (b) identify the areas/districts in consultation with provincial departments of agriculture and municipalities, (c) engage the provincial department of agriculture and municipalities for buy-in and to avoid duplication with any similar initiatives in the identified areas, (d) analyse the current situation with regards to fresh produce

marketing facilities in the targeted areas/district, (e) analyse the production of the emerging producers in the targeted areas/district, (f) analyse the market of the emerging producers in the targeted areas/district, (g) identify the producers that could benefit from such infrastructure,(h) analyse the economic viability and sustainability of the project, (i) design an appropriate business model, (j) propose the appropriate institutional arrangements, (k) propose the appropriate management structure, (l) design the appropriate infrastructure with cold storages, (m) analyse the demand for such infrastructure, (n) design the implementation plan, and (o) design a monitoring and evaluation plan

1.3 PURPOSE

The purpose of this study was to compile a feasibility report on the establishment of two fresh produce depots per province. The depots should perform amongst other things, the following: packaging, grading and provision of cold-room storage facilities that would benefit the previously marginalised emerging producers to increase their gross farm income and production by delivering fresh produce of high quality to markets, processors and retailers.

CHAPTER 2

2. METHODOLOGY

The study used several techniques and tools to collect primary and secondary data from various sources ranging literature review, census of agricultural statistics, key informants and stakeholders in agriculture. Provincial workshops and structured and semi-structured questionnaires were used to source information from focus groups, municipalities, commodity associations, financial institutions, development agencies, fresh produce markets/agents, producers, input suppliers, buyers and officials of the departments of agriculture.

Feasibility analysis techniques were used to assess/measure how beneficial or practical the establishment of fresh produce depots would be to NAMC and DoA. In addition, it was used to determine whether or not to proceed with the project and identify any risks associated with the project. A feasibility matrix criterion substantiated whether to proceed or not in a specific area and

highlight critical issues before making a decision. The techniques focus on technical, economic, operational, schedule and legal feasibility of the fresh depot facility. We have developed a rating scale to quantify and measure the benefits and costs.

A team of seven-experienced agriculturists conducted interviews using structured questionnaires. In all the nine provinces, the agriculturists interviewed farmers who produce vegetables and fruits in the areas selected to locate fresh produce depots as advised by the stakeholders who included farmer associations, provincial departments of agriculture, district municipalities, financial development institutions and market agents. In addition, the agriculturists conducted interviews using semi-structured questionnaires to the key informants who included provincial departments of agriculture (marketing and extension officers), input suppliers, fresh produce markets, agricultural experts, buyers, transporters and financial development agencies.

Agricultural engineers designed the proposed fresh produce depot facility after providing data from field surveys which included: crop type, agricultural potential of the area, current yields per commodity, available land and water, planting time and growing periods of various vegetables, cropping patterns and harvesting time of the year in the area.

During stakeholder or focus group meetings in the nine provinces, the facilitators divided participants in a group of 10-15 delegates to interrogate the business model of the depots in relation to ownership, management structures and services, along with institutional arrangements. In addition, participants suggested the location of depots but indicated that the provincial departments of agriculture and municipalities should ratify the selected sites. Participants proposed indicators that could ensure sustainability and viability of the depot facilities.

The project team assessed risk in relation to the ability to manage a depot facility, technical expertise in production, scheduling of production, crop types, land and water availability, suitability of climate for producing selected vegetables or fruits, availability of machinery in the priority locations, maintenance of the facilities and funds to operate the depots. Economic feasibility and viability of the depot facilities were assessed using cost-and-benefit analysis tools, as well as

return-on-investment methods, to determine whether the benefits of establishing the facilities outweigh the establishment costs.

CHAPTER 3

POST-HARVEST HANDLING OF HORTICULTURAL CROPS

3.1 Introduction

Worldwide, quality remains the major factor in determining the marketability of fresh produce. The National Department of Agriculture had developed quality standards for various fruits and vegetables. Various countries have various quality standards, which make international trade and marketing difficult. Globalisation has rendered export markets to be more lucrative than local or national markets and this has resulted into the establishment of global standards for various produce, products and services, which have been referred to as ISO. Fresh produce such as fruits and vegetables are traded under ISO 9002A. Naturally, producing quality fruit or vegetable starts from land preparation, the propagation material used, production techniques, harvesting and post-handling techniques. In other words, producing quality commodities is a function of what was done or not done during the entire value chain. In this review, the attention is mainly on post-harvest handling, in order to highlight the importance of establishing two fresh produce depots per province in South Africa, if the previously marginalised farmers have to participate in both national and global markets.

3.2 Nature of fresh fruits and vegetables

Post-harvest losses of edible horticultural crops are due to extrinsic and intrinsic factors. The major causes of quality deterioration in horticultural crops are high transpiration rates, high respiration rates and pre-harvest contamination with pathogenic microbes. Generally, post-harvest exposure of fruits and vegetables to high temperatures, low relative humidity and/or windy conditions increases transpiration and respiration rates, resulting into immediate quality. Immediate reduction of transpiration and respiration rates soon after harvest, therefore, is an indispensable practice in the post-harvest handling of horticultural crops. Another important physiological activity, which increases post-harvest losses of fruit crops, is referred to as climacteric respiration. Immediately after harvesting climacteric fruit, the respiration rates decline, and then rise until a climacteric peak is reached, followed by a decline which irreversibly leads to tissue senescence. Thus, to prevent post-harvest losses of climacteric fruits such as bananas, mangoes, avocadoes, citrus, harvested fruits have to be exposed to low temperatures soon after harvest in order to reduce respiration rates and delaying the fruit from reaching the climacteric peak (McMahon *et al*., 2002). The complexity of post-harvest handling is explained in order to demonstrate that smallholder farmers and/or emerging farmers alone cannot be able to handle this without government intervention.

3.3 Post-harvest losses

In developing countries of Africa post-harvest losses range between 15% and 30% of the harvested crops (Buys and Nortje, 1997). However, when excluding South African census, post-harvest losses of horticultural crops in African countries are estimated at 50% (Eckert and Ogawa, 1985). This figure, and even much more, is a good estimate of the post-harvest losses incurred by previously marginalized farmers in South Africa, particularly in land reform projects. In the United States of America, post-harvest losses of fruits and vegetables amount to ca. 19% at an estimated annual loss of $18 billion (Kantor *et al*., 1997).

Post-harvest handling is essential for the maintenance of the quality of fresh produce. Conventionally, potent synthetic pesticides were effectively used to ensure that high quality fruits are available over extended periods. However, due to increased global pesticide-phobia, producers have been forced to evaluate alternative approaches to ensure delivery of fruit with the highest quality. Approaches which are currently being used to ensure extended availability of quality fresh produce include use of soft chemicals, bio-pesticides, disinfectants, calcium applications, growth regulators, chemical elicitors to induce natural host defenses, biological control, integrated control,

hypobaric pressure, physical means such as intermittent ultraviolet illumination, radiation, hot water or heat shock treatments, modified atmosphere storage and packaging genetic modification of plants (Barkai-Golan, 2001; Coates and Johnson, 1997; Janisiewicz and Korsten, 2002). Obviously, most of these approaches would not be accessible to fragmented emerging farmers.

3.4 Relation between horticultural crops and pathogenic microbes

The densities of microbial populations per unit surface area vary with each fruit development stage and are influenced by prevailing environmental conditions (Buck *et al*., 2003). Generally, bacterial microbes are more prominent on vegetable crops, whereas fungal microbes are dominant on fruit crops (De Roever, 1999). The differences had been ascribed to pH variations, vegetables having a lower surface pH, and therefore being densely populated by acid-loving bacteria (Snowdon, 1992). Also, the densities of bacteria vary with plant age, developmental stage, climatic variation and seasonal variation. The number may range between 10^4–10^8 colony forming units (cfu) per gram tissue (European Commission, 2002). Each step along the production chain changes the proportion of the three types of microbes, with most handling practices increasing the pathogenic groups, which are of major economic importance in various horticultural industries. When developing a post-harvest strategy for any horticultural crop, it is essential to take into account the fluctuations of microbial densities and ensure that the system is designed to cope with these microbes on various crops.

3.5 Pre-harvest factors impacting on post-harvest quality

In crop production, effective quality management of fresh produce starts in the field (Thompson *et al*., 2002). Korsten (2006) reviewed various pre-harvest factors that negatively impact post-harvest quality of horticultural crops, which include infliction of injuries, handling time from harvest to cooling, *etc*. The first step in optimal product quality starts at selecting the most appropriate propagation material which is of good quality and then planting or transplanting them in soils with minimum amount of stress-triggering factors. The further implementation of appropriate and optimal production and management practices are essential to ensure maximum quality and extended shelf life. Generally, pre-harvest conditions may even have a greater impact on post-harvest quality than post-harvest handling systems (Ippolito and Nigro, 2000). For instance, pre-harvest stress factors such as water deficits, salt stress, physiological drought, fluctuating whether conditions, high

nitrogen levels and/or high levels of pests, have direct impact on post-harvest quality of horticultural crops.

Quality at harvest cannot be improved but can only be maintained for a limited period. Harvesting fruits at the optimal stage, size and maturity, can therefore result in peak quality and maximum shelf life potential. Managing total crop health in the field reduces post-harvest losses. Thus, when developing post-harvest intervention strategies for reducing losses of horticultural crops, it should be remembered that quality is a function of the entire production chain.

3.6 Post-harvest handling

Pathogens may be introduced anywhere from picking, loading, transporting and within the pack-house line during sorting, grading, packing, repacking, or within the wholesale displaying and transaction and during preparation for consumption. Throughout this post-harvest chain, human and facility hygiene are exceedingly important. Generally, most of the contamination that results in post-harvest losses of horticultural crops occurs in the pack house, more especially where water is used in cleaning the fruits. Various approaches are used to ensure reduction of post-harvest losses.

- Hygienic pack-house and cool storage conditions, where rotten produce is regularly removed
- Effective cold chain management to ensure product integrity and preventing post-harvest pathogens from spoiling produce during transit
- Low-pressure (hypobaric) storage has the effect of reducing respiration rate and dissipating evolved ethylene (Jamieson, 1980)
- Heat treatments (44°C–55°C), mainly as short-term dips or longer exposure dipping times at slightly lower temperatures (38°C–46°C) (Barkai-Golan, 2001)
- Hot water dip treatments have also been used successfully on a commercial scale for citrus to control *Penicillium* spp.
- Hot air treatments, particularly moist air, have been effective for controlling *Botrytis*, *Alternaria* and *Cladosporium* spp. on citrus

- Ionising radiation is being successfully used in most countries on different crops to extend shelf life and prevent decay (Barkai-Golan, 2001)

Various alternative products are also being evaluated to replace highly effective post-harvest fungicides. Controlled or modified atmosphere storage established in environments surrounding fresh produce has been used extensively over many years (Barkai-Golan, 2001). Sealing certain fresh fruits in polymeric packaging promotes also extension of shelf life. Recent developments include the development of 'active' or 'smart' films, ethylene scavengers or anti-ethylene bags. This technology is likely to expand as producers adopt on-farm packing to avoid costly repacking for foreign markets.

In most cases, an integrated approach, where several methods are combined, is used control to ensure post-harvest quality, shelf life and product safety. For instance, at Zebediela Citrus Estates, chemicals, hot air, brushing, waxing and wrapping are some of the integrated approaches which are used. Generally, the approach will differ from crop to crop. This should be taken into consideration when proposing a intervention of market depot per province and it should also be stipulated in the recommendation whether post-harvest management of pathogens in the depot while be compatible for the recommended crops.

3.7 Quality standards for fresh produce in South Africa

The Agricultural Products Standards Act 119 of 1990, promulgated in Government Gazette R707 of 13 May 2005, provides standards regarding food safety and food hygiene of regulated agricultural products of plant origin destined for export markets. The scope of the Act covers packaging and associated cold storage facilities and handling of agricultural products of plant origin destined for export, which originated from more than one farm. Contents of this Act are relevant for the proposed fresh produce depots since they will be handling produce from different farms, and most probably, for export markets.

Any fresh produce depot will have to be registered and certificated with the Department of Agriculture, The depot will have to keep food safety records under 11 sections of the worksheet,

which include traceability, HACCP principles, location and structure of pack-house, water supply, drainage and waste disposal, personal hygiene, storage (cleaning chemicals, post harvest chemicals), food control and monitoring equipment, post-harvest chemical treatment, facility maintenance, cleaning and pest control, and finally, managing product withdrawals. Records need to be kept for inspection for a period of two years on various aspects which are intended to safeguard the consumers. The Act explains the standards which must be met in each section in detail. The fresh produce depots will have to meet the minimum criteria of these norms. Consequently, in the feasibility report, the requirements of this legislation must be taken into consideration.

3.8 Conclusion – post harvest handling

Obviously, the factors which induce post-harvest losses of fresh produce are situational. Consequently, when provinces choose dissimilar crops, the structure of their depots will also differ accordingly. Once the targeted fruits and vegetables for a depot within a municipality have been identified, specific post-harvest pathogens for the chosen commodities should be revisited in order to ensure that the proposed facility will be able to decontaminate the produce that will be passing through the facility.

CHAPTER 4

ECONOMIES OF PRODUCING FRUITS AND VEGETABLES IN FIFTY-TWO DISTRICT MUNICIPALITIES OF SOUTH AFRICA

4.1 Introduction

The horticultural industry of South Africa accounts for nearly one-third of total gross farm income in the country. There are 17 major fresh produce markets throughout South Africa, the largest being the Johannesburg Fresh Produce Market (JFPM) which comprises a 34% market share with a total turnover of nearly 900,000 tons valued at over R2.0 billion in 2006 (NAMC Section 7 Report, 2006). In 2007, tomato volumes sold at the JFPM were 107 000 tonnes (JFPM Statistics, 2008) at a value

of over R300 million. Potatoes, onions, and cabbages are the other major vegetables sold nationwide. Between 2005 and 2006, gross income from horticultural products increased by 1.3%, from R20 388million to R20 648 million. The income from deciduous fruit and citrus fruit had a decline of 7.0% and 14.3%, respectively. On the contrary, income from subtropical fruit and viticulture increased by 3.9% and 2.0 % to R1 496 and R2 733 million, respectively. Income from vegetable production rose by 13.9% to R7 229 million. In general, the South African horticultural industry is growing in both quantities produced and prices received.

4.1.1 PRODUCTION OF FRUIT AND VEGETABLES IN SOUTH AFRICA

4.1.1.1 VEGETABLES

Vegetables are produced in most parts of the country. In 2005-2007, total production of vegetables produced were 2 157 579 tons. Production of major vegetables such as tomatoes, potatoes, onion and carrots increased annually.

Year	2002/03	2003/04	2004/05	2005/06	2006/07
	'000 tons				
Potatoes	1 556	1 620	1 800	1 768	1 863
Tomatoes	442	383	46	451	453
Onions	335	377	393	397	405
Green Mealies	296	322	317	316	318
Cabbages	176	174	165	154	135
Pumpkins	215	224	225	231	228
Carrots	116	128	130	134	124
Other	501	481	512	502	494
Total	**3 637**	**3 709**	**4 006**	**3 953**	**4 020**

Adapted from Abstract of Agricultural statistics, 2007

Over 53% of the volume o

f vegetables and approximately 56% of potatoes produced in South Africa are traded on the fresh produce markets. The total volume of vegetables and potatoes sold on these markets during 2006/07 amounted to 1 119 646 tons and 950 000 tons respectively.

The per capita consumption of fresh vegetables was 38, 74 kg during 2006/07, approximately

4, 7% lower than the 40, 64 kg of 2006/06. The promotion of a healthy diet by various stakeholders in fresh produce could be attributed to high consumption of fresh products. The total gross human consumption of potatoes during 2006 is 1.58 million tons and the per capita consumption estimated at 33 kg per annum.

4.1.1.2 SUBTROPICAL FRUIT

Subtropical crops are adaptable to specific areas of the country because of their preference of particular climatic conditions. Most subtropical fruit crops require warmer conditions and are sensitive to high temperature fluctuations and to frost. The main production areas in South Africa are parts of the Limpopo, Mpumalanga and KwaZulu-Natal provinces. Granadillas and Guavas are also grown in the Western Cape, while pineapples are cultivated in the Eastern Cape and KwaZulu-Natal. Production of subtropical fruit from 2002 to 2007 is shown in the table below:

Year	2002/03	2003/04	2004/05	2005/06	2006/07
	'000 tons				
Avocados	77.2	57.1	82.1	74.6	64.3
Bananas	352	277	316.3	366.2	357.3
Pineapples	176.5	160.8	166.5	166.7	160.1
Mangoes	74	80	93.4	63.9	66.9
Papayas	15.4	12.6	16.9	14.5	14.4
Granadillas	1.5	1.8	1.5	1.2	0.6
Litchis	12.1	9.9	4.2	4.5	5.8

Guavas	26.4	24.1	28.3	28.5	27
Total	735.1	623.3	709.2	720.1	696.4

Adapted from Abstract of Agricultural statistics, 2007

Most subtropical fruit crops bear fruit biannually, thereby producing the highest crop the other year and small crop the coming year. High production depletes plant reserves thus causing the trees to bore small crops. The largest contributor to sales in subtropical on the fresh produce markets recorded in tons in 2006/07 were bananas (213 903), pineapples (25 540), avocados (21 240), mangoes (21 811), papayas (10 064), litchis (2 379), granadillas (522) and guavas (2 800).

4.1.1.3 DECIDUOUS FRUIT

The main deciduous fruit producing areas in South Africa are in the Western and Eastern Cape provinces. In general, deciduous fruit adapt to areas with warm, dry summers and cold winters. The area under production during 2006 season is estimated at 74 138ha. It is estimated that 2 254 producers grow deciduous fruit for fresh consumption, 1 174 for stone fruit, 954 producers for dry and table grapes and 700 producers for pome fruit. In 2006/07 production of deciduous fruit were estimated at 1 528 678 tons. Production of deciduous fruit from 2002 to 2007.is shown in the table below:

Year	2002/03	2003/04	2004/05	2005/06	2006/07
	'000 tons				
Apples	791	821	699	623	645
Pears	319	324	310	316	337
Table grapes	261	291	256	291	284
Peaches and nectarines	243	172	177	168	169
Apricots	240	88	37	76	36
Plums	58	59	55	39	54
Total	1 914	1 755	1 534	1 513	1 525

Adapted from Abstract of Agricultural statistics, 2007

During 2006/07 season, approximately 389 818 tons of deciduous fruit were sold on local fresh produce markets, whereas 685 808 tons were exported to Africa, Asia and European countries. Total and per capita consumption of deciduous fruit during 2006/07 were 926 000 tons and 19.36 kg per annum.

Determination of the status quo of the democratic South Africa's fresh produce is limited by the fact that commercial agricultural census in South Africa is taken every 10 years. Available data were collected just before the change in the political landscape in 1993, whereas the ones after the 27 April 1994, were collected in 2002. These data are widely used in planning for long-term investments such as establishing orchards. Other complicating factors are that the currently available censuses (2002) were recorded per magisterial districts, which were major towns or cities. This nomenclature is different from the district municipalities which had since been adopted after in democratic South Africa.

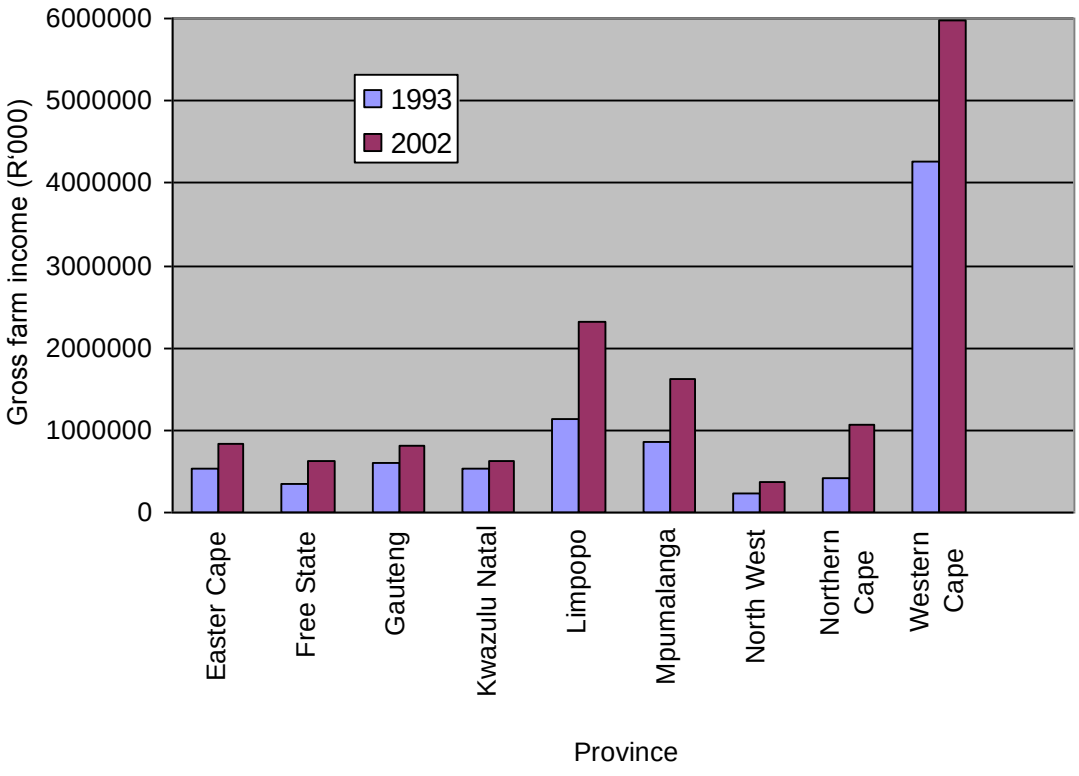


FIGURE 1: GROSS FARM INCOME OF VEGETABLES AND FRUIT IN DIFFERENT PROVINCES OF SOUTH AFRICA.

Actually, the highest crop losses in developing countries occur at post-harvest. The desktop study was conducted to re-align the fresh produce censuses with the new demarcated district municipalities in order to provide a better picture with regard to the: (1) gross farm income, (2) area planted, and (3) volume produced for various vegetables and fruits per province within the demarcated district municipalities. Results of the desk top would allow for: (1) identification of district municipalities which are active in the production of fresh produce, (2) ranking of the district municipalities which are economic champions in vegetable production and/or fruit production, (3) ranking of vegetables and/or fruits which can be viewed as being champions within the newly demarcated district municipalities. Figure 1 compares the gross farm income of vegetables and fruits coming from different provinces of South Africa. Western Cape recorded the highest gross farm income of over R6 billion during a ten year period, followed by Limpopo with over R2 billion, and Mpumalanga and Northern Cape with a gross farm income of over an R1billion. Eastern Cape, Free State, Gauteng, KwaZulu Natal and North West generated less than a billion, where North West generated the least gross farm income from horticultural products (Figure 1).

4.2 HORTICULTURAL STATUS IN NEWLY DEMARCATED DISTRICT MUNICIPALITIES

South Africa has a total of 52 newly demarcated district municipalities, distributed throughout the nine provinces, with the province with the largest number of municipalities being in KwaZulu-Natal (11) and Mpumalanga Province (3) having the fewest.

4.2.1 EASTERN CAPE PROVINCE

Eastern Cape Province has seven district municipalities. Using the gross farm income for vegetable production as a ranking yardstick, the most important district municipalities in Eastern Cape are Amathole, Cacadu, Ukhlamba and Chris Hani, generating R6.5 million, R4.8 million, R3.5 million and R1.3 miilion respectively to the gross farm income of the province (Table 1-a; 1-b). In this province, the gross farm income from vegetables runs into millions in all district municipalities except for Alfred Nzo and OR Tambo. Vegetables mainly produced are potatoes and tomatoes each contributing to a provincial gross farm income of R9.5 million and R4.3 million respectively. Fruit production in district municipalities which generate gross farm income into millions, but in a decreasing order are Amathole, Cacadu and Nelson Mandela Metro, with a gross farm income of

R27 million, R22 million and R16 million, respectively mainly coming from citrus in all the districts (Table 2-a; 2-b).

TABLE 1-A GROSS FARM INCOME AND PRODUCTION OF VEGETABLES IN DISTRICT MUNICIPALITIES OF EASTERN CAPE.

Vegetable	Alfred Nzo			Amathole			Cacadu			Chris Hani		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Asparagus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beetroot	0.00	0.00	0.00	22.90	1.30	12.60	6.07	0.73	3.33	9.00	0.40	3.50
Broccoli	0.00	0.00	0.00	1.00	0.00	0.00	160.87	-	-	0.00	0.00	0.00
Cabbage	35.00	1.00	50.00	119.70	35.80	1349.10	244.80	23.93	659.60	55.00	6.80	158.80
Carrot	0.00	0.00	0.00	583.10	5.10	167.10	329.80	12.60	26.00	109.70	2.30	59.80
Cauliflower	0.00	0.00	0.00	0.00	0.00	0.00	46.73	2.67	36.27	0.00	0.00	0.00
Celery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cucumber	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Green bean	0.00	0.00	0.00	0.00	1.60	8.00	0.00	8.07	66.60	0.00	0.00	0.00
Green mealie	0.00	0.00	0.00	167.70	0.00	0.00	66.80	0.00	0.00	11.70	0.00	0.00
Lettuce	0.00	0.00	0.00	52.80	0.00	0.00	25.47	0.00	0.00	0.00	0.00	0.00
Mushroom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Onion	0.00	0.00	0.00	162.00	2.70	88.20	53.53	3.00	31.80	304.10	9.00	184.60
Pepper	0.00	0.00	0.00	99.20	0.00	0.00	6.80	0.00	0.00	0.00	0.00	0.00
Potato	5.00	0.00	0.00	1016.90	24.00	52.30	3474.73	91.93	1963.60	713.40	33.00	573.20
Pumpkin	0.00	0.00	0.00	90.70	8.40	84.30	124.60	10.73	137.60	18.70	1.90	17.00
Sweet potato	0.00	0.00	0.00	0.00	0.00	0.00	78.80	3.80	60.93	0.00	0.00	0.00
Tomato	6.00	0.00	0.00	4062.30	48.00	1829.60	191.07	4.07	102.93	6.90	1.10	1.90
Other	0.00	0.00	0.00	163.80	799.70	15832.80	19.80	278.73	5605.27	40.00	5.30	12.80
Total	**46.00**	**1**	**50**	**6542.1**	**926.6**	**19424**	**4829.87**	**439.53**	**8690.6**	**1268.5**	**59.8**	**1011.6**

Source: census of commercial agriculture, 2002

TABLE 1-B GROSS FARM INCOME AND PRODUCTION OF VEGETABLES IN DISTRICT MUNICIPALITIES OF EASTERN CAPE (… CONTINUED).

Vegetable	Nelson Mandela Metro			OR Tambo			Ukhlamba		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Asparagus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beetroot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Broccoli	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cabbage	0.00	0.00	0.00	52.00	2.00	41.00	83.83	6.33	186.50
Carrot	0.00	0.00	0.00	0.00	0.00	0.00	76.33	0.00	0.00
Cauliflower	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Celery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cucumber	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Green bean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	2.33
Green mealie	307.00	0.00	0.00	0.00	0.00	0.00	4.67	0.00	0.00
Lettuce	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mushroom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Onion	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.17	3.67
Pepper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Potato	965.00	31.00	545.00	18.00	1.00	9.00	3339.00	122.83	2324.83
Pumpkin	0.00	0.00	0.00	0.00	0.00	0.00	10.17	1.17	11.83
Sweet potato	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tomato	0.00	0.00	0.00	0.00	0.00	0.00	5.33	0.33	6.83
Other	0.00	826.00	12375.00	7.00	2.00	19.00	0.00	1.00	28.17
Total	1272	857	12920	77	5	69	3519.5	132.16	2564.16

Source: census of commercial agriculture, 2002

TABLE 2-A GROSS FARM INCOME AND PRODUCTION OF FRUIT IN DISTRICT MUNICIPALITIES OF EASTERN CAPE PROVINCE.

Fruit	Alfred Nzo	Amathole	Cacadu	Chris Hani

	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Citrus	9.00	1.00	9.00	25811.00	925.10	19656.40	7423.87	275.27	5980.73	1.83	0.20	1.80
Subtropical	0.00	0.00	0.00	1138.00	0.00	0.00	2276.80	0.00	0.00	0.40	0.00	0.00
Avocado	0.00	0.00	0.00	0.00	0.00	3.70	0.00	3.73	0.00	0.00	0.00	0.00
Banana	0.00	0.00	0.00	0.00	1.40	6.20	0.00	0.00	77.67	0.00	0.00	0.00
Pineapple	0.00	0.00	0.00	0.00	132.00	2103.40	0.00	221.00	3412.57	0.00	0.00	0.00
Others	0.00	0.00	0.00	0.00	4.90	4.90	0.00	1.87	11.20	0.00	0.00	0.50
Deciduous	0.00	0.00	0.00	28.30	0.00	0.00	11845.27	0.00	0.00	151.70	0.00	0.00
Apple	0.00	0.00	0.00	0.00	0.00	0.00	0.00	164.36	5588.79	0.00	0.50	0.20
Peach	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.67	164.07	0.00	2.40	34.70
Pear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.80	1050.20	0.00	0.00	0.00
Table grape	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	2.20	0.00	0.40	10.20
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.80	106.33	0.00	0.0	0.00
Total	**9**	**1**	**9**	**26977.3**	**1063.4**	**21774.6**	**21545.94**	**745.57**	**16393.76**	**153.93**	**3.5**	**47.4**

Source: census of commercial agriculture, 2002

TABLE 2-B GROSS FARM INCOME AND PRODUCTION OF FRUIT IN DISTRICT MUNICIPALITIES OF EASTERN CAPE PROVINCE (… CONTINUED).

Fruit	Nelson Mandela Metro			OR Tambo			Ukhlamba		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Citrus	14780.00	882.00	13750.00	19.00	1.00	19.00	0.00	0.00	0.00
Subtropical	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Avocado	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Banana	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pineapple	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Deciduous	1363.00	0.00	0.00	0.00	0.00	0.00	5.83	0.00	0.00
Apple	0.00	20.00	550.00	0.00	0.00	0.00	0.00	0.00	0.00

Peach	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Table grape	0.00	0.00	0.00	0.00	2.00	45.00	0.00	0.00	0.00
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**16143**	**902**	**14300**	**19**	**3**	**64**	**5.83**	**0.0**	**0.0**

4.2.2 FREE STATE PROVINCE

Free State Province has five district municipalities. The total gross farm income of vegetables in this province runs into millions in all district municipalities, with income mainly coming from Thabo Mofutsanyana, Lejweleputswa, Fezile Dabi, Motheo and Xhariep generating R26 million, R13 million, R7.7 million and R3 million respectively (Table 3). The major produced vegetables are potatoes, carrots and pumpkins. In terms of fruit production, the district municipality which generates gross farm income into millions is **only** Thabo Mofutsanyana (Table 4).

TABLE 3 GROSS FARM INCOME AND PRODUCTION OF VEGETABLES IN DISTRICT MUNICIPALITIES OF FREE STATE PROVINCE.

Vegetable	Fezile Dabi			Lejweleputswa			Motheo			Thabo Mofutsanyane			Xhariep		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Asparagus	0.00	0.00	0.00	407.14	0.00	0.00	0.00	0.00	0.00	4146.50	0.00	0.00	0.00	0.00	0.00
Beetroot	0.00	0.00	0.00	0.00	0.69	7.54	14.00	0.33	4.17	0.00	0.00	0.00	2.62	0.15	1.77
Broccoli	.00	0.00	0.00	8.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cabbage	1.75	0.25	2.5	0.00	5.92	160.00	356.33	17.83	799.50	788.70	9.50	153.70	16.38	0.69	32.38
Carrot	0.75	0.00	0.00	107.00	20.69	722.38	425.33	15.50	398.50	208.40	1.20	58.40	1.77	0.08	0.77
Cauliflower	.0000	0.00	0.00	1270.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Celery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Cucumber	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Green bean	80.75	2.13	57.63	0.00	22.00	131.00	16.33	1.33	6.67	6.60	1.00	3.60	2.38	0.08	0.31
Green mealie	0.00	0.00	0.00	424.77	0.00	0.00	33.17	0.00	0.00	0.00	0.00	0.00	1.08	0.00	0.00
Lettuce	0.00	0.00	0.00	140.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mushroom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Onion	4.75	0.88	3.25	0.00	9.15	314.54	86.00	11.83	256.50	0.00	0.00	0.00	317.00	10.92	222.23
Pepper	0.00	0.00	0.00	205.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Potato	7371.75	276.38	4385.38	0.00	236.08	6027.62	2093.17	82.17	7132.17	20575.50	680.50	13566.80	2580.69	62.77	1301.77
Pumpkin	262.38	33.38	30.88	9790.46	13.54	76.00	95.00	11.50	212.67	568.90	32.90	243.90	68.15	12.69	154.15
Sweet potato	0.00	0.00	0.00	67.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tomato	13.50	0.38	6.00	0.00	1.15	19.23	27.17	0.67	12.33	3.30	0.10	1.50	1.54	0.15	1.46
Other	0.00	45.63	205.38	446.08	12.85	171.54	37.17	166.83	438.50	0.00	102.90	388.80	6.15	2.85	3.31
Total	7735.63	359.03	4691.02	12868.29	322.07	7629.85	3183.67	307.99	9261.01	26297.9	828.1	14416.7	2997.76	90.38	1718.15

Source: census of commercial agriculture, 2002

TABLE 4 GROSS FARM INCOME AND PRODUCTION OF FRUIT IN DISTRICT MUNICIPALITIES OF FREE STATE PROVINCE.

Fruit	Fezile Dabi			Lejweleputswa			Motheo			Thabo Mofutsanyane			Xhariep		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Citrus	201.75	13.00	190.63	4.54	0.00	0.00	0.33	0.67	10.50	0.00	0.00	0.00	0.23	0.15	3.15
Subtropical	0.00	0.00	0.00	322.38	0.00	0.00	8.33		0.00	60.40	0.00	0.00	2.92	0.00	0.00
Deciduous	0.00	0.00	0.00	29.08	0.00	0.00	36.50		0.00	4306.10	0.00	0.00	17.62	0.00	0.00
Apple		0.00	0.00	0.00	0.00	0.00	0.00	1.00	3.67	31.40	0.00	673.20	0.00	0.00	0.00
Peach		0.00	0.00	0.00	0.00	0.00	0.00		0.00	23.20	0.00	228.30	0.00	0.00	0.00
Prunes/plums		0.00	0.00	0.00	0.00	0.00	0.00		0.00	1.30	0.00	4.80	0.00	0.00	0.00

Pears		0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.40	0.00	4.60	0.00	0.00	0.00
Table grape		0.00	0.00	0.00	0.00	0.00	0.00	0.33	8.00	11.70	0.00	291.70	0.00	0.00	0.00
Others		0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	35.10	0.00	60.40	0.00	0.00	0.00
Total	201.75	13	190.63	356	0.23	0.0	45.16	0.5	22.17	4469.6	0.0	1263	20.77	0.15	3.15

Source: census of commercial agriculture, 2002

4.2.3 GAUTENG PROVINCE

Gauteng Province has six district municipalities. The gross farm income of vegetables in this province runs into millions in all district municipalities, with the leading income coming from City of Tshwane, West Rand, City of Joburg, Metsweding and Sedibeng generating over R23 million, R21 million, R11.4 million, R11 million, R8.8 million and R6.6 million, respectively (Table 5-a; 5-b). The leading vegetables produced in Gauteng are tomatoes, potatoes, mushrooms, carrots and beetroots. In terms of fruit production, in all district municipalities, there was none where fruits generated gross farm income into millions (Table 6-a).

TABLE 5-A GROSS FARM INCOME AND PRODUCTION OF VEGETABLES IN DISTRICT MUNICIPALITIES OF GAUTENG PROVINCE.

Vegetable	City of Tshwane			City of Jo'burg			Ekurhuleni		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Asparagus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beetroot	366.50	6.50	207.50	0.00	0.00	0.00	157.33	10.00	238.89
Broccoli	0.00	0.00	0.00	0.00	0.00	0.00	958.89	0.00	0.00
Cabbage	542.50	15.50	649.00	20.00	0.67	26.67	1162.89	50.67	1907.89
Carrot	133.00	5.00	75.50	25.67	1.00	17.00	1843.67	51.11	1478.00

Cauliflower	0.00	0.00	0.00	0.00	0.00	0.00	366.00	17.44	355.00
Celery	0.00	0.00	0.00	0.00	0.00	0.00	27.11	0.00	0.00
Cucumber	0.00	0.00	0.00	383.33	0.00	0.00	180.78	0.00	0.00
Green bean	589.50	40.50	319.50	0.00	0.00		526.11	23.00	280.67
Green mealie	538.50	0.00	0.00	0.00	0.00	0.00	183.78	0.00	0.00
Lettuce	1905.50	0.00	0.00	0.00	0.00	0.00	1716.22	0.00	0.00
Mushroom	16359.50	0.00	0.00	7490.33	0.00	0.00	1472.89	0.00	0.00
Onion	0.50	0.00	0.00	128.00	2.33	57.33	0.11	0.00	0.00
Pepper	65.00	0.00	0.00	0.00	0.00	0.00	493.44	0.00	0.00
Potato	1460.00	15.50	731.50	0.00	-	731.00	791.89	17.33	378.11
Pumpkin	37.50	3.00	27.00	9.33	0.67	10.00	256.00	9.78	219.78
Sweet potato	0.00	0.00	0.00	0.00	0.00	0.00	30.78	1.56	34.67
Tomato	375.50	8.00	188.50	51.33	0.67	22.67	933.00	17.78	344.56
Other	1028.00	48.00	2219.00	771.00	3.33	2219.00	309.11	138.56	2556.44
Total	**23401.5**	**142**	**4417.5**	**8878.99**	**4.67**	**3040**	**11410**	**337.23**	**7794.01**

Source: census of commercial agriculture, 2002

TABLE 5-B GROSS FARM INCOME AND PRODUCTION OF VEGETABLES IN DISTRICT MUNICIPALITIES OF GAUTENG PROVINCE (... CONTINUED).

Vegetable	Metsweding			Sedibeng			West Rand		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Asparagus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beetroot	0.00	0.00	0.00	0.00	0.00	0.00	376.50	15.00	293.50

Broccoli	0.00	0.00	0.00	0.00	0.00	0.00	1907.75	0.00	0.00
Cabbage	167.50	10.50	256.50	76.00	8.00	235.00	1472.50	43.00	2108.75
Carrot	32.50	1.00	20.00	8.50	0.50	5.50	5232.50	98.00	3492.50
Cauliflower	71.00	2.00	40.00	0.00	0.00	0.00	334.25	16.50	311.25
Celery	0.00	0.00	0.00	0.00	0.00	0.00	343.00	0.00	0.00
Cucumber	0.00	0.00	0.00	221.50	0.00	0.00	658.75	0.00	0.00
Green bean	66.50	3.00	29.50	1.50	1.00	3.50	542.50	23.25	154.50
Green mealie	313.00	0.00	0.00	402.00	0.00	0.00	98.50	0.00	0.00
Lettuce	327.00	0.00	0.00	12.00	0.00	0.00	4774.25	0.00	0.00
Mushroom	7482.00	0.00	0.00	5385.00	0.00	0.00	1121.00	0.00	0.00
Onion	44.50	1.00	136.00	4.00	0.00	0.00	185.00	4.00	82.75
Pepper	0.00	0.00	0.00	0.00	0.00	0.00	596.50	0.00	0.00
Potato	1717.50	54.50	805.50	21.50	1.00	15.50	1655.75	26.25	883.50
Pumpkin	21.00	11.00	113.50	21.50	1.50	21.50	243.50	10.00	175.00
Sweet potato	9.00	1.00	19.50	0.50	0.00	0.00	94.25	5.75	109.50
Tomato	365.00	6.00	305.50	321.00	3.00	146.50	280.75	4.00	136.75
Other	408.00	49.00	944.50	170.00	94.00	1051.50	769.00	163.75	3696.50
Total	**11024.5**	**139**	**2670.5**	**6645**	**109**	**1479**	**20686.25**	**409.5**	**11444.5**

Source: census of commercial agriculture, 2002

TABLE 6-A GROSS FARM INCOME AND PRODUCTION OF FRUIT IN DISTRICT MUNICIPALITIES OF GAUTENG PROVINCE.

Fruit	City of Tshwane	City of Jo'burg	Ekurhuleni

	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Citrus	91.50	5.50	88.50	0.00	0.00	0.00	2.33	0.11	2.22
Subtropical	26.50	0.00	0.00	28.00	0.00	0.00	0.00	0.00	0.00
Banana	0.00	1.00	12.50	1.00	14.00	0.00	0.00	0.00	0.00
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Deciduous	38.00	0.00	0.00	73.33	0.00	0.00	94.89	0.00	0.00
Apple	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peach	0.00	0.50	2.00	0.00	3.67	3.33	0.00	9.89	98.56
Pear	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plums/prunes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Table grape	0.00	1.50	10.50	0.00	1.00	16.67	0.00	0.00	0.00
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**156**	**8.5**	**113.5**	**102.33**	**18.67**	**20**	**97.22**	**10**	**100.78**

Source: census of commercial agriculture, 2002

TABLE 6-B GROSS FARM INCOME AND PRODUCTION OF FRUIT IN DISTRICT MUNICIPALITIES OF GAUTENG PROVINCE.

Fruit	Metsweding			Sedibeng			West Rand		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Citrus	158.50	0.00	0.00	367.00	24.50	369.50	0.00	0.00	0.00
Subtropical	93.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Banana	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Others	0.00	5.00	12.00	0.00	0.00	0.00	0.00	0.00	0.00
Deciduous	2928.50	0.00	0.00	598.00	0.00	0.00	1554.00	0.00	0.00

Apple	0.00	18.00	547.50	0.00	9.00	96.50	0.00	0.00	0.00
Peach	0.00	69.50	688.50	0.00	21.00	182.50	0.00	46.25	563.00
Pear	0.00	19.50	637.00	0.00	0.00	0.00	0.00	0.75	18.00
Plums/prunes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.25	5.50
Table grape	0.00	1.50	16.00	0.00	0.00	0.00	0.00	0.25	0.50
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**3180**	**113.5**	**1901**	**965**	**54.5**	**648.5**	**1554**	**48.5**	**587**

Source: census of commercial agriculture, 2002

4.2.4 KWAZULU-NATAL PROVINCE

KwaZulu-Natal Province has eleven district municipalities. The gross farm income of vegetables in this province runs into millions in seven district municipalities, namely, Umgungundlovu, Ugu, Sisonke, Durban Metro, Thukela, Majuba and iLembe, which generated R26 million, R13 million, R9 million, R8 million, R5 million, R1.8 million, R1.7 million and R1.6 million respectively (Table 7-a; 7-b). The premier vegetables produced in this province are tomatoes, potatoes, pumpkins, pepper, green beans, green peas and to a certain extend onions. In terms of fruit production, district municipalities which produce fruits that generate gross farm income into millions are Umkhanyakude, Uthungulu, Durban Metro, iLembe, Umgungundlovu and Ugu (Table 8-a; 8-b; 8c). Fruits mainly produced in all district municipalities except in Majuba are citrus, followed by pineapples (Table 8-b).

TABLE 7-A GROSS FARM INCOME AND PRODUCTION OF VEGETABLES IN DISTRICT MUNICIPALITIES OF KWAZULU-NATAL PROVINCE.

Vegetable	Durban Metro			iLembe			Majuba			Mzinyathi		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Asparagus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.17	0.00	0.00
Beetroot	147.50	10.5	128.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Broccoli	0.00	0.00	0.00	1476.00	0.00	0.00	0.00	0.00	0.00	218.33	0.00	0.00
Cabbage	1048.50	22.5	743.75	0.00	2.00	80.00	148.00	2.00	155.50	27.17	11.83	661.00
Carrot	112.00	2.75	55.75	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00
Cauliflower	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00

Celery	233.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cucumber	822.25	0.00	0.00	62.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Green bean	54.25	5.25	20.00	0.00	6.00	52.00	78.00	0.00	0.00	2.33	0.33	0.00
Green peas	44.25	0.00		0.00	0.00		6.00	0.00	0.00	178.83	0.00	0.00
Green mealie	66.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lettuce	5358.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mushroom	14.75	0.00	0.00	0.00	0.00	0.00	295.00	0.00	0.00	0.00	0.00	0.00
Onion	4.50	0.00	6.50	115.00	0.00	0.00	0.00	2.00	52.00	4.00	0.00	0.00
Pepper	434.50	0.00	0.00	0.00	0.00	0.00	219.00	0.00	0.00	0.67		0.00
Potato	19.75	12.75	193.00	0.00	0.00	0.00	186.50	9.5	248.50	0.00	39.17	1265.00
Pumpkin	0.00	0.00	9.00	0.00	0.00	0.00	0.00	0.00	185.50	0.00	0.00	0.00
Sweet potato	17.75	0.00	0.00	0.00	0.00	0.00	830.00	0.00	0.00	14.50	0.00	0.00
Tomato	0.00	0.25	7.75	0.00	35.00	776.00	0.00	6.33	0.00	28.17	6.33	308.33
Other	0.00	24.00	317.50	0.00	395.00	5921.00	0.00	70.00	73.00	0.00	7.50	59.83
Total	8378.5	78	533.75	1653	438	6697	1762.5	89.83	714.5	502.17	53	2294.16

Source: census of commercial agriculture, 2002

TABLE 7-B GROSS FARM INCOME AND PRODUCTION OF VEGETABLES IN DISTRICT MUNICIPALITIES OF KWAZULU-NATAL PROVINCE.

Vegetable	Sisonke			Thukela			Ugu			Umgungundlovu		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Asparagus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beetroot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	162.14	4.14	95.00
Broccoli	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	491.29	0.00	0.00
Cabbage	1742.00	36.67	2088.67	81.50	14.00	274.25	1075.25	65.50	2125.25	11213.57	70.14	2634.00
Carrot	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.50	6.50	993.86	35.86	1077.43
Cauliflower	0.00	0.00	0.00	0.00	6.25	0.00	0.00	0.00	0.00	332.86	13.29	275.43
Celery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86	0.00	0.00
Cucumber	0.00	0.00	0.00	0.00	0.00	0.00	1519.00	0.00	0.00	59.29	0.00	0.00
Green bean	23.67	4.00	26.00	10.50	5.75	31.50	87.00	1.25	6.25	315.57	12.14	136.29
Green peas	77.00	0.00	0.00	43.50	5.50	16.00	134.00	0.00	0.00	335.14	0.00	0.00

Green mealie	8.00	0.00	0.00	0.00	0.00	0.00	226.50	0.00	0.00	881.43	0.00	0.00
Lettuce	0.00	0.00	0.00	0.00	0.00	0.00	35.50	0.00	0.00	0.00	0.00	0.00
Mushroom	0.00	0.00	0.00	1.25	0.00	0.00	143.75	0.00	0.00	0.00	0.00	0.00
Onion	19.00	0.00	0.00	566.50	4.00	124.00	10.50	0.00	0.00	531.57	0.00	0.00
Pepper	5806.33	0.00	0.00	4552.75	0.00	0.00	7975.00			9020.00	0.00	0.00
Potato	8.00	100.00	3536.67	27.25	105.00	3146.75	313.75	109.00	28.04	618.86	183.14	5710.71
Pumpkin	0.00	0.67	9.33	0.00	31.75	348.75	0.00	1.25	10.75	0.00	12.57	94.86
Sweet potato	1755.00	0.00	0.00	66.75	0.00	0.00	1838.50	0.00	0.00	693.57	0.00	0.00
Tomato	0.00	5.67	174.33	0.00	3.50	99.25	0.00	14.75	757.50	0.00	7.00	310.14
Other	0.00	130.67	1019.33	1.50	22.25	119.00	0.00	23.00	442.75	226.86	144.71	2395.71
Total	**9439**	**277.68**	**6854.33**	**5351.5**	**198**	**4159.5**	**13368.75**	**148**	**1239.04**	**25876.87**	**482.99**	**12729.57**

Source: census of commercial agriculture, 2002

TABLE 7-C GROSS FARM INCOME AND PRODUCTION OF VEGETABLES IN DISTRICT MUNICIPALITIES OF KWAZULU-NATAL PROVINCE.

Vegetable	Umkhanyakude			Uthungulu			Zulu Land		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Asparagus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beetroot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Broccoli	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cabbage	115.50	8.00	243.00	232.25	10.75	356.75	157.50	8.00	264.75
Carrot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cauliflower	0.00	0.00	0.00	126.75	3.25	65.00	0.00	0.00	0.00
Celery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cucumber	0.00	0.00	0.00	112.00	0.00	0.00	0.00	0.00	0.00
Green bean	33.50	1.00	25.50	7.00	0.50	2.25	3.75	0.00	2.00
Green mealie	29.50	0.00	0.00	1.25	0.00	0.00	58.75	0.00	0.00
Lettuce	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mushroom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Onion	0.00	0.00	0.00	38.25	2.50	57.00	0.00	0.00	0.00

Pepper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Potato	1.00	0.00	0.00	40.75	0.75	20.00	1105.25	24.25	586.75
Pumpkin	0.00	0.00	0.00	0.00	0.00	0.00	17.75	1.75	14.75
Sweet potato	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tomato	613.00	4.00	266.50	401.00	6.75	188.50	362.50	7.00	281.00
Other	389.50	74.50	1135.50	15.50	182.75	3709.75	0.00	134.25	2264.25
Total	**1182**	**87.5**	**1670.5**	**974.75**	**207.25**	**4399.25**	**1705.5**	**175.25**	**3413.5**

Source: census of commercial agriculture, 2002

TABLE 8-A GROSS FARM INCOME AND PRODUCTION OF FRUIT IN DISTRICT MUNICIPALITIES OF KWAZULU-NATAL PROVINCE.

Fruit	Durban Metro			iLembe			Majuba			Mzinyathi		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Citrus	63.00	4.5	65.50	5905.00	389.00	5820.00	0.00	0.00	499.00	16.67	1.83	22.00
Subtropical	1342.25	0.00	0.00	1107.00	0.00	0.00	0.00	0.00	0.00	6.83	0.00	0.00
Avocado	0.00	0.00	0.00	0.00	8.00	40.00	0.00	0.00	0.00	0.00	1.00	2.50
Bananas	0.00	45.5	9.27	0.00	26.00	387.00	0.00	0.00	0.00	0.00	0.00	0.00
Pineapple	0.00	4.75	71.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mangoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Others	0.00	4.00	9.25	0.00	25.00	26.00	0.00	0.00	0.00	0.00	0.00	0.00
Deciduous	52.25	0.00	0.00	0.00	0.00	0.00	166.50	0.00	0.00	32.33	0.00	0.00
Apples	0.00	0.25	9.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	16.50
Peaches	0.00	3.50	3.25	0.00	0.00	0.00	0.00	7.00	55	0.00	0.00	0.00
Pears	0.00	0.50	9.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.83	11.17
Total	**1457.5**	**63**	**176.77**	**7012**	**448**	**6273**	**166.5**	**7**	**554**	**55.83**	**5.16**	**52.17**

Source: census of commercial agriculture, 2002

TABLE 8-B GROSS FARM INCOME AND PRODUCTION OF FRUIT IN DISTRICT MUNICIPALITIES OF KWAZULU-NATAL PROVINCE.

Fruit	Sisonke	Thukela	Ugu	Umgungundlovu

	Income (R'000)	**Area (ha)**	**Yield (tons)**	**Income (R'000)**	**Area (ha)**	**Yield (tons)**	**Income (R'000)**	**Area (ha)**	**Yield (tons)**	**Income (R'000)**	**Area (ha)**	**Yield (tons)**
Citrus	932.67	123.00	871.00	89.00	3.00	45.00	218.00	14.5	183.25	1313.57	69.43	1324.00
Subtropical	2.33	0.00	0.00	0.00	0.00	0.00	11591.25	0.00	0.00	1590.71	0.00	0.00
Avocado	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.75	3.00	0.00	46.71	329.29
Bananas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	356.75	6809.50	0.00	5.00	68.57
Pineapple	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00	21.75	0.00	0.00	0.00
Mangoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.75	100.75	0.00	0.00	0.00
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	16.00	0.00	0.00	0.00
Deciduous	0.00	0.00	0.00	18.50	0.00	0.00	76.75	0.00	0.00	402.57	0.00	0.00
Apples	0.00	0.33	10.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peaches	0.00	0.00	0.00	0.00	1.3	20.00	0.00	0.00	0.00	0.00	12.43	231.00
Pears	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.25	51.00	0.00	1.43	16.42
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	6.71
Total	**935**	**123.33**	**881.33**	**107.5**	**4.3**	**65**	**11886**	**431**	**7185.25**	**3306.85**	**140**	**1975.99**

Source: census of commercial agriculture, 2002

TABLE 8-C GROSS FARM INCOME AND PRODUCTION OF FRUIT IN DISTRICT MUNICIPALITIES OF KWAZULU-NATAL PROVINCE.

Fruit	Umkhanyakude			Uthungulu			Zulu Land		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Citrus	1323.00	77.00	0.00	14592.25	342.75	0.00	4622.25	135.75	0.00
Subtropical	37658.00	0.00	0.00	3862.75	0.00	0.00	227.50	0.00	0.00
Avocado	0.00	0.00	0.00	0.00	13.25	217.00	0.00	3.50	2.50
Banana	0.00	6.00	145.00	0.00	94.00	1798.25	0.00	7.50	115.25
Bananas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pineapple	0.00	926.00	1606.00	0.00	3.50	46.00	0.00	0.00	0.00
Mangoes	0.00	5.50	17.50	0.00	0.00	0.00	0.00	8.75	73.25
Others	0.00	1.00	3.50	0.00	2.00	9.25	0.00	0.00	0.00

Deciduous	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Apples	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peaches	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pears	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Others	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**38981**	**1015.5**	**1772**	**18455**	**455.5**	**2070.5**	**4849.75**	**155.5**	**191**

Source: census of commercial agriculture, 2002

4.2.5 LIMPOPO PROVINCE

Limpopo Province has five district municipalities. The gross farm income from vegetables in this province runs into millions in all five district municipalities, with the highest income coming from Capricorn, Mopani, Sekhukhune, Vhembe and Waterberg , which generated R 162 million, R141 million, R74 million, R39 million and R27 million, respectively (Table 9). The leading vegetables produced in Limpopo Province are tomatoes, potatoes, onions, sweet potatoes, pumpkins, peppers, cucumber, beetroots and to a certain extent, carrots.

In terms of fruit production, all district municipalities also have gross farm income that runs into millions, with the premiers being Mopani, Sekhukhune, Vhembe, Capricorn and Waterberg, which generated R283 million, R197 million,R53.9 million, R20.9 million and R13.4 million, respectively (Table 10). The major fruits produced in all districts are citrus, followed by various subtropical fruits, which are not substantially produced in Sekhukhune and Waterberg district municipalities. However, the latter two districts produced substantial amounts of table grapes.

TABLE 9 GROSS FARM INCOME AND PRODUCTION OF VEGETABLES IN DISTRICT MUNICIPALITIES OF LIMPOPO PROVINCE.

Vegetable	Capricorn			Mopani			Sekhukhune			Vhembe			Waterberg		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Asparagus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beetroot	99.00	7.00	84.00	0.00	0.00	0.00	773.00	51.00	618.00	13.50	0.25	2.75	2.00	1.00	11.60
Broccoli	0.00	0.00	0.00	0.00	0.00	0.00	447.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cabbage	238.00	26.00	397.00	500.33	24.00	706.33	4771.00	154.00	4138.00	230.75	15.00	518.00	381.20	26.40	548.00
Carrot	112.00	9.00	107.00	0.00	0.00	0.00	2746.00	84.00	1778.00	1.50	0.00	0.00	5.60	0.40	5.80
Cauliflower	0.00	0.00	0.00	0.00	0.00	0.00	4274.00	283.00	3705.00	0.00	0.00	0.00	0.00	0.00	0.00
Celery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cucumber	170.00	0.00	0.00	454.67	0.00	0.00	384.00	0.00	0.00	7.25	0.00	0.00	292.40	0.00	0.00
Green bean	33.00	7.00	22.00	1909.00	69.33	549.00	4409.00	220.00	1797.00	93.50	5.25	31.50	325.40	35.00	105.20
Green mealie	2406.00	0.00	0.00	1771.33	0.00	0.00	1056.00	0.00	0.00	1483.00	0.00	0.00	2035.80	0.00	0.00
Green pea	0.00	0.00	0.00	0.00	0.00	0.00	0.00	470.00	1737.00	0.00	0.00	0.00	0.00	0.00	0.00
Lettuce	68.00	0.00	0.00	0.00	0.00	0.00	19.00	0.00	0.00	0.00	0.00	0.00	11.60	0.00	0.00
Mushroom	0.00	0.00	0.00	0.00	0.00	0.00	1545.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Onion	12568.00	359.00	10194.00	51.00	3.00	37.33	2885.00	44.00	1517.00	6234.00	133.75	3413.25	8094.40	180.80	4190.80
Pepper	24.00	0.00	0.00	2488.00	0.00	0.00	1146.00	0.00	0.00	374.50	0.00	0.00	124.00	0.00	0.00
Potato	124871.00	25500.00	71895.00	2658.00	42.67	1700.00	35028.00	687.00	21064.00	15235.25	285.75	8479.75	9800.60	271.60	5651.40
Pumpkin	9117.00	481.00	4536.00	7174.33	381.67	6703.03	4463.00	145.00	1662.00	1236.75	85.75	1235.00	2812.00	233.80	3382.60
Sweet potato	637.00	30.00	600.00	34.00	1.67	29.67	3038.00	100.00	2198.00	546.00	20.25	561.25	84.40	8.60	123.40
Tomato	9668.00	115.00	4319.00	122206.00	1155.67	52877.33	2584.00	42.00	1106.00	12618.25	270.00	13115.50	2291.20	58.80	1765.80
Other	2932.00	424.00	7200.00	2193.33	4188.00	108776.00	5207.00	364 0.00	71710.00	1727.50	1294.75	24402.25	1498.40	567.40	6024.60
Total	**162943**	**4008**	**99354**	**141439.99**	**5866.01**	**171378.69**	**74775**	**5920**	**113030**	**39801.75**	**211 0.75**	**51759.25**	**27759**	**1383.8**	**21809.2**

TABLE 10 GROSS FARM INCOME AND PRODUCTION OF FRUIT IN DISTRICT MUNICIPALITIES OF LIMPOPO PROVINCE

Fruit	Capricorn			Mopani			Sekhukhune			Vhembe			Waterberg		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Citrus	6324.00	257.00	5087.00	197409.33	4461.33	119948.66	122874.00	3325.00	71312.00	30689.75	1172.00	24818.50	7207.20	403.20	5805.20
Subtropical	4628.00	0.00	0.00	86220.67	0.00	0.00	1136.00	0.00	0.00	22865.25	0.00	0.00	444.20	0.00	0.00
Avocado	0.00	132.00	898.00	0.00	1134.67	8637.67	0.00	0.00	0.00	0.00	375.50	2412.25	0.00	2.00	17.40
Banana	0.00	37.00	249.00	0.00	296.67	7550.66	0.00	7.00	110.00	0.00	318.00	6321.75	0.00	14.00	17.20
Mango	0.00	0.00	0.00	0.00	1634.67	10242.33	0.00	92.00	291.00	0.00	88.50	515.25	0.00	0.00	0.00
Pawpaw	0.00	0.00	0.00	0.00	46.00	1182.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pineapple	0.00	0.00	0.00	0.00	0.67	2.00	0.00	0.00	0.00	0.00	5.25	94.00	0.00	0.20	5.40
Others	0.00	75.00	266.00	0.00	233.33	2381.00	0.00	1.00	7.00	0.00	294.00	2989.75	0.00	20.80	223.60
Deciduous	9997.00	0.00	0.00	24.00	0.00	0.00	73434.00	0.00	0.00	300.25	0.00	0.00	5710.40	0.00	0.00
Peach	0.00	102.00	945.00	0.00	0.00	0.00	0.00	11.00	280.00	0.00	0.00	0.00	0.00	26.20	570.60
Prunes/plums	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	70.00
Table grape	0.00	0.00	0.00	0.00	0.00	0.00	0.00	918.00	14874.00	0.00	0.00	0.00	0.00	42.60	988.80
Others	0.00	20.00	39.00	0.00	10.67	6.33	0.00	0.00	0.00	0.00	0.75	0.00	0.00	0.00	8.40
Total	**20949**	**623**	**7484**	**283654**	**7818.01**	**149951.32**	**197444**	**4354**	**86874**	**53855.25**	**2254**	**815260.58**	**13361.8**	**514**	**7706.6**

Source: census of commercial agriculture, 2002

2.6 MPUMALANGA PROVINCE

Mpumalanga Province has three district municipalities. The gross farm income from vegetables in this province runs into millions in all three district municipalities, with the leading income generators being Nkgangala, Ehlanzeni and Gert Sibande,which generated R29.1millon, R11 million and R5.6 million (Table 11). Mpumalanga Province produces all vegetables except for asparagus. Also, the high-veld area of Gert Sibande District Municipality does not produce 10 of the 20 vegetables which are produced in Mpumalanga Province.

In terms of fruit production, Ehlanzeni and Nkgangala are the major income generators, with Gert Sibande being the third. All three district municipalities have gross farm income that runs into millions. Ehlanzeni generated R92.8 million, followed by Nkgangala with R51.5 million and Gert Sibande generating over R20 million mainly coming from citrus and subtropical crops (Table 12). The major fruits produced in all districts are citrus, whereas Gert Sibande does not produce any subtropical fruits, probably due to its high altitude.

TABLE 11 GROSS FARM INCOME AND PRODUCTION OF VEGETABLES IN DISTRICT MUNICIPALITIES OF MPUMALANGA PROVINCE.

Vegetable	Ehlanzeni			Gert Sibande			Nkgangala		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Asparagus	0.00	0.00	0.00	128.64	0.00	0.00	0.00	0.00	0.00
Beetroot	25.29	1.86	22.00	11.27	0.45	13.64	145.00	8.60	129.40
Broccoli	0.00	0.00	0.00	0.00	0.00	0.00	14.20	0.00	0.00
Cabbage	429.57	19.43	661.14	252.73	11.91	394.64	714.40	46.80	1109.40
Carrot	122.14	4.29	80.43	69.64	3.18	85..18	1570.80	43.60	1478.80
Cauliflower	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Celery	13.29	0.00	0.00	0.00	0.00	0.00	14.00	0.00	0.00
Cucumber	863.43	0.00	0.00	62.18	0.00	0.00	47.20	20.80	155.80
Green bean	1392.43	37.00	427.57	8.45	0.45	4.45	237.80	0.00	0.00
Green mealie	108.86	0.00	0.00	43.18	0.00	0.00	222.80	0.00	0.00
Green peas	0.00	1.00	1.43	0.00	0.00	0.00	0.00	12.00	72.80
Lettuce	76.00	0.00	0.00	0.00	0.00	0.00	282.20	0.00	0.00
Mushroom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Onion	104.00	3.00	55.71	353.09	7.36	155.00	76.00	2.20	38.80
Pepper	905.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Potato	1117.43	34.29	528.00	4248.18	107.83	2482.09	25243.40	354.20	10913.40
Pumpkin	395.29	47.14	511.14	42.09	30.64	49.36	273.40	207.40	255.00
Sweet potato	373.29	26.86	477.86	307.73	1.64	28.82	0.00	0.00	0.00
Tomato	4184.86	61.43	2521.57	83.45	0.91	64.00	25.20	3.83	106.40
Other	895.00	807.43	28989.57	4.55	20.00	65.55	279.60	304.20	11977.60

Total	**11006.02**	**1043.73**	**34276.42**	**5615.185615.18**	**184.37**	**3342.73**	**2914629146**	**1003.63**	**26237.4**

Source: census of commercial agriculture, 2002

TABLE 12 GROSS FARM INCOME AND PRODUCTION OF FRUIT IN DISTRICT MUNICIPALITIES OF MPUMALANGA PROVINCE.

Fruit	Ehlanzeni			Gert Sibande			Nkgangala		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Citrus	35196.29	1179.57	27569.00	873.27	3.27	33.64	24317.00	307.60	10558.20
Subtropical	56607.71	0.00	0.00	19446.64	0.00	0.00	26529.17	0.00	0.00
Avocado	0.00	533.43	3416.57	0.00	0.00	0.00	0.00	0.00	0.00
Banana	0.00	1083.14	172450.57	0.00	0.00	0.00	0.00	0.00	0.00
Mango	0.00	439.14	2278.14	0.00	0.00	0.00	0.00	0.00	0.00
Pawpaw	0.00	63.86	0.00	0.00	0.00	0.00	0.00	0.00	441.00
Pineapple	0.00	0.71	2.43	0.00	0.00	0.00	0.00	0.00	0.00
Others	0.00	139.43	1130.14	0.00	3.91	1769.73	0.00	0.40	4.00
Deciduous	1018.71	0.00	0.00	349.00	0.00	0.00	640.17	0.00	0.00
Apple	0.00	0.00	0.00	0.00	6.83	0.00	0.00	0.20	0.00
Peach	0.00	28.71	0.00	0.00	1.00	0.00	0.00	48.60	0.00
Pear	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.20	0.00
Table grape	0.00	2.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Others	0.00	6.43	0.00	0.00	0.91	0.00	0.00	0.60	0.00
Total	**92822.71**	**3477.71**	**206846.85**	**20668.91**	**15.92**	**1803.37**	**51486.34**	**357.6**	**11003.2**

Source: census of commercial agriculture, 2002

4.2.7 NORTH WEST PROVINCE

North West Province has four district municipalities. The gross farm income from vegetables in this province runs into a few millions only **in Bojanala District Municipality, which generated R1.2**

million only (Table 13). The leading vegetables produced in North West Province are carrots, tomatoes, potatoes, sweet potatoes, pumpkins and green beans. In this province fruits do not contribute substantially into the gross farm income, although citrus and peaches are produced to a certain extent (Table 14).

TABLE 13 GROSS FARM INCOME AND PRODUCTION OF VEGETABLES IN DISTRICT MUNICIPALITIES OF NORTH WEST PROVINCE.

Vegetable	Bojanala			Bophirima			Central			Southern		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Asparagus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beetroot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	25.67	17.60	0.00	0.00
Broccoli	72.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cabbage	217.00	4.75	171.50	183.00	8.33	272.67	56.67	3.00	70..00	0.00	0.00	0.00
Carrot	36.67	0.50	16.75	49.33	2.00	68.00	11.67	1.67	32.67	0.00	0.00	0.00
Cauliflower	73.75	3.50	47.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Celery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cucumber	199.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Green bean	99.00	8.25	14.50	84.00	4.67	27.00	11.67	2.00	12.00	19.00	0.25	1.25
Green peas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Green mealie	57.33	0.00	0.00	220.67	0.00	0.00	32.67	0.00	0.00	103.20	0.00	0.00
Lettuce	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.60	0.00	0.00
Mushroom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Onion	86.00	3.25	66.00	1.00	0.55	1.50	21.67	13.67	297.33	7.00	0.75	6.25
Pepper	6.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Potato	187.75	10.50	312.50	0.00	0.00	0.00	29.50	8.50	23.50	229.33	0.00	0.00
Pumpkin	45.00	3.00	34.25	42.67	14.67	78.67	80.33	6.33	22.67	17.00	4.50	24.75
Sweet potato	9.67	0 .75	8.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tomato	1.50	6.67	274.33	69.00	2.00	45.33	91.67	2.33	69.67	71.80	1.20	33.00
Other	146.50	28.00	90.00	38.00	3.00	8.50	0.00	7.00	97.67	12.00	12.00	69.00
Total	**1238.84**	**34.67**	**1036.08**	**687.67**	**35.22**	**501.67**	**335.85**	**46.5**	**651.18**	**478.53**	**18.7**	**134.25**

Source: census of commercial agriculture, 2002

TABLE 14 GROSS FARM INCOMES AND PRODUCTION OF FRUIT IN DISTRICT MUNICIPALITIES OF NORTH WEST PROVINCE.

Fruit	Bojanala			Bophirima			Central			Southern		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Citrus	53.00	39.71	432.94	.00	0.00	0.00	54.33	3.00	76.67	.40	0.800	13.60
Subtropical	39.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.40	0.00	0.00
Avocado	0.00	15.75	23.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Others	0.00	0.00	0.00	0.00	14.33	164.00	0.00	0.00	0.00	0.00	0.00	0.00
Deciduous	0.00	0.00	0.00	41.00	0.00	0.00	27.67	0.00	0.00	190.20	0.00	0.00
Peaches	0.00	29.25	189.75	0.00	2.00	3.33	0.00	5.00	100.00	0.00	12.40	1..20
Plums	0.00	8.75	16.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Table grape	0.00	2.33	16.67	0.00	0.00	0.00	0.00	0.67	10.00	0.00	2.00	47.60
Others	0.00	0.25	0.50	0.00	0.67	10.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**92.67**	**96.04**	**679.61**	**41.00**	**17.00**	**177.33**	**82.00**	**8.67**	**186.67**	**198.00**	**15.20**	**62.40**

Source: census of commercial agriculture, 2002

.2.8 NORTHERN CAPE PROVINCE

Northern Cape Province has five district municipalities. The gross farm income from vegetables in this province runs into a few millions, with Diamond Veld leading with ca. R26million, Bo-Karoo,R3 million and Namakwa generating R1.4 million in gross farm income (Table 15). The premier vegetables produced in Northern Cape are tomatoes, potatoes, pumpkins, onions, cabbage and beetroots. Three district municipalities, namely, Benede Orange, Diamond Veld and Namakwa, lead in fruit production in the province, generating R25.8 million, R5.7 million and R2.7 million respectively, mainly coming from citrus and deciduous fruits (Table 16).

TABLE 15 GROSS FARM INCOME AND PRODUCTION OF VEGETABLES IN DISTRICT MUNICIPALITIES OF NORTHERN CAPE PROVINCE.

Vegetable	Benede Orange			Bo-Karoo			Diamond veld			Kgalagadi			Namaqwa		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Asparagus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71.40	0.00	0.00
Beetroot	2.67	0.33	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.20	0.80	8.60

Broccoli	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cabbage	0.00	0.00	0.00	12.77	0.77	6.92	23.50	1.25	45.00	0.00	2.00	83.00	0.00	3.00	97.00
Carrot	0.00	0.00	0.00	6.92	0.58	5.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cauliflower	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Celery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cucumber	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Green bean	0.00	0.00	0.00	0.54	0.08	0.15	312.50	12.50	120.00	0.00	0.00	0.00	51.60	2.00	12.00
Green pea	0.00	12.00	28.33		0.00	0.00	0.00	4.25	1050		0.00	0.00	0.00	0.00	0.00
Green mealie	11.67	0.00	0.00	15.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lettuce	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mushroom	0.00	0.00	0.00	0.00	0.00	0.00	432.75	0.00	0.00	0.00	0.00	0.00	59.40	0.00	0.00
Onion	6.00	0.33	4.00	413.25	11.31	334.31	6796.75	104.25	4072.00	0.00	0.00	0.00	247.80	6.60	210.40
Pepper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	99.80	0.00	0.00
Potato	740.00	16.67	340.33	2027.31	210.67	4681.92	17566.00	303.50	10105.75	50.00	1.00	19.00	630.60	15.80	394.40
Pumpkin	15.67	2.67	14.00	549.46	60.23	472.31	301.50	12.50	84.25	0.00	0.00	0.00	15.20	1.40	19.00
Sweet potato	0.00	0.00	0.00	2.00	0.15	2.69	22.25	1.50	27.00	0.00	0.00	0.00	0.00	0.00	0.00
Tomato	0.00	0.00	0.00	43.23	0.69	22.08	85.50	1.50	38.50	142.00	3.00	80.00	227.40	2.20	94.20
Other	186.67	58.33	661.33	23.77	5.08	66.85	334.00	145.50	2612.00	0.00	32.00	166.00	12.40	18.00	184.40
Total	**962.68**	**90.33**	**1049.99**	**3074.48**	**289.56**	**5592.75**	**25874.75**	**586.75**	**18154.5**	**192**	**38**	**348**	**1430.8**	**49.8**	**1020**

TABLE 16 GROSS FARM INCOME AND PRODUCTION OF FRUIT IN DISTRICT MUNICIPALITIES OF NORTHERN CAPE.

Fruit	Benede Orange			Bo-Karoo			Diamond veld			Kgalagadi			Namaqwa		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Citrus	1439.67	37.33	546.33	44.00	2.15	37.08	2656.75	133.25	2319.75	167.00	12.00	166.00	25.00	5.40	55.80
Subtropical	441.33	0.00	0.00	2.31	0.00	0.00	688.00	0.00	0.00	0.00	0.00	0.00	43.20	0.00	0.00
Mango	0.00	5.33	63.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	35.67	572.00	0.00	0.15	2.15	0.00	29.25	490.75	0.00	0.00	0.00	0.00	2.00	22.20

Deciduous	256206.00	0.00	0.00	297.46	0.00	0.00	2308.25	0.00	0.00	0.00	0.00	0.00	2612.40	0.00	0.00
Total	**258087.00**	**78.33**	**1182.00**	**343.77**	**2.30**	**39.23**	**5653.00**	**162.50**	**2810.50**	**167.00**	**12.00**	**166.00**	**2680.6.00**	**7.40**	**78.00**

Source: census of commercial agriculture, 2002

4.2.9 WESTERN CAPE PROVINCE

Western Cape Province has six district municipalities. In all district municipalities, the gross farm income from vegetables runs into millions. The leading district municipalities in generating income in are West Coast, Cape Metropole, Cape Winelands, Eden, Overberg and Central Karoo, which generated R58.5 million, R56 million, R31 million, R8 million, R5.8 million and R1.3 million, respectively (Table 17-a; 17-b). The major vegetables produced in Western Cape Province include tomatoes, potatoes, onions, pepper, pumpkins, sweet potatoes, lettuce, cauliflowers, carrots, beetroots and cabbage. All six district municipalities in the Western Cape generate gross farm income from fruits into millions (Table 18-a; 18-b). The leading income generators in decreasing order are West Coast (R1 billion), Cape Winelands (R731.1 million), Overberg (R227 million), Cape Metropole (R78 million), Eden (R14.3 million) and Central Karroo (R2.9 million).

TABLE 17-A GROSS FARM INCOME AND PRODUCTION OF VEGETABLES IN DISTRICT MUNICIPALITIES OF WESTERN CAPE PROVINCE.

Vegetable	Cape metropole			Cape winelands			Central Karoo		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Asparagus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Beetroot	443.67	32.67	414.00	61.67	2.67	54.00	0.00	0.00	0.00
Broccoli	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cabbage	6869.00	273.00	4489.52	658.00	171.00	6706.33	0.00	0.00	0.00
Carrot	16001.00	308.67	8433.00	0.00	240.67	6733.00	0.00	0.00	0.00
Cauliflower	2144.00	64.67	1589.33	2144.00	64.67	1589.33	0.00	0.00	0.00
Celery	707.33	0.00	0.00	707.33	0.00	0.00	0.00	0.00	0.00

Cucumber	623.00	0.00	0.00	977.00	0.00	0.00	0.00	0.00	0.00
Green bean	2229.00	101.00	667.00	704.00	44.00	281.00	0.00	0.00	0.00
Green mealie	12.00	0.00	0.00	13695.00	0.00	0.00	0.00	0.00	0.00
Lettuce	5276.67	0.00	0.00	6061.67	0.00	0.00	0.00	0.00	0.00
Mushroom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Onion	5035.00	43.67	950.33	101.00	36.67	827.33	163.00	4.50	86.5
Pepper	781.00	0.00	0.00	624.00	0.00	0.00	0.00	0.00	0.00
Potato	8490.00	201.00	5176.67	0.00	320.00	7089.67	44.00	0.00	30.25
Pumpkin	1050.00	74.33	1044.00	85.00	52.33	897.00	52.00	1.50	12.25
Sweet potato	34.33	5.00	40.33	918.33	15.00	415.33	0.00	0.00	0.00
Tomato	3331.00	30.33	1121.67	1204.00	76.33	5093.67	130.00	0.25	7.50
Other	3728.00	606.67	11708.67	3860.00	553.67	11304.72	898.50	22.00	22.00
Total	**56755.00**	**1741.01**	**35634.52**	**31801.00**	**1577.01**	**40991.38**	**1287.50**	**28.25**	**158.50**

Source: census of commercial agriculture, 2002

TABLE 17-B GROSS FARM INCOME AND PRODUCTION OF VEGETABLES IN DISTRICT MUNICIPALITIES OF WESTERN CAPE PROVINCE (CONTINUED).

Vegetable	Eden			Overberg			West cost		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Asparagus	0.00	0.00	0.00	0.00	0.00	0.00	2.76	0.00	0.00
Beetroot	24.44	2.44	18.44	23.50	1.25	15.75	25.43	0.00	0.00
Broccoli	933.67	0.00	0.00	317.25	0.00	0.00	279.24	0.00	0.00
Cabbage	596.50	36.00	672.56	93.00	18.00	506.75	923.98	24.14	660.57
Carrot	132.00	9.11	118.78	0.00	0.00	0.00	1183.12	15.00	372.57
Cauliflower	244.22	5.56	73.56	53.00	2.50	46.25	238.97	0.00	0.00
Celery	1756.33	0.00	0.00	0.00	0.00	0.00	484.57	0.00	0.00
Cucumber	16.56	0.00	0.00	59.00	0.00	0.00	2035.71	0.00	0.00
Green bean	10.50	12.33	73.67	67.00	4.00	26.50	334.01	20.71	126.29
Green peas	339.50	0.00	0.00	1653.00	0.00	0.00	1048.50	0.00	0.00
Green mealie	1433.44	0.00	0.00	90.50	0.00	0.00	1124.72	0.00	0.00
Lettuce	0.00	0.00	0.00	0.00	0.00	0.00	465.62	0.00	0.00
Mushroom	637.50	0.00	0.00	511.00	0.00	0.00	1461.81	0.00	0.00
Onion	500.78	11.67	233.78	744.75	48.25	1065.75	1150.28	20.00	432.29

Pepper	820.00	0.00	0.00	191.00	0.00	0.00	32036.69	0.00	0.00
Potato	191.00	46.00	925.67	268.00	82.75	377.75	959.18	2227.00	65921.14
Pumpkin	138.33	10.22	90.67	25.25	34.50	449	507.73	85.29	941.71
Sweet potato	53.00	8.33	165.56	1784.00	1.50	28.75	13602.56	29.43	879.29
Tomato	0.00	6.33	149.67	0.00	12.00	361	2.76	0.00	0.00
Other	248.56	0.00	1816.11	0.00	208.75	3336.25	614.55	1891.86	33583.00
Total	**8076.33**	**147.99**	**4338.47**	**5880.25**	**413.50**	**6213.75**	**58482.19**	**4313.43**	**102916.86**

Source: census of commercial agriculture, 2002

TABLE 18-A GROSS FARM INCOME AND PRODUCTION OF FRUIT IN DISTRICT MUNICIPALITIES OF WESTERN CAPE PROVINCE

Fruit	Cape metropole			Cape wine lands			Central Karoo		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Citrus	2414.00	56.67	1134.00	30399.00	691.71	15050.00	13.50	1.5	13.25
Subtropical	2212.67	0.00	0.00	1224.57	0.00	0.00	0.00	0.00	0.00
Mango	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00
Other	0.00	95.33	0.00	0.00	69.71	0.00	0.00	0.00	0.00
Deciduous	73851.67	0.00	0.00	700090.43	0.00	0.00	2977.5	0.00	0.00
Total	**78478.34**	**152.00**	**1134.00**	**731714.00**	**761.71**	**15050.00**	**2991.00**	**1.50**	**13.25**

TABLE 18-B GROSS FARM INCOME AND PRODUCTION OF FRUIT IN DISTRICT MUNICIPALITIES OF WESTERN CAPE PROVINCE (CONTINUED).

Fruit	Eden			Overberg			West cost		
	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)	Income (R'000)	Area (ha)	Yield (tons)
Citrus	314	6.89	140	8154	202.50	4947.75	51184.43	1471.00	36135.43
Subtropical	154.89	0.00	0.00	28	0.00	0.00	918613.43	0.00	0.00
Avocado	0.00	0.67	0.00	0.00	0.5	0.00	0.00	0.00	0.00
Mango	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.43
Others	0.00	5.44	0.00	0.00	0.75	0.00	0.00	0.00	208.21
Deciduous	13830	0.00	0.00	219211.25	0.00	0.00	51184.43	1471.00	36135.43
Total	**14298.89**	**13.00**	**140.00**	**227393.25**	**203.75**	**4947.75**	**1020982.29**	**2942.00**	**72481.50**

Source: census of commercial agriculture, 2002

4.3 SUMMARY AND CONCLUSION

This is a broad analysis of the economies and productivity of various vegetables and fruits in line with the newly demarcated district municipalities in the Republic of South Africa. Basically, those vegetables and fruits which contribute the most gross farm income were singled out, in order to allow for the selection of the suitable districts where the fresh produce market depots can be piloted. However, it should be noted that those vegetables and fruits which were not selected should be viewed as crops with the potential for further development towards a niche market.

As fresh produce marketing depots with packing and cool storage facilities are generally located in high production areas, it would be important that producers in high-producing district municipalities be sampled as key informants by engaging municipalities and provincial department of agriculture to guide the process of locating the facilities. The commercial and emerging producers will both be interviewed in order to obtain a balanced view of the production potential of the district. This will include the current marketing initiatives by government institutions, private business and other stakeholders in agriculture.

CHAPTER 5

RESULTS OF SURVEYS FOR THE ESTABLISMENT OF FRESH PRODUCE DEPOT FACILITIES IN NINE PROVINCES OF SOUTH AFRICA

5.1 Introduction

Consultative workshops on the feasibility of establishing fresh produce depot facilities in nine provinces of South Africa started on 11 August 2008 through 30 September 2008. This chapter provides the summary of the major findings of the baseline study at the identified priority locations for the establishment of the fresh produce depot facilities. Detailed results of the analysed data per province is summarised in **5.3.1.**

5.2 LOCATION OF DEPOT FACILITIES IN NINE PROVINCES

5.2.1 STAKEHOLDER CONSULTATIVE PROCESS

Representatives of the National Department of Agriculture, provincial departments of agriculture, district municipalities, farmers' unions, farmer representatives, financial institutions and fresh produce marketing agents, participated in stakeholder consultative processes for the location of depot facilities per province. Attendance registers per province were circulated to provide evidence of attendance. The provincial departments of agriculture and district municipalities were engaged to buy-into the concept of establishing depot facilities in order to avoid duplication with any similar initiatives in the identified locations.

The participating stakeholders were also allowed to make presentations with respect to the current situation with regard to fresh produce marketing facilities in targeted district municipalities. The available facilities are located in private farms, which specialise in specific commodities such as citrus, mangoes, avocadoes, tomatoes, *etc*. In other provinces such as Limpopo,,KwaZulu Natal and North West locations were already identified for the fresh produce depot facilities, but these were not yet budgeted for. In all provinces, it was agreed that the proposed facilities would change the lives of the previously marginalised farmers for the better.

5.2.2 IDENTIFIED LOCATIONS AND WATER SOURCE

During the selection consultative processes, participating stakeholders were allowed to make presentations with regard to locations in which the facility should be located. The service provider presented the status quo in terms of gross income and volumes of horticultural produce in a province where consultation was underway. In selecting a suitable location of the fresh produce depot facilities, the sustainability of the facility was ensured by taking the following factors into consideration: (1) current production of fresh produce by both emerging and commercial farmers, (2) availability of government-owned land and/or buildings, (3) accessibility to the proposed site and distance from production areas, and the (4) availability of irrigation water (borehole, dam or irrigation scheme) for the production of fresh produce

In each province, after identifying one or two locations, the participating stakeholders had to prioritise the location of the facility in that province. For instance, in the Eastern Cape Province, the priority location for the fresh produce depot is Port Saint Johns, situated in OR Tambo District Municipality.

TABLE 19. PRIORITY AREAS FOR LOCATION OF THE DEPOTS

PROVINCE	DISTRICT MUNICIPALITY	PRIORITY LOCATION	TYPE OF WATER SOURCE
Eastern Cape	OR Tambo	1 = Port Saint Johns	Irrigation scheme
	Amathole	2 = Nkonkonbe	Irrigation scheme
Free State	Thabomofutsanyana	1 = Ditlhabeng	Irrigation scheme
	Motheo	2 = Mantsopa	Borehole/dam
Gauteng	Sedibeng	1 = Lesedi	Borehole/dams
		2 = Midvaal	Borehole/dam
KwaZulu-Natal	Umkhanyakude	1 = Jozini	Irrigation scheme
	Ilembe	2 = Ndwendwe	Dam
Limpopo	Vhembe	1 = Thulamela	Irrigation scheme
	Mopani	2 = Greater Tzaneen	Irrigation scheme

Mpumalanga	Ehlanzeni	1 = Bushbuckridge	Irrigation scheme
		2 = Mbombela	Irrigation scheme
Western Cape	West Coast	1 = Matzikama	Dam
	Cape winelands	2 = Ceres	River Dam
Northern Cape	Frances Baard	1 = Jan Kemp	Irrigation scheme
	Siyanda	2 = Upington	Irrigation scheme
North West	Dr Ruth Mompati	1 = Taung	Irrigation scheme
	Ngaka Modiri Molema	2 = Zeerust	Irrigation scheme

5.3 PRODUCTION OF EMERGING PRODUCERS IN TARGETED DISTRICTS

Emerging farmers are producing various vegetables and fruits in the surroundings of the priority locations. The fresh produce at these locations were summarised per province in nine tables of subsection 5.3.1 item 7.

5.3.1 PROVINCIAL PRODUCTION OF EMERGING PRODUCERS IN FRUIT AND VEGETABLES

5.3.1.1 EASTERN CAPE PROVINCE

	Researched items	**Findings**
1.	Description of depot location	Priority location 1 for establishment of the depot was Port Saint Johns in OR Tambo DM; with location 2 being Nkonkonbe in Amathole DM.
2.	Agricultural potential	**Water source**: In both priority locations irrigation water is directly from the rivers, specifically from river dams.
		Availability of water: Irrigation water is currently available all year round at both locations.
		Irrigation method: Generally, farmers use water-saving irrigation methods such as sprinkler irrigation methods.
3.	Number of farmers	The Port Saint Johns Fresh Produce Depot (FPD) will serve a total of 219 marginalised farmers, whereas the Nkonkonbe FPD will serve a total of 97 farmers. Combined, the two facilities will serve a total of at least 316 farmers

4.	Land size (ha)	Farmers who will serve the Port Saint Johns FPD and the Nkonkonbe FPD have 112 ha and 465 ha, respectively, for a total of 577 ha being available to service the two proposed fresh produce depot facilities.
5.	Crop produced	In decreasing order, the following crops are currently produced: potato, cabbage, butternut, spinach, pepper and beetroots during the cool seasons, with maize being produced during summer months at Nkonkonbe. Also, for the Port Saint Joins FPD, there are farmers who produce citrus, bananas, avocados and mangos.
6.	Production schedules	Currently the two production centres do not have production schedules, which suggest that production is not coordinated. The farmers indicated the need to have production schedules.
7.	Production volumes	The farmers do not keep production records. However, from the areas planted, estimated production volumes (tons) for crop produced per ha is as follows; tomato (50 tons), potato (30 tons), cabbage (40 tons), butternuts (20 tons),spinach (15 tons), pepper (25 tons), beetroot (25 tons) and green mealies (20 tons). Estimated production per ha is avocados (12 tons), mangoes (50 tons), citrus (60 tons) and bananas (30 tons)
8.	Land ownership	This is communal land, with the farmers having Permission to Occupy certificates. Consequently, the land is inheritable by next of kin. This land ownership may constitute certain challenges in that if the farmer is not interested in farming and is also reluctant to lease the land, it may become difficult to take advantage of the economies of scale that these schemes can confer.
9.	Technical knowledge	In both priority areas, farmers indicated that technical-know how in crop production was a constraint, suggesting the need for technical training in the preferred crops.
10.	Quality standards	In both preferred locations, the respondents indicated that they did not have information on quality standards as prescribed by the fresh produce markets
11.	Production resources	**Skilled management**: In both priority locations, lack of skilled management was a major constraint, although management structures were already in place.
		Tractors/ Equipment: This was a major constraint in both priority locations.
		Post-harvest handling facilities: In both priority locations respondents indicated that lack of post-harvest handling facilities was a major constraint to the production of their crops. The listed constraints also included various information related to successful marketing of fresh produce.

		Workforce: In both locations, the respondents indicated that farm labour was not a constraint.
12.	Market potential	In both locations the current marketing arrangements comprise household and local markets, with the national and export markets providing an untapped market.
13.	Inputs suppliers	The two areas have well-established input suppliers.
14.	Risk considerations	In both locations, lack of management skills, compounded with low education, may constitute a high risk, along with high summer temperatures.
15.	Legal issues	The proposed locations of the depot facilities are on local municipality land and during the workshop their representatives indicated that land would be made available for the facilities at the selected locations.
16.	Access to finance	Access to finance for production loans was currently a constraint to farmers at both priority locations.
17.	Infrastructure	Access roads from the farms to the locations of the fresh produce depots were a constraint.
18.	Transport	Transport both from the farms to the proposed locations and then to markets was a constraint for respondents from both locations.

DM = District Municipality

5.3.1.2 FREE STATE PROVINCE

	Researched items	**Findings**
1.	Description of depot location	The priority location 1 for establishment of the depot was Ditlhabeng in Thabomofutsanyana DM; with location 2 being Mantsopa in Motheo DM.
2.	Agricultural potential	**Water source**: In both priority locations irrigation water is directly from the rivers, specifically from river dams.
		Availability of water: Irrigation water is currently available all year round at both locations.
		Irrigation method: Generally, farmers use water-saving irrigation methods such as sprinkler irrigation methods.
3.	Number of farmers	The Ditlhabeng Fresh Produce Depot (FPD) will serve a total of 154 marginalised farmers, whereas the Mantsopa FPD will serve a total of 112 farmers. Combined, the two

		facilities will serve a total of at least 266 farmers
4.	Land size (ha)	Farmers who will serve the Ditlhabeng FPD and the Mantsopa FPD have 680 ha and 413 ha, respectively, for a total of 1 093 ha being available to service the two proposed fresh produce depot facilities.
5.	Crop produced	In decreasing order, the following crops are currently produced: cabbage, potato, butternut, spinach, pepper and beetroots.
6.	Production schedules	Currently the two production centres do not have production schedules, which suggest that production is not coordinated. The farmers indicated the need to have production schedules.
7.	Production volumes	The farmers do not keep production records. However, from the areas planted estimated production volumes (tons) for crop produced per ha were as follows; potato (30 tons), cabbage (40 tons), butternuts (20 tons), spinach (15 tons), pepper (25 tons) and beetroot (25 tons).
8.	Land ownership	The land for these emerging farmers is mostly communal land, with the farmers having Permission to Occupy certificates.
9.	Technical knowledge	In both priority areas, farmers indicated that technical-know how in crop production was a constraint, suggesting the need for technical training in the preferred crops.
10.	Quality standards	In both preferred locations, the respondents indicated that they did not have information on quality standards as prescribed by the fresh produce markets.
11.	Production resources	**Skilled management**: In both priority locations, lack of skilled management was a major constraint, although management structures were already in place.
		Tractors/ Equipment: This was a major constraint in both priority locations.
		Post-harvest handling facilities: In both priority locations respondents indicated that lack of post-harvest handling facilities was a major constraint to the production of their crops. The listed constraints also included various information related to successful marketing of fresh produce.
		Workforce: In both locations, the respondents indicated that farm labour was not a constraint.

12.	Market potential	In both locations, the current marketing arrangements comprise household and local markets, with the national and export markets providing an untapped market.
13.	Inputs suppliers	The two areas have well-established input suppliers.
14.	Risk considerations	In both locations, lack of management skills, compounded with low education, may constitute a high risk, along with high summer temperatures.
15.	Legal issues	The proposed locations of the depot facilities are on local municipality land and during the workshop their representatives indicated that land would be made available for the facilities at the selected locations.
16.	Access to finance	Access to finance for production loans was currently a constraint to farmers at both priority locations.
17.	Infrastructure	Access roads from the farms to the locations of the fresh produce depots were a constraint.
18.	Transport	Transport both from the farms to the proposed locations and then to markets was a constraint for respondents from both locations.

DM = District Municipality

5.3.1.3 GAUTENG PROVINCE

	Researched items	**Findings**
1.	Description of depot location	The priority location 1 for establishment of the fresh produce depot was Lesedi in Sedibeng DM, with location 2 being proposed at Midvaal in Sedibeng DM
2.	Agricultural potential	**Water source**: In both priority locations irrigation water is directly from the municipality tap-water, which may be costly for sustainable crop production. Since this water is treated, it may be harmful, particular to bacteria that is required to drive the Nitrogen cycle to produce nitrates which is the form in which N is absorbed by plants.
		Availability of water: Irrigation water is currently available all year round at both locations.
		Irrigation method: Generally, farmers use water-saving irrigation methods such as sprinkler irrigation methods.
3.	Number of farmers	The Lesedi Fresh Produce Depot (FPD) will serve a total of 29, whereas there were no statistics for Midvaal FPD.

4.	Land size (ha)	Farmers who will serve the Lesedi FPD have a total of 64.5 ha.
5.	Crop produced	In decreasing order, the following crops are currently produced: spinach, cabbage, beetroot, beans/peas, carrot, onion and pumpkin.
6.	Production schedules	Currently the two production centres do not have production schedules, which suggest that production is not coordinated. The farmers indicated the need to have production schedules.
7.	Production volumes	The farmers do not keep production records. However, from the areas planted, estimated production volumes (in tons) per hectare are as follows; spinach (15), cabbage (40), beetroot (25), beans/peas (12), carrot (25), onion (25) and pumpkin (20).
8.	Land ownership	This is municipality land, with farmers not having Permission to Occupy certificates. Consequently, the land is not inheritable by the next of kin.
9.	Technical knowledge	In both priority areas, farmers indicated that technical-know how in crop production was a constraint, suggesting the need for technical training in the preferred crops.
10.	Quality standards	In both preferred locations, the respondents indicated that they did not have information on quality standards as prescribed by the fresh produce markets
11.	Production resources	**Skilled management**: In both priority locations, lack of skilled management was a major constraint, although management structures were already in place.
		Tractors/ Equipment: This was a major constraint in both priority locations.
		Post-harvest handling facilities: In both priority locations respondents indicated that lack of post-harvest handling facilities was a major constraint to the production of their crops. The listed constraints also included various information related to successful marketing of fresh produce.
		Workforce: In both locations, the respondents indicated that farm labour was generally not a constraint.
12.	Market potential	In both locations the current marketing arrangements comprise household and local markets, with the national and export markets providing an untapped market.
13.	Inputs suppliers	The two areas have well-established input suppliers.

14.	Risk considerations	In both locations, lack of management skills, compounded with low education, may constitute a high risk, along with high summer temperatures.
15.	Legal issues	The proposed locations of the depot facilities are on local municipality land and during the workshop their representatives indicated that land would be made available for the facilities at the selected locations.
16.	Access to finance	Access to finance for production loans was currently a constraint to farmers at both priority locations.
17.	Infrastructure	Access roads from the farms to the locations of the fresh produce depots were a constraint.
18.	Transport	Transport both from the farms to the proposed locations and then to markets was a constraint for respondents from both locations.

DM = District Municipality

5.3.1.4 KWAZULU-NATAL PROVINCE

	Researched items	**Findings**
1.	Description of depot location	The Priority location 1 for establishment of the depot was Jozini in Umkhanyakude DM; with location 2 being Indwendwe in Ilembe DM.
2.	Agricultural potential	**Water source**: In both priority locations irrigation water is directly from the rivers, specifically from river dams.
		Availability of water: Irrigation water is currently available all year round at both locations.
		Irrigation method: Generally, farmers use water-saving irrigation methods such as sprinkler irrigation methods.
3.	Number of farmers	The total number of farmers is 1 250 for the two areas.
4.	Land size (ha)	Farmers who may serve the two FPDs have a total of 2 500 ha.
5.	Crop produced	Include green mealies, butternut, dry beans, cabbage, sweet potato and potato.
6.	Production schedules	Currently the two production centres do not have production schedules, which suggest that production is not coordinated. The farmers indicated the need to have

		production schedules.
7.	Production volumes	The farmers do not keep production records. However, from the areas planted, estimated production volumes (in tons) per hectare are as follows; green mealies (20), butternut (20), dry beans (12), cabbage (40), sweet potato and potato (25-40).
8.	Land ownership	This is communal land, with the farmers having Permission to Occupy certificates. Consequently, the land is inheritable by next of kin. This land ownership may constitute certain challenges in that if the farmer is not interested in farming and is also reluctant to lease the land, it may become difficult to take advantage of the economies of scale that these schemes can confer.
9.	Technical knowledge	In both priority areas, farmers indicated that technical-know how in crop production was not a constraint.
10.	Quality standards	In both priority locations, the respondents indicated that they did not have information on quality standards as prescribed by the fresh produce markets.
11.	Production resources	**Skilled management**: In both priority locations, lack of skilled management was not a major constraint.
		Tractors/ Equipment: This was not a major constraint in both priority locations.
		Post-harvest handling facilities: In both priority locations respondents indicated that lack of post-harvest handling facilities was not a major constraint to the production of their crops. Currently, there are companies which are assisting the emerging farmers, but these emerging farmers could well-come their own facilities.
		Workforce: In both locations, the respondents indicated that farm labour was not a constraint.
12.	Market potential	In both locations, the current marketing arrangements comprise household, local, national and export markets.
13.	Inputs suppliers	The two areas have well-established input suppliers.
14.	Risk considerations	In both locations, lack of management skills, compounded with low education, may constitute a high risk, along with high summer temperatures.
15.	Legal issues	The proposed locations of the depot facilities are on local municipality land and during the workshop their representatives indicated that land would be made available for the facilities at the selected locations.

16.	Access to finance	Access to finance for production loans was currently a constraint to farmers at both priority locations.
17.	Infrastructure	Access roads from the farms to the locations of the fresh produce depots were a constraint.
18.	Transport	Transport both from the farms to the proposed locations and then to markets was a constraint for respondents from both locations.

DM = District Municipality

5.3.1.5 LIMPOPO PROVINCE

	Researched items	**Findings**
1.	Description of depot location	The priority location 1 for establishment of the depot was Thulamela in Vhembe DM; with location 2 being the Greater Tzaneen in Mopani DM.
2.	Agricultural potential	**Water source**: In both priority locations irrigation water is directly from the rivers, specifically from river dams.
		Availability of water: Irrigation water is currently available all year round at both locations.
		Irrigation method: Generally, farmers use water-saving irrigation methods such as sprinkler irrigation methods.
3.	Number of farmers	The Thulamela Fresh Produce Depot (FPD) will serve a total of 817 marginalised farmers, whereas the Greater Tzaneen FPD will serve a total 736 farmers. Combined, the two facilities will serve a total of at least 1 553 farmers
4.	Land size (ha)	Farmers who will serve the Thulamela FPD and the Greater Tzaneen FPD have 4 298 ha and 6 592 ha, respectively, for a total of 10 890 ha being available to service the two proposed fresh produce depot facilities.
5.	Crop produced	In decreasing order, the following vegetable crops are currently produced: tomato, cabbage, butternuts, green pepper; sweet corn, chillies, watermelons and baby vegetables; whereas the fruits include citrus, banana, avocado, mango, litchi, guava, macadamia and granadilla.
6.	Production schedules	Currently the two production centres do not have production schedules, which suggest that production is not coordinated. The farmers indicated the need to have

		production schedules.
7.	Production volumes	The farmers do not keep production records. However, from the areas planted, estimated production volumes (in tons) per hectare is as follows; tomatoes (60), cabbage (40), butternuts (20), sweet corn (20), melons (30). Avocado (12), mango (50) and citrus (60)
8.	Land ownership	Farmers who will support the Thulamela FPD farm on communal land, with Permission to Occupy; whereas most of those who will serve the Greater Tzaneen FPD have title deeds and/or lease agreements.
9.	Technical knowledge	In both priority locations, respondents suggested that technical-know-how in crop production was not a constraint. Most respondents indicated that they had ongoing training in various aspects of crop production.
10.	Quality standards	In both priority locations, the respondents indicated that they did not have information on quality standards as prescribed by the fresh produce markets
11.	Production resources	**Skilled management**: In both priority locations, lack of skilled management was not a major constraint, as shown by the existence of various management structures and ongoing training in most projects.
		Tractors/ Equipment: This was not a constraint as farmers had access to various sources of finance.
		Post-harvest handling facilities: In both priority locations respondents indicated that lack of post-harvest handling facilities was a major constraint in the marketing of their produce.
		Workforce: In both priority locations, the respondents indicated that farm labour was not a constraint.
12.	Market potential	In both priority locations the current marketing arrangements comprise household, local, national and export markets.
13.	Inputs suppliers	The two priority locations have well-established input suppliers in the form of co-operatives.
14.	Risk considerations	In both priority locations, high summer temperatures and high incidence of diseases may constitute a high risk.
15.	Legal issues	The proposed locations of the depot facilities are on local municipality land and during the workshop their representatives indicated that land would be made available for the facilities at the selected locations.

16.	Access to finance	Access to finance for production loans was currently a constraint to farmers at both priority locations.
17.	Infrastructure	Access roads from the farms to the locations of the fresh produce depots were a constraint.
18.	Transport	Transport both from the farms to the proposed locations and then to markets was a constraint for respondents from both locations.

DM = District Municipality

5.3.1.6 MPUMALANGA PROVINCE

	Researched items	**Findings**
1.	Description of depot location	The priority location 1 for establishment of the fresh produce depot was Bushbuckridge in Ehlanzeni DM, with location 2 being proposed at Mbombela in Ehlanzeni DM.
2.	Agricultural potential	**Water source**: In all schemes, irrigation water is from the river, with Dingleydale and Newforest have river dams, whereas Hoxani scheme taps water directly from the river.
		Availability of water: In Hoxani water is available all year round, whereas in the other two schemes, depending on irrigation, water is not limiting for at least six months. However, respondents from all schemes have indicated that water shortage is one of the major constraints that they encounter during the production of the major crop. Consequently, matching of land and crop water requirements would be necessary if this factor is not to disrupt the sustainable running of the fresh produce depot facilities.
		Irrigation method: In Hoxani, irrigation method comprises both sprinkler and drip irrigation methods, which are water-saving. In Newforest and Dingleydale, irrigation method comprises furrow irrigation method, which is inherently too wasteful.
3.	Number of farmers	The Bushbuckridge Fresh Produce Depot (FPD) will serve a total of 645 farmers from the Dingleydale Irrigation Scheme. The Mbombela FPD will serve a total of 665 farmers from Newforest (534 farmers) and Hoxani (131 farmers) Irrigation Schemes. Combined, the two facilities will serve a total of at least 1 310 farmers

4.	Land size (ha)	Dingleydale (955 ha), Newforest (935) and Hoxani (800 ha) have a total of 2 690 ha available to service the two proposed fresh produce depot facilities.
5.	Crop produced	In decreasing order, the following crops are currently produced: tomato, cabbage, butternut, chillies, onions and beetroots during the cool seasons, with green mealies being produced during summer months. In addition, other produce, on a small scale, sweet potato, okra, potato and cassava. A few farmers also produce mango, citrus and macadamia nuts.
6.	Production schedules	Currently the three schemes do not have production schedules, which suggest that production is not coordinated. The farmers indicated the need to have production schedules.
7.	Production volumes	The farmers do not keep production records. However, from the areas planted, estimated production volumes (in tons) per hectare is as follows; tomatoes (60), cabbage (40), butternuts (20), green mealies (20), onions (25), melons (30). mango (50) and citrus (60)
8.	Land ownership	This is communal land, with the farmers having Permission to Occupy certificates. Consequently, the land is inheritable by next of kin. This land ownership may constitute certain challenges in that if the farmer is not interested in farming and is also reluctant to lease the land, it may become difficult to take advantage of the economies of scale that these schemes can confer.
9.	Technical knowledge	In all three schemes, farmers indicated that technical-know how in crop production was not a constraint. However, this assertion was doubtful since the other question which gauged the sincerity of the answer to this question was answered in the negative. All respondents indicated that they did not use additives, which suggested the need for technical training, if farmers are to supply the depot facilities with high quality produce.
10.	Quality standards	In all three schemes, the respondents indicated that they did not have information on quality standards as prescribed by the l
11.	Production resources	**Skilled management**: In all three schemes the management structures are well-constituted, with various committees being responsible for various competences. However, in all the schemes, skills development had been minimal at Newforest and absent at Dingleydale and Hoxani.

		Tractors/ Equipment: In all three schemes, respondents indicated that tractors for land preparation were not a constraint in producing the major crops. Hoxani Irrigation Scheme, for instance, has 20 tractors and all equipment required to successfully produce a crop of high quality.
		Post-harvest handling facilities: In all schemes respondents indicated that lack of post-harvest handling facilities was a constraint to the production of their crops. However, it is important to note that the constraints also included various information related to successful marketing of fresh produce, including access roads from the schemes to the main roads where the fresh produce depot facilities will be located.
		Workforce: In Dingleydale, respondents indicated that labour force was among the major constraint faced in the production of their major crops, whereas this was not the case for the other two schemes.
12.	Market potential	In Dingleydale and Newforest current marketing arrangements of their main produce are household and local markets; whereas producers at Hoxani market their produce at National and international markets. Also, the latter have contractual marketing arrangements.
13.	Inputs suppliers	Despite the presence of the Pfukani Co-op, the Hoxani group indicated that suppliers such as pesticides and electricity were among the major constraints in the current production systems, whereas the other group did not list any constraint with respect to inputs suppliers. Dingleydale has a co-op, which is currently not operational. These are some of the facilities which may be rehabilitated in order to locally strengthen the value chain from inputs suppliers through production to marketing.
14.	Risk considerations	In all schemes except Hoxani Irrigation Scheme, water is available for almost six months, depending on the amount of rainfall received during that year. This may constitute a risk since the post-harvest facility cannot afford to idle for six months. However, the situation can be improved if farmers can use water-saving irrigation methods, as is done at Hoxani Irrigation Scheme. Common water-saving irrigation methods include drip irrigation.
15.	Legal issues	The proposed locations of the depot facilities are on local municipality land and during the workshop their representatives indicated that land would be made available for the facilities at the selected locations.

16.	Access to finance	Access to finance for production loans was currently a constraint to farmers at both priority locations.
17.	Infrastructure	Access roads from the farms to the locations of the fresh produce depots were a constraint.
18.	Transport	Transport both from the farms to the proposed locations and then to markets was a constraint for respondents from both locations.

DM = District Municipality

5.3.1.7 WESTERN CAPE PROVINCE

	Researched items	**Findings**
1.	Description of depot location	The priority location 1 for establishment of the depot was Matzikama in West Coast DM; with location 2 being Ceres in Cape Winelands DM.
2.	Agricultural potential	**Water source**: In both priority locations irrigation water is directly from the rivers, specifically from river dams.
		Availability of water: Irrigation water is currently available all year round at both locations.
		Irrigation method: Generally, farmers use water-saving irrigation methods such as sprinkler and drip irrigation methods.
3.	Number of farmers	The Matzikama Fresh Produce Depot (FPD) will serve a total of 131 farmers, whereas the Ceres FPD will serve a total of 46 farmers. Combined, the two facilities will serve a total of at least 177 farmers
4.	Land size (ha)	Farmers who will serve the Matzikama FPD and the Ceres FPD have 133 ha and 298.4 ha, respectively, for 431.4 ha being available to service the two proposed fresh produce depot facilities.
5.	Crop produced	In decreasing order, the following crops are currently produced: butternuts, pumpkins, melons, cabbage, potato, onions, chilli, beans, squash and cauliflower. Also, for the Ceres FPD, there are farmers who produce peaches, nectarines, plums and pears.
6.	Production schedules	Currently the two production centres do not have production schedules, which suggest that production is not coordinated. The farmers indicated the need to have

		production schedules.
7.	Production volumes	The farmers do not keep production records. However, from the areas planted, estimated production volumes (in tons) per hectare are as follows; potato (30), melons (30), cabbage (40), onion (25), peaches and pears (50).
8.	Land ownership	Most of the land is under sole proprietors and trusts. Consequently, the land allows for continuity.
9.	Technical knowledge	In both priority locations, farmers indicated that technical-know how in crop production was not a constraint.
10.	Quality standards	n both priority locations, the respondents indicated that they did not have information on quality standards as prescribed by the fresh produce markets
11.	Production resources	**Skilled management**: In both priority locations, lack of skilled management was a major constraint, although management structures were already in place.
		Tractors/ Equipment: This was a major constraint in both priority locations.
		Post-harvest handling facilities: In both priority locations respondents indicated that lack of post-harvest handling facilities was a major constraint to the production of their crops. The listed constraints also included various information related to successful marketing of fresh produce.
		Workforce: In Matzikama this was viewed as a constrained, whereas in Ceres it was not a constrained.
12.	Market potential	Farmers had access to all marketing arrangements, but the proposed facilities may increase their export marketing potential.
13.	Inputs suppliers	The two priority locations have established inputs suppliers.
14.	Risk considerations	The low management skills and occurrence of frost, especially for the farmers that will supply the Ceres FPD, constitute high risks. At the Matzikama FPD, high temperatures in summer may result in sunburn, and thus, lowering yield.
15.	Legal issues	The proposed locations of the depot facilities are on local municipality land and during the workshop their representatives indicated that land would be made available for the facilities at the selected locations.

16.	Access to finance	Access to finance for production loans was currently a constraint to farmers at both priority locations.
17.	Infrastructure	Access roads from the farms to the locations of the fresh produce depots, storage facilities, and electricity were cited as constraints.
18.	Transport	Transport both from the farms to the proposed locations and then to markets was a constraint for respondents from both locations.

DM = District Municipality

5.3.1.8 NORTHERN CAPE PROVINCE

	Researched items	**Findings**
1.	Description of depot location	The priority location 1 for establishment of the depot was Jan Kemp Dorp in Frances Baard DM; with location 2 being Upington in Siyanda DM.
2.	Agricultural potential	**Water source**: In both priority locations irrigation water is directly from the river dams.
		Availability of water: Irrigation water is currently available all year round at both locations.
		Irrigation method: Generally, farmers use furrow irrigation methods, which are inherently wasteful in terms of water and leaching fertilisers out of the root zones.
3.	Number of farmers	The Jan Kemp Dorp Fresh Produce Depot (FPD) will serve 108 farmers, whereas the Upington FPD will serve 28 farmers. Combined, the two facilities will serve a total of at least 136 farmers
4.	Land size (ha)	Farmers who will serve the Jan Kemp Dorp FPD and the Upington FPD have 121 ha and 86 ha, respectively, for 207 ha being available to service the two proposed fresh produce depot facilities.
5.	Crop produced	In decreasing order, the following crops are currently produced: cabbage, potato, pumpkins, beetroots, carrots and melons. In addition, for the Jan Kemp Dorp, there are farmers who produce guava and citrus, whereas those at Upington also produce peaches and figs.
6.	Production schedules	Currently the two production centres do not have production schedules, which suggest that production is not coordinated. The farmers indicated the need to have

		production schedules.
7.	Production volumes	The farmers do not keep production records. However, from the areas planted, estimated production volumes (in tons) per hectare are as follows; cabbage (40), potato (30), pumpkins (20), beetroots (25), carrots (25) and melons (30).
8.	Land ownership	This is communal land, with the farmers having Permission to Occupy certificates. Consequently, the land is inheritable by next of kin. This land ownership may constitute certain challenges in that if the farmer is not interested in farming and is also reluctant to lease the land, it may become difficult to take advantage of the economies of scale that these schemes can confer.
9.	Technical knowledge	In both priority areas, farmers indicated that technical-know how in crop production was a constraint, suggesting the need for technical training in the preferred crops.
10.	Quality standards	In both preferred locations, the respondents indicated that they did not have information on quality standards as prescribed by the fresh produce markets
11.	Production resources	**Skilled management**: In both priority locations, lack of skilled management was a major constraint, although management structures were already in place.
		Tractors/ Equipment: This was a major constraint in both priority locations.
		Post-harvest handling facilities: In both priority locations respondents indicated that lack of post-harvest handling facilities was a major constraint to the production of their crops. The listed constraints also included various information related to successful marketing of fresh produce.
		Workforce: In both locations, the respondents indicated that farm labour was not a constraint.
12.	Market potential	In both locations the current marketing arrangements comprise household and local markets, with the national and export markets providing untapped market potentials.
13.	Inputs suppliers	The two areas have well-established input suppliers.
14.	Risk considerations	In both locations, lack of management skills, compounded with low education, may constitute a high risk, along with high summer temperatures.
15.	Legal issues	The proposed locations of the depot facilities are on local municipality land and during the workshop their

		representatives indicated that land would be made available for the facilities at the selected locations.
16.	Access to finance	Access to finance for production loans was currently a constraint to farmers at both priority locations.
17.	Infrastructure	Access roads from the farms to the locations of the fresh produce depots were a constraint.
18.	Transport	Transport both from the farms to the proposed locations and then to markets was a constraint for respondents from both locations.

DM = District Municipality

5.3.1.9 NORTH WEST PROVINCE

	Researched items	**Findings**
1.	Description of depot location	The priority location 1 for establishment of the depot was Taung in Dr Ruth Mompati DM; with location 2 being Zeerust in Ngaka Modiri Molema DM.
2.	Agricultural potential	**Water source**: Farmers who will service the Taung Fresh Produce Depot (FPD) use water from both river dams and boreholes, whereas those for the Zeerust depot exclusively use water from the boreholes for irrigation.
		Availability of water: Irrigation water is currently available all year round at both locations.
		Irrigation method: Generally, farmers use water-saving irrigation methods such as sprinkler and drip irrigation methods.
3.	Number of farmers	The Taung FPD will serve 152 marginalised farmers, whereas the Zeerust FPD will serve 39 farmers. Combined, the two facilities will serve 191 farmers.
4.	Land size (ha)	Farmers who will serve the Taung FPD and the Zeerust FPD have 90 ha and 41 ha, respectively, for a total of 131 ha being available to service the two proposed fresh produce depot facilities.
5.	Crop produced	In decreasing order, the following crops are currently produced: spinach, onion, beetroot, beans, carrot, tomato, melons, cabbage, pumpkins and pepper. In addition, in both farming locations, there are farmers who produce citrus and pecan nuts.

6.	Production schedules	Currently the two production centres do not have production schedules, which suggest that production is not coordinated. The farmers indicated the need to have production schedules.
7.	Production volumes	The farmers do not keep production records. However, from the areas planted, estimated production volumes (in tons) per ha is as follows; tomato (50 tons), potato (30 tons), cabbage (40 tons), butternuts (20 tons),spinach (15 tons), pepper (25 tons), beetroot (25 tons) and green mealies (20 tons)
8.	Land ownership	This is communal land, with the farmers having Permission to Occupy certificates. Consequently, the land is inheritable by next of kin. This land ownership may constitute certain challenges in that if the farmer is not interested in farming and is also reluctant to lease the land, it may become difficult to take advantage of the economies of scale that these schemes can confer.
9.	Technical knowledge	In both priority areas, farmers indicated that technical-know how in crop production was a constraint, suggesting the need for technical training in the preferred crops.
10.	Quality standards	In both preferred locations, the respondents indicated that they did not have information on quality standards as prescribed by the fresh produce markets
11.	Production resources	**Skilled management**: In both priority locations, lack of skilled management was a major constraint, although management structures were already in place.
		Tractors/ Equipment: This was a major constraint in both priority locations.
		Post-harvest handling facilities: In both priority locations respondents indicated that lack of post-harvest handling facilities was a major constraint to the production of their crops. The listed constraints also included various information related to successful marketing of fresh produce.
		Workforce: In both locations, the respondents indicated that farm labour was not a constraint.
12.	Market potential	In both locations the current marketing arrangements comprise household and local markets, with the national and export markets providing an untapped market.
13.	Inputs suppliers	The two areas have well-established input suppliers.
14.	Risk considerations	In both locations, lack of management skills, compounded with low education, may constitute a high risk, along with

		high summer temperatures.
15.	Legal issues	The proposed locations of the depot facilities are on local municipality land and during the workshop their representatives indicated that land would be made available for the facilities at the selected locations.
16.	Access to finance	Access to finance for production loans was currently a constraint to farmers at both priority locations.
17.	Infrastructure	Access roads from the farms to the locations of the fresh produce depots were a constraint.
18.	Transport	Transport both from the farms to the proposed locations and then to markets was a constraint for respondents from both locations.

DM = District Municipality

5.4 STATUS OF MARKETING INFRASTRUCTURE IN TARGETED PRIORITY LOCATIONS

TABLE 20. MARKETING INFRASTRUCTURE IN TARGETED AREAS

PROVINCE	DISTRICT MUNICIPALITY	PRIORITY LOCATION	Existing Market
Eastern Cape	OR Tambo	1 = Port Saint Johns	Kei FPM
	Amathole	2 = Nkonkonbe	Building of 2 packhouses for citrus farmers East London FPM
Free State	Thabomofutsanyana	1 = Ditlhabeng	Mangaung FPM
	Motheo	2 = Mantsopa	Feasibility study in progress to build a collection centre. Collection centre to export to Lesotho buyers
Gauteng	Sedibeng	1 = Lesedi	Sedibeng FPM
		2 = Midvaal	Sedibeng FPM
KwaZulu-Natal	Umkhanyakude	1 = Jozini	Completed Feasibility to establish a Collection centre
	Ilembe	2 = Ndwendwe	Feasibility study underway for collection centres
Limpopo	Vhembe	1 = Thulamela	Completed Feasibility study to establish Vhembe Fresh Produce Market. FPM to export to Zimbabwe and Mozambique Local: Tiger brands
	Mopani	2 = Greater Tzaneen	Feasibility study for AgroFood Park in progress Local: Tiger brands
Mpumalanga	Ehlanzeni	1 = Bushbuckridge	White River and Barberton
		2 = Mbombela	Building of packhouses at Mattafin and Cairn Farm in progress Nelspruit FPM
Western Cape	Westcoast	1 = Matzikama	Epping FPM
	Cape winelands	2 =Ceres	Producers had approached WCDoA for a collection centre
Northern Cape	Frances Baard	1 = Jan Kempdorp	Sol plaatje FPM
	Siyanda	2 = Upington	Sol Plaatje FPM and Local markets
North West	Dr Ruth Mompati	1 = Taung	Matlosana FPM-and Local Markets
	Ngaka Modiri	2 = Zeerust	Feasibility study to build FPM completed. FPM to export to Botswana

*FPM=Fresh Produce Market

5.5 NUMBER OF BENEFICIARIES AS PER PRIORITY LOCATIONS

The current number of beneficiaries is based on the number of previously marginalised farmers (active and passive) in the targeted priority locations. The numbers do not include potential employees at the proposed facilities or those that will benefit in the entire production chain due to increased business activities.

TABLE 21. NUMBER OF BENEFICIARIES PER PRIORITY LOCATION

PROVINCE	DISTRICT MUNICIPALITY	PRIORITY LOCATION	NO. OF BENEFICIARIES
Eastern Cape	OR Tambo	1 = Port Saint Johns	219
	Amathole	2 = Nkonkonbe	97
Free State	Thabomofutsanyana	1 = Ditlhabeng	154
	Motheo	2 = Mantsopa	112
Gauteng	Sedibeng	1 = Lesedi	29
		2 = Midvaal Data not available	0
KwaZulu-Natal	Umkhanyakude	1 = Jozini	750
	Ilembe	2 = Ndwendwe	500
Limpopo	Vhembe	1 = Thulamela	817
	Mopani	2 = Greater Tzaneen	736
Mpumalanga	Ehlanzeni	1 = Bushbuckridge	645
		2 = Mbombela	665
Western Cape	Westcoast	1 = Swartland	131
	Cape winelands	2 = Ceres	46
Northern Cape	Frances Baard	1 = Jan Kemp	108
	Siyanda	2 = Upington	28
North West	Dr Ruth Mompati	1 = Taung	152
	Ngaka Modiri Molema	2 = Zeerust	39
TOTAL NUMBER OF POTENTIAL BENEFICIARIES			**5 228**

5.6 ECONOMIC VIABILITY AND SUSTAINABILITY OF FRESH PRODUCE DEPOT FACILITIES

Various stakeholders suggested various factors which should serve as indicators of economic viability and sustainability. The factors which emerged in most of the provinces included:

- Entities being able to meet financial and legal obligations
- Entities being able to receive starter packs from CASP/LARP grants in order to reduce the starting financial burden of the farmers
- Entities being able to brand the commodities, with the additional capability of tracing the origin of the producer
- Financial institutions later on being able to provide loans throughout the production chain
- Depot facilities be managed by experienced companies which are evaluated on performance basis
- Depot facilities should receive revenue from services that they will render, with producers not directly linked to the facilities also being allowed to use the facilities at certain times for a fee

Production of various commodities will be well-organised in order to ensure economies of scale.

5.6.1 ENTERPRISE BUDGETS OF COMMODITIES

Enterprise budgets to determine costs and returns for the production of commodities intended to deliver to the depot facilities

TOMATO ENTERPRISE BUDGET

ENTERPRISE:	**TOMATO**	CASH CROP	COUNTRY:	South Africa
REGION:			PROVINCE:	Mpumalanga
DATE:	NOV 2008			

DESCRIPTION:	UNIT	PRICE OR COST/UNIT	QUANTITY	VALUE OR COST/HA
INCOME:				
1. GROSS RECEIPTS FROM PRODUCTION:	Crate	44.95	1000	44950
TOTAL RECEIPTS				44950
2. ALLOCATED COSTS:				
PRE-HARVEST COSTS:				
Soil preparation (Cultivation)	Ha	300	1	300.00
Seedling production	Ha	1990.00	1	1990.00

FERTILIZERS	NPK (2:3:4 (30))	Kg	3.08	500	1540
LAN		Kg	0.9	500	450
CHEMICALS	Tamaron	L	80.41	0.4	32.164416
	Folicur	L	265.21	0.5	132.6048
	Dithane	Kg	32.70	4	130.804512
	Bulldock	L	281.77	1	281.7738
LABOUR	Planting	Hour	5.8	160	928
	Handhoe	Plot	20	41	820
	Spraying	Hour	5.8	200	1160
	Fertilizer Application	Hour	5.8	80	464
	Machinery	Hour	5.8	0	0
	Irrigation	Hour	5.8	80	464
MACHINERY(Fuel-Lube-Repairs)		Ha			0
IMPLEMENTS(repairs-maintenance)		Ha	0	0	0
IRRIGATION ENERGY(ELECTRICITY)		Ha	0	0	0
IRRIGATION (Maintenance)		MM	0	0	0
TOTAL PRE-HARVEST COST/HA					**8393.35**
HARVEST & MARKETING COSTS					
LABOUR	Harvest	Hour	5.8	900	5220
MACHINERY(Maintenance)		Ha	0	0	0
Transport		Ton	50	44.95	2247.5
TOTAL HARVEST COST/HA					**7467.5**
TOTAL ALLOCATED COSTS PER HA					**15860.85**
3. GROSS MARGIN PER HA					**29089.15**

Notes:

Spacing:300-500mm x 1500-2500mm

Population:12000-16000 plants per ha

Seeding rate:100-200 for seedtrays,200-300g for seed beds and 500-750g per ha for direct seeding

Crate =20KG

Adapted from Directorate of Agricultural Economics: DALA, 2008

POTATO ENERPRISE BUDGET:

POTATO:GROSS MARGIN:	UNDER SPRINKLER IRRIGATION		COUNTRY:	South Africa
DATE: Nov 2008			PROVINCE:	Mpumalanga

1BAG=10KG		UNIT	PRICE OR COST/UNIT	QUANTITY	VALUE OR COST/HA
1. GROSS INCOME FROM PRODUCTION:		BAG		2000	
CLASS 1	LARGE	BAG	20.6	280	5768
CLASS 1	MEDIUM	BAG	18	300	5400
CLASS 1	SMALL	BAG	15	280	4200
CLASS 2	MEDIUM	BAG	7.5	1140	8550
MINUS MARKET COMMISSION		BAG	0.26	2000	520
MINUS AGENT COMMISSION		BAG	0.39	2000	780
MINUS COUNCIL LEVY		BAG	0.114	2000	228
TOTAL RECEIPTS - LEVIES PAID					**22390**
2. ALLOCATED COSTS:					
PRE-HARVEST					
CLEANING LABOUR		HOUR	0	0	0
CONTRACT.TRANSPORT.FERTILISER		TON	38.6	1.2	46.32
CONTRACT.TRANSPORT.SEED		TON	40.8	1.5	61.2
SEED HANDLING		HOUR	2	16	32
CONTRACT.AERIAL SPRAYING		HA	40	7	280
LOADING LABOUR		HOUR	5.8	1.35	7.83
EDB		L	147.28	25	3681.972
CALIRUS		KG	161.52	0.5	80.76
DITHANE		KG	32.70	18	588.6203
SENCOR		KG	144	0.75	108
DUAL		L	68.64	1.5	102.96
CATNION		L	34.64	7	242.48
GRAMOXONE		L	61.44	4	245.74752
2:3:4(30)+0.5%ZN		KG	1.02	700	714
L.A.N(28)		KG	0.9	200	180
SEED		BAG	16	100	1600
MACHINERY(FUEL-LUBRICATION-REP)		HA	559.69	1	559.69
IMPLEMENT(REPAIRS-LUBRICATION)		HA	42.04	1	42.04
MACHINERY LABOUR		HOUR	5.8	19.92	115.536
IMPLEMENT LABOUR		HOUR	5.8	19.08	110.664
INTEREST ON OPERATING CAPITAL		RAND	0.16	4399.9099	703.99

TOTAL PRE-HARVEST COST PER HA				**9503.81**
PRE-HARVEST COST PER BAG				4.75
HARVEST:				
PACKING LABOUR	HOUR	5.8	40	232
HARVEST SEASONAL LABOUR	HOUR	5.8	13	75.4
SUPERVISION LABOUR	HOUR	5.8	6.53	37.874
LOADING LABOUR	HOUR	5.8	16	92.8
TRANSPORT-MARKET	BAG	0.6	2000	1200
BAGS(POTATOES)	BAG	0.44	2000	880
MACHINERY(FUEL-LUBE-REPAIRS)	HA	244.01	1	244.01
IMPLEMENTS(REPAIRS-LUBE)	HA	34.53	1	34.53
MACHINERY LABOUR	HOUR	5.8	8.74	50.692
IMPLEMENT LABOUR	HOUR	5.8	81.23	471.134
INTEREST ON OPERATING CAP	RAND	0.16	1659.22	265.48
TOTAL HARVESTING COST PER HA				**3583.92**
HARVESTING COST PER BAG				1.79
TOTAL ALLOCATED COST PER HA				**13087.72**
ALLOCATED COST PER BAG				6.54
3.GROSS MARGIN PER HECTARE				**9302.28**
GROSS MARGIN PER BAG				4.65

Notes
Spacing : 200-450mm x 700-1000 mm depending on seed size and equipment
Population : 130 000- 150 000 stems per ha for table Potatoes;160 000 stems per ha for seed Potatoes
Seeding rate: 100-120 x 30 kg pockets per ha

PEACH ENTERPRISE BUDGET:

				COUNTRY:
LIFESPAN:	20 YEARS	(TRAY=4K		PROVINCE:
PRODUCTION YEAR		YEAR 4-20		
DATE:	NOV 2008	UNIT	PRICE/COST PER UNIT	QUANTITY
1. GROSS RECEIPTS FROM PRODUCTION		KG	4.44	
TOTAL RECEIPTS-MINUS LEVIES PAID:				
2. ALLOCATED COSTS:				
KRAAL MANURE		KG		
SUPER PHOSPHATE		KG	2.85	
LAN (28)		KG	1.4	
LEBAYCID		L	R 241.69	
WEED CONTROL		HOUR	5.8	
PRUNING LABOUR		HOUR	5.8	
MACHINERY (FUEL-LUBRICATION-REPAIRS)				
IMPLEMENTS (REPAIRS-LUBE)				
MACHINERY LABOUR		HOUR	5.8	
INTEREST ON OPERATING CAPITAL		RAND	0.23	
TOTAL PRE HARVEST COST PER HA				
HARVEST:				
PICK UP LABOUR				
CARTONS		EACH	4	
MACHINERY (FUEL-LUBE-REPAIRS)				
IMPLEMENTS (LUBE-REPAIRS)				
TOTAL HARVEST COST PER HA				
HARVEST COST PER KG				
TOTAL ALLOCATED COST PER HECTARE				
ALLOCATED COST PER KG				
3. GROSS MARGIN PER HECTARE				
GROSS MARGIN PER KG				

NOTES:

OWN LABOUR IS USED FOR HARVEST

DATE:

AVOCADO ENTERPRISE BUDGET

ENTERPRISE:AVOCADO COUNTRY:

PROVINCE:

DATE: NOV-08

PRODUCTION YEAR 4

DESCRIPTION		UNIT	PRICE OR COST/UNIT
INCOME:			
1. GROSS INCOME FROM PRODUCTION:			
Export Market (66%)		Box	
Local Market (30%)		Box	
Oil (4%)		Ton	
TOTAL RECEIPTS			
2. ALLOCATED COSTS:			
PRE-HARVEST:			
Soil/Leaf analysis		Each	
FERTILIZER:	Zinc Oxide	KG	
	Urea	KG	
	Copper -Oxy-Chloride	KG	
	SuperPhosphate	KG	
	Potassium chloride	KG	
CHEMICALS	Gramoxone	L	
	Solubor	KG	
	Avovet	L	
	M4 injection by contractors	Ha	
LABOUR	Spray rucksack (fertilizers)	HOUR	
	Pest control	HOUR	
	Copper spraying	HOUR	
	Irrigation labour	HOUR	
	Tractor driver	HOUR	
	Weed control	HOUR	
	Pruning and applying Avocet	HOUR	
MACHINERY (MAINTENANCE-FUEL-LUBRICATION)		HA	
IRRIGATION ENERGY		M3	
IRRIGATION MAINTENANCE		HA	
CONSULTANT FEES		HA	
TOTAL PRE-HARVEST COST			
HARVEST & MARKETING COSTS:			
Packing material (boxes)		Each	

Harvest labour	HOUR
Packing labour	Box
Machinery labour	HOUR
Transport	Box
SAAGA Levy	Box
Commission	Box
MACHINERY-IMPLEMENTS(FUEL-LUBE-MAINTENANCE)	Ha
TOTAL HARVEST COST/HA	
TOTAL ALLOCATED COSTS/HA	

3.GROSS MARGIN/HA

NOTES

BOX = 4,5KG

Prices include VAT

5.7 Appropriate business models

In accordance we the terms of reference for this study, we were expected to propose a business model for the fresh produce depots. A business model is a concept used to describe a profit-producing system that has an important degree of independence from the other systems within an enterprise. The concept is widely used for a broad range of informal and formal descriptions of the purpose, offerings, strategies, infrastructure, organizational structures, trading practices, and operational processes and policies. Various conceptual business models were reviewed (Buchanan and Gilles, 1990; Buckinx et al., 2007; Carrol and Reichheld, 1992; Dawkins and Reichheld, 1990; Moloney, 2006; Osterwalder, 2004; Reichheld, 1996; Reichheld and Sasser, 1990; Schlesinger and Heskett, 1991; Stieb, 2006; Storbacka *et al*., 1994).

Our synthesis of the business model for the fresh produce depots was largely influenced by the conceptualizations of Osterwalder (2004). Osterwalder (2004) proposed a synthesis of different conceptualizations into a reference business model based on similarities of a large range of models that eventually constituted a four-block model: infrastructure, offering, finance and customer as illustrated below.

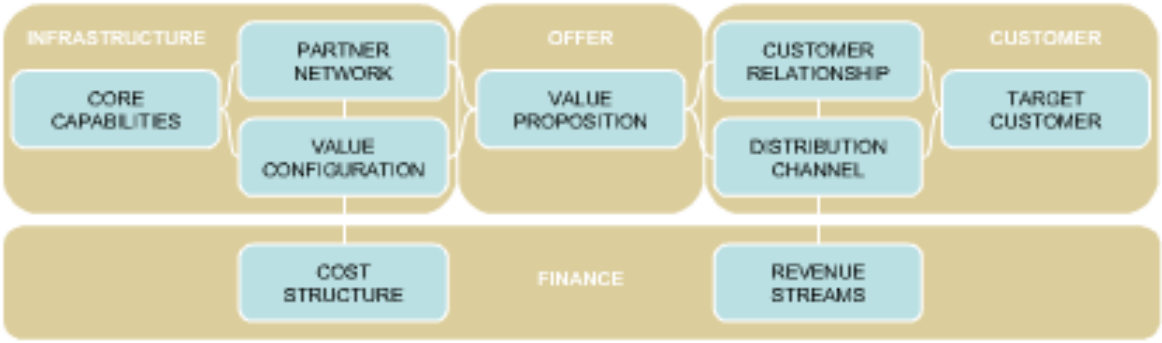


FIGURE 4. A REFERENCE BUSINESS MODEL (OSTERWALDER, 2004)

The components of a business model are briefly described in order to ensure that the origin of the proposed hybrid business models is put in perspective for the fresh produce depot facilities.

(i) Infrastructure

Core capabilities: The fresh produce depots should have the capabilities that allow them to meet the five performance objectives of any modern business in fresh produce: quality, cost, speed, flexibility and reliability.

Partner network: The fresh produce depot will have backward (clients = farmers) and forward (consumers = markets) alliances that complement other aspects of the entity.

Value configuration: This aspect prescribes the rationale that makes a fresh produce depot mutually beneficial for both its backward and forward alliances.

(ii) Offering (Value proposition)

A value proposition is an overall view of the products and services that together represent value for a specific customer segment (Osterwalder, 2004). Value proposition describes the way a firm

differentiates itself from its competitors and is the reason why customers buy from a certain supplier and not from the other. In the proposed fresh produce depots, a value proposition should be beneficial to both the backward and forward alliances. In order to differentiate themselves, the fresh produce depots, in addition to complying with the quality standards, will need to be innovative in both the services and products that they deliver to both the backward and forward alliances.

(iii) Customers

Target customer: The target audience for the fresh produce depots will be the backward and forward alliances.

Distribution channel: The fresh produce depots, with their roles spanning acceptance of produce from the clients, then grading, storing and packaging for distribution to fresh produce markets, may be expected to perform several other key functions, which may include:

- **Information**: Gathering and distributing marketing research and intelligence information about market forces in the marketing environment needed for planning and aiding exchange.
- **Promotion**: Developing and spreading persuasive communications that would brand offerings from the fresh produce depots.
- **Contact**: Finding and communicating with prospective buyers, both nationally and internationally.
- **Matching**: Shaping and fitting the buyer's needs, including activities such as storing, grading, assembling and packaging according to the buyers' specifications.
- **Negotiation**: Reaching agreements on prices and other terms of the offer so that ownership or procession can be transferred.
- **Physical distribution**: Transportation that ensures maintenance of product quality.
- **Financing**: Acquiring and using funds to cover the cost of the channel work.
- **Risk taking**: Assuming the risks of carrying out the channel work.

Customer relationship: This would link the fresh produce depot with the backward and forward alliances, the concept referred to as customer relationship management.

(iv) Finances

Cost structure: The cost structure encompasses the monetary consequences of the means employed in the enterprise. The ownership model will actually dictate the cost structure.

Revenue: The fresh produce depots should attempt to be innovative in generation of revenue, which would include collecting levies from users of the depot facilities, sale of agricultural inputs, etc.

5.7.1 PROPOSED BUSINESS MODEL

In the proposed business model, it should be noted that the fresh produce depots have farmers/producers as clients to the depot and forwarding markets as customers. The business model for the fresh produce depots that we produce is a hybrid of four business models, namely (i) Multi-level marketing (MLM) business model, (ii) Bricks and click business model, (iii) Service quality business model and (iv) Collective business model. Each model is briefly described followed by the rationale for proposing a hybrid of these three business models.

A. MULTI-LEVEL MARKETING (MLM) BUSINESS MODEL

This is a business model that would allow fresh produce depots to market their products through agents, as is usually the case for fresh produce. In MLM business model, agents are awarded a commission based upon the volume of product sold through each of their independent organizations. In other words, no sale no commission is awarded. Agents, therefore, develop complex organizations by either building an active customer base, who buy direct from the parent company, or by recruiting a *downline* of independent distributors who also build a customer base, thereby expanding the overall organization. Additionally, distributors can also earn a profit by retailing products they purchased from the parent company at wholesale price.

Agents earn a commission based on the sales efforts of their organization, which includes their independent sale efforts as well as the leveraged sales efforts of their downline. Commissions are paid to multi-level marketing distributors according to the company's compensation plan. There can be multiple levels of people receiving royalties from one person's sales. Although this model reduces the income to the farmer, it has an advantage for the products to access various markets, both nationally and internationally.

B. BRICKS-AND-CLICK BUSINESS MODEL

In a bricks-and-clicks business model, a company integrates both offline (*bricks*) and online (*clicks*) presences. Due to easy access to the Internet facilities, it will be far easier for the fresh produce depot facilities to establish an online presence with a strong brand to employ a successful pure "dot com" strategy. Some of the advantages of this business model include:

1. **Core competency**: Successful producers of agricultural commodities tend to have one or two core competencies that they can do better than their competitors. In order to be successful, the depot facilities should handle specialized products, which would also necessitate a rigid crop rotation system for vegetable farmers or switching to the production of fruit crops. When a bricks and mortar business goes online it is able to use this core competency more intensively and extensively.
2. **Existing supplier networks**: In this business model, which promotes long-term investments, it also promotes establishment of relationships of trust with suppliers, which ensures problem free delivery and an assured supply. This relationship may also entail price discounts and other preferential treatment.
3. **Existing distribution channels**: As with supplier networks, existing distribution channels can ensure problem free delivery, price discounts, and preferential treatments.
4. **Brand equity:** Often, since in this model existing firms have invested large sums of money in brand advertising over the years, this equity can easily be leveraged on-line by using recognized brand names.
5. **Stability:** Generally, businesses which produce a narrow range of products for many years appear more stable. People trust them more than pure on-line firms. This is particularly true in financial services.
6. **Existing customer base:** Because existing bricks-and-clicks already have a base of sales, they can more easily obtain economies of scale in promotion, purchasing and production; economies of scope in distribution and promotion; reduced overhead allocation per unit; and shorter break even times.
7. **A lower cost of capital:** Established bricks-and-clicks will have a lower cost of capital. Bond issues may be available to existing firms that are not available to dot coms. The underwriting cost of a dot com IPO is higher than an equivalent brick and click equity offering.
8. **Learning curve advantages**: Every industry has a set of best practices that are more or less known to established bricks-and-clicks firms. New dot coms will be at a disadvantage unless they can redefine the industry's best practices and leap-frog existing firms.

A distinction should be made between bricks-and-clicks business models and e-business models. Generally, e-business models are common in businesses which stress cost efficiency in the five performance objectives of operations. These business models are not burdened with brick and mortar costs and can offer products at very low marginal cost. However, they tend to spend substantially more on customer acquisition.

C. SERVICE QUALITY BUSINESS MODEL

According to Storbacka, Strandvik and Gronroos (1994), in service quality business model, farmer/customer satisfaction is first based on a recent experience of the service. This assessment depends on prior expectations of overall quality compared to the actual performance received. If the recent experience exceeds prior expectations, farmer/customer satisfaction is likely to be high. The farmer/customer satisfaction can also be high even with mediocre performance quality if the farmer/customer's expectations are low, or if the performance provides value, that is, it is priced low to reflect the mediocre quality. Likewise, the customer can be dissatisfied with the service encounter and still perceive the overall quality to be good. This occurs when a quality service is priced very high and the transaction provides little value.

The service quality business model looks at the strength of the business relationship; where it proposes that this strength is determined by the level of satisfaction with recent experience, overall perceptions of quality, customer commitment to the relationship, and bonds between the parties. Customers are said to have a "zone of tolerance" corresponding to a range of service quality between "barely adequate" and "exceptional." A single disappointing experience may not significantly reduce the strength of the business relationship if the customer's overall perceptions of quality remain high, if switching costs are high, if there are few satisfactory alternatives, if they are committed to the relationship, and if there are bonds keeping them in the relationship. The existence of these bonds acts as an exit barrier. There are several types of bonds, including: legal bonds (contracts), technological bonds (shared technology), economic bonds (dependence), knowledge bonds, social bonds, cultural or ethnic bonds, ideological bonds, psychological bonds, geographical bonds, time bonds, and planning bonds.

This model then examines the link between relationship strength and customer loyalty. Customer loyalty is determined by three factors: relationship strength, perceived alternatives and critical episodes. The relationship can terminate if: (1) the farmer moves away from the company's service area, (2) the farmer no longer has a need for the company's products or services, (3) more suitable

alternative providers become available, (4) the relationship strength has weakened, (5) the fesh produce depot handles a critical episode poorly, and (6) unexplainable change of price of the service provided.

The final link in the model is the effect of client/customer loyalty on profitability. The fundamental assumption of all the loyalty models is that keeping existing clients/customers is less expensive than acquiring new ones. Generally, a 5% improvement in client/customer retention can cause an increase in profitability between 25% and 85% (in terms of net present value) depending upon the industry (Reichheld and Sasser, 1990). However, Carrol and Reichheld (1992) dispute these calculations, claiming that they result from faulty cross-sectional analysis. According to Buchanan and Gilles (1990), the increased profitability associated with client/customer retention efforts occurs because:

- The cost of acquisition occurs only at the beginning of a relationship: the longer the relationship, the lower the amortized cost.
- Account maintenance costs decline as a percentage of total costs (or as a percentage of revenue).
- Long-term clients/customers tend to be less inclined to switch and also tend to be less price-sensitive. This can result in stable unit sales volume and increases in dollar-sales volume.
- Long-term clients/customers may initiate free word of mouth promotions and referrals.
- Long-term clients/customers are more likely to purchase ancillary products and high-margin supplemental products.
- Long-term clients/customers tend to be satisfied with their relationship with the company and are less likely to switch to competitors, making market entry or competitors' market share gains difficult.
- Regular clients/customers tend to be less expensive to service because they are familiar with the processes involved, require less "education," and are consistent in their order placement.
- Increased client/customer retention and loyalty makes the employees' jobs easier and more satisfying. In turn, happy employees feed back into higher client/customer satisfaction in a virtuous circle.

For this final link to hold, the relationship must be profitable. Striving to maintain the loyalty of unprofitable clients/customers is not a viable business model. That is why it is important for marketers to assess the profitability of each of its clients (or types of clients), and terminate those

relationships that are not profitable. In order to do this, each client/customer's "relationship costs" are compared to their "relationship revenue." A useful calculation for this is the patronage concentration ratio. This calculation is hindered by the difficulty in allocating costs to individual relationships and the ambiguity regarding relationship cost drivers.

An investment in one's employees' ability to provide superior service to customers can be seen as a virtuous circle. Effort spent in selecting and training employees and creating a corporate culture in which they are empowered can lead to increased employee satisfaction and employee competence. This will likely result in superior service delivery and customer satisfaction. This in turn will create customer loyalty, improved sales levels, and higher profit margins. Some of these profits can be reinvested in employee development thereby initiating another iteration of a virtuous cycle.

A harvesting strategy can be an example of a vicious circle. Rather than reinvesting in employee development, new product development, and market research, management could decide to harvest their investment by reducing costs then increasing dividends or increasing executive compensation. The consequence of this could be reduced employee wages, minimal training, an outdated product line, and a failure to understand the needs of the client/customer. This will likely result in employee dissatisfaction, employee incompetence, and high employee turnover. This could cause poor service delivery, customer dissatisfaction, high customer turnover, and loss of market share. Reduced sales and lower profit margins may require a further reduction in investment thereby initiating another iteration of the vicious cycle.

Schlesinger and Heskett (1991) added employee loyalty to the basic client/customer loyalty model. They developed the concepts of "cycle of success" and "cycle of failure". In the cycle of success, an investment in your employees' ability to provide superior service to customers can be seen as a virtuous circle. Effort spent in selecting and training employees and creating a corporate culture in which they are empowered can lead to increased employee satisfaction and employee competence. This results in superior service delivery and customer satisfaction. This in turn will create customer loyalty, improved sales levels, and higher profit margins. Some of these profits can be reinvested in employee development thereby initiating another iteration of a virtuous cycle. Fredrick Reichheld (1996) expanded the loyalty business model beyond customers and employees. He looked at the benefits of obtaining the loyalty of suppliers, bankers, distributors, shareholders, and the board of directors.

D. COLLECTIVE BUSINESS MODEL

In this model, a business organization or association typically composed of relatively large numbers of businesses, tradespersons or professionals in the same or related fields of endeavor, which pools resources, shares information or provides other benefits for their members. In the past, collective business systems such as the trade association, the cooperative and the franchise were created to allow groups of independently owned businesses with common interests to successfully compete in the marketplace.

Businesses are being consolidated through mergers, rollups or acquisitions. Typically, by the end of the consolidation process, a particular industry or profession becomes dominated by three or four nationally-based enterprises. Under these circumstances many smaller companies (often serving only local requirements and in private ownership) are often forced out of business or decide to sell to one of the dominant entities because it can no longer compete profitably with them. Typically, locally based businesses are unable to compete because they lack the capital, global marketing capabilities, purchasing power and expensive technology necessary to operate efficiently. This trend toward consolidation is expected to continue well into the twenty-first century and is sometimes shortened in developing countries, where the initial business in a market sector may be a single, large enterprise able to compete on the international market.

Presently, and for the foreseeable future, the inherent limitations of traditional collective business systems such as the trade organization, the cooperative and the franchise render them considerably less effective than they once were in advancing the business interests of their constituents. The following is a brief synopsis of those traditional collective business systems.

Trade associations: These are non-profit organizations in which the individual members are companies or individuals engaged in a common business pursuit. Competitors join together to create a platform format in which they deal with common problems of their industry. Any applicant meeting the standards of the association must be accepted as a member. Anti-trust law prohibits a member trade association from denying an otherwise qualified applicant's membership based upon a geographical proximity to an existing member. Trade associations commonly offer their members educational programs, the opportunity to come together at meetings to discuss common problems, and marketing materials designed to be imprinted by each member with its relevant information. Trade associations also offer elective group purchasing plans. The trade association bears no credit risk in these transactions but instead, provides chosen vendors with access to a large body of member customers. Because the trade association does not pledge its credit, the vendor must rely upon the credit worthiness of each purchaser.

To sustain its operations, a trade association generally receives an initiation fee and/or a yearly membership fee (collectively "dues") from its members, and it may collect rebates or commissions from the purchasing plan suppliers. The trade organization imposes relatively low membership dues on its members. However, because initiation fees and annual membership fees are nominal, the trade organization lacks the ability to engage in offering its members national marketing capability, access to expensive technologies and cost-effective purchasing programs for major purchases due to a lack of capital. Furthermore, being non-profit, trade associations do not have the management mentality necessary to sustain major projects such as national sales and marketing. While offering potentially valuable services to businesses, few trade associations offer much direct help in the major business areas of purchasing, production or marketing.

Cooperative: A cooperative is a non-profit organization somewhat similar to a trade association. A significant difference between the cooperative and the trade association, however, is that with a trade association, the members have a non-equity position in the association, whereas in the typical cooperative the members will have an equity interest as all members of the cooperative own a portion of the cooperative. The cooperative utilizes its volume leverage with suppliers in purchasing products and services for less than the individual member company could obtain outside of the cooperative. The cooperative marks up the purchased products or services in order to cover operating expenses. Any net income achieved by the cooperative is then returned to the cooperative members in the form of a redistribution of profits or dividends.

Proposed business models: The fresh produce depot facilities will be serving both farmers as clients and markets as customers. Consequently, the business model for such a facility cannot be a simple matter. MAC proposes a hybrid of the outlined business models, where the primary features of the models can be adapted for use at various priority locations

5.8 APPROPRIATE BUSINESS OWNERSHIPS

Basically, there are four business ownerships, with numerous hybrids. In South Africa the main business ownerships include the following:

Sole proprietorship: A sole proprietorship is a business owned by one person. The owner may operate on his or her own or may employ others. The owner of the business has total and unlimited personal liability of the debts incurred by the business.

Partnership: A partnership is a form of business in which two or more people operate for the common goal of making profit. Each partner has total and unlimited personal liability of the debts incurred by the partnership. There are three typical classifications of partnerships: general partnerships, limited partnerships, and limited liability partnerships.

Corporation: A business corporation is a for-profit, limited liability entity that has a separate legal personality from its members. A corporation is owned by multiple shareholders and is overseen by a board of directors, which hires the business's managerial staff.

Cooperative: Often referred to as a "co-op business" or "co-op", a cooperative is a for-profit, limited liability entity that differs from a corporation in that it has members, as opposed to shareholders, who share decision-making authority. The default meaning of agricultural cooperative is usually an agricultural service cooperative, which is the numerically dominant form in the world. There are two primary types of agricultural service cooperatives, supply cooperative and marketing cooperative. Supply cooperatives supply their members with inputs for agricultural production, including seeds, fertilizers, fuel, and machinery services. Marketing cooperatives are established by farmers to undertake transformation, packaging, distribution, and marketing of farm products (both crop and livestock). Farmers also widely rely on credit cooperatives as a source of financing for both working capital and investments.

Stakeholders who participated at meeting suggested the fresh produce depot facilities be established and shareholding be given on patronage basis, with dividends being paid *prorata*. In addition, producers proposed that they would like to focus on production, and a well-qualified company or persons who understand fresh produce be appointed as management and marketing of produce coming from the depot. The actual business ownership models suggested differed from cooperatives, trusts, public companies and public private partnership (PPP). After analysing proposals from different provinces regarding the appropriate business ownership, we found that the suitable model is the public-private partnership (PPP), with limited liability partnerships for the community and the government.

The South African National Treasury PPP Manual (2004) defines PPP as a “contractual arrangement between a public sector institution and a private party in which the private party performs an institutional function or uses state assets and assumes substantial financial, technical and operational risk in the design, financing, building and or operation of the project, in return for a

benefit". The said definition provides a basis to distinguish PPPs from other types of interaction between the public and private sectors. When the association results in a project that does not transfer substantial financial, technical and operational risks, it cannot be regarded as a PPP. National Treasury advises that, each PPP should be conceptualized, planned and executed as a project in accordance with steps outlined in the manual, to ensure full compliance. The proposed board of directors, jointly with NAMC and DoA, would be expected to finalise the legal agreements of the model in terms of rules of engagement as defined by the PPP Manual. Generally, farmers will need some form of training on advantages and disadvantages of various business models in order to familiarise themselves with the one that would better meet their needs.

The table below summarises the different PPP models proposed to suite agribusiness marketing infrastructure and their main variants according to modalities and characteristics.

Model	Characteristics
Build-Operate-Transfer (BOT) o *Build own operate transfer (BOOT)* o *Build rent own transfer (BROT)* o *Build lease operate transfer (BLOT)* o *Build transfer operate (BTO)*	*The private sector designs and builds an asset, operates it, and then transfers it to the government when the operating contract ends, or at some other pre-specified time. The private partner may subsequently rent or lease the asset from government*
Design-Build-Finance-Operate (DBFO) o *Build own operate (BOO)* o *Build develop operate (BDO)* o *Design-construct-manage-finance (DCMF)*	*The private sector designs, builds, owns, develops, operates and manages an asset with no obligation to transfer ownership to the government. These are variants of design-build-finance-operate (DBFO) models*

Source: IMF, 2004 and European Commission, 2003

The different PPP models presented above can be flexibly selected and tailored according to the sector of application. Some areas are better suited for risk transfer to private party than others, as the different models imply various degrees of controls by the public party.

The operating company will trade lowly graded products to local traders who collect direct the depot and resell to hawkers or customers. The depot could be a point of dispatching order placed through fresh produce markets and operating company. It would make business sense to link the depot facility with other national fresh produce market to serve as a supply base for BBEE agents who does not have sufficient products to sell. The relationship of the facility with other fresh produce markets will bring about complementary products to ensure sustainability. Also, the agency will source produce from commercial farmers.

We propose that the operating company provide technical support to farmers and appointed management of the depot facility, thereby transferring skills to municipality, owners and directors. The operating company should make the following personnel on a fulltime basis; production coordinator, pack house manger and marketing manager. The agency will also advise with regard to production systems, quality, HACCP, etc. The project management firm should get buy-in from experience commercial farmers to transfer skills to potential farmers who farm in the area targeted.

Farmers in selected deliver their produce to a functional collation centre or depot as per the service level agreement. Once the produce reaches the collation centre, then the marketing company will be responsible for packing, sorting, grading, quality inspection and distribution of fresh products to various distribution market channels. Market channels to be supplied are as follows; corporate retail (supermarkets and chain stores), national fresh produce markets, exports, local market (hawkers, rural households and vendors); and government institutions (prisons, hospitals, feeding schemes, etc) as shown in Figure 2.

The proposed business and operational model is summarised in a matrix below

Characteristic	**Existing markets**	**Proposed depot Facility**
Ownership	Government	Public private partnership (PPP)
Management	Government	Private (driven by business principles)

Infrastructure	Huge Under-utilised	Adequate for beginners
Backward Linkages	Weak	Integrated with collection centres and transport providers
Forward Linkages	Fresh produce market	Directly linked to retailers, processors, fresh produce markets and wholesalers
Payment solutions	Payment after 7-30 days	Cash settlement within 7 days from date of delivery
Services	Provided by government	Depot to provide the following services: technical support, inputs, production loan, renting of equipment, quality inspection, market information
System of sale and pricing		Producers are informed of pricing strategy Sale of lowly graded products Convert overripe products into dried fruits and ready to eat salads

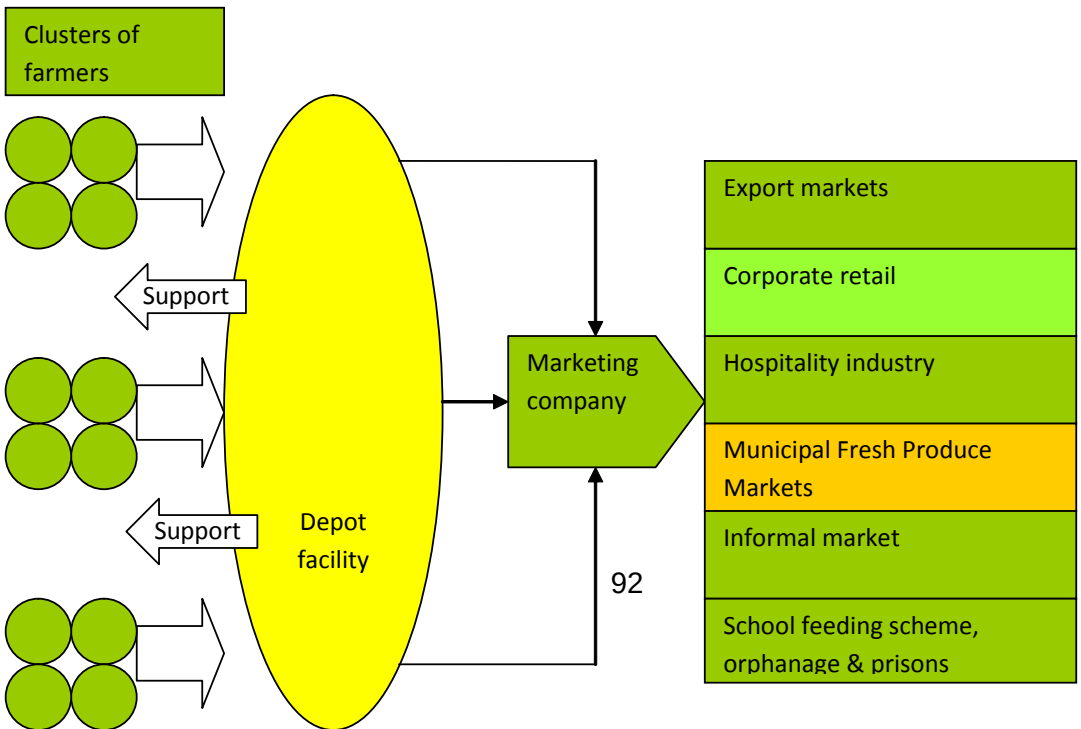


FIGURE 2. TYPICAL DISTRIBUTION AND MARKET CHANNELS SOURCING PRODUCTS FROM DEPOT

5.8 APPROPRIATE INSTITUTIONAL ARRANGEMENTS

Stakeholders in various provinces generally agreed that it would be better if a board of directors could oversee the performance of the fresh produce depot facilities, which would release farmers to focus on production. The proposed representation includes the government at all tiers, farmers, private investors, and special interest groups, which would include professionals. The exact composition in terms of shareholding would differ from location to location. Producers indicated that they would like to organise themselves in either a cooperative or Limited company. The respondents proposed that dividends should be apportioned as follows: 30% shares owned by farmers, 50% managing company and 20% owned by government. The government can release its shares to AgriBEE group after 5 years as a partner providing support.

5.9 APPROPRIATE MANAGEMENT STRUCTURES

In all provinces, there was a general agreement that a professional private company that would be accountable to the owners should manage the fresh produce depot facilities. Like in all businesses, the managing company will be retained on performance basis. Generally, in all reports it is clear that should the managing company not involve the owners, there should be a clear indication as to when the company will exit in order to reduce the problems which farmers faced with such managing companies prior to the 1994 dispensation. During the said era, farmers were actually viewed/treated as labourers on their own land, whereas the managers did all the management activities with all activities being wrapped under the cloak of secrecy. The model should allow for appropriate training with absolute transparency. Our findings concur with Reports 1 and 2 produced by NAMC, wherein it was recommended that market management should have financial independence and authority to manage the market without interference from the board of directors.

5.10 APPROPRIATE INFRASTRUCTURE WITH COLD STORAGES

5.10.1 CONCEPT DESIGN AND COST ESTIMATES

Small farmers have been battling to sell their products on markets across the country. Small yields makes it financially impractical for these farmers to make use of markets situated in economic

centers. Providing these farmers with a service where they can get their products to large markets will be greatly beneficial to them.

The idea behind the market depot is to bridge this gap between the small farmers and the large markets. The depot will coordinate the cultivation and production of producers in selected areas, whereby produce will be collected from the farms and transported to the market depot for processing. After processing in depot, products could be delivered to various market channels. Because of large volumes, costs per unit will drop and this will make it financially viable for transportation to large markets.

The producer will bring his produce to the market depot or the farmer can pay a fee and the market depot will collect it from him. At the market depot, the produce will be weighed, graded and electronically recorded in accordance with the farmer's profile. The produce will be processed, packed and sent off to the markets. The depot will then deduct the fee for their service and the farmer will receive the balance.

The market depot will have all the necessary infrastructure and machinery to pack large volumes of different products. This includes processing lines and cold storage. . Detailed costing and equipment is in 5.10.2.There will also be an electronic recording system to ensure that all data a correctly recorded. Payments will be made electronically over the Internet to prevent cash from being used on the premises.

For the market depot to operate successfully it will be advisable to have a steady and reliable production rate. Thus, there will be support to the farmers to schedule the planting of their crops so that the production rate at the market depot is as steady as possible.

Complimentary facilities

Essential facilities for the smooth operation of the depot such as ripening, cold rooms, palletising room, crates, washing bay for crates and trucks and inputs storage should be build and managed by the managing company. In addition, the private company shall manage harvesting and cultivating equipment.

Support services

The proposed depot facility should provide the following services to the beneficiaries' technical advice on production, production finance, and transportation of produce from the farms to the depot and from the depot to the market, production schedules and crop rotation systems. In addition, the depot facilities should ensure that true empowerment is in the areas that they serve occurs.

Essential services

The operating company should encourage providers of services such as banking, seed traders and fertilizer as well as chemicals to rent space in close proximity to the depot facility

5.10.2 PLANTING AND HARVESTING SCHEDULE FOR FRESH PRODUCE TO DELIVER TO DEPOT

The diagram below depicts the harvesting and planting schedule of various crops intended to deliver to the depot in accordance with adaptability and yield potential

	Jan	Feb	March	April	May	June	July	August	Sep	Oct	Nov	Dec
						Tomatoes						
Plant	xxxxxxxx	xxxxxxxx		xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxxx			
Harvest	xxxxxxxx					xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxxx			xxxxxxxx
						Potatoes						
Plant	xxxxxxxx	xxxxxxxx		xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxxx			
Harvest	xxxxxxxx	xxxxxxxx				xxxxxxxx	xxxxxxxx		xxxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx
						Onion						
Plant		xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx				
Harvest	xxxxxxxx	xxxxxxxx				xxxxxxxx		xxxxxxxx	xxxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx
						Brassica						
Plant		xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxx	xxxxxxxx						
Harvest					xxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxx			
						Melons						

Plant		xxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx				
Harvest					xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxxx
						Green Mealies						
Plant	xxxxxxxx					xxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxxx	xxxxxxxx	xxxxxxxx	xxxxxxxxx
Harvest	xxxxxxxx	xxxxxxxx	xxxxxxxx						xxxx	xxxxxxxx	xxxxxxxx	xxxxxxxxx
						Mango						
Plant	N/A											
Harvest	Sep15-Nov15								xxxx	xxxxxxxx	xxxxxxxx	xxxxx

FIGURE 5-A. PLANTING AND HARVESTING SCHEDULE FOR THE DEPOT

Harvesting Periods

	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Tomatoes				**Maintenance**								
Potatoes												
Onion												
Brassica												
Melons												
Green Mealies												
Mango												

FIGURE 5-B. PLANTING AND HARVESTING SCHEDULE FOR THE DEPOT

Bushbuck Ridge: 800ha irrigated production estimated at 20 days per month, 8 hours per day over harvesting periods set out in sheet 2

				Size (ha)	Period (month)	Yield (ton/ha)	Prod Rate(ton/hr)	Processing Method	Job creation per shift
Tomatoes			**Tomatoes**	100.0	6.0	50.0	5.2	Mechanised	45 people
Plant	Jan-Feb	Apr-Sept	**Potatoes**	200.0	8.0	20.0	3.1	Mechanised	25 people

Harvest	Dec-Jan	Jun-Sep	**Onion**	150.0	7.0	30.0	4.0	Mechanised	35 people
			Brassica	100.0	4.5			Sorting tables	25 people
Potatoes			**Mellon's**	100.0	8.0			Sorting tables	5 people
Plant	Jan-Feb	Apr-Sep	**Green Mealies**	150.0	6.5	15.0	2.2	Sorting tables	5 people
Harvest	Sep-Feb	Jun-Jul	**Mango**	n/a	2.0	n/a	n/a	Sorting tables	5 people

FIGURE 5-C. EXPECTED PRODUCTION VOLUMES OF THE DEPOT

TABLE 22. COST ESTIMATES OF THE DEPOT

Market Depot (Bushbuck ridge) Preliminary Cost Estimate (Excluding VAT)			
Item	**Units**	**Price per unit**	**Cost**
Automated Onion line	1	R 875,000.00	R 875,000.00
Automated Potato line	1	R 430,000.00	R 430,000.00
Automated Tomato line	1	R 930,000.00	R 930,000.00
Overhead conveyer	1	R 100,000.00	R 100,000.00
Sorting Tables	20	R 1,000.00	R 20,000.00
Building	3312 sqm		
Earth works	N/A	N/A	R 500,000.00
Covered loading area	400sqm	R 500.00	R 200,000.00
Processing area	2888 sqm	R 1,200.00	R 3,456,000.00
Offices	112 sqm	R 3,000.00	R 96,000.00
Office furniture and equipment	N/A	N/A	R 100,000.00
Storage area	322 sqm	R 1,500.00	R 475,500.00
Gate house	9 sqm	R 2,000.00	R 2,000.00
Cold room	224 sqm	R 6,000.00	R 1,344,000.00
Ablution	85 sqm	R 3,500.00	R 297,500.00

Paving	1630 sqm	R 165.00	R 160,800.00
Shaded parking	100 sqm	R 265.00	R 26,500.00
Perimeter fence	450m	R 100.00	R 45,000.00
Electricity supply	100kW	N/A	R 120,000.00
Water tanks: 5kl with stands	3	R 10,000.00	R 30,000.00
Pallet scale 3 ton	1	R 6,000.00	R 6,000.00
Pallet Jack	1	R 6,000.00	R 6,000.00
Forklift	1	R 160,000.00	R 160,000.00
8 ton Truck	1	R 350,000.00	R 350,000.00
Bakkie	1	R 200,000.00	R 200,000.00
Contingencies			R 600,000.00
		Total	R 10,530,300.00

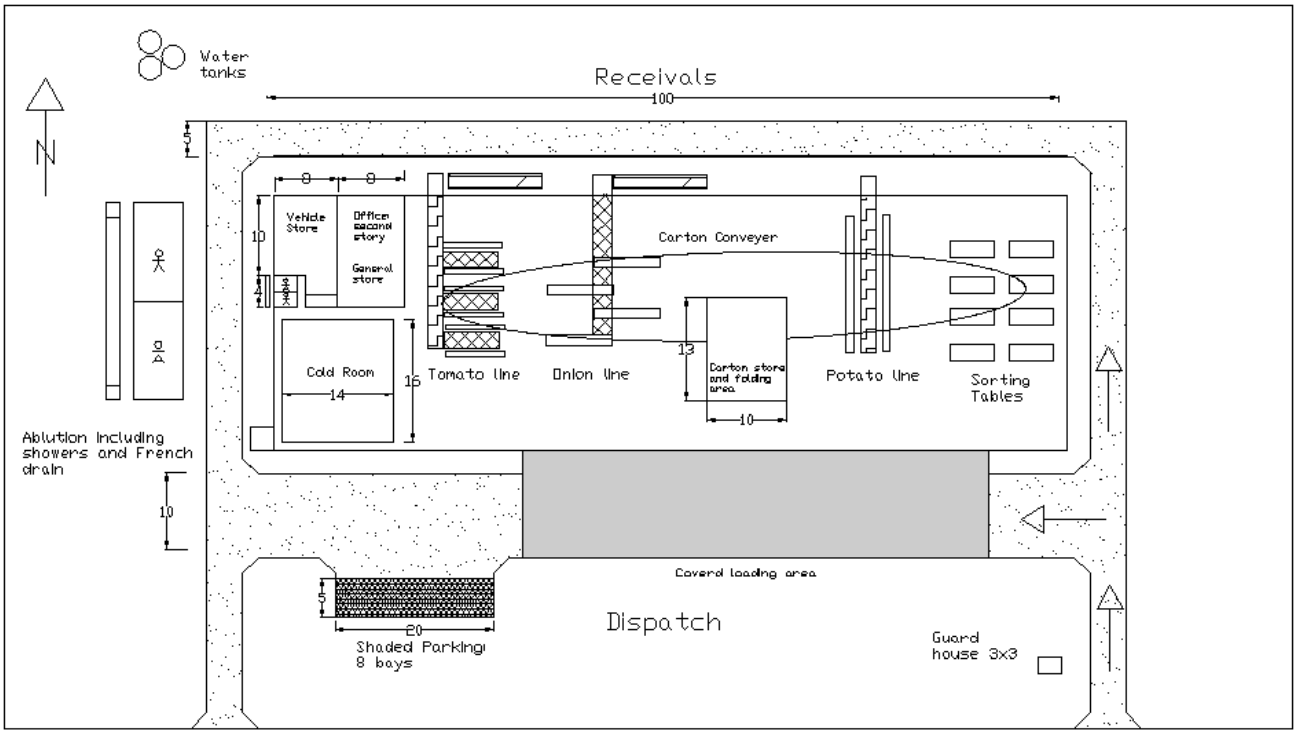
INCOME STATEMENT OF DEPOT

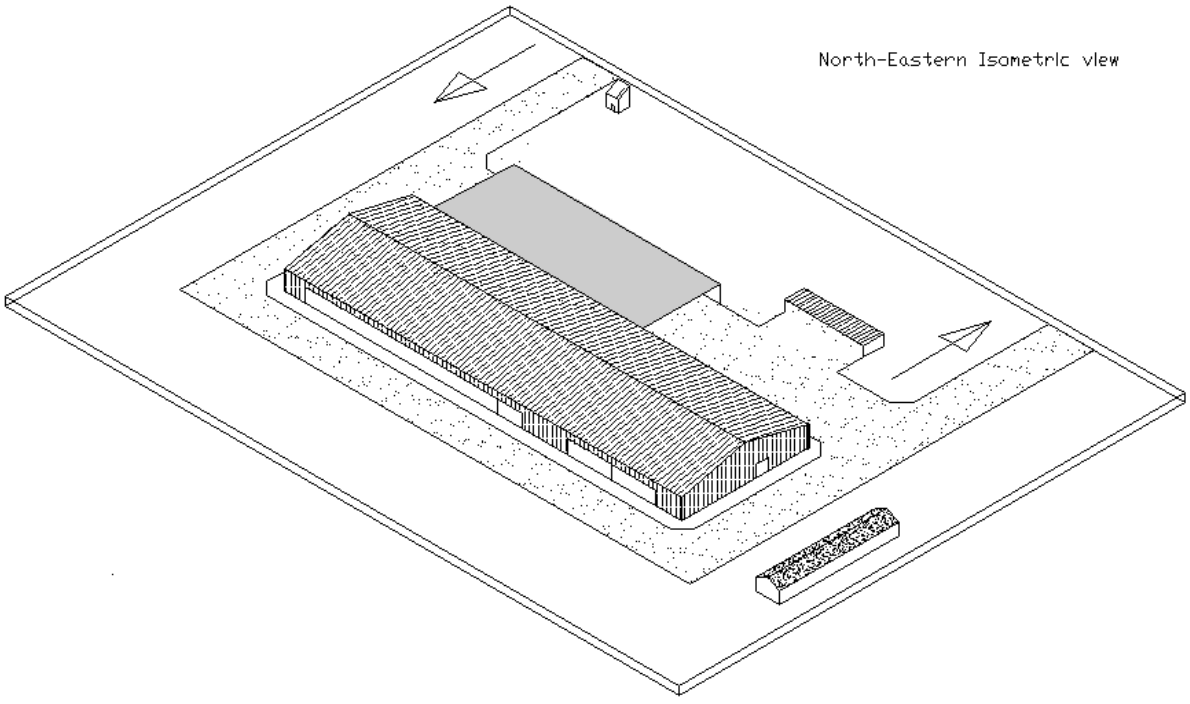
Income and Expenditure of Depot based on 800ha (24 000 tons) per annum	
Income	Rand/ton per ha
Potato	R 1,700.00
Tomato	R 1,900.00
Onion	R 2,200.00
Other	R 1,000.00
	R 6,800.00
Average per ton	**R 1,700.00**
Cost per ton of produce (800ha@30ton per ha)	
Forklift	R 9.00
Glue (cartons)	R 8.00
Wages	R 120.00
Packing materials	R 900.00
Chemicals	R 40.00
Wax	R 30.00

Pallets	R 70.00
Transport(/ton.km) Truck	R 1.00
Transport(/ton.km) bakkie	R 3.00
Transport Interlink (/ton.km)	R 0.50
Marketing costs	R 5.00
Maintenance	R 15.00
Electricity	R 20.00
Total	**R 1,221.50**
Gross Profit (to farm)	**478.5**
Gross profit Depot	**R 29,316,000.00**

PROPOSED DESIGN OF DEPOT

Below is detail drawing of the proposed design of the depot. The depot compose of the building, paving area, packing and perimeter fence


Water tanks
Receivals
100
N
5
8
8
10
4
Vehicle Store
Office second story
General store
Carton Conveyer
Cold Room
14
16
Tomato line
Onion line
13
Carton store and folding area
10
Potato line
Sorting Tables
Ablution including showers and French drain
10
Covered loading area
5
20
Shaded Parking 8 bays
Dispatch
Guard house 3x3


North-Eastern Isometric view

3.10.2 FEASIBILITY ANALYSIS

The fresh produce depot facilities are an indispensable facility in the value chain for the successful marketing of agricultural produce. The feasibility study is expected to provide the NAMC and the DA with enough information to decide:

a. **Whether the project can be done**: Results of this study have shown that the depot facilities can be done in terms of the availability of land that can provide economies of scale for the production of various fresh produce in all provinces. Also, various municipalities indicated their keen interest in the project by their willingness to provide land for the establishment of the fresh produce depot facilities. The government in the proposed PPP business ownership can be the district municipality, which is mandated to conduct business for the common benefit of a cluster of local municipalities. Although the study did not determine the suitability of land for the commercial production of fresh produce for the fresh produce facilities, it should be indicated that the major limiting factor would be the availability of water all-year-round and extremes in temperatures which would preclude the production of certain crops.

b. Whether the final product will benefit its intended users: The study demonstrated that the fresh produce depot facilities would benefit the intended previously marginalised farmers in various provinces. However, the facilities can also benefit unintended users in that they would provide other services, which are indispensable. For instance, the nature of fresh produce necessitates the need to have various intermediates in the marketing chain.

During the feasibility study phase, the questionnaire also made detailed provision of the following issues:

- The present organisational system including users, policies, functions and objectives: In most of the irrigation, schemes that will serve the proposed fresh produce depot facilities; the schemes are committee-managed, which suggested the presence of policies, functions and objectives. However, in most schemes the leadership constraint centre around issues that can be addressed through training

- Problems with the current system included poor performance in terms of quality and production, inconsistent supply, low skills base, literacy and elderly farms, most of whom are already pensioners, and inadequate extension services.

In analysing the feasibility for the establishment of the proposed depot facility, we have used five aspects to assess the practicality of its success by asking questions set out below.

5.10.2.1 TECHNICAL FEASIBILITY

Is the proposed technology or solution practical?

The proposed technology is readily available in the country. Currently, commercial farmers in the country successfully operate the technology. Dormas is the leading manufacturer of vegetables and fruit processing and packhouse equipment based in Johannesburg, RSA.

As proposed in the business model, private companies are encouraged to oversee the daily management of the depot. The operating company will appoint qualified and experience personnel to run the depot. It is proposed that a proven, mature and basic technology with a longer customer base be sourced. The proposed technology is available and has the capacity to handle the packing, grading and sorting of vegetables and fruits.

The depot facilities are technically feasible for the selected areas given the fact that the availability of large tracks of land would provide the much needed economies of scale. Ideally, the following production factors should be closely studied to ascertain the sustainability of the depot facilities: climate, soils and land availability, availability of water in terms of quantity, quality and availability, potential cultivars, ability to manage insect and diseases, growing season, consistent yields, reputable nurseries and inputs suppliers. Appendices A indicate areas suitable for vegetable production in South Africa.

5.10.2.2 ECONOMIC FEASIBILITY

The fresh produce facilities may be possible given some of the highlighted resource constraints due to the following:

- The project is possible with resources coming from municipalities, private investors, development agencies, provincial and national government
- Private sector investment through its corporate social investment funds. For instance, a packhouse is currently being constructed by AngloPlaats in Mokopane for farmers dispossessed of their farming units due to underground activities of mining in the area.

The following are some of the tangible benefits of using the fresh produce depot:

Benefits	Costs
Tangible benefits • Increased sales • Premium quality of produce delivered to various market channels • Cost reduction • Increased margins on sales • Increased throughput/efficiency • Well planned production schedules • More effect use of staff time • Record production statistics of producers	**Development costs** • **Development and purchasing costs**: ○ Cost of development team ○ Consultant fees ○ Equipment ○ Sorter, grader and packing line ○ Operating soft and hard ware • **Installation costs** ○ Installing the machinery ○ Training operators
Intangible benefits • Increased flexibility of operation • Higher quality products/services • Better customer relations • Improved staff morale	• **Operational costs (recurring costs**) ○ Maintenance of facility, equipment and computers ○ Salaries of personnel ○ Ongoing training of personnel

After assigning values to costs and benefits, it would be appropriate to determine cost versus benefits by calculating cost and benefit using this formula:

5.10.2.3 OPERATIONAL FEASIBILITY

Do end-users and management accept the depot facility?

During stakeholder meetings in all provinces, farmers expressed their willingness to use the depot, as it will alleviate their problem of supplying poor quality products to markets. The depot facility will comply with environmental regulations and all legal aspects of the country.

5.10.2.4 SCHEDULE FEASIBILITY

How long will it take to get the technical expertise?

We may have the technology, but that does not mean we have the skills required to use the technology. It is expected that the operating company has or will employ experienced personnel to ensure smooth running of the depot. .

TABLE 3 FEASIBILITY MATRIX CRITERIA TO ASSESS READINESS OF THE PROVINCE

Feasibility Criteria	Weight %	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	Northern Cape	North West	Western Cape
Operational feasibility **Functionality:** Describes to what degree the depot would benefit DoA and producers. How well the system will work **Political:** A description of how well received this solution would	30	*Improve quality of produce and increase sales. Selected areas production* ***Depot is***	*Improve quality of produce and increase sales. Selected areas production* ***Depot is welcomed by users and Dept of agric***	*Improve quality of produce and increase sales. Selected areas production* ***Depot is welcomed by users and Dept***	*Improve quality of produce and increase sales. Selected areas production* ***Depot is welcomed by users and Dept of agric officials***	*Improve quality of produce and increase sales. Selected areas production* ***Depot is welcomed by users and Dept of agric officials***	*Improve quality of produce and increase sales. Selected areas production* ***Depot is welcomed by users and Dept of agric officials***	*Improve quality of produce and increase sales. Selected areas production* ***Depot is welcomed by users and Dept of agric officials***	*Improve quality of produce and increase sales. Selected areas production* ***Depot is welcomed by users and Dept of agric***	*Improve quality of produce and increase sales. Selected areas production* ***Depot is welcomed by users and Dept of agric officials***

be from operating company, producers and DoA		***welcomed by users and Dept of agric officials***	***officials***	***of agric officials***					***officials***	
Technical feasibility **Technology:** Assessment of the maturity, availability to be acquired, desirability of Dormas to support the depot. **Production considerations**: Assessment of production potential, number of farmers, area under production(ha), production volumes, equipment, irrigation water, tractors, electricity,ect **Expertise**: an assessment to technical expertise needed to develop, operate, manage, maintain the system	30	Technology available locally. Dormas to provide support Selected area suitable for production and possess the infrastructure and equipment See production schedules and crop rotation in Appendices A & B Operating company has expertise to operate the system	Technology available locally. Dormas to provide support Selected area lacks equipment and infrastructure for large volumes See production schedules and crop rotation in Appendices A & B Operating company has expertise to operate the system	Technology available locally. Dormas to provide support Inadequate land to produce required volumes See production schedules and crop rotation in Appendices A & B Operating company has expertise to operate the system	Technology available locally. Dormas to provide support Selected area suitable for production and possess the infrastructure and equipment See production schedules and crop rotation in Appendices A & B Operating company has expertise to operate the system	Technology available locally. Dormas to provide support Selected area suitable for production and possess the infrastructure and equipment See production schedules and crop rotation in Appendices A & B Operating company has expertise to operate the system	**Technology available locally.** **Dormas to provide support** **Selected area suitable for production and possess the infrastructure and equipment** **ee production schedules and crop rotation in Appendices A & B** Operating company has expertise to operate the system	Technology available locally. Dormas to provide support Inadequate land and infrastructure to produce required volumes See production schedules and crop rotation in Appendices A & B Operating company has expertise to operate the system	Technology available locally. Dormas to provide support Inadequate land to produce required volumes. See production schedules and crop rotation in Appendices A & B Operating company has expertise to operate the system	Technology available locally. Dormas to provide support Selected area suitable for production and possess the infrastructure and equipment Adequate land to produce required quantities See production schedules and crop rotation in Appendices A & B Operating company has expertise to operate the system

Economic feasibility Cost of development Return on Investment	30	R10, 3milion	R10, 3milion	R10, 3milion	R10, 3milion	R10, 3milion	R10, 3milion	R10, 3milion	R10, 3milion	R10, 3milion
Schedule feasibility Assessment of how long the depot will take to design and implement	10	Less than 3 months	Less than 2 months	Less than 2 months	Less than 2 months	Less than 2 months	Less than 2 months	9-10 months	9 months	Less than 3 months
Ranking total score	100									

5.11. PROPOSED IMPLEMENTATION PLAN

We have proposed an implementation plan of the fresh produce depot facilities in nine provinces of South Africa shown in table. The plan has five objectives and various activities with responsible organisation, measurable outputs, indicators and timeframes.

OBJECTIVE 1: Establish a business/trade legal entity in priority locations in nine provinces				
Activities	Outputs	Indicators	Time-frame	Responsibility
1.1 Organise meetings with key stakeholders to come up with consensus on business/trade legal entity.	Stakeholders identified legal entity.	Reports of meetings and consultations.	8 weeks	NAMC, DoA, Districts, PDA
1.2 Organise meetings with key stakeholders to elect board members.	Identified potential board members.	Report of meetings and consultations.	8 weeks	NAMC, DoA, District, PDA
1.3 Identify an attorney to facilitate the development of the selected legal entity deeds.	Focused attention on stakeholders and institutions of the legal entity.	Legal entity deeds.	8 weeks	NAMC, DoA, Districts, PDA, Board members
1.4 Develop guidelines for registration of the legal entities.	Baseline guidelines development. Focused attention on stakeholders and institutions of the business/trade legal entity.	Baseline survey reports.	4 weeks	Appointed attorneys, Board members

1.5 Conduct a baseline study of the recommended partnerships or linkages to the business/trade legal entity.	Baseline survey reports indicating:- the existence of a legal entity; its strengths and weaknesses and opportunities for development, identifying and assessing the partnerships in terms of numbers, organizations, geographic location, marketing arrangement and constraints. Focused attention on key players and institutions of the business/trade legal entity.	Baseline survey reports.	2 months	NAMC, DoA, District, PDA, Board members

1.6 Convene board members' workshop.	Board members' workshop facilitated and prioritized legal entity formed. To discuss the empowerment / strengthening of Board members through development of a legal entity. Facilitate priorities of legal entities identified and used as focal point for program intervention.	Legal entity business plans.	One Month	NAMC, DoA, District, PDA, Board members
1.7 Establish formal links between legal entity and relevant industry chains.	Association with government departments formalized. Functional provincial program structures.	Asset handed-over to legal entity.	8 weeks	NAMC, DoA, District, PDA
1.8 Formalize operational mechanisms of legal entity.	Management structure and functions. Operational Lines and documents developed.	Working manuals.	4 weeks	Board members

1.9 Facilitate the development of a business plan for the legal entity.	A business-plan for legal entity developed. Functional legal entity program structure.	Special Procurement contracts. Business Plan document.	4 weeks	Board members
1.10 Facilitate the formation of commodity associations.	Formation of commodity associations Secure production plans.	Commodity associations.	8 weeks	Board members
1.11 Support the prioritized legal entity to present its plan to ESKOM (Small Business Development).	Agreement with ESKOM to support electricity connection. Enhanced irrigation plan to support irrigation.	Approved plan by ESKOM (SBD).	8 weeks	Board members
1.12 Develop and implement monitoring and evaluation mechanism for the erection of the depot facilities	Consolidation of the broad implementation process of the aim of the legal entity. Provision of information to NAMC, DoA, PDAs, Districts and other role-players for informed decision making.	Documented reports.	Annually	Board members
OBJECTIVE 2: Erection of the proposed fresh produce depot facilities at two priority locations per province				

Activities	Outputs	Indicators	Time-frame	Responsibility
2.1 Develop and approve budget for construction of the facilities	Detailed budget for erection of the facilities	Budget reports	10 weeks	NAMC, DoA, Districts, PDA, Board members
2.2 Erect fresh produce depot facilities	Depot facilities which comply with ISO 9002	Two depot facilities per province	52 weeks	NAMC, DoA, Districts, PDA, Board members
2.3 Commission the fresh produce depot facilities	Depot facilities in priority locations of all provinces commissioned.	Commissioning reports.	4 weeks	NAMC, DoA, Districts, PDA, Board members
2.4 Launch the fresh produce depot facilities	Depot facilities in priority locations of all provinces launched.	Launching reports.	18 weeks	NAMC, DoA, Districts, PDA, Board members
OBJECTIVE 3: Develop and implement a strategic plan to handle challenges encountered by the legal entity and farmers in the stratified levels conforming to the production chain of the fresh produce depot facilities.				
Activities	Outputs	Indicators	Timeframe	Responsibility
3.1 Identification of problem areas with key stakeholders (production planning).	Detailed analysis depicting shortfalls on production planning.	Reports.	Ongoing	Board members
3.2 Identification of problem areas with key stakeholders (production).	Understanding the roles and relationships with institutions central to the production chain.	Reports.	Ongoing	Board members

3.3 Identification of problem areas with key stakeholders (marketing).	Detailed analysis depicting shortfalls on marketing of the commodities.	Reports.	Ongoing	Board members
3.4 Determine alternative, viable and sustainable solutions to address 3.1; 3.2; 3.3.	Detailed plan that addresses 3.1; 3.2 and 3.3.	Reports.	Ongoing	Board members
3.5 Develop implementation plans derived from 3.4.	Implementation plans of recommendations outlined in 3.4.	Reports.	Ongoing	Board members
3.5 Develop and implement a conforming disaster mitigation plan for the entire production chain.	Detailed implementation plan for disaster mitigation in the entire production chain.	Reports.	4 weeks	Board members
OBJECTIVE 4: Develop and implement a strategy for human capacity building and farmer empowerment.				
Activities	Outputs	Indicators	Time-frame	Responsibility
4.1 Determine and discuss the skill (technical skill for production ability) shortfall as recorded in the baseline study.	Detailed training needs assessed.	Report and training manuals.	12 weeks	Board members
4.2 Determine and discuss the skill (farm/ production planning) as recorded in the baseline study.	Practical skill to plan and co-ordinate production of various crops.	Report and training manuals.	12 weeks	Board members
4.3 Determine and discuss the skill (financial management) as recorded in the baseline study.	Practical skill to manage finances of the legal entity.	Report and training manuals.	12 weeks	Board members

4.4 Determine and discuss the skill (marketing ability) shortfall as recorded in the baseline study.	Practical skill to manage various marketing components.	Report and training manuals.	12 weeks	Board members
4.5 Determine and discuss the skill (technical skill for production ability) shortfall as recorded in the baseline study.	Practical skill to manage irrigation (land use) scheduling.	Training manuals.	12 weeks	Board members
4.6 Develop and implement mechanisms of information sharing amongst farmers (national, regional).	Networking and local and national seminars. Organized demand for services / response mechanism.	Networking meeting documents information centre.	12 weeks	Board members
4.7 Develop modalities of creating interest for the youth, women and the disabled to participate facilities.	Youth, women and the disabled participate within envisaged facilities.	Head-count in fresh produce facilities and targeted farms.	10 weeks	Board members
4.8 Institutional profiling and continuous strengthening (monitoring and evaluation mechanisms).	Institutions within the business/trade legal entity strengthened. Effective and responsive service providing institutions created within the business/trade legal entity.	Institutional profiles. Service provider's day documented with clear roles and procedures to guide access of farmers.	8 weeks	Board members

4.9 Facilitate progressive farmers to be equipped with knowledge/skills to enhance the dissemination of their capabilities.	Progressive farmers engaged in farmer-to-farmer extension of skills. Skills and knowledge of magnet farmers put to effective use by wider group of farmers.	Document detailing capacity building needs of magnet farmers and intervention strategies. Magnet farmers facilitated to share skills with other farmers.	Ongoing	Board members
OBJECTIVE 5: Document lessons learned from implementation of two pilots of fresh produce depot facilities per province in South Africa				
Activities	Outputs	Indicators	Time- frame	Responsibility
5.1 Document experiences of the pilot phase with clear implementation recommendations to support the rollout of the project to other districts	Improve implementation and coordination of the fresh produce dept facilities.	Lessons learned documented.	8 weeks	NAMC, DoA
5.2 Use lessons let to develop improved policies to rollout projects to other districts within the provinces	Rollout improved projects to other districts	Improved policies documented.	Ongoing	NAMC, DoA

5.12. MONITORING AND EVALUATION PLAN

Monitoring and evaluation of the entire production chain of the fresh produce depot facilities would be an essential feedback mechanism within the adaptive management framework to keep the fresh

produce depots in a dynamic and responsive state towards the ever changing environmental business conditions. Monitoring and evaluation will provide the stakeholders, shareholders and other concerned partners with information on the progress and results of implementation of fresh produce depots. The evaluation process is intended to provide the feedback that triggers adjustments to actions, plans and budgets, to ensure that they are realistic and are being adhered to. Also, the evaluation provides management direction for the fresh produce depots in terms of goals, objectives, standards and guidelines, all of which are based on underlying working assumptions about policy and technology. Monitoring may include simple observation of the results of management activities, or more rigorous and systematic data collection, to provide a basis for periodic evaluation of the fresh produce depots.

Generally, there are three levels of monitoring:

- Implementation monitoring: Was the project accomplished? This aspect determines if plans, prescriptions, projects and activities were implemented as designed and in compliance with accepted standards (ISO 9002) for fresh produce depots.
- Effective monitoring: Does the project work? This determines if plans, prescriptions, projections and activities are being effective in meeting management goals and directions.
- Validation monitoring: Is the guidance correct? Here a determination is being made if the initial data and assumptions used in developing the fresh produce depots were correct, or if there, were a better way to meet planning regulations, policies or goals.

Evaluation includes analysis of the information and data collected during the monitoring phase. A review and evaluation of monitoring results will be conducted annually and summarised in an annual report. The Prairie Supervisor will also review the conditions on the land in the 5th year of the Plan implementation to determine whether conditions have changed significantly.

Monitoring is most effective when driven by specific questions, with monitoring and evaluation being geared to determine the need to revise management plans or how they are implemented. Monitoring and evaluation, therefore, should form the basis for adaptively retaining the fresh

produce depot facilities up-to-date and responsive to environmental changes by verifying the effectiveness of management plan standards and guidelines and anticipated programmes and project effects on resources. Monitoring and evaluation, when properly done, should provide critical information for developing amendments to the roles and responsibilities linked to the management plan of the fresh produce depot facilities.

12.1 Roles and responsibilities

The fresh produce depot facilities as envisaged in this document will continue to strengthen the collaborative working relationships between the DoA, NAMC and various tiers of government in the province. The DoA and NAMC should implement the fresh produce depots and conduct monitoring and evaluation, which should include: preparing an annual monitoring program, collecting data for implementation, effectiveness, and validation monitoring; collaborating with the provincial departments of agriculture in data collection, analyzing, interpreting and reporting results, conclusions and providing recommendations to the producers, and then making the reports available to the public and other agencies.

The DoA and provincial departments of agriculture may share responsibilities to provide the fresh produce depot facilities with scientific and technical expertise to conduct effectiveness and validation of monitoring and evaluation. These responsibilities may include advising and assisting the facilities with development of strategic business plans, sampling methods and designs, collection of data, and analysis and interpretation of data.

12.2 Annual monitoring and evaluation program

The DoA and NAMC should jointly be responsible for coordinating the preparation of an annual monitoring and evaluation report. This report will summarize the monitoring activities conducted during the year covered and the results obtained, address each of the monitoring questions listed in the monitoring plan, and evaluating the progress in the implementation of the fresh produce depots. The annual monitoring and evaluation report should include recommendations for remedial action, if

necessary; to make management activities and their effects consistent with the global fresh produce depot facilities. Finally, with appropriate training, it may be necessary for primary producers to assist in prioritizing what will be monitored in any given year.

12.3 Monitoring and evaluation INDICATORS

The proposed monitoring and evaluation items for the fresh produce depot facilities are organised as prescribed by ISO 9002. Data collected for each monitoring item should be aggregated and evaluated on an annual basis, unless otherwise noted. Monitoring items should be displayed alphabetically by resource area and include the following components:

12.3.1 MONITORING QUESTIONS

Specific monitoring questions should be developed to provide information essential to measuring fresh produce depot facilities accomplishment and effectiveness in each province. Questions should address existing issues and help identify emerging issues. Monitoring questions should be constructed to address one or more monitoring priorities.

12.3.2 MONITORING PRIORITIES

After monitoring questions are developed, a screening process sorts the more significant questions from the less significant to ensure efficient use of limited resources: time, money and personnel. The priority of a question may affect the intensity or extent of associated monitoring activities. Some of the considerations used in the screening process follow with a brief explanation:

High management assumption uncertainty (MP1): Examples: (1) a new way of doing something where there is limited experience with the new technique; (2) actions taken in response to an unprecedented situation.

High condition disparity (MP2): Examples: (1) a particular operational output is at a much lower level than planned; (2) the amount of use of a particular resource or use at a particular location is much higher than desired.

Likely to affect (MP3): There may be other forces affecting an output in the facility much more significantly than anything the operations of the facility do. Also, there may be environmental factors which are outside the scope of management activities of the facilities. An efficient monitoring strategy should then focus on these circumstances in order to ensure that management activities have a discernable outcome.

Great consequences (MP4): Examples: (1) if an operational activity is at risk, consequences could be high, whether or not management activities are likely to affect it; (2) if a relationship with co-operators or local government is at risk due to a management activity, consequences could be high (in this case, a human resource).

Key issue (MP5): Key issues identified through scoping may warrant monitoring even if they are (1) well understood, (2) the existing condition is good and (3) management activities will have little impact. Monitoring may be necessary for educational and/or accountability purposes.

Cost effectively answered (MP6): If the cost of answering the question is especially high in regard to benefits, or if an adequate monitoring method cannot be developed, the resource in question may be more appropriately studied by another entity, such as Agricultural Research Council, the Department of Water Affairs and Forestry, or educational institutions.

12.3.3 MONITORING DRIVERS

Various policy documents require specific monitoring tasks. The level and intensity of additional monitoring is dependent on available staffing, funding and the priorities of an entity. The following is a list of monitoring drivers for fresh produce depot facilities:

- ISO 9002
- Desired conditions, goals, objectives, standards and guidelines for fresh produce depot facilities
- Validation of assumptions/models
- Legal and regulatory requirements for production of fresh produce and establishment of fresh produce depot facilities as prescribed by the three tiers of government in South Africa
- Public expectations as regard to poverty alleviation
- Cost
- Court rulings

12.3.4 UNIT OF MEASURE

A unit of measure is a quantitative or qualitative parameter to answer monitoring questions. One or more units of measure can be associated with each question. Examples include tonnes of tomato per hectare, number of created jobs, number of agri-businesses initiated due to the establishment of the fresh produce depot facilities, *etc*.

12.3.5 SAMPLING METHODS

General methods for collecting information needed to address the monitoring question should be specified. The methods will be periodically updated.

12.3.6 RATING SCALE

Scale describes the level of monitoring and analysis in relation to depot area. This measure is important in describing effects dealing with volume heterogeneity and viability issues; as well as, describing cumulative effects of management actions. Examples include: land potential of where primary production occurs. For instance, it may be incorrect to compare production volumes from areas with high production potential with those from low production potential. Alternatively, it would

be wrong to compare production volumes from commercial farmers with those from emerging farmers.

12.3.7 FREQUENCY

Frequency describes the pattern of monitoring efforts over time. Examples include: annually, every five years, or every ten years.

In conclusion, monitoring and evaluation is a complex management field, which requires the management to prioritise what will be monitored in any given year. The ensuing monitoring and evaluation matrix for the fresh produce depot facilities serves as a model, which were proposed at provincial consultative meeting for a depot, but may be adapted from province to province or from year to year.

A monitoring and evaluation matrix for the fresh produce depot facilities

Monitoring question	Monitoring priority	Monitoring driver	Sampling unit	Sampling methods	Scale	Frequency
1. Project accomplishments						
1.1 To what extent have objectives of the project been met?	MP1-MP6	Poverty alleviation	No. of created jobs	Surveys	Volumes delivered to facility	Quarterly
1.2 National markets served	MP1-MP5	Poverty alleviation	Volumes achieved	Surveys	Volumes delivered to facility	Quarterly
1.3 Export markets served	MP1-MP5	Poverty alleviation	Volumes achieved	Surveys	Volumes delivered to facility	Quarterly
2. Use of facility						
2.1 Targeted farmers	Key issues	Poverty alleviation	No. of farmers using facility	Surveys	Volumes delivered to facility	Quarterly
2.2 Untargeted farmers	Key issues	Poverty alleviation	No. of farmers using facility	Surveys	Volumes delivered to facility	Quarterly

2.3 Consistency of usage	Key issues	Poverty alleviation	No. of supplying facility per frequency	Surveys	Volumes delivered to facility	Quarterly
3. Creation of real jobs						
3.1 At depot facilities	Key issues	Poverty alleviation	No. of created jobs	Surveys	No. of employees due to facility	Quarterly
3.2 On targeted farms	Key issues	Poverty alleviation	No. of farmers using facility	Surveys	No. of employees due to facility	Quarterly
3.3 On non-targeted farms	Key issues	Poverty alleviation	No. of farmers using facility	Surveys	No. of employees due to facility	Quarterly
3.4 In agri-business	Key issues	Poverty alleviation	No. of farmers using facility	Surveys	No. of employees due to facility	Quarterly
4. Creation of real wealth						
4.1 Targeted farmers	Key issues	Poverty alleviation	No. of farmers farming full-time	Surveys	No. of employers related to facility	Quarterly
4.2 Non-farmers	Key issues	Poverty alleviation	No. of farmers farming part-time	Surveys	No. of employers related to facility	Quarterly
5. Environmental impact						
5.1 Around the facilities	Key issues	Poverty alleviation	Vegetation	Inspection	Extent of land degradation	Annually
5.2 At targeted farms	Key issues	Poverty alleviation	Land conservation	Inspection	Extent of land degradation	Annually
5.3 At non-targeted farms	Key issues	Poverty alleviation	Land conservation	Inspection	Extent of land degradation	Annually

12.3.8 EVALUATION CRITERIA OF THE DEPOT FACILTIES

Indicator	**Description**	Measure
Performance	Will the depot have adequate throughput and response time?	Daily target of all employee
Information	Will the facility provide producers and management with timely accurate and useful information?	Achievement/ underachievement
Economy	Will the operation provide cost-effective information to the business? Could there be reduction in costs or increase in benefits?	Achievement/ underachievement
Control	Will operation offer effective controls to protect against fraud, theft and guarantee accurate data?	Achievement/ underachievement
Efficiency	Will the operation maximally utilise available resources including people and time?	Achievement/ underachievement
Services	Will the operation provide reliable service, e.g. technical support?	Achievement/ underachievement

CHAPTER 6

6.1 Opportunities, LESSONS Learned and Challenges

Opportunities

- Zunco Foods intends to enter into an off-take agreement with depots nationally to procure most of the products
- Improved quality for exports
- Increased sales and income
- Source inputs in bulk for farmers supplying the depot
- Development of a tailored training program for production and business skills for producers and employees of depot
- Organise producers into commodity associations for sound business linkages
- Limpopo, KwaZulu Natal, Mpumalanga, Eastern Cape, North West, Gauteng, Free State and Western Cape has initiatives regarding marketing infrastructure, either on individual farms or to service group of producers.

Challenges

- Continuous supply of produce to depot
- Source irrigation supplies to expand current land size under irrigation
- Low skill base to cope with demand of the depot

Lessons learned

- Non existence of statistical information regarding production, hectare and gross farming income of emerging producers
- Provincial department's protocol when securing a meeting with officials and farmers take longer time to come to fruition.

APPENDICES

A.PRODUCTION SCHEDULES

OPTIMUM PLANTING TIMES FOR VEGETABLES IN SOUTH AFRICA

The optimum times for the planting of seed, seedlings or vegetative propagation material are given for the different vegetables in the different production areas and provinces as in indicated by the numbers 1 to 7:

1. The Highveld (i.e. areas with heavy frost in winter) of Gauteng, Mpumalanga, North-West and Free State.
2. The Middleveld (i.e. areas with light to moderate frost in winter) of Gauteng, the Northern Province, North-West and certain areas of KwaZulu-Natal.
3. The Lowveld:
   - **A.** Areas with very hot summers and frost free winters of the Northern Province, Mpumalanga and KwaZulu-Natal.
   - **B.** Cooler areas with very light frost during winter of the Northern Province, Mpumalanga and KwaZulu-Natal.
4. The rest of Free State, Northern Cape and Central Karoo.
5. KwaZulu-Natal Midlands
6. The Eastern Cape and Central Karoo.
7. The Western Cape and South-Coast (with winter rains).

The different vegetables are given in the Table according to plant families and in alphabetical order. By grouping them into families, closely related vegetables are placed together and it facilitates the interpretation of the optimum times considerably.

It must be kept in mind that if earlier or later plantings are to be made as are given in the Table, it should be possible but then it becomes a risk as a result of too high or too low temperatures (especially untimely frost), or the occurrence of disease e.g. Virus diseases in cucurbits during late plantings, etc.

Plant Family	Common name of vegetable	**PRODUCTION AREA**							
		1	2	3A	3B	4	5	6	7
Alliaceae (Onion Family)	Chive	Feb-Apr and Sep-Oct	Mar-Apr and Sep	Apr and Aug	Mar-Apr and Aug-Sep	Mar and Sep	Mar-Apr and Sep	Mar-Apr and Sep	Mar and Sep
	Garlic	Feb-Mar	Mar-Apr	Apr	Mar-Apr	Feb-Apr	Mar-Apr	Mar-May	Apr-May
	Leek	Jan-Mar	Feb-Mar	Mar-Apr	Feb-Mar	Jan-Feb	Feb-Mar	Feb-Apr	Mar-May
	**Onion Short day: Sow seed for seedling	End Jan-Mar	End Jan-begin Apr	Mar-Apr	Feb-Apr	Feb-Mar	Jan-Apr	Mar-Apr	Mar-Apr
	Onion short day: Transplant seedling	Mar-May	Mar-Jun	Apr-Jun	Apr-Jun	Apr-Jun	Apr-Jun	Apr-May	May-Jun
	Onion Short day: Direct sowing	End Jan-Mar	End Jan-begin Apr	Apr	Feb-Apr	Mar	End Jan-begin Apr	Mar-Apr	Apr
	Onion Short day: Sow for pickle onions sets	Aug-Sep	Aug-begin Sep	End Jul-Aug	End Jul-Aug	Sep-Oct	Aug-Sep	Aug-Sep	Aug-Sep
	Onion Short day: planting of sets	End Jan-Feb	End Jan-Feb	Feb-Mar	Feb-Mar	End Jan-Feb	End Jan-Feb	End Jan-Feb	End Jan-Feb

	Onion Medium day: Sow seed for seedlings	-	-	-	-	Mid Apr-May	May	May	May
	Onion medium day: Transplant seedlings	-	-	-	-	Sep	Sep	Sep	Sep
	Shallot	Feb-Mar	Feb-Mar	Feb-Mar	Feb-Mar	Feb-Mar	Feb-Mar	Feb-Mar	Feb-Mar
	Spring Onion	Feb-Apr and Sep-Oct	Mar-Apr and Sep	Apr and Aug	Mar-Apr and Aug-Sep	Mar and Sep	Mar-Apr and Sep	Mar-Apr and Sep	Mar-Apr and Sep
	Carrot	Sep-Mar	Aug-Apr	Mar-Jul	Feb-Apr and Jul-Aug	Jan-Mar and Aug-Oct	Aug-Apr	Aug-Apr	Jan-Mar and Aug-Nov
	Celery	Sep-Nov	Feb-Mar and Sep-Oct	Mar	Feb-Mar	Sep-Oct	Feb-Mar	Feb-Mar	Feb-Mar
	Parsley	Feb-Apr and Sep-Oct	Mar-Apr And Aug-Oct	Mar-May and Jul-Sep	Mar-Apr and Aug-Sep	Feb-Mar and Sep-Oct	Mar-Apr and Aug-Sep	Mar-Apr and Aug-Oct	Mar-Apr and Aug-Oct

Plant Family	Common name of vegetable	**PRODUCTION AREA**							
		1	2	3A	3B	4	5	6	7
Apiaceae (Carrot family continued)	Parsnip	Jan-Mar and Aug-Oct	Feb-Apr and Jul-Oct	Mar-Apr and Jul-Aug	Feb-Mar and Jul-Sep	Jan-Mar and Aug-Sep	Jan-Apr and Jul-Sep	Feb-Apr and Aug-Oct	Mar-Apr and Aug-Oct

Araceae	Amadumbi	-	Aug-Oct	Aug	Aug-Sep	Aug-Oct	Aug-Oct	Aug-Oct	Aug-Oct
Asteraceae	Artichoke (globe)	Jan	Jan	Jan	Jan	Jan	Jan	Jan	Jan
	Artichoke (tuberous or Jerusalem)	Sep-Nov	Sep-Nov	Jul-Aug	Aug-Oct	Sep-Nov	Sep-Nov	Aug-Nov	Sep-Nov
	Chicory (radicchio)	Feb-Mar	Mar-Apr	Mar	Mar-Apr	Feb-Mar	Mar-Apr	Mar-Apr	Mar-Apr
	Chicory (coffee)	Feb-Mar	Mar-Apr	Mar	Mar-Apr	Feb-Mar	Mar-Apr	Aug-Apr	Mar-Apr
	Chicory (witloof)	Feb-Mar and Sep	Mar-Apr	Mar	Mar-May	Mar-Apr	Mar-Apr	Mar-Apr	Mar-Apr
	Endive	Jan-Mar	Jan-Mar	May	Mar-May	Feb-Mar	Jan-Mar	Feb-Mar and Aug-Sep	Apr-Aug
	Lettuce (butter)	Jan-Feb and Aug-Sep	Feb-Sep	Mar-May	Feb-May	Jan-Mar and Aug-Sep	Jan-Mar and Aug-Sep	Jan-Apr and Jul-Oct	Aug-May
	Lettuce (head)	Jan-Feb and Aug-Sep	Feb-Sep	Mar-May	Jan-Mar and Aug-Sep	Jan-Mar and Aug-Sep	Jan-Mar and Aug-Sep	Jan-Apr and Jul-Oct	Aug-May
	Lettuce (specialty)	Jan-Feb and Aug-Sep	Feb-Sep	Mar-May	Feb-May	Jan-Mar and Aug-Sep	Jan-Apr and Aug-Sep	Jan-Apr and Jul-Oct	Aug-Oct
	Skorzonera (salsify)	Aug-Oct	Aug-Oct	Mar-May	Feb-Jul	Aug-Oct	Aug-Oct	Aug-Oct	Aug-Oct
Brassicaceae (Cole crop	Broccoli	Dec-Feb	Feb-Mar	Mar	Feb-Mar	Jan-Mar	Dec-Mar	Jan-Apr	Dec-Mar

family)	Brussels sprouts	Jan-Feb	Jan-Mar	-	Mar-Apr	Jan-Feb	Jan-Mar	Jan-Feb	Jan-Feb
	Cabbage	Aug-Feb	Feb-Apr and Aug-Oct	Feb-Jun	Feb-Apr and Jul-Aug	Nov-Feb	Aug-Apr	Nov-Feb	Nov-Apr
	Cauliflower	Dec-Feb	Feb-Mar	Mar	Feb-Mar	Jan-Mar	Dec-Mar	Jan-Apr	Dec-Mar
	Chinese cabbage	Aug-Feb	Feb-Mar and Aug-Sep	Mar-Apr and Jul-Aug	Feb-Apr and Aug-Sep	Feb-Mar	Feb-Mar	Feb-Mar	Feb-Mar and Aug
	Horseradish	Feb-Mar and Sep-Oct	Feb-Mar and Aug-Sep	Feb-Apr	Feb-Mar and Jul-Aug	Jan-Mar and Sep-Oct	Feb-Mar and Aug-Sep	Feb-Mar and Aug-Sep	Feb-Mar and Aug-Sep
	Kale, Collard	Dec-Mar	Feb-Apr	Mar-May	Feb-May	Jan-Mar	Feb-Apr	Feb-Apr	Feb-Apr
	Kohlrabi	Nov-Apr	Nov-Apr	Apr-May	Mar-May	Aug-Dec	Feb-May	Aug-Dec	Apr-Aug
	Radish	Feb-Apr and Aug-Nov	Feb-Mar and Aug-Oct	Feb-Sep	Feb-Apr and Jul-Sep	Feb-Mar and Aug-Oct	Jan-Apr and Aug-Oct	Aug-May	Mar-Oct

Plant Family	Common name of vegetable	**PRODUCTION AREA**							
		1	2	3A	3B	4	5	6	7
Brassicaceae (Cole crop family continued)	Tumip	Jan-Apr and Aug-Sep	Jan-Apr and Jul-Sep	Feb-Jun	Feb-May and Jul	Jan-Apr and Aug-Sep	Jan-Apr and Aug-Sep	Feb-Mar and Jul-Aug	Mar-Nov

Chenopodiaceae	Beetroot	Aug-Mar	Feb-Apr and Aug Oct	Feb-Jul	Feb-Apr and Jul-Aug	Feb-Mar and Aug-Oct	Aug-Apr	Aug-Feb	Feb-Mar and Jul-Nov
	Spinach	Aug-Mar	Aug-Apr	Mar-Jun	Feb-Apr and Jul-Aug	Aug-Apr	Aug-Apr	Aug-Apr	Mar-Apr and Aug-Sep
	Swiss Chard (spinach beet)	Jan-Mar and Aug-Oct	Jan-Apr and Aug-Oct	Mar-Aug	Feb-Apr and Jul-Aug	Jan-Mar and Aug-Oct	Jan-Mar and Aug-Oct	Jan-Mar and Aug-Oct	Mar-Apr and Aug-Sep
Convolvulaceae	Sweet potato	Oct-Nov	Oct-Dec	Aug-Feb	Sep-Jan	Oct-Dec	Oct-Dec	Oct-Dec	Oct-Dec
Cucurbitaceae (Cucubirt family)	Baby Marrow	Oct-Nov	Sep-Jan	Mar-Aug	Feb-Mar and Jul-Sep	Oct-Nov	Sep-Nov	Sep-Dec	Aug-Jan
	Butternut Squash	Oct-Nov	Sep-Jan	Mar-Aug	Feb-Mar and Jul-Sep	Oct-Nov	Sep-Nov	Sep-Dec	Aug-Jan
	Chayote	Sep	Aug-Sep	Jul	Aug	Sep	Sep	Sep	Sep
	Cucumber (common)	Oct-Dec	Sep-Jan	Feb-May	Jan-Mar and Aug-Sep	Sep-Dec	Sep-Dec	Sep-Dec	Sep-Dec
	Cucumber (greenhouse)***	Jan-Dec	Jan-Dec	Mar	Feb-Mar	Jan-Dec	Jan-Dec	Jan-Dec	Jan-Dec
	Cucumber (gherkin)	Oct-Dec	Sep-Jan	Feb-May	Jan-Mar and Aug-Sep	Sep-Dec	Sep-Dec	Sep-Dec	Sep-Dec
	Gem Squash	Oct-Nov	Sep-Jan	Feb-Aug	Jul-Sep	Oct-Nov	Sep-Nov	Sep-Dec	Aug-Jan

	Maranka	Oct-Nov	Aug-Sep	Jul-Aug	Jul-Sep	Oct-Nov	Sep-Oct	Sep-Oct	Sep-Oct
	Melon (sweet & musk)	Oct-Nov	Aug-Dec	Jun-Aug	Jul-Sep	Oct-Nov	-	Sep-Oct	Sep-Dec
	Patty Pan	Oct-Nov	Sep-Jan	Feb-Aug	Jan-Mar and Jul-Sep	Oct-Nov	Sep-Nov	Sep-Dec	Aug-Jan
	Pumpkin (Flat White Boer type= FWB)	Oct-Nov	Sep-Dec	Feb-Aug	Mar-Aug	Oct-Dec	Sep-Dec	Sep-Nov	Sep-Nov
	Pumpkin (Hubbard)	Oct-Nov	Sep-Dec	Feb-Aug	Mar-Aug	Oct-Dec	Sep-Dec	Sep-Nov	Sep-Nov
	Pumpkin (Ceylon)	Oct-Nov	Sep-Dec	Feb-Aug	Jan-Mar and Jul-Sep	Oct-Dec	Sep-Dec	Sep-Nov	Sep-Nov

Plant Family	Common name of vegetable	**PRODUCTION AREA**							
		1	**2**	**3A**	**3B**	**4**	**5**	**6**	**7**
Cucurbitaceae (Cucurbit family)	Pumpkin (marrow)	Oct-Nov	Sep-Dec	Feb-Aug	Jan-Mar and Jul-Sep	Oct-Dec	Sep-Dec	Sep-Nov	Sep-Nov
	Table Squash	Oct-Nov	Sep-Jan	Feb-Aug	Jan-Mar and Jul-Sep	Oct-Nov	Sep-Nov	Sep-Dec	Aug-Jan
	Watermelon	Oct-Nov	Aug-Sep	Jul-Aug	Jul-Sep	Oct-Nov	Sep-Oct	Sep-Oct	Sep-Oct
	Watermelon (Jam)	Oct-Nov	Aug-Sep	Jul-Aug	Jul-Sep	Oct-Nov	Sep-Oct	Sep-Oct	Sep-Oct
	Bambara Groundnut	Nov	Nov-Dec	Jan	Dec	Nov-Dec	Nov-Dec	Nov-Dec	Nov-Dec

Fabaceae (Pod plant family)	Bean Sprouts*	Jan-Dec		Jan-Dec	Jan-Dec	Jan-Dec	Jan-Dec	Jan-Dec	Jan-Dec
	Broad Bean	Mar-May	Apr-May	Apr-May	Apr-May	Apr-May	Apr-May	Apr-May	Apr-Jun
	Cowpea	Nov	Nov-Dec	Jan	Dec	Nov-Dec	Nov-Dec	Nov-Dec	Nov-Dec
	Dry Pea	Jul	May-Jun	Mar-Apr	Mar-May	Jul	Jun	May-Jun	Aug
	Green Bean (bush)	Sep-Jan	Sep-Feb	Feb-Mar and Jul-Aug	Feb-Mar and Jul-Sep	Sep-Jan	Aug-Jan	Oct-Jan	Sep-Feb
	Green Bean (runner)	Sep-Dec	Sep-Jan	Feb-Apr and Jul-Aug	Feb-Mar and Jul-Sep	Sep-Dec	Aug-Dec	Oct-Dec	Sep-Jan
	Green pea	Jul-Jan	May-Jun	Mar-Apr	Mar-May	Jul-Aug	Jun-Jul	May-Jul	Apr-Aug
	Green pea- Edible podded (Snow peas or Mange Tout)	Jul-Sep	Jun nd Jan	Mar-Apr	Mar-May	Jul-Aug	Jun-Jul and Jan	May-Jul	Apr-Aug
	Pigeon Pea	Oct-Nov	Sep-Nov	Aug-Sep	Aug-Sep	Sep-Oct	Sep-Nov	Sep-Nov	Oct-Nov
Poaceae (Grass family)	Sweetcorn	Oct-Dec	Sep-Dec	Jul-Sep	Jul-Oct	Oct-Dec	Oct-Dec	Sep-Dec	Sep-Dec
Solanaceae	Eggfruit (brinjal	Sep-Oct	Aug-Nov	Jul-Dec	Jul-Sep	Sep-Oct	Aug-Oct	Aug-Oct	Aug-Oct

Plant family	Common name of vegetable	**PRODUCTION AREA**							
		1	2	3A	3B	4	5	6	7
Solanaceae (Tomato family) (Continued)	Hot chili	Sep-Oct	Aug-Oct	Jan-Apr and Jul	Jan-Feb and Aug-Oct	Oct-Nov	Sep-Nov	Aug-Oct	Aug-Oct

	Paprika	Sep-Oct	Aug-Oct	Jan-Apr and Jul	Jan-Feb and Aug-Oct	Oct-Nov	Sep-Nov	Aug-Oct	Aug-Oct
	Potato	Jul-Sep & (Oct-Dec in North west)	Jul-Aug and Jan-Feb	Apr-Jul	Jan-Feb and Jul-Sep	Eastern Free State: Aug-Dec Rest: Dec-Jan & Aug	Aug-Oct	Jan-Dec South Karoo: Only Jan	SW-Cape: Dec-Mar &Jul-Sep S-Cape & Sandveld: Jan-Dec
	Sweet pepper (capsicum or green paper)	Sep-Oct	Aug-Oct	Jan-Apr and Jul	Jan-Feb and Aug-Oct	Oct-Nov	Sep-Nov	Aug-Oct	Aug-Oct
	Tomato (fresh market)	Oct-Nov	Sep-Dec	Feb-Mar	Jan-Mar and Jul-Aug	Sep-Nov	Aug-Nov	Aug-Oct	Jul-Sep
	Tomato ("cocktail")	Oct-Nov	Sep-Dec	Feb-Mar	Jan-Mar and Jul-Aug	Sep-Nov	Aug-Nov	Aug-Oct	Jul-Sep
	Tomato (cherry)	Oct-Nov	Sep-Dec	Feb-Mar	Jan-Mar and Jul-Aug	Sep-Nov	Aug-Nov	Aug-Oct	Jul-Sep
	Tomato (greenhouse)***	Jan-Dec	Jan-Dec	Feb-Mar	Jan-Dec	Jan-Dec	Jan-Dec	Jan-Dec	Jan-Dec
	Tomato (processing)	Oct-Nov	Sep-Dec	Feb-Mar	Jan-Mar and Jul-Aug	Sep-Nov	Aug-Nov	Aug-Oct	Jul-Sep

*Under controlled environmental conditions

** Because of the day length sensitivity of onions, the optimum sowing-and planting times are very complicated. Very clear cultivar differences also occur.

*** Greenhouses must be heated during the winter months in areas with cold winters

APPENDICES B: CROP ROTATION IN VEGETABLES

PLANNING OF A CROP ROTATION SYSTEM

The planning of a crop rotation system in cases where several vegetables crops are to be grown on a small area of 1 ha soil can be as follows:

- Divide the soil in blocks to accommodate all the vegetables
- See to it that related crops do not follow each other in a specific block.
- Work in 4 year cycles because most disease causing organisms disintegrate in the soil after a few years.
- Keep in mind which crops can be grown in summer or winter and what is the total growth period of each crop, i.e. how long a specific crop is going to occupy the land.
- Make use of crops for green manure.
- Keep record of everything.

See Table 2 for an example of a crop rotation system.

ADVANTAGES OF CROP ROTATION

A good rotation system has consequently the following advantages:

- The control of disease is simplified. By changing crops continuously it is assured that less problems are experienced with diseases.
- Insect and herb control benefit from it although insecticides and herbicides become more effective.

- Cultivation of the soil is optimal. Soil fertility and structure are retained and improved by the supplying of large quantities of organic material from time to time by green manure crops.

- There is a more continuous covering of the soil by vegetation with less loss of water and soil by erosion.

- The differences between crops are utilized, for example differences in their cultivation methods, nutritional needs, relationships, climatic adaptation and growth period.
- Labour is evenly distributed and a variety of food and income is assured.

Family	Crop	Climate adaptation (Cool weather=C Warm weather=W	Growth period (plants to harvest; days)
Solanaceae (Tomato Family)	Potatoes Egg fruit Peppers: • Chilies • Sweet Peppers • Paprika Tomatoes	W W W W W W W	135-150 120-150 150-210 150-210 150-210 150-210
Alliaceae (Onion family)	Spring onions Chives Garlic Leek Shallot Onions	C C C C C C+W	150 150 180-210 120-150 120-150 180-210
Brassicaceae (Cabbage family)	Cauliflower Kale Broccoli Kohlrabi Cabbage Horse radish Turnip Radish Chinese cabbage Brussel sprouts	C C C C C+W W C C C C	75-180 150-180 80-120 150 90-180 210-240 90-120 40-90 90-120 100-180
Curcurbitaceae (Cucurbit family)	Cucumbers Pumpkins: • Boer- • Green Hubbard- • Cylons- • Marrow- Squashes: • Baby marrows- • Gem Squash- • Butternuts- Chayote	W W W W W W W W W W	90-120 150-200 120-180 120-180 100-150 60-120 90-120 100-150 135

Family	Crop	Climate adaptation (Cool weather=C Warm weather=W	Growth period (plants to harvest, days)
Asteraceae (lettuce family)	Endive Artichoke Artichoke (Jerusalem) Lettuce Salsify	C C+W C+W C C+W	90-120 7-10year 7-10 year 90-120 150-180
Chenopodiaceae (Beetroot family)	Beetroot Swiss chard Spinach	C+W C C	90-150 150 90-120

An example of a crop rotation system over 4 years for 1 ha soil for the cultivation of: Tomatoes, sweet peppers, cauliflower, cabbage, carrots, beetroot, green beans

Year	**Season**	**BLOCK NO.**			
		1	2	**3**	4
2009	Winter	Cabbage	Beetroot	Green manure	carrots
	summer	Sweet potatoes	Green mealies	Tomatoes	Green beans
2010	Winter	Carrots	cauliflower	Beetroot	Green manure
	Summer	Green beans	Sweet potatoes	Green mealies	Sweet peppers
2011	Winter	Green manure	Carrots	Cabbage	Beetroot

	summer	Tomatoes	Green beans	Sweet potatoes	Green manure
2012	Winter	Beetroot	Green manure	Carrots	Cauliflower
	Summer	Green mealies	Sweet potatoes	Sweet peppers	Green beans

Adapted from B.1 Vegetables general by Coertze, 1998, ARC-VOPI

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