The financial implications of diversifying wine grape production to include citrus in the Robertson area, Western Cape, South Africa

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Declaration

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own original work, that I am the authorship owner thereof (unless to the extent explicitly otherwise stated) and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

Signature: Blanché Chenay Bezuidenhout

Date: March 2020

Abstract

In the past years diversification became very popular as it was successfully applied to overcome many challenges faced by farmers. Diversification is defined as the change in traditional norms and strategies towards the success of a farming operation. South Africa's wine grape industry is important to the country's economy. In recent years this industry have faced a number of challenges, which compelled them to generate additional alternative income. Four trends were identified which contributed to these challenges. The four trends are the reduction in the area under wine grape vineyards, increase of additional alternative crops, stagnated average wine grape prices and the impact of the drought that occurred in the Western Cape from 2015 – 2017. Consequently, wine grape farmers in the Robertson area diversified to include citrus. A number of uncertainties occurred in terms of the financial viability of this diversification process. Therefore, the research objective of this research study was to evaluate the financial implications associated with the outcomes of the diversification process by wine grape farmers in the Robertson area.

Three multi-period whole-farm budget models within a systems thinking approach was developed. A systems thinking approach is ideal as it accommodates the complexity of a farm systems and the development of the knowledge of a farmer to make more informed decisions. Simulation modelling accounts for interrelated interactivity of components. Whole-farm budget models are essential simulation models as it accommodates a large number of variables, consists of interrelated interactivity, are understandable by participants, is user-friendly and easily adaptable. The financial results obtained, was remarkable.

The financial results presented that the worth of the farm increased, as the Net Present Value (NPV) was negative in Model 1, and positive in Model 3. There is also no significant changes that occur in the use of infrastructure, as the capital investment required did not increased substantially. These results was based on the assumption a replacement ratio of 1:1. This means that for every hectare of wine grape removed, mainly due to age, one hectare of citrus was replaced. However, this assumption was not a representation of the reality. There were two factors which was important in citrus production. The first factor was the water requirement (m^3 per year) for citrus which was significantly higher, compared to the water requirement (m^3 per year) for wine grapes. Secondly, farms are affected during the irrigation season from citrus by the Brandvlei dam scheme, as the farmers do not have access to water for the full time period, due to maintenance of the dam. Considering these two factors, two scenarios were developed to accommodate the factors where the replacement ratio was adjusted to 1:0.8 and 1:0.7, respectively. However, the impact on the financial performance remained closed to the original results obtained. Therefore, wine grape farmers are advised to consider diversifying with citrus.

Opsomming

In vorige jare was diversifikasie alreeds baie gewild, aangesien dit suksesvol toegepas was om vele uitdagings wat boere in die gesig staar, te oorkom. Diversifikasie word gedefinieer as die verandering in tradisionele norme en strategieë om suksesvol te boer. Suid-Afrika se wyndruifbedryf is belangrik vir die land se ekonomie. Gedurende huidige jare, het hierdie bedryf 'n aantal uitdagings te staan gekom wat daartoe gelei het dat hulle addisionele alternatiewe inkomste moet genereer. Vier neigings is geïdentifiseer wat tot hierdie uitdagings bygedra het. Die vier neigings is die vermindering in die gebied onder wyndruifwingerde, toename in bykomende alternatiewe gewasse, gestagneerde gemiddelde wyndruifpryse en die impak van die droogte wat in die Wes-Kaap voorgekom het vanaf 2015 - 2017. Gevolglik het wyndruifboere in die Robertson gebied gediversifiseer om sitrus in te sluit. 'n Aantal onsekerhede het voorgekom rakende die finansiële lewensvatbaarheid van hierdie diversifiseringsproses. Daarom was die navorsingsdoel van hierdie navorsingstudie om die finansiële implikasies wat verband hou met die uitkomste van die diversifiseringsproses deur wyndruifboere in die Robertson-omgewing te evalueer.

Drie meerjarige begroting modelle vir die hele boerdery binne 'n stelseldenkingsbenadering was ontwikkel. 'n Stelseldenkingsbenadering is ideaal, aangesien dit die kompleksiteit van 'n plaasstelsel akkommodeer en die kennis van 'n boer verhoog om meer ingeligte besluite te neem. Simulasiemodellering is verantwoordelik vir interverwante interaktiwiteit van komponente. Begrotingsmodelle vir heelboerderye is noodsaaklike simulasiemodelle, aangesien dit 'n groot aantal veranderlikes bevat, bestaan uit interafhanklike interaktiwiteit, is maklik verstaanbaar

deur deelnemers, is gebruikersvriendelik en maklik aanpasbaar. Die finansiële resultate was merkwaardig.

Die finansiële resultate toon dat die waarde van die boerdery toegeneem het, aangesien die Netto Huidige Waarde (NHW) negatief was in Model 1 en positief in Model 3. Daar is ook geen noemenswaardige veranderinge in die gebruik van infrastruktuur nie, aangesien die nodige kapitaalinvestering nie aansienlik toegeneem het nie. Hierdie resultate was gebaseer op die aanname van 'n vervangingsverhouding, 1:1. Dit beteken dat elke hektaar wyndruif wat verwyder was, hoofsaaklik weens ouderdom, een hektaar sitrus vervang was. Hierdie aanname was egter nie 'n voorstelling van die werklikheid nie. Daar was twee faktore wat 'n groot rol speel in sitrusproduksie. Die eerste faktor was die waterbehoefte (m^3 per jaar) vir sitrus wat aansienlik hoër was, in vergelyking met die waterbehoefte (m^3 per jaar) vir wyndruiwe. Tweedens voorsien die Brandvlei dam skema nie water vir die volle tydperk in die besproeiingseisoen vir sitrus nie, weens instandhouding van die dam. Met inagneming van hierdie twee faktore, is twee scenario's ontwikkel om die faktore te akkommodeer waar die vervangingsverhouding onderskeidelik op 1: 0.8 en 1: 0.7 aangepas was. Die impak op die finansiële prestasie was ongeveer dieselfde as die oorspronlike resulte verkry. Daarom word wyndruifboere aangeraai om dit te oorweeg om met sitrus te diversifiseer.

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Chapter 1: Introduction and background

1.1. Introduction and background

The agriculture, forestry and fisheries industries in South Africa are very important to the country's national Gross Domestic Product (GDP). In the fourth quarter of 2017 these industries contributed 3.1% (DAFF, 2018). A fifth of the total value to total GDP is contributed by the Western Cape Province (WCDPT, 2018). Agriculture contributes at least 0.8% to the Western Cape Province's GDP (WCDPT, 2018). The Western Cape is known to employ the largest number of permanent farmworkers in comparison to all the other provinces in South Africa (Moseley, 2006). Viticulture is defined as the production of wine, table grapes, wine grapes, as well as the production of dried products of the vineyards (Wheeler & Marning, 2019). The South African wine industry is the 9th biggest wine producer in the world, and contributes four percent to global production (SAWIS, 2018). The wine industry also contributes R36 billion to the country's GDP and employs approximately 290 000 citizens (WCDPT, 2018). In 2018, wine cellars in South Africa produced approximately 825 million litres of wine, 50.91%was exported and the rest was sold domestically (SAWIS, 2018).

Globally, the area under cultivated vineyard was estimated at 7.6 million hectares in 2017 (SAWIS, 2017), 9% lower than the estimation for 2015. Most of South Africa's vineyards are situated in the Western Cape and in 2018 compromised 93 021 hectares of wine grape vineyards (SAWIS, 2018). This is 15.59% lower than the area under wine grape cultivation in 2013, which was 108 070 hectare. Over the same time period, there was a 34.74% increase in citrus fruit production, from 12 137 hectare in 2013 to 16 354 hectare in 2017 (Pienaar, 2018a). The Western Cape's wine grape production area is further divided into different wine regions. The Stellenbosch region has the most wine grape vineyards and makes up 16.1% of the planting in the Province, followed by Paarl (15.87%), Swartland (13.81%), Robertson (13.75%), Breedekloof (13.55%), Olifants River (10.42%), Worcester (6.99%), Northern Cape (4.14%), Cape South Coast (2.83%) and Klein Karoo (2.44%) (SAWIS, 2018).

Due to the drought that prevailed in the Western Cape from 2015 to 2017 (during which dam levels were at their lowest in the past decade), the wine grape harvest by the end of November 2017 was the smallest it had been in the past five decades (SAWIS, 2017). This also affected the employment of seasonal workers, which declined due to the less than usual demand. Income of the farmers decreased by between 25% to 50% (SAWIS, 2017). In addition, average wine grape prices per ton have stagnated between R3 000/ton and R5 000/ton, over the past decade (Pienaar, 2018a). These factors, and others have compelled wine grape farmers to look for alternative ways to generate income and consequently, to consider diversification. However, in general, diversification options are limited due to soil and climate characteristics.

Out of the ten wine producing areas in the Western Cape Province, the Robertson area, seems to be well suited for the production of soft citrus. This prevails from the ongoing trend that is occurring in this area, where wine grape farmers are diversifying to include citrus production. The diversification process from wine grape production to include citrus production is dynamic and long term. Producers that consider diversifying, need to consider the replacement of wine grapes, the establishment of citrus, new markets, production activities, and water requirements and availability. There are uncertainties regarding the longer term financial implications of making this diversification process.

1.2. Problem statement

Studies in recent years have shown that there has been a significant decline in the production of wine grapes in the Western Cape Province. Further to this are the relatively low and previously erratic wine grape prices per ton, which, over the past ten years has stagnated between R3 000/ton to R5 000/ton (Pienaar, 2018a). This, together with increased global competition, the increase in cost of establishing new vineyards or the replacement cost, the increase in VAT (that resulted in a decline in local consumers) and the lower returns received by farmers against the higher production costs that a farmer incurs, has all created a challenging environment for wine grape production.

Since 2015, the drought added more strain on the profitability of wine grape production. This forced the farmer to develop strategies and coping mechanisms to deal with the adversities. Considering the challenges that wine grape farmers are facing, a number diversified their production systems to include citrus. Compared to the water demand of wine grapes (4 000 – 4 500 m^3), the water demand for citrus is significantly higher (11 000 – 13 000 m^3). Citrus, however, reaches its highest water demand during autumn and winter seasons. This is after the wine grape harvest and when the water requirement for wine grapes has decreased. Diversification to include citrus, might be due to the associated increase in average price per ton in citrus production. It is important to evaluate the financial implications associated with the diversification process of wine grape farmers to include citrus.

1.3. Research objectives

The main objective of this research project is to evaluate the financial implications of the diversification process to include citrus in wine grape production systems in the Robertson wine producing area.

To reach this main objective the following goals are set, namely:

- to evaluate the status quo in financial terms at the whole farm level,
- to identify the physical/biological, including structural and investment implications of incorporating citrus in the production system, and
- to determine the financial implications, on the whole farm level, of including citrus as an enterprise in a wine grape farm in the Robertson area.

1.4. Suggested method

A farm system is complex and difficult to understand. A systems thinking approach is a method that does not ignore complexity and can be used to provide an in-depth evaluation of a farm system. It considers impacting factors and relationships, and assesses structure and function as determining outcome of the whole farm system. Simulation modelling accounts for the relational interaction and complexity in systems and is a cost and time effective way to construct a representation of a real farm. Whole-farm budget models are essentially simulation models that can include large numbers of variables and show the impact of changes to these variables through a sequence of relationships. In developing whole-farm budget models, this study intends the use of a typical farm which represents physical factors that producers from a homogenous area can relate to. The use of expert knowledge is imperative in the compilation of the models, as it enhances the understanding of the implications due to the changes and validates the assumptions made. The proposed method will be used to establish the financial implications associated with diversifying wine grape production to include citrus.

1.5. Limitations

The findings of this research project are based on a typical farm in the Robertson area, therefore it cannot be applied to any farm, but can be adapted if necessary. Another limitation of this research project is that it is focused on farm level and does not consider other wine industries, such as wine cellars and trade markets.

1.6. Outline of the thesis

Chapter 1 describes the background and problem statement of the wine grape industry. It also discusses the research objectives and questions, along with an introduction to the proposed method to be used. Chapter 2 discusses the background of the diversification process, followed by four trends that compelled wine grape farmers to generate additional alternative income. The four trends include the reduction in area under wine grape vineyards, the increase of additional alternative crops, stagnated average wine grape prices, as well as major consequences of the drought in the Western Cape that occurred from 2015 - 2017. In Chapter 3 an introduction to the systems approach in terms of complexity, principles and applications are discussed. Further to this, is the common types of models used in agriculture, as well as the layout of the intended models compiled. This describes the components the models consist of, how the data was collected and the interactivity of the models. Lastly, the financial performance of the diversification process is presented in Chapter 4, followed by conclusions, summary and recommendation in Chapter 5.

Chapter 2 Literature Review

2.1. Introduction

It is necessary for farmers to maintain sustainability, profitability and growth. When faced with challenges, diversification is one of the options that can be applied to overcome difficulties and maintain the business. Diversification involves the shift of resources from focusing production on one crop to include an additional high valued crop. It provides another way to generate income rather than focusing only on improved productivity to increase yields of the one crop (Joshi, Gulati, Birthal & Tewari, 2004). The employment of this strategy is becoming evident in the wine grape industry in the Western Cape. Due to obligations arising from quotas with wine cellars, farmers will not move away from wine grape production completely (Wood & Kaplan, 2006), and may opt to diversify. There are four potential trends that compelled wine grape farmers to diversify to generate additional alternative income. The first trend is reduction in farm area, followed by the second trend which is the inclusion of alternative crops to current production. The third trend is related to financial pressures due to stagnating growth of average wine grape prices. The fourth trend is the impact of the drought that occurred from 2015 to 2017, and the consequences thereof.

The goal of this chapter is to firstly discuss agricultural diversification, providing background to this strategy, and its relevance in this research study. Following this, the above mentioned trends will be explained in detail, highlighting their impact on wine grape farms and their potential contribution towards diversification.

2.2. Background of diversification

There are different methods to improve a farming operation in terms of sustainability, profitability and growth. These methods include increase of market penetration, market development, product development and diversification (Ansoff, 1957). This research project focuses on diversification. Diversification is seen as an evolutionary process in agriculture and is essential in broadening and improving farming operations (Mc Fadden & Gorman, 2016). Diversification is defined as the change in traditional norms and strategies towards the success of a farming business (Meert, Van Huylenbroeck, Vernimmen, Bourgeois & van Hecke, 2005). It ensures adaptability and transformability in the long term, and profitability over the short term (Darnhofer, 2010). Globally, diversification is popular as it has been applied successfully in various situations. For example, in Western Europe, farms are small and have insufficient infrastructure or poor financial management, leading to increased poverty among farmers. These farmers were compelled to develop survival strategies. Diversification was applied as it is seen as a useful strategy to cope with such problems (Meert *et al.*, 2005). It is important for farmers to build resilience towards changes that may occur economically, environmentally, socially or politically. Understanding and developing diversity in its various forms contributes to resilience. For example, in Austria, workshops were held with family members to determine their resilience thinking towards dynamic changes and the impact of social aspects, such as the sustainability of rural communities, on farming operations. This study was based on mostly organic farms, where they concluded that diversifying with crops was necessary to ensure adequate crop rotation and the health of the soil (Darnhofer, 2010). There are a number of areas in which diversity can be developed –

biodiversity (includes the growing of different crops); resource diversity; diversity of information sources (communication partners); diversity of economic opportunities; diversity in relationship types (with neighbours or formal contracts) (Darnhofer, 2010).

There are three types of diversification opportunities areas where a farmer can consider diversifying. Vertical diversification is a common opportunity where farmers can expand their production by manufacturing their own production materials such as components for tractors (Ansoff, 1957). Horizontal diversification entails the introduction of an additional crop to the current production, but it does not contribute value to the farming operations yet (Ansoff, 1957). However, the farmers do have the necessary abilities, technologies and marketing for the production of the additional crop. Finally, in lateral diversification, farmers can expand beyond their abilities and out of the agricultural industry into other industries (Ansoff, 1957). Thus, farmers have a range of possibilities for diversification. After it is determined where diversification could be applied, the form of diversification can be identified. There are many forms of diversification that a farmer can use. Product diversification refers to expanding the farming operations into a new product market, rather than specializing with a single-product market (Mc Fadden & Gorman, 2016). Another form of diversification is agricultural diversification, where the new activity to be incorporated is part of the existing field of agricultural production (Meert *et al.*, 2005). This means additional crops or livestock are added to current production. There is also structural diversification, which entails the reuse of specific farm resources into new non-agricultural products or services such as farm gate sales, on-farm processing, etc. (Meert *et al.*, 2005). Another example is the leasing of farmland to individuals that are not part of the farming operation. The last form that farmers might follow is income diversification. This form includes all possibilities of non-specific assets that are used for non-agricultural activities that are not connected to the farm business (Meert *et al.*, 2005). For instance, a family member is employed elsewhere (off-farm) and contributes to the total income of a farm household (Meert *et al.*, 2005). Farmers can use any of these forms, a combination of these forms, and many others, to maintain sustainability, profitability and growth.

A concept that links closely with diversification is innovation. Studies in business management literature has shown that there is a close and sequential link between innovation and diversification (Mc Fadden & Gorman, 2016). Innovation is the combination of different resources and abilities that are at a farmer's disposal to better the future of a farming operation, such as diversifying (Mc Fadden & Gorman, 2016). Innovation diversification is characterized as creativeness and novelty and increases the ability of creating a more sustainable comparative advantage and overcoming the challenges faced by farmers (Mc Fadden & Gorman, 2016). The incorporation of innovative diversification offers numerous environmental, financial and other benefits. Therefore, when farmers apply one of the various forms of diversification, it is imperative to do it innovatively. The wine grape industry in South Africa is faced with a number of challenges, which can be addressed through diversification. The following section provides insight into four trends which became challenging for the wine grape industry in the Western Cape Province.

2.3. Trends that led to diversification on wine grape farms

2.3.1. Reduction in area under wine grape vineyards

The area planted under wine grape vineyards has declined significantly over the past years. Farm area is important as it can be linked to efficiency in different ways (Piesse, Conradie, Thirtle & Vink, 2018). In most cases, the area planted is considered to be the most important factor as it has a direct impact on the output of a farm, which in turn affects the efficiency of farmers (Vink, 2019). Since the 1970's until 2016, wine grape growers have declined by a total of 2 800 (Vink, 2019). Wine grape vineyards has decreased from 103 000 hectares in the 1970's (Vink, 2019) to approximately 94 545 hectares by 2017 (SAWIS, 2017). Table 2.1 shows the change in area planted under different crops over the past five years in the Western Cape.

Table 2.1: A summary of area (Ha) planted under different permanent crops from 2013 – 2017 in the Western Cape Province

Crop	**2013** **Total Ha**	**2017** **Total Ha**	**Absolute** **Change (Ha)**	**Change** **(%)**
Berries	913	1 212	299	32.69
Citrus	12 137	16 354	4 216	34.74
Exotics	1 649	1 581	-68	-4.13
Nuts	645	1 155	510	79.09
Olives	6 167	6 207	40	0.64
Pome fruit	32 371	32 231	-140	-0.43
Stone fruit	18 433	16 900	-1 533	-8.32
Sub-tropical	1 166	1 407	241	20.71
Table grapes	12 863	13 095	233	1.81
Wine grapes	108 070	91 221	-16 848	-15.59
Total	194 849	181 390	-13 459	-6.91

Source: Adapted from (Pienaar, 2018b)

Table 2.1 show that the area planted under wine grape vineyards in the Western Cape decreased by 15.59% from 2013 to 2017, which is a total decline of approximately 16 848 hectares. In contrast, the hectares planted for nuts has increased by 79.09%, along with citrus that increased by 34.74% over the same period. These results might be an indication of farmers diversifying to include additional crops, such as nuts and citrus, which are the crops with the highest increase in hectares. Annexure E shows a more detailed picture regarding the trends in area planted under various crops. The green blocks represent the increase in the number of hectares for a specific crop and the red blocks indicates decrease in the number of hectares for a specific crop in the Western Cape for the year 2016/2017. As mentioned, for the Langeberg region it indicates that the area under wine grapes declined by 16 848 hectares. In contrast, an increase of 599 hectares and 25 hectares for lemons and limes transpired, respectively. As it is evident that wine grape vineyards are decreasing, it is possible that wine grape farmers are replacing their vineyards with additional alternative crops to diversify income to be more financially stable (Louw, 2019).

2.3.2. Additional alternative crops

Diversification is the process of farming with more than one particular crop and/or livestock (Joshi *et al.*, 2004). There are additional alternative crops that wine grape farmers can consider. Currently, in the Western Cape Province, there are wine grape farmers that already diversified their production processes to higher valued crops (Louw, 2019).

Organic farming is one route farmers are following to diversify the production process. It is seen as a financially rewarding alternative in South Africa, and has become popular, demonstrated by a growth from 35 farms in 1999 to approximately 150 farms in 2000 (Niemeyer & Lombard, 2003). The growth in the organic industry is mainly attributed to the changing preferences of consumers who have become more aware of health and environmental issues (Niemeyer & Lombard, 2003). There are many administration procedures that are associated with the production of organic products, for instance the need for certification by an international organization such as Ecocert and Fair for life, which is challenging (Kriel, 2017). Main products that were certified during the 2000s are vegetables, wine and table grapes (Niemeyer & Lombard, 2003). In the case of converting wine grape vineyards into organic vineyards, this requires synthetic fertilizers and pesticides to be withdrawn from the production process, which takes approximately four years (Kriel, 2017). The same converting process also requires more labour and intensive recordkeeping to address the concerns of the consumer regarding the environment (Kriel, 2017). Nevertheless, the yields of organic vineyards are approximately between 25% and 35% higher than the yields of traditional vineyards (Kriel, 2017).

In the Western Cape there are many diversification operations. For instance, there are a number of diversified farms that consists of wheat, livestock and grapes (Moseley, 2006). Other alternative crops combined with wine grape are tomatoes, pecan nuts or dry grapes for the raisin market (Kriel, 2017). The choice of alternative crops usually depends on the conditions of the environment, such as marketing areas. However, for the purpose of this study the focus will be on the recent trend in the Robertson area, where wine grape farms are diversifying production to include citrus. It is important to note the changes required in infrastructure when diversifying.

The infrastructure is a key tool in the production process, as the right infrastructure is a necessity for the success of the farm business. Therefore, when farms are diversifying their production to citrus, there will be a need to change or adapt the infrastructure as well. Wine grape farmers will most likely need to acquire additional machinery, labour and equipment to be successful in citrus production. During this study, the differences between the infrastructures of wine grapes and citrus will be established. The concept of diversification are globally applied for many reasons such as obtaining top management, effective productivity, and so forth (Ansoff, 1957). When diversification occurs, farmers are challenged by management issues that may rise such as mismanaging of infrastructure. Many changes will need to take place to ensure success of the diversification process. Besides the potential financial burden that may occur in required infrastructure, the average prices of agricultural land and wine grape sold is a trend that also compelled wine grape farmers to diversify.

2.3.3. Price trends that effect the wine grape industry

Agricultural sustainability is key to any farm business, therefore an evaluation of economic, environmental and social factors is important (Lien, Hardaker & Flaten, 1981; Mariani & Vastola, 2015; Theocharopoulos, Melfou & Papanagiotou, 2012). Sustainability is defined as the ability of the farm system to continue in the future (Theocharopoulos *et al.*, 2012), consequently the financial viability of the farm becomes important leading to the evaluation of different prices of various goods (Lien *et al.*, 1981). Economic indicators, such as price, can assist farmers in decision-making associated with investment and production. (Lien *et al.*, 1981). The following two t price trends; agricultural land prices and the average price of wine grapes sold, are trends impacting wine grape farmers in Robertson.

2.3.3.1. The trend of agricultural land prices in the Western Cape Province

Over the past few years agricultural land prices in the Western Cape have fluctuated substantially, depending on the region. Some of the common factors that influence agricultural land prices are inflation rates, net farm income, land productivity, policy related issues, the quality of land, growth of the population and interest rates (Obi, 2008). The value of irrigated agricultural land in the Western Cape during 2010 was approximately R23 071 per hectare, and increased in 2016 to approximately R53 191 per hectare, but decreased again in 2018 to approximately R29 554 per hectare (Nowers, 2019a). The value of agricultural land is an indication of the wealth of the farm, its economic performance, productivity, competitiveness and is the main attraction to investors (Ajuruchukwu & van Schalkwyk, 2006). Farmers should therefore farm with crops that are profitable, which can increase the wealth of the farming operation in terms of its value. Figure 2.1 shows the fluctuations in agricultural land prices in the Western Cape from 2003 to 2018; and Figure 2.2 shows the agricultural land prices in the Robertson area from 2014 to 2018.

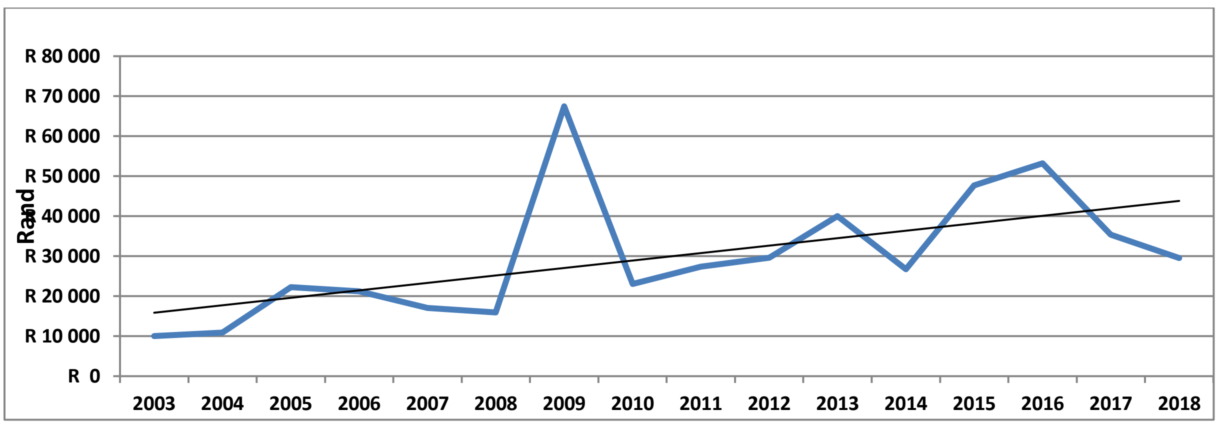

Figure 2.1: Trend in agricultural land prices in the Western Cape Province from 2003 - 2018

Source: Adapted from (Nowers, 2019a)

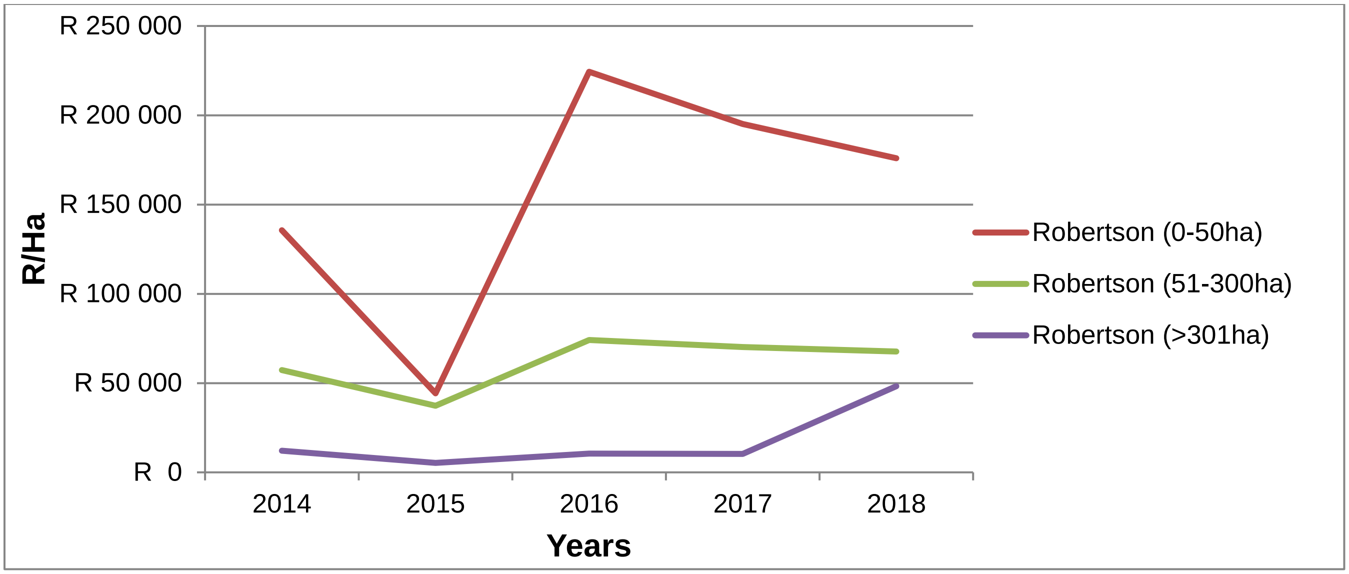

Figure 2.2: The value of agricultural land in Robertson are from 2014 – 2018

Source: Adapted from (Nowers, 2019b)

It can be seen in Figure 2.1 that the agricultural land price in the Western Cape does fluctuate, but with an increasing trend, however since 2016 it decreased substantially. Figure 2.2. shows the value of agricultural land of small (1-50hectares), medium (51-300hectares) and large (>301hectares) sized farms, and indicates that the value mostly decreased. The reason for this decrease since 2018, is potentially due to policy related issues, as the president of the leading political party, the African National Congress (ANC), announced that agricultural land could potentially be claimed without compensation (Monteiro, 2018). That announcement decreased the price of agricultural land, as it dropped by approximately 32% in middle of 2018 (Monteiro, 2018). The cash flow income of farms are effected by increasing agricultural land prices and stagnate wine grape prices (discussed under section 2.3.3.2.), therefore, farmers need to adapt to be financed. Consequently wine grape farmers consider diversifying to include citrus.

2.3.3.2. Average wine grape and citrus prices

The wine grape industry of South Africa plays an important role in the country's economy, but recently experienced financial pressure due to stagnating growth in terms of the stagnated prices per ton of wine grapes. On most wine farms in South Africa, only the grapes are produced and not wine as well (Vink, 2019), which might contribute to the financial pressures faced by the wine grape industry. The average price ranges of wine sold is also a trend that drives farmers to generate alternative income, as it has stagnated over the past decade (Vink, 2019). According to Vink (2019) the wine industry struggled due to an oversupply, to improve the prices at which wine is sold. Wine grape production directly impacts the wine industry, therefore a crucial balance of economics is required between both components. While the average prices of wine sold stagnated between R3 000/ton and R5 000/ton over approximately a 12 year period in the Western Cape, the average production costs (including total cash expenditure and provision for replacement) for the wine grape industry (excluding Malmesbury) was R44 390/hectare for 2016 (van Zyl & van Niekerk, 2017), which may lead to lower profitability. Figure 2.3 below shows the prices (R/ton) of wine grapes sold along with other fruits, such as citrus.

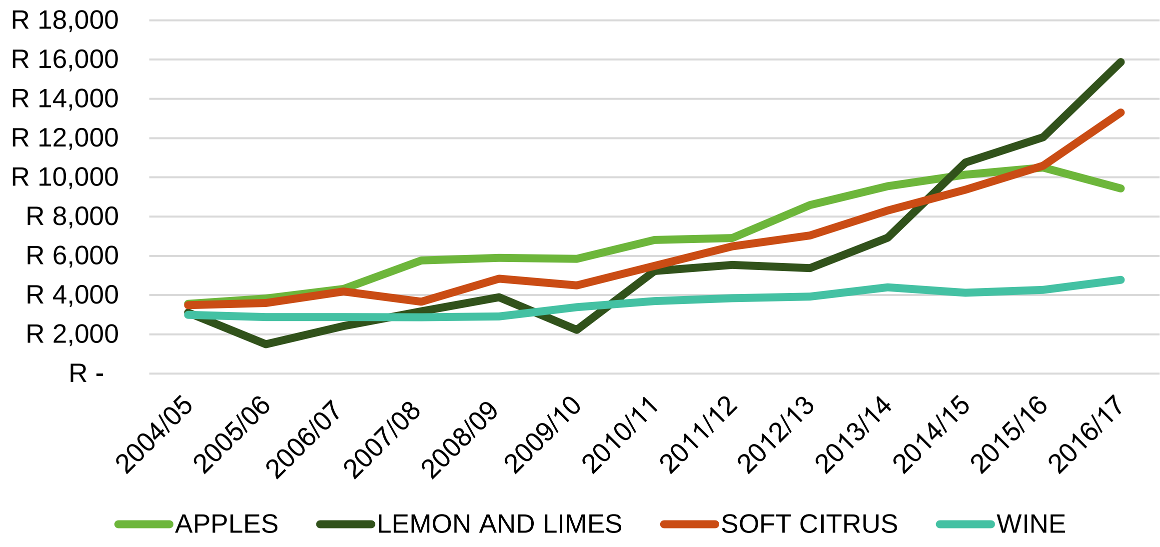

Figure 2.3: Average prices (R/ton) of wine grapes and other fruits in the Western Cape from 2004/05 to 2016/17

Source: Adapted from (Pienaar, 2018b)

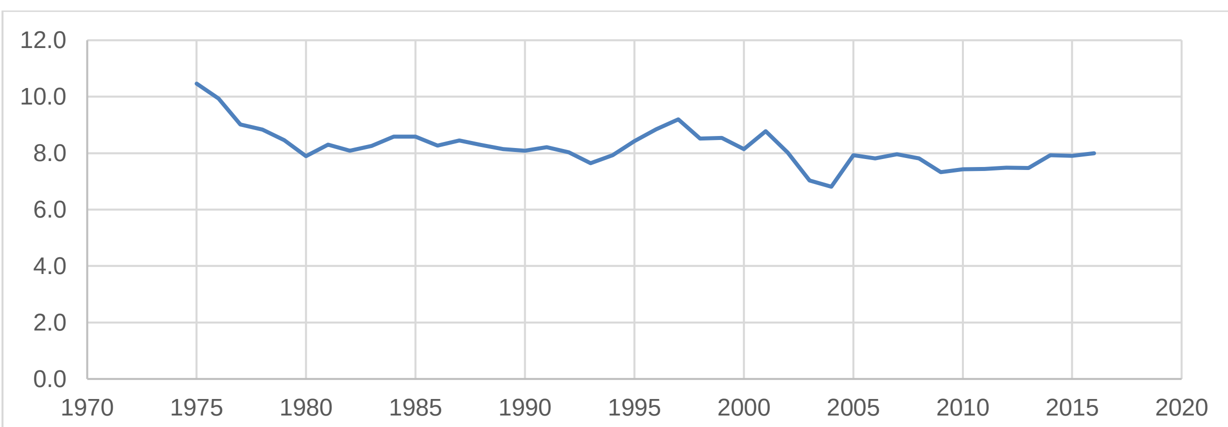

Figure 2.4: Domestic wine consumption in litre per capita South Africa since the 1900's

Source: (Anderson, Nelgen & Pinilla, 2017a)

Figure 2.3 shows the annual average wine grape price (between R3 000/ton to R5 000/ton) from 2004/05 to 2016/17 (Pienaar, 2018b). As a result, the profitability of wine grape production is vulnerable. Price and production risk may lead to bankruptcy and other negatively impacted financial positions in the Western Cape. The primary reasons for this price effect are mainly attributed to the effects of climate changes, such as drought, floods and hail that have an enormous effect on the harvest of wine grapes, and compromises the supply and demand. Besides the stagnation in average prices of wine sold, Figure 2.4 indicates that domestic wine consumption has stagnated since the 1970's between eight to ten litres per capita (Floris, 2015; Vink, 2019). This is mainly the result for white middle class income, as the wine industry failed to develop the black middle class consumption (Vink, 2019). Based on Figures 2.3 and 2.4, the wine industry and indirectly wine grape production, are not performing as it could. In contrast, the average prices of citrus (specifically lemons and limes) have increased over the same period. Figure 2.3 illustrates the increase for lemon and limes, from an estimated R3 000/ton in 2004, to R16 000/ton by 2017. The producer prices for soft citrus also increased from R3000/ton to R12 000/ton for the same time period. Average prices of lemons, limes and soft citrus has been above the average prices of wine sold since 2010. To avoid bankruptcy and failure as a farm business, the wine grape farmers have started to diversify the production basket to include; citrus, stone fruit and almonds in an attempt to be more financially stable. In addition to average price influences on the decision to diversify, the Western Cape experienced a drought during 2015-2017 that contributed to wine grape farmers' consideration of diversification.

2.3.4. The impact of the drought in the Western Cape Province

In 2015, a drought started affecting the Western Cape, impacting many livelihoods, especially farms. According to the World Economic Forum, water scarcity is the third largest global risk (Hedden & Cilliers, 2014). South Africa is the 30th driest country with an average annual rainfall of 495mm (Viljoen & van der Walt, 2018), which contributed to the start of the drought in the Western Cape in 2015. This is the worst drought in recorded history for this province (Pienaar & Boonzaaier, 2018). Meteorologists predict that the situation in the Western Cape will only worsen, as it is expected that the province will experience extreme weather conditions such as hail, flooding and extended droughts over the next 100 years (Goudriaan *et al*., 2019 and WWF, 2018). Many risks are associated with extreme weather conditions. Diversifying seems to reduce vulnerability to climate changes as a whole (Tibesigwa, Visser & Turpie, 2017).

The drought in the Western Cape between 2015 and 2017 affected irrigation processes and systems. Only 40% of the water was allocated to farms by the Western Cape Water Supply System (Pienaar & Boonzaaier, 2018), and water restrictions were expected to be set on the agricultural sector. In 2016/2017, water restrictions began as dam levels halved from what they were in 2014/2015. Theewaterskloof Dam, one of the largest dams in the province, was at a 52% capacity (*City of Cape Town: Dam Levels Report 15*, 2019) and water were restricted by 30% for the Berg River system. On-farm water supply of some farms were approximately 50% less than usual for irrigation. This low water supply caused financial problems for farmers as it was difficult to maintain water requirements for different crops, at it got more expensive. The water requirement (m^3) per year for irrigation of specific crops is given below in Table 2.2.

Table 2.2: Water requirement (m^3 per year) for irrigation of specific crops in the Western Cape

Crop	**Water requirement (m^3) per year**
Wine grapes	4 000 – 5 500
Table grapes	7 000 – 9 000
Apples	9 000 – 11 000
Pears	9 000 – 11 000
Early stone fruit	5 000 – 6 500
Late stone fruit	6 500 – 8 500
Citrus	11 000 – 13 000

Source: Adapted from (Pienaar, 2018b)

Wine grapes require between 4 000 – 5 500 m^3 of water per year, which is significantly lower than the high water intensity requirement of citrus, which is between 11 000 – 13 000 m^3 for irrigation (Table 2.2), yet wine grape farmers in the Robertson area diversified to include citrus (Louw, 2019). Even for wine grape production it was difficult to maintain the water requirement, especially in 2017, when further water restrictions were put in place. These restrictions varied between 50% in Breede Valley, 60% in Berg River and Riviersonderend region to the highest water restriction of approximately 85% in the Lower Olifants River (Clanwilliams, Klawer and Vredendal) (Goudriaan *et al.*, 2019).

Consequently, agricultural farmers were compelled to remove vineyards, which led to a decrease in certain irrigation systems. Figure 2.5 shows the increase in flood, pivot and sprinkler systems, in contrast with the decrease of drip and macro irrigation over a five-year period (2013 – 2017) in the Western Cape.

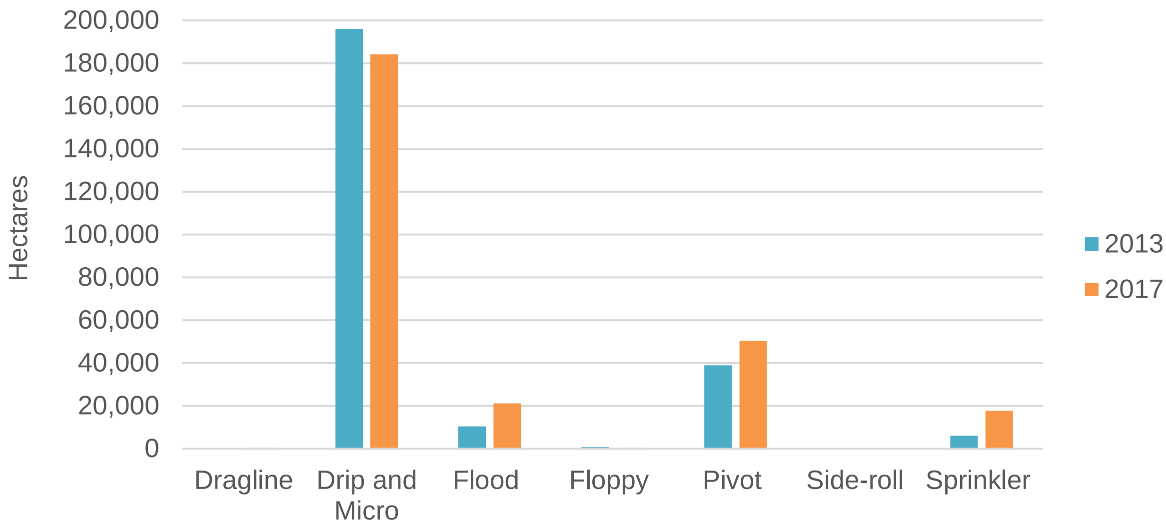

Figure 2.5: The usage of irrigation systems between 2013 and 2017 in the Western Cape

Source: Adapted from (Pienaar, 2018b)

Drip and macro irrigation systems are efficient at supplying water directly to the soil targeting the root system (Camp, 1998).Sprinklers and centre pivot irrigation systems are more efficient at spreading the water evenly and also minimizing water loss (Dasberg & Or, 2013). However, the use of sprinkler irrigation may result in exposing the soil to air because of many expositions to water (Dasberg & Or, 2013). Therefore, drip irrigation is the most suitable system for the planting of vineyards, as it avoids problems like soil aeration, and is well adapted to provide supplemental irrigation (Dasberg & Or, 2013).

The decline in drip and macro irrigation systems however, is not due to the inefficiency of these systems during the drought, but due to the approximately 16 000hectare decrease of wine grape vineyards (Pienaar & Boonzaaier, 2018). Figure 2.5. is also an indication of the shifting to shorter term crops such as vegetables, where the planting decision was based on water availability (Louw, 2019). It was difficult for most wine grape farmers to maintain irrigation processes and systems, which in turn impacted exports and employment, and the impact on agricultural investment.

2.3.4.1. Decline in wine grape production

Production of wine grapes, in terms of area planted, showed significant decline as it is vulnerable to climate change (Hannah, Roehrdanz, Ikegami, Shepard, Shaw, Tabor, Zhi, Marquet & Hijmans, 2012; Pienaar & Boonzaaier, 2018). Viticulture is sensitive to climate change because temperature and moisture are key elements in the growing process of crops (Hannah *et al.*, 2012). The drought in the Western Cape led to an overall decline in production within the agricultural sector, with economic losses estimated at R5.9 billion in 2018 (Pienaar & Boonzaaier, 2018). The negative effect of the drought on production in the wine grape sector typically has a long term lag effect. It is difficult for this industry to recover as quickly as other industries, because it takes longer (years) for a vineyard to grow until harvested (Goudriaan *et al.*, 2019). Water stress experiences during a specific year usually results into further below average yields for at least two more years.

In the Western Cape satellite data (also used by farmers) was employed by economists to analyse the impact of the drought on the production of farms (Goudriaan *et al.*, 2019). The information used is available on Fruitlook, a software program with data exclusive to the Western Cape (Goudriaan *et al.*, 2019). The study focused on the different regions in the Western Cape, and the results were different for each farm. The impact on the Lower Olifants River region, that had the highest water restriction of 85%, was the most negatively impacted, where production dropped by more than 25% (Goudriaan *et al.*, 2019). These farmers had to either remove damaged crop, or it resulted in a complete die-off with a long term negative impact on production (Goudriaan *et al.*, 2019). In this area approximately 90% of irrigated fields consisted of wine and table grape cultivation (Goudriaan *et al.*, 2019). The decline in production led to decreases in output throughout the wine industry. Less wine was produced, for example, in 2017, approximately 1.1 million litres of wine valued at R22 billion was produced, and in 2018 litres of wine produced declined by approximately 9% due to the drought (Browdie, 2018). The smaller crush of wine grapes and wine led to the reduction of agricultural exports for South Africa.

2.3.4.2. The economic effect of the drought

Agriculture is important in the economy of South Africa. Due to the drought there has been a significant decline in exports. In the Western Cape, commercial agriculture is the leading export sector (Moseley, 2006). There is a direct relationship between exports and the growth of developing countries, as exports contribute to the Gross Domestic Product (GDP) (Bulagi, 2014). The agricultural sector of South Africa is an important trader and exporting agricultural products to Africa and other countries, and competes at an international level in producers from the European Union, South America, Australia, the Far East and United States (Bulagi, Belete & Hlongwane, 2015). In 2018 the agricultural sector contributed approximately 2.4% to South Africa's GDP. The Western Cape Province contribute approximately 3.96%, at an estimated amount of R21 billion to the value added in the Western Cape (Pienaar & Boonzaaier, 2018). There was significant declines in agricultural export volumes in 2018, up to 19% lower than the previous year (Pienaar & Boonzaaier, 2018). GDP declined by 0,6% over the same time period (Warf & Stutz, 2019). The wine grape industry added to this decline of agricultural exports value as seen in Figure 2.6, which shows the trend of annual growth of exported values of the overall grape industry in South Africa.

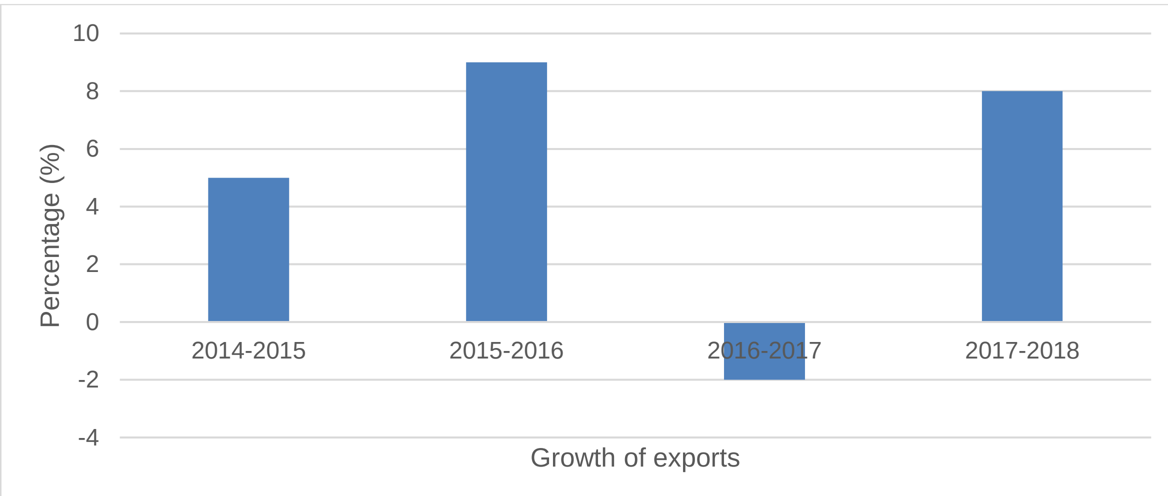

Figure 2.6: Exported growth in value (%) of the overall grape industry in South Africa

Source: (Trade map, 2019)

Since the onset of the drought in the Western Cape in 2015, the value of agricultural exports in percentage declined from approximately 9% in 2015/2016 to minus 2% in 2016/2017 (Fig 2.6). During the drought period, vineyards were damaged and/or taken out of production (Goudriaan *et al.*, 2019). Consequently, the agricultural export value of wines in South Africa also decreased; in 2014 it was valued at approximately R10 412 498, and in 2016 it declined to an estimated amount of R8 764 599 (Anderson, Nelgen & Pinilla, 2017b). This impacted the wine industry in South Africa and the international competitiveness (Vink, 2019). Competitive performance of wine is defined as the expansion of wine trade in respect to its competitors that will enhance investment and other scarce resources to maintain sustainable returns (Van Rooyen*, Esterhuizen & Stroebel*, 2011). Figure 2.7 illustrates the international competitiveness as revealed comparative advantage (RCA) of South Africa's wine industry since 1985.

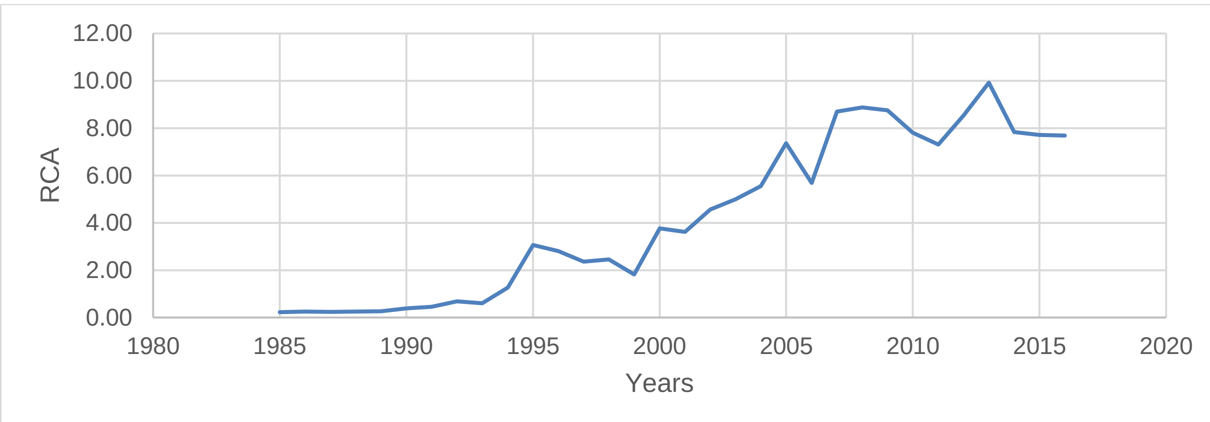

Figure 2.7: International competitiveness of South Africa's wine industry

Source: (Anderson *et al.*, 2017a)

RCA is an indicator that compares the growth of net exports of a product (in this case wine) to a benchmark (which is all of South Africa's agricultural products). A ratio above one, will indicate positive competitiveness (Laursen, 2015; Vink, 2019). Throughout the 1900's, until the 1970's, the South African wine industry experienced regulated marketing as a result of the establishment of the Co-operative Winemakers Union (KWV) in 1918 (Vink, 2019). The KWV had absolute power over the wine grape producers and was highly focused on high volume production and income stabilization of the producers with relatively low quality wine (Van Rooyen *et al.*, 2011 and Vink, 2019).

From the 1970's to the 1990's, competitiveness decreased, mostly as a result of the 'anti-apartheid' trade sanctions. This forced the wine industry to compete in a constrained economic and political environment (Van Rooyen *et al.*, 2011). Between 1990 and 1995, the wine industry transformed remarkably since the release of the late president of South Africa, Nelson Mandela, in 1992. Economic conditions improved quickly as investment increased, greater access to international market and interactions with trade occurred (Van Rooyen *et al.*, 2011). This led to increasing competitiveness for the South African wine industry.

A decrease was observed in 1996 (Fig. 2.7), however it increased again from 2000, but since 2006 the wine industry has been competing in a constrained environment due to advancement in technology in the world (Van Rooyen *et al.*, 2011). According to Van Rooyen *et al* (2011) the decrease since 2015 was highly subject to the drought that occurred in the Western Cape. This led to decreasing wine grape production and ultimately decreasing exports. Ever since, the South African wine industry has struggled to compete internationally.

The industry fails to develop a sustainable domestic market and it is still highly dependent on export trade with partners such as the United States of America and the European Union (Vink, 2019). Besides the negative impact of South Africa's exports on international competitiveness, there's a direct link between exports and the growth of the South African economy (Ajmi, *Aye, Balcilar & Gupta*, 2015). The decline in agricultural exports led to a decline in GDP of South Africa as indicated in the trend of South Africa's GDP since 2011 (Fig. 2.8).

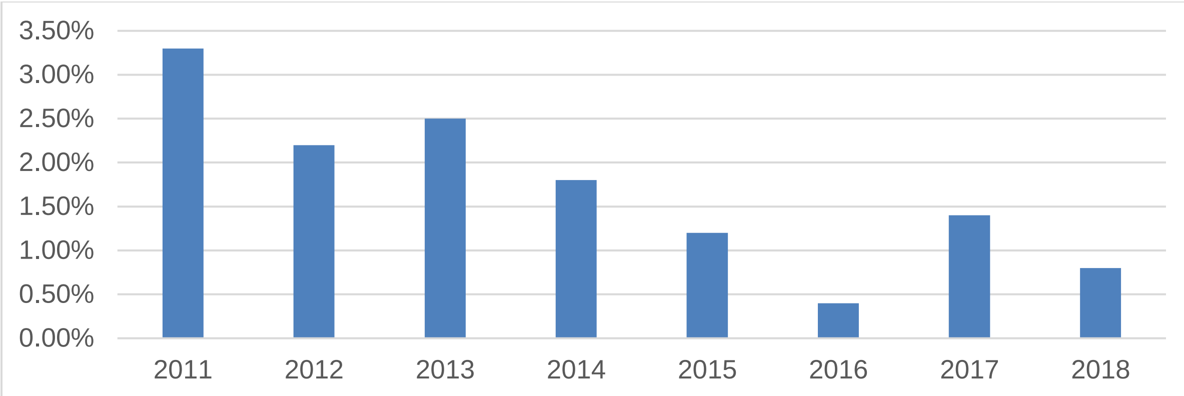

Figure 2.8: South Africa's Gross Domestic Product (GDP) since 2011

Source: (StatsSA, 2019)

There was a decline in the GDP of South Africa since 2015, in line with the decline in exports as previously discussed. The GDP declined from 1.2% in 2015 to 0.8% in 2018, which is mainly due to the rapid decline of the contribution from the agriculture sector (Warf & Stutz, 2019). Agricultural production declined, that resulted in agricultural exports to also decline, and employment in the agricultural sector was also affected in the Western Cape.

2.3.4.3. Consequences on employment in the agricultural sector of Western Cape

The agricultural sector is known to generate employment opportunities and therefore lowers the unemployment rate of South Africa. The production of wine grape is considered to be a highly labour intensive process that also provides employment for those who are semi-skilled (Pienaar & Boonzaaier, 2018). The employment of farm workers in the agricultural sector in the Western Cape has declined since the drought began in 2015. In the third quarter of 2018, Stats SA announced an unemployment rate of 27.5%, whereby 16.4 million are employed and 6.2 million are unemployed between

15 and 64 years of age (StatsSA, 2018). The current unemployment rate for the Western Cape is at 22% (Pienaar & Boonzaaier, 2018). The wine industry employs approximately 290 000 people in the Western Cape Province (WCDPT, 2018), a portion of the population that became potentially vulnerable due the drought. Figure 2.9 shows the agricultural employment over the past decade, as well as the moving average of agriculture in the Western Cape.

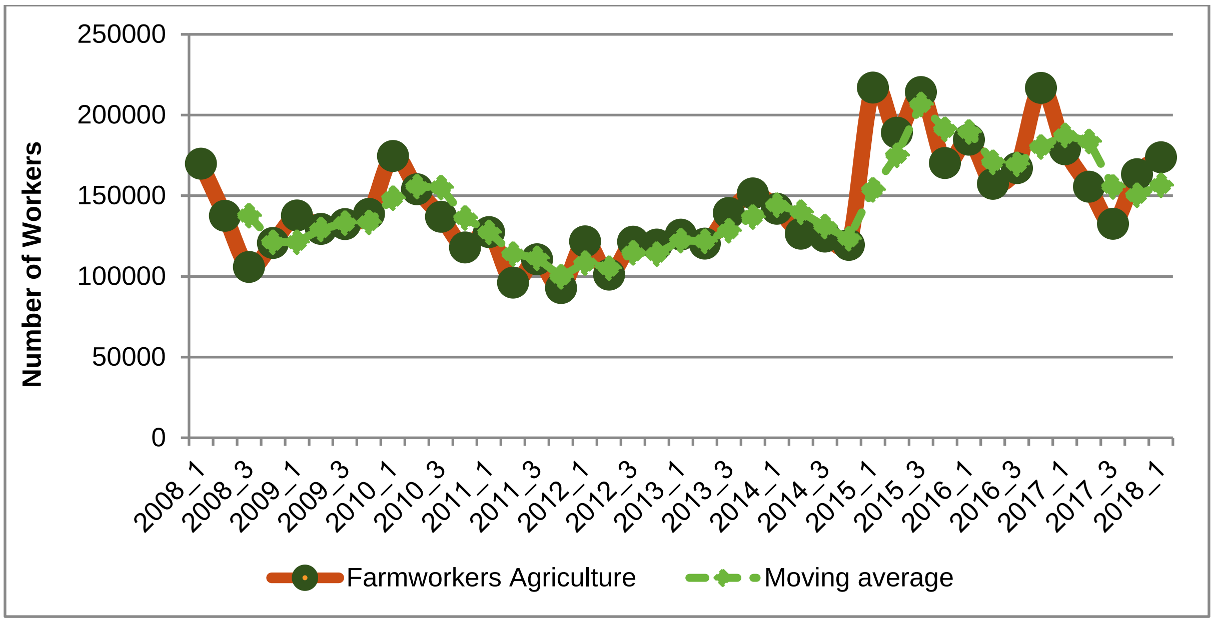

Figure 2.9: Western Cape's agricultural employment of farm workers and the moving average of farm workers employed

Source: (Pienaar, 2018b)

There has been an upward trend in the number of farmworkers employed in agriculture and in the moving average of farmworkers employed since 2008 (Fig 2.9). This indicates the importance of the agricultural sector in terms of employment. The Western Cape employs the highest number of permanent farm workers in South Africa (Moseley, 2006). Between 2015 and 2017 there was a decline in both farmworkers employed and in the moving average of farmworkers employment. This was due to the drought that caused highly labour intensive industries, such as the wine grape industry, to suffer job losses of approximately 30 000 (Goudriaan *et al.*, 2019; Pienaar & Boonzaaier, 2018). Figure 2.10 illustrates the differences in the number of jobs in agriculture in 2013 and 2017 for a variety of industries.

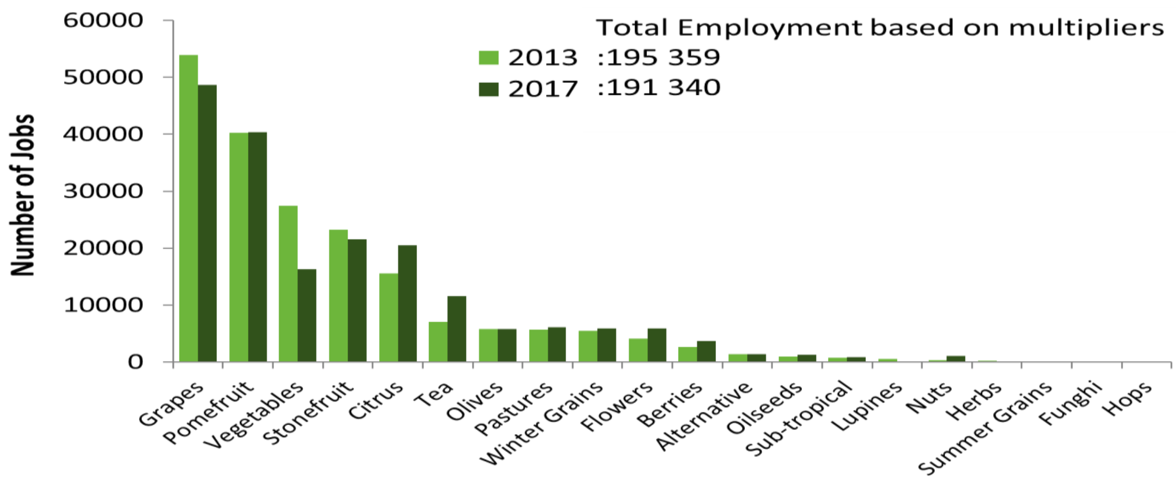

Figure 2.10: Total employment based on multipliers of different crops in the Western Cape since 2013 to 2017

Source: (Pienaar, 2018b)

The total employment in the Western Cape Province was 195 359 in 2013 and it decreased in 2017 to an estimated amount of 191 340 agricultural employers (Fig 2.10). This decrease occurred mainly in the vegetable industry, followed by grapes and stone fruit industries. In the wine grape industry, farmers experienced the smallest harvest ever since 2005 (Snyman *et al*., 2019), resulting in less demand for seasonal agricultural workers (Pienaar & Boonzaaier, 2018). In contrast, there has been a significant increase in agricultural employment in the citrus and tea industries, specifically between 2013 and

2017. The main reason for this contrast is the decline in production of producing wine grapes, vegetables and stone fruit, while the production of citrus, tea and flowers has increase immensely. Since the agricultural sector is important for employment, the production of citrus suggests it will improve the high rate of unemployment in South Africa. Nevertheless, the drought caused the wine grape industry to be less attractive for many reasons, including the influence on agricultural on-farm investment in the agricultural sector.

2.3.4.4. Investment in the agriculture sector of the Western Cape

Agriculture investment declined as the effects of the drought became evident in the Western Cape. Any form of investment in agriculture contributes to the improvement in technology advantages of the agricultural sector. On-farm investment contributes to the production of agricultural goods, therefore it is defined as the change of physical inputs, the improvement on land, enhancing of human and social capital (Zepeda, 2001). Agriculture investment is a key factor in development for farmers, as well as for sustainability and the competitiveness of the agricultural sector (Pienaar & Boonzaaier, 2018). Both private and public investment in agriculture declined over the past decades, causing many concerns, such as the lack of adoption of new technology , marketing products and even holds the risk of losing production as a whole (Zepeda, 2001). There are many factors influencing the decline in agricultural investments, such as political instability. The uncertainties that the drought holds on agricultural production has a negative impact on planning of investment, as well as infrastructure (Marangos & Williams, 2005). By diminishing investment, risks arise for future development of production, as well as the growth of the economy (Marangos & Williams, 2005). The

Western Cape experienced disinvestment, mostly due to the drought. Gross Fixed Capital Formation (GFCF) is defined as producer's investment deducting disposal plus the value of non-produced assets that are part of production (*Cap context indicators 2014-2020*, 2017). In the agricultural sector of the Western Cape, the GFCF declined by R1.8 million between 2013 and 2016, from R4.8 million to R3 million (Pienaar & Boonzaaier, 2018). This caused major concerns, as long term productivity is dependent on the GFCF for its growth in the agricultural sector. However, it is expected that this will increase once the drought eases.

2.4. Conclusion

It is evident that the wine grape industry is under pressure. This negatively impacts the whole wine industry, which is an important industry contributing to South Africa's economy. These pressures are caused by trends such as the reduction in farm area, decrease in agricultural land prices, as well as the stagnated average wine grape prices. The biggest trend responsible for the pressure is the drought that occurred in the Western Cape from 2015 to 2017. This resulted in the deduction of production, decreased agricultural exports, loss in agricultural employments and decline in agricultural investment by producers.

The impact of the drought is not surprising in the Western Cape had on the agricultural sector. Even if the province where to receive sufficient annual rainfall, it will take approximately two to three years for the dams to be filled to rectify the water restrictions that are imposed (WWF, 2018). Therefore, farmers need to find ways to be more innovative in terms of water use, learn to re-use resources and adapt new ways to generate alternative income. Increased access to water might be expensive, such as building new dams, increasing storage of exiting dams, or extracting groundwater during droughts (Goudriaan *et al.*, 2019). Farmers will also need to irrigate more efficiently, as this will impact future production. Wine grape farmers in the Robertson area realized the circumstances, and many farmers diversified production by including citrus, a very high water intensity crop but with the ability of much higher yields. However, diversifying the production system is challenging, with many financial implications. These will be evaluated in this research study by the use of a multi-period whole-farm budget models, in order to facilitate better informed decision-making in future.

Chapter 3: Methodology

3.1. Introduction

The preceding chapter highlighted the trends identified which compelled wine grape farmers to diversify to include citrus in the Robertson area. Numerous risks are associated with diversification processes. When diversification is applied, financial implications will rise. The goal of this chapter is to introduce a method to determine the financial implications. Regarding the complexity of understanding the effect of a new enterprise, the systems thinking approach is suggested. This is followed by the type of models that can be applied, with emphasizes on deterministic simulation models. The structure of a whole-farm budget model is outlined, describing the adaptation of an existing model, the collection of data and the components the model consists of.

The systems thinking approach in agriculture became popular over the past decade as agriculture developed and an in-depth understanding was required by farmers, to make informed decisions. Therefore, how systems approach thinking came into being is highlighted. It is important to note the complexity of a farm system.

In agriculture, there are two basic types of models; deterministic and stochastic models. For the purposes of this research project, a deterministic model is applicable due to its ability to give specific outcomes and not use random variables. However, farming systems consists of numerous components that are interconnected, therefore, a simulation model, which is a type of deterministic model will be developed.

Three multi-period whole-farm models, which are simple simulation tools, will be compiled. This chapter will conclude with the structure of the multi-period whole-farm budget models. There are various components that the whole-farm budget model consists. Whole-farm budgets indicates how the whole-farm profitability is calculated, through the two main financial indicators which are the Internal Rate of Return on capital investment (IRR) and the Net Present Value (NPV).

3.2. Systems approach in agriculture

System thinking approach became popular amongst farmers and researchers over the past decades as agriculture developed. A system is defined as a unified whole that consists of interrelated subsystems that depend on each other (Rana, 2019). The word system comes from a Greek word *"synistanai"* which mean "to bring together or combine" (Rana, 2019). The systems approach was used to manage armies and governments, and more recently in the Industrial Revolution of the 19^{th} and 20^{th} centuries for philosophy and science (Rana, 2019). The way in which the systems approach was used, were appropriate, but insufficient due to the lack of explaining because of the increase complexity of agricultural systems. Therefore, it led to the development of Farming System Research (FSR), which is a broader approach that takes into account the real farm conditions and the circumstances of farmers (Patanothai, 1997 and Rana, 2019).

A farm system is essentially complex. It consists of various factors and interrelationships between these factors. The system is managed and manipulated by producers who aim to make a profit. This requires a tool that can integrate rather that separate these components. The systems approach is designed to achieve this integration and reflect the effect of a change in one component of the system and the performance of the whole system.

Systems approach is further defined as a systematic and quantitative analysis of agricultural systems which are holistic (Kropff, Bouma & Jones, 1900). This allows for an in-depth understanding of how the farming system works as a whole, to improve the efficiency of the farming system. The whole farm is considered before decision making relating to the type of enterprise and the use of technology is made. It addresses the farmer's enterprises, the inter relationships among enterprises and between the farm and the environment. The systems approach possesses the capacity to allow for changes in farming techniques to increase production of enterprises (Knott, 2015), and evaluate whether changes are more profitable and sustainable.

Agriculture depends on many interrelated systems. Interrelated systems vary between biological systems, mechanical systems, economic systems and management systems that consist of subsystems and components (Knott, 2015). It is evident that all these systems have different characteristics and complex functions, which is typical of the complexity of farming systems. There are also principles which need to be applied when systems approaches are used.

3.2.1. Complexity and principles of the systems approach

Farming systems are complex and uncertainties, regarding the decision-making process, make the use of systems approach more applicable. The objective of a Systems Approach Framework (SAF) is the collection of information regarding the functions of complex systems that cannot be gathered from a series of subsystem-scale studies (Różyński, Bielecka & Schönhofer, 2019). The complexity of agriculture derives from the ecological region, the diversity of the interrelatedness of crops and livestock fertilisations, pest and weed management systems, the mechanical processes, sustainability issues, consumerism, product- and input prices (Hoffmann, 2010). Complex systems needs a holistic perspective such as the systems approach, which is object-oriented and analytical (Różyński *et al.*, 2019), and can relate issues that occur on a farm to the performance.

It is important to incorporate the underlying principles of the farming systems approach into the priorities of agricultural programs. These principles are guidelines that can be used to apply a systems thinking approach to a farming system (Norman, 2002 and Rana, 2019). Some of the principles is to consider the farm as a whole, rather than the individual components. Modern technologies should be applied in the system to estimate yields and optimise results. It is also a necessity to determine the efficiency of the farm business in terms of equal gender income, employment and the resources used. Systems approaches also provide insight to form solutions which can ensure sustainability in the development of a farming system, and enable empowerment of the farmers and their families. Other principles of a systems approach is that it can focus on ecological sustainability and sustainable livelihoods, and increase the emphasizes on participatory approaches.

3.2.2. Application of a systems approach

The application of a systems approach to agriculture is important in terms of utilizing all resources efficiently to maintain sustainability in the production of the enterprises, as well as increasing profitability. There are specific components that make up a systems approach, which provide a theoretical basis, such as simulation modelling, expert systems, databases, linear programming and Geographic Information Systems (GIS) (Kropff *et al.*, 1900). Instead of systems approaches' being more theoretical research, it became more applicable on farming systems. The purpose of applying a systems approach is to determine potential yields, methods that can be used in production, the simulation of crop growth, development and impacts of climate change (Murthy, 2004). In this research study, simulation models will be applied, and these are discussed under Section 3.3.1.1. There are three types of applications of crop simulation models - the first is a strategic application (where the crop model is tested before planting begins); the second is a practical application (where the crop model was tested before and during the period of crop growth); and lastly, as a forecasting application (when the model is tested to predict yields before and during the growth period crops) (Murthy, 2004). For the purpose of this research project a forecasting application method will be used as it is more applicable and aligned with the objectives of assessing the expected financial implications of including citrus as an enterprise in wine grape farming in Robertson.

3.3. Define modelling

A model is a representation of the behaviour of real world situations that helps in explaining, understanding or improving the performance of a system (Murthy, 2004). A model is defined as a simplified reality that cannot be copied (Murthy, 2002). This simplification allows for comprehensive description of any problem that occurs, however it can be difficult to represent a reality that is operational and comprehensible (Murthy, 2004). Therefore, models are a representation of the real world in terms of production on a farm that is based on assumptions and observations. Models are often used in farm system research. Models are important practical research tools for farmers because it can enhance effective decision-making due to its practical uses (Hoffmann, 2010). Models organise knowledge, show effective production processes, and identify gaps, all depending on the type of models farmers intend to use. Due to the advancement of software technology, models are also ideal, as multiple calculations can be done to evaluate possible outcomes by the manipulation of input data and system parameters (Knott, 2015). Many such models exists.

3.3.1. Types of models

There are two basic types of models; stochastic and deterministic models. The type of model that will be used, depends on the type of system that will be modelled as well as the purpose of the modelling system. Stochastic models use random variables, as well as assigning profitability distributions to the variable, stipulating that this model takes risks into account (Rauff & Bello, 2015). When these models are used, the outcome normally varies and allow for comparison of different scenarios. In contrast, deterministic models allow for the determination of exact outcomes, not using any random variation, therefore the relationships within a system are constant, which is aligned with a systematic approach (Rauff & Bello, 2015). Deterministic models ignore variance in risks that are associated with the system. For the purpose of this study, deterministic models will be used as it analyses a given set of variables (inputs) for a specific outcome. There are various types of deterministic models. Simulation models are the most appropriate to use in this research study.

3.3.1.1. Simulation models

Simulation is a process of building models and analysing systems. Simulation is defined as a descriptive tool that is used to describe and explore an existing system in order to design improvements and extensions of that system (Attonaty *et al*., 1999). After a model that represents a system is constructed, simulation takes place, which is the process that mimics the behaviour of the system in various circumstances (Knott, 2015). Farming systems comprises of interacting components, therefore, a simulation model will assist in supporting the interactivity that occurs (Attonaty *et* al.,1999). According to De Vries (1977) simulation models enhance our understanding of the system which will enrich our knowledge. If the knowledge regarding the farming structure and mechanism is sufficiently structured, stable and easy to use, it could help farmers to make better informed and more effective decisions, and more accurately predict expected outcomes.

In agricultural economics, the simulation model incorporates both physical and economic facets of farms, however in economics it is usually challenging to construct a physical model for a whole farm model (Knott, 2015). There are many different approaches in simulating agricultural systems, however the process or steps to be followed remains mostly similar and is presented in Figure 3.1.

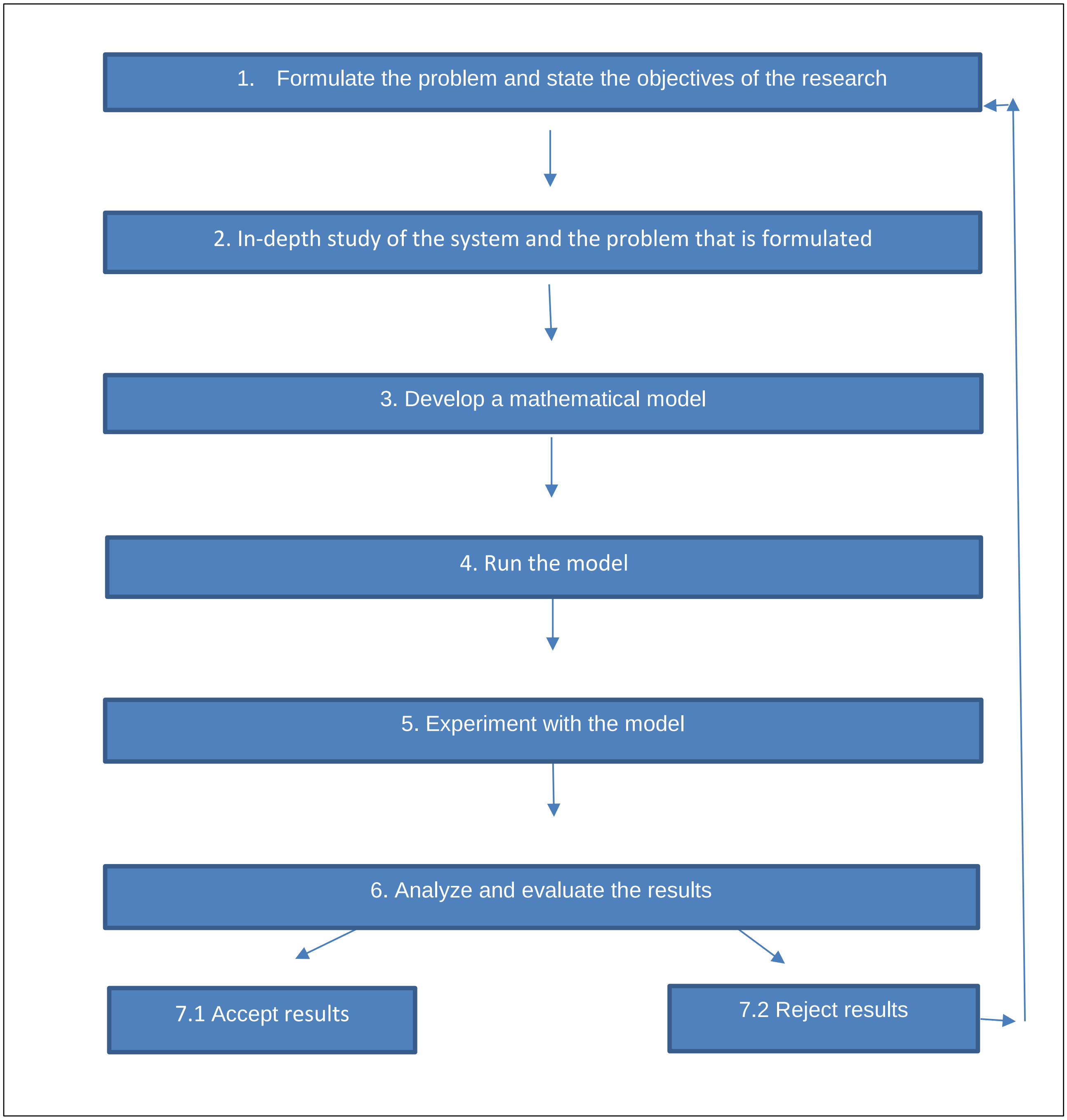

Figure 3.11: The order of implementing simulation models of simulating economic problems

Source: Adapted from (Strauss, 2005)

Figure 3.1 shows an implementation tool for simulating economic objectives of study. The layout of the process is a guideline of how this study is conducted. It guides to formulate a problem and develop a model to address the issue, until decisions are made based on the outcomes of the model. Based on this structure, a standard budget simulation, in the form of whole-farm budgets are applied. However, there are some disadvantages associated with simulation models.

The main disadvantage of using a simulation model is that it allows for numerous conditions and variables to be incorporated during the conceptual development. This requires that the compiler of a simulation model must understand the system being modelled and how the system works. A key feature becomes the role of experts, that contribute necessary multidisciplinary knowledge in constructing the models (Hoffmann, 2010). Another disadvantage of simulation models are that it is not optimization orientated and although alternative options can be evaluated, and even compared, there is no certainty that the best outcomes will be identified (Hoffmann, 2010). The behaviour of humans is also normally ignored in the compilation of the model, as it is challenging to simulate (Weersink, *et al*., 2003). The main advantage is that budget models in a spreadsheet environment can accommodate and integrate a large number of variables and parameters. It can show the effect of alternative crop combinations as well as the process of shifting from one system to another.

An important step in simulation modelling is to validate the model. To validate simulation models can also be challenging in terms of philosophical debates between relativism and objectivism (Kleindorfer, O'Neill & Ganeshan, 1998). The proposed simulation tool that will be use in this research study is a standard budget model that is developed over the longer term to allow for the re-establishment cycles of vineyards and the shift from wine grapes to citrus. It is also a whole-farm model in order to integrate the effects of shifting towards citrus on infrastructure, machinery and labour.

3.4. Whole-farm budgeting models

A standard budget simulation is a simple form of simulation, which is beneficial in measuring future implications of farm business decisions, both physically and financially. The sophistication of budgets lies in the number of variables that can be integrated through a sequence of equations rather than sophisticated mathematical formulae's. Budgets are valuable decision-making tools as it can be integrated with other management tools, such as crop simulators, labour management systems, certification requirements and the financial record keeping system. There are two ideas flowing from a budget simulation. The first idea regards the knowledge about a decision-makers behaviour in terms of management (Attonaty *et al*., 1999). The second idea is the representation of risks concerning development (new contracts, land sold and structural changes) on a farm with regards to uncertainty (Attonaty *et al*., 1999). A common criticism of this approach is that it is not designed to generate an optimal solution as mathematical programs usually do (Hoffmann, 2010), however the benefits of this type of modelling outweighs the disadvantages associated with the model.

The use of whole-farm budgeting is attractive because it is a relatively simple tool which can easily be explained and understood by participants. This is particularly important to accommodate practicing producers and present a model that all participants can easily relate to. Whole-farm budgeting views the farm system as a whole, therefore it has the capacity to accommodate large numbers of variables and relationships (Hoffmann, 2010). With the use of a computer spreadsheet program (Microsoft excel), the whole-farm budget is designed to capture complex situations, calculations and relationships, but are adaptable and user-friendly (Hoffmann, 2010). Whole-farm budgets quantify and subtract fixed costs from the whole-farm gross margin to determine the net farm income value (NPI) as a monetary value or a percentage yield on investment (IRR). Net present value is the discounted value of future inflows and is ideal for financial comparisons, therefore it is commonly used by different farms.

The disadvantages of budget models are mostly related to those of simulation models. The most common disadvantage of budget models is the lack in optimizing the objectives, meaning it does not ensure the best possible solutions (Hoffmann, 2010). In using budgets as a simulation technique, there is a need for a thorough understanding of the farming system that is being modelled. An in-depth understanding of the farming system is advantageous, as the performance of the whole-farm budget can increase since it is well structured and trusted by participants (Hoffmann, 2010). In this instance the question focuses on determining the expected financial implications of including citrus enterprises in a typical wine grape farm. For this purpose a budget model is sufficient. It can show the risks involved with diversifying and also quantify the expected effect of such a change, in financial terms.

3.4.1. The application of a "typical farm"

The concept of a "typical farm" is commonly used when compiling whole-farm budgets, rather than using an average farm. A typical farm is defined as a farm that represents farms within a relatively homogenous area (Feuz & Skold, 1992). An average farm is when the average farm size and land use are determined, based on farms that is in a homogenous area. The average is, however, strongly influenced by outliers (in this case very large farms) that often lead to a farm that very few producers can relate to. The idea to use a typical farm model started in the 1930's in the United States, where the relationship between variables in a system was important, as it mostly shifted from a production cost approach to a whole-farm approach (Feuz & Skold, 1992). A typical farm is not determined on the basis of a specific set of data, such as personal information (Knott, 2015). The objective of using the concept of a typical farm is to minimize the effect of differentiating between farms doing exceptionally well, compared to farms not performing as well (Knott, 2015). The components that are established in a typical farm model must be done by consulting with producers for their knowledge and opinions (Knott, 2015). These individual components should be validated by a group of experts in the particular field. When a typical farm is used, the ideal is to establish a mode, and not an average, of farms in a homogenous area. A mode is the point in a set of data that appears the most often (Hoffmann, 2010). This will be applied to the farm size, whole-farm profitability, management quality, access to markets, cropping systems and cultivation practices (Hoffmann, 2010).

A typical whole farm approach is essential to determine farm profitability and the effect of the changes in the variables on farm-level profitability. A typical farm model allows for comparisons between managerial decisions and options, however direct comparisons within a specific individual farm are not possible because a typical farm operates hypothetically (Knott, 2015). However, due to its flexibility, the model can be adapted to a specific farm by a farmer. The operations of different farms are completely different from one another. Therefore, the impact of a certain set of factors on the profitability for a specific farm will be different from the impact on another farm. The factors that impact farm profitability are normally trends, strategies and basic policy options (Hoffmann, 2010), however for a typical farm model to maintain its integrity it is necessary for general assumptions such as technology, market access and management to remain valid (Carter, 1963). The application of the model is thus to determine the expected financial implications of foreseen structural changes. The typical farm only provides the basis for comparison (with the farm that is used for simulation), but it is more representative, which contributes to the value of the research effort.

3.4.2. Adaptation of an existing model

The process followed to obtain information for the adaptation of an existing model was done through exploratory research. Exploratory research is commonly used for a research problem that cannot be assessed with existing data, hence, an open mind is required to accommodate alternative possibilities (Yu, 2017). Exploratory research is divided into two subsections; primary research and secondary research. For the purposes of this research project both subsections are used for modelling a typical farm that was already identified and described for the Robertson area in a study that focused on water allocation (Seeliger, *et al*., 2018). Firstly, primary research among wine grape producers regarding assumptions in terms of the description of the farm was carried out. Secondary research was based on online-, literature- and case study research, from the following resources; the 2017/2018 booklet compiled by SAWIS, the 2017/2018 cost guide compiled by Vinpro, the 2010/2011 Guide to Machinery Cost compiled by Department of Agriculture, Forestry and Fisheries (DAFF) and a case study by Citrus Research International. The use of the time period 2017/2018 is merely for validity. Data is used to construct the various multi-period whole-farm budget models that were compiled in this research project.

3.4.3. Data collection and validation

Primary research such as interviews were used to validate the data captured in the models. The technique used is called the Delphi technique. This technique started in the 1950's and is defined as a method to structure group communications where the process that allows individuals to raise their opinions as a whole regarding a complex problem will be effective (Linstone & Turoff, 2002). This technique requires a group of experts regarding a specific problem to retrieve relevant information of a homogenous nature. The participants are identified as experts from a specific field. In this project it included viticulture, horticulture, plant protection, soil science, agricultural economics and producers. The participants are all presented with the same data and questions and inputs remain confidential. This means that opinions should not influence the inputs of other participants. After the models of this research study were compiled, verification was done by presenting the models to industry experts for comments. This was done with a group of producers, including wine grape producers that diversified into citrus or other crops, wine grape producers that consider diversifying, producers that continue with wine grape production only an agricultural specialists of wine grapes in the Robertson area. This group evaluated the content of the models and determine whether the price assumptions on inputs, outputs and infrastructure are applicable. This was carried out in a professional manner, as it is important to ensure that the information obtained is meaningful. The idea is to have detailed models to avoid the risk of obtaining skewed results (Hoffmann, 2010). The following section describes the structure of the models and the specific way in which each components' data was collected.

3.4.4. The structure of the whole-farm model

Three multi-period, whole-farm budget models projected over a time period of 25 years was compiled. The first model is a representation of a typical wine grape farm in Robertson. The second model represents a typical wine grape farm which is diversifying to include citrus. This contains the systematically incorporation and expansion of citrus on to the wine grape farm. The third model represent the simulation of wine grape and citrus farms, which indicate the potential outcome of a fully diversified farm. Regarding cash flow, the second model will be the core model of this research study.

3.4.4.1. Physical description of the typical farm

A typical farm was used to represent physical parameters to which producers can relate in the Robertson area. The data for the physical and financial factors of the multi-period whole-farm budget were established through both primary and secondary sources. For a farm business, the main assumption in application to the model is the total size of a farm because other factors are dependent on it, changing as the farm size changes (Hoffmann, 2010). These factors include the area cultivated, the land utilized, mechanization, the requirements for labour, as well as fixed improvement requirements (Knott, 2015).

Other physical factors that are incorporated in the multi-period whole farm budget that impacts the financial performance of a farm is the land distribution and land utilization. The land distribution is divided into own land and hired land. The land that is rented will impact the factor cost component of the model, however for this model it is assumed that all land is owned. The expected cash flow is typically impacted by own land to borrowed land, which determines the rent cost. On all farms there typically is land that is not used for production. This uncultivated land includes land used for roads, dams, sandy soils, river beds, housing, infrastructure and windows. Land utilization indicates the number of hectares that is used as the cultivated area for each crop in the production system. The budget model is adaptable to various changes in parameters and assumptions. A sequence of physical, mathematical and financial equations will, *inter alia*, automatically change the amount of hectares of each cultivated crop to calculate possible outcomes on the whole-farm profitability.

The farm structure information needed for the farm description included total farm size, land distribution and land utilization. The farm structure was established with existing literature (Seeliger, *et al*., 2018) and for validation telephonic consultations with wine grape farmers and wine grape specialists in the Robertson area were carried out.

3.4.4.2. The calculation component

The calculation component is rather complex, as the input components are interconnected through a sequence of equations to generate outputs, such as profitability. To ensure the validity and accuracy of the model, standard accounting principles are applied. For example when the gross margin per hectare of an individual crop is determined, the information flow is from the input component. The inputs are presented in physical terms such as tons of yield, litres of chemicals, kilograms of fertilizers and hours of labour or tractor use. The equations in the model structure multiply the price of each physical unit by the relevant price and the application level to calculate the cost of an input. The cost items collocated to each profitability term are then subtracted based on standard accounting principles to determine these profit margins. The gross margins are then used in the calculations of the actual multi-period whole-farm budget that calculated the NPV and the IRR of the farm as a whole. This is just one example of the numerous interrelated calculations that are structured into the budget model.

3.4.5. Inventory

A detailed description of a farm's tangible assets is imperative for many role players such as investors, therefore, inventories need to be transparent and as accurate as possible (Knott, 2015). The financial description of a farm, is an expression of what the farm is physically worth, in financial terms. A thorough financial description is presented by an inventory, or an asset register. For this research study a detailed inventory for all three models is provided. The item groups that are typically recorded into an inventory of a wine grape and fruit farm include; land, fixed improvements, machinery, equipment and vehicles (Hoffmann, 2010). In the structure of the whole-farm budget model these items are directly connected to the total farm size. When variations occur in total farm size all these items are also automatically affected. The physical items in an inventory are primarily used to calculate the capital requirement for the farm as a business unit, therefore, the values of all items incorporated in the inventory must be accurate. An accurate inventory will increase the farms ability to qualify for finance, which will enhance the financial sustainability of the farm. In this study the inventory is important because of the expected changes in mechanization when citrus is included into a wine grape farm. These foreseen changes are due to sprayers, bin trailers for harvesting, ladders and other harvesting equipment, and possible changes to the irrigation infrastructure. During the farm validation phase it was indicated that the irrigation systems in place in wine ,grape production farms are sufficient to irrigate citrus irrespective of the higher water requirement. This is because the peak water requirement for citrus is during the winter season months when the requirement is lower for wine grapes. The financial description also typically include an amortization component that focuses on the repayment of borrowed money.

The data used for the various items in the inventory are based on numerous sources. The assumption of land size indicated in the inventory was based on consultations with wine grape and citrus farmers in the Robertson area. The assumptions for fixed improvements were obtained from the Vinpro 2017/2018 Cost Guide and the 2017/2018 SAWIS booklet. This information is based on industry norms which are fairly accurate, and producers confirmed that the Vinpro data can be used for this purpose. The prices for vehicles, equipment and machinery were obtained from the 2010/2011 DAFF Guide to Machinery Costs. The specifications of the machinery, vehicle and equipment was determined by consulting the group of experts to validate the structure of the typical farm. The norm, proposed by the Guide to Machinery Costs, for replacing machinery items is 12 years. For the purpose of this research project, all the prices that were used on the inventory were verified by the group of experts.

3.4.6. Allocated and non-allocated variable costs

The production costs and labour components form the input component incorporated in all three respective models. The input prices are used to calculate the expected whole-farm profitability of the farm business. The items that are included in the general production costs and labour components for both the production of wine grapes and citrus include production material such as chemicals, fertilizers, plant material and seeds (Knott, 2015). Other production costs include repairs and maintenance, labour costs, fuel, consultations, harvest costs, irrigation costs, drainage systems, the cost of soil preparation , as well as water and electricity costs (Knott, 2015). These costs were gathered through secondary sources such as SAWIS and Vinpro and validated by the group of experts.

3.4.7. Gross production value and gross margin

For this research study enterprise budgets for a time period of 25 years were compiled for every cultivar of wine grapes and citrus in the three respective models. An enterprise budget is a physical and financial plan of a specific commodity. It represents a physical plan due to the availability of the type and quantity of the inputs and outputs (yield) per unit associated with the production of the farm business (Louw, van Zyl, Kirsten, Blignaut, Coetzee & Geyser, 2013). The financial plan is important because it assigns costs to all the production inputs that are used for each commodity (Louw *et al.*, 2013). Besides the fact that enterprise budgets are established on a per hectare basis, it also includes the gross production values, the directly allocatable costs and the non-directly allocatable costs.

The gross margin per hectare for each commodity was calculated by deducting the directly allocatable costs and non-directly allocatable costs from the gross production value. In the second model that was compiled, replacement of wine grapes with citrus is simulated for wine grape vineyards that where scheduled for replacement due to its age. This continues until 11.1 hectares of citrus were incorporated into the typical farm. The gross margin are further incorporated into the capital budget to determine whole farm profitability. The enterprise budgets form the basis of the multi-period whole-farm budget that was constructed for each of the three scenarios. The data used for the calculations of the gross production value were extracted from the information components of the model. This includes prices, physical inputs and application levels, yields and product quality information. Product quality refers to the pool of wine grapes such Pool A or B and these have price implications, which are accommodated in the model structure.

3.4.8. Overhead and fixed costs

The overhead and fixed costs of a farm business include the fixed amounts that a farm is liable for, regardless of the scale or intensity of production. The overhead and fixed costs typically include items such as; insurance, licenses, permanent labour, electricity, auditors fees, bank costs, maintenance on fixed improvements, water board membership, communication costs and administration costs (Knott, 2015). The data for the overhead and fixed costs component was obtained from the reports compiled by SAWIS and Vinpro. In their reports, the overhead and fixed costs are calculated as a per hectare cost. The costs were used as it represents actual farm data.

3.4.9. Whole-farm profitability

The capital budget integrates all the components that were discussed. The calculation structure is based on standard accounting principles and cost allocation is done accordingly to determine whole-farm profitability. The time period of 25 years was chosen to allow for at least one full replacement cycle for the wine grape crops and replacement of machinery and equipment.

The main objective of compiling the multi-period simulated whole-farm budget models was to determine the expected financial performance of crop production options. Citrus is a higher water requirement crop, with promising yields in comparison to that of wine grapes (Pienaar, 2018b). Determining the financial position is critical because it is an indication to wine grape farmers whether they could diversify. It is also necessary to determine the financial implications of structural changes, such as the impact of diversification, on the whole-farm profitability. In the calculation, the effect of inflation is incorporated by using real interest rates for the cash flow. The principle of constant prices is used and the interest rates are accordingly adopted to real rates.

The components discussed are directly interrelated within the capital budget. The total gross margin for the whole farm is calculated by adding the gross margin of each enterprise. The total fixed costs are calculated from the fixed cost assumptions component. The total capital expenditure flows are calculated in the inventory. Replacement of machinery and equipment is based on the lifetime (year) and age at the beginning of the calculation period. The salvage value of a machinery item is deducted from the purchase price of the new item to determine the value of the machinery (Knott, 2015).

The capital budget concludes with the calculation of net annual flow of funds. This is calculated by subtracting the overhead and fixed cost, as well as the capital expenditure from the total farm gross margin. The net annual flow of funds is used to determine the whole-farm profitability through two financial indicators. These are the NPV and IRR. The IRR is defined as the percentage that will be returned on capital investment, and the NPV represents the current value of the farm business in terms of the discounted values of the expected future cash flows (Kierulff, 2012). These two financial indicators are ideal for the comparison of different projects that are meant to start at different times over different periods. The impact of various changes, such as diversifying, was incorporated in these models to establish whether the diversification for the wine grape farmers will be profitable. In this instance the same farm is used as basis for comparison of alternative land use options with different consequential infrastructure requirements. It is about ranking the various outcomes in terms of expected profitability. Both the NPV and IRR are however included to show the monetary value and not only yield on investment. With the same farm investment it would be expected that the ranking of IRR and NPV should remain constant.

3.4.10. Affordability: ratio of own to borrowed finance and cash flow budget

The cash flow budget is used to measure whether the capital investment is affordable. It considers the effect of the borrowed capital and interest. Since the cash flow budget only includes cash items, the effect of the interest payments on the bank balance of the farm business is determined. The prices used throughout the model is constant, therefore, the nominal interest rate must be converted into real interest rate. The following formula is applied:

- Real interest rate = {[(1 + nominal interest rate) / (1 + inflation rate)] – 1}%

In the calculation of the cash flow budget the break even year is normally established. This break even year is an indication of when farmers can expect to start making profits. This will also determine the affordability of the borrowed capital, as well as the replacement of the machinery and the equipment.

3.5. Conclusion

The research problem focuses on the expected financial implications when wine grape farmers diversify the product mix to include citrus. To establish the financial implications requires an application of a suitable method, which was outlined throughout this chapter. A farming system is complex because of many interrelated components. The systems approach is followed which will allow for encourage more informed decisions on total farm profitability. It will also show the interactivity of the components.

For the purpose of this research study, three multi-period simulation whole-farm budget models over 25 years were compiled. The outcome determines the expected whole-farm profitability by calculating the NPV and the IRR. Each of these models represents a choice of crop mix, from wine grape production to a diversified farm including citrus. All calculations are based on standard accounting principles to support validity and accuracy. The three main components that the models consist of are the input component (for example, general production cost), the calculation component (calculations for the enterprise budget) and the output component (the capital budget). The data used for this research project were both primary and secondary data. All assumptions and structure of the typical farm were validated by a group of experts by using the Delphi technique.

Chapter 4: Financial results of the diversification process of a typical farm in Robertson

4.1. Introduction

In Chapter 3 the method of how the financial performance of a typical farm was determined, and how the model was validated, were described. The financial performance for a typical farm in Robertson was determined by compiling three multi-period whole-farm budget models over a period of 25 years. This was done primarily to accomplish the objectives of this research project, which were to determine the expected effect of diversifying into citrus from wine grape production.

The financial results contain the physical description of a typical farm with respect to farm size, land distributions and land utilization. Thereafter, the capital investment requirement regarding the farming assets are presented, followed by the gross production value for the whole farm for all three situations. The next financial result presented is the contribution of the input prices, which are the variable costs that occurred in this research project. The total gross margin for a whole farm for the first five years is shown. The applicable overhead and fixed costs for the three options are shown, followed by whole-farm profitability and cash flow projections. Under the whole-farm profitability components, scenarios that are aligned with the research problem and objectives are presented. The scenarios consider adapting to planting the replacement hectares with citrus.

4.2. The physical extent of the typical farm

In this research study the concept of a typical wine grape farm for the Robertson area was used. This allows for changes in parameters within the models to determine the expected impacts of alternative crop mixes on whole-farm profitability. The Robertson area, where the typical farm is based, is shown in Annexure A. The use of a typical farm allow for evaluation of alternatives, however it should not be directly applied to a specific farm. The results regarding the typical farms size and land distributions are shown in Table 4.1. The farm structure was established by previous research and validated, using the Delphi technique.

Table 2.1: Farm size, own to rented land ratio and land prices for a typical farm in the Robertson area

Area	Typical farm size (ha)	Own to rented land ratio		Own to rented land (ha)		Land Price
		Own land	Rented land	Own land	Rented land	R/ha
Robertson	200	100%	0%	200ha	0ha	R129 650

Table 4.1 indicates that for all three land use scenarios, the typical farm size is 200hectares, which is solely owned by the wine grape farmer, meaning no additional land was rented. The value of land is R129 650 per hectare, which brings the land value of the whole farm to approximately R25 930 000. This value was validated by a group of experts. However, the cultivatable land for all three models is 38%, meaning the farmer only utilizes 76hectares for production purposes. This indicates that this wine grape farm does

not utilise the land to its full capacity. Land use in this area is a direct factor of the availability of irrigation water and water rights. The following section outlines the allocation of the 76hectares for each specific cultivar.

4.3. Land utilisation

Land utilisation describes the breakdown of the percentage usable land allocated to each cultivar that was defined as typical for this area. The area for each cultivar was determined as a factor of the total cultivated area. The following Tables (4.2 and 4.3) represent the land use patterns for each of the different crop use scenarios.

Table 4.2: Land use patterns for a typical farm in Robertson for Model 1

Cultivar	% of usable land	Ha allocated to cultivar
Wine grapes		
Chenin Blanc	14%	10.6ha
Colombar	18%	13.7ha
Sauvignon Blanc	14%	10.6ha
Cabernet Sauvignon	16%	12.2ha
Chardonnay	13%	9.9ha
Pinotage	11%	8.4ha
Shiraz	9%	6.8ha
Merlot	5%	3.8ha

Table 4.2 shows the land use patterns for Model 1, and indicates that land use for Colombar is the highest at 13.7hectares, followed by Cabernet Sauvignon at

12.2hectares, and then Chenin Blanc and Sauvignon Blanc, each at 10.6hahectares. The cultivar with the least hectares distributed is Merlot, with only 3.8hectares of the land utilised. The assumption of the composition of the cultivars was based on SAWIS data and validated as typical by the producers and the local wineries. These percentages were used to calculate the per hectare allocated to each cultivar of the wine grapes.

Table 4.3: Land use patterns for a typical farm in Robertson for Model 2 and Model 3

Cultivars	% of usable land	Ha allocated to cultivar
Wine grapes		
Chenin Blanc	14%	9.1ha
Colombar	18%	11.7ha
Sauvignon Blanc	14%	9.1ha
Cabernet Sauvignon	16%	10.4ha
Chardonnay	13%	8.4ha
Pinotage	11%	7.1ha
Shiraz	9%	5.8ha
Merlot	5%	3.2ha
Citrus		
Navels (Cambria)	53%	5.9ha
Mandarin (Nova)	26%	2.9ha
Mandarin (Satsuma)	21%	2.3ha

Table 4.3 indicates the land use patterns for a typical farm in Robertson for Model 2 and Model 3. It shows information for both wine grapes and citrus cultivars. The results of the wine grape cultivars in Models 2 and 3 are different from those in Model 1, due to the incorporation of the diversification process with citrus. Colombar still accounts for the highest land use but with 11.7hectares, followed by Cabernet Sauvignon with 10.4hectares, and Chenin Blanc and Sauvignon Blanc with 9.1 hectares each. The total land allocation for the wine grape cultivars is 64.9hectares and 11.1 hectares are used for citrus. The citrus replaces the wine grape cultivars that were taken out of production due to the normal replacement schedules. The 11.1 hectares of citrus are allocated to three cultivars; Navels (Cambria) with 5.9hectares, Mandarin (Nova) with 2.9hectares and Mandarin (Satsuma) with 2.3hectares.

4.4. Capital investment requirement

The capital investment requirement is calculated in the inventory component. The items that capital investments consist of include: land, fixed improvements, vehicles, equipment and machinery. The inventory for Model 1 differs slightly from Models 2 and 3 due to the diversification process. The calculations of the capital investment can be seen in Annexure C. Table 4.4 is an outline of capital investment required for all three models.

Table 4.4: Capital investment requirement for a typical farm in the Robertson area

Capital investment requirement for a typical farm in the Robertson area	
Model 1	**Model 2 and Model 3**
R32 121 517	R32 191 437

In Table 4.4, the indicated value of the capital investment requirement in Model 1 is R32 121 517. This sum total is determined by the land value of R25 930 100, fixed improvements value of R3 455 583 and the vehicle, machinery and equipment value of R2 735 834. The capital investment requirement for Model 1 is solely for the production of wine grapes. The capital investment requirement for Models 1 and 2, based on land and fixed improvements, remains the same, however for vehicle, machinery and equipment the amount is R2 775 754. This capital investment required is different from Model 1, as it contains the implementation of the diversification process to include citrus. Between the models, a slight difference of approximately R70 000 occurs in vehicle, machinery and equipment, as only ladders, picking bags and bins trailers were added for the production of citrus.

4.5. Gross production value of the whole farm

The gross production value of the whole farm is the sum of all the gross production values of the cultivars in the whole-farm budget. This is determined by multiplying the quantity of the output with price. Items such as production volume, exports volume, exchange rate and international prices typically impacts the gross value. Table 4.5 indicates the price per unit (ton) of all the cultivars for all three models.

Table 4.5: The price per unit (R/ton) for the cultivars for all three models

Cultivars	Price per unit (R)
Wine grapes	
Chenin Blanc	R2 191
Colombar	R2 053
Sauvignon Blanc	R3 000
Cabernet Sauvignon	R2 800
Chardonnay	R3 270
Pinotage	R2 577
Shiraz	R3 008
Merlot	R3 020
Citrus	
Navels (Cambria)	R3 604
Mandarin (Nova)	R6 617
Mandarin (Satsuma)	R6 617

Table 4.5 indicates that the values of the cultivars for wine grapes varies between R2 000/ton and R3 270/ton. Chardonnay is the cultivar with the highest price at R3 270/ton, while the cultivar, Colombar, has the lowest price at R2 053/ton. These prices stagnated over the past decade, therefore, diversification to include citrus was incorporated. The values of both Mandarin cultivars that have been incorporated and are more than double, then that of any of the wine grape cultivars, at R6 617/ton. The prices

of citrus have exponentially increased over the past decade. The prices of wine grapes and citrus have been used to calculate the gross production values.

Table 4.6: Total gross production value for the typical farm in Robertson for all three models

Model	Gross production value for the whole farm and per hectare	
	R/farm	R/ha
Model 1	R4 178 839	R432 033
Model 2	R6 555 675	R1 309 973
Model 3	R6 550 197	R1 309 973

Table 4.6 represents the total gross production value of the whole farm, and per hectare, for all three models. The diversification process is incorporated in Models 2 and 3, the gross production value of the whole farm, and per hectare, is higher than that obtained in Model 1. This difference can be accounted for by the change in gross production value in the cultivars of citrus over the last years.

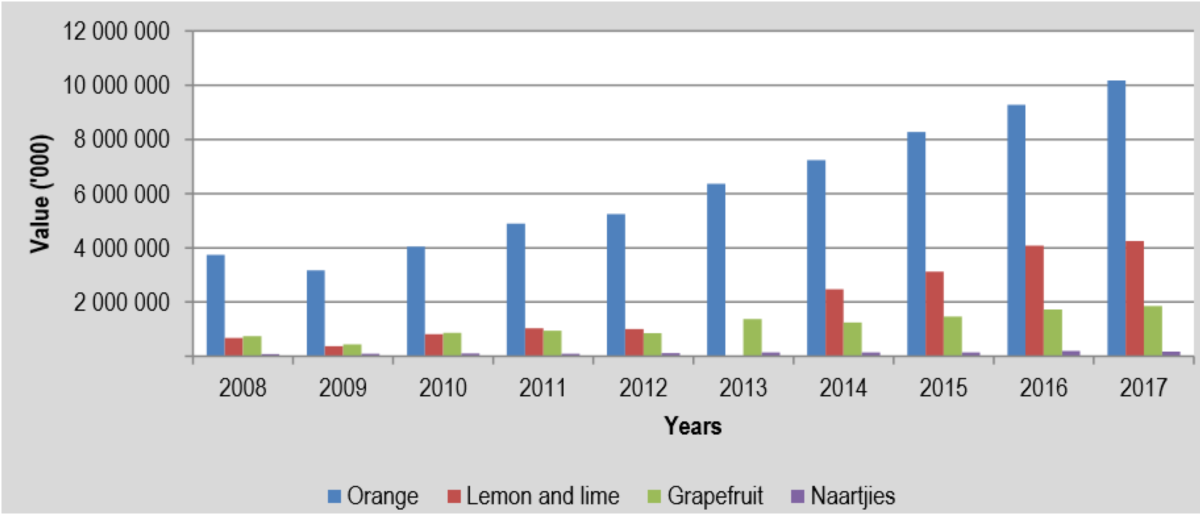

Figure 4.12: Gross production value for citrus cultivars between 2008 - 2017

Source: (DAFF, 2011)

Figure 4.1 illustrates that the gross production value of citrus has increased from 2008-2017, where oranges show the highest increase, followed by lemons and limes. These results show the impact citrus has when incorporated into the production process of a wine grape farming business, and its impact is evident in the financial results of this research project. The cost implication associated with the diversification process, is also important for production.

4.6. Variable costs

For each of the three models an enterprise budget for each cultivar was developed. Variable costs are associated with the production of the farming business. Variable costs include seed costs, fertilisation costs, chemical costs, transport costs, crop insurance costs, fuel costs and repair and maintenance costs. Table 4.7 contains the relative percentage contributions of the total variable costs of the farming business.

Table 4.7: The percentage contribution of various inputs to total variable costs in Robertson for all three models

	Seed	Fertiliser	Chemicals	Fuel	Maintenance	Other
Model 1	1.14%	10.21%	18.52%	10.09%	18.57%	41.47%
Model 2 & Model 3	0.41%	11.80%	19.94%	15.78%	12.46%	39.60%

Since citrus is incorporated into Models 2 and 3, the costs also change accordingly. Table 4.7 indicates that the relative percentage contribution of fertiliser increased by 1.59%, chemicals by 1.42% and fuel by 5.69%. The increased contribution in fuel indicates a higher usage of machinery and equipment because citrus spraying programmes are more intense. In contrast, the maintenance costs contribution decreased by 6.11%. This indicates that the use of infrastructure in the diversification process is spread over a longer period. Other costs that are associated with the production of a farming business are overhead and fixed costs.

4.7. Overhead and fixed costs

The overhead and fixed costs are considered to remain constant and not dependent on production. The overhead and fixed costs will remain the same for all three models, as the diversification process does not influence it as well. Producers did indicate that communication cost may be affected due to marketing with regards to citrus, but could not associate a value to it. Overhead and fixed costs include items such as permanent labour, water rights, bank costs, electricity, auditors' fees, communication, maintaining of fixed improvements, manager, license and insurance. The overhead and fixed costs are R1 632 034 per year.

4.8. Gross margin

For each model an enterprise budget for each cultivar was constructed. The gross margin for each cultivar is calculated by deducting the total variable costs from the gross production value. Annexure D provides an outline of an enterprise budget for a wine grape cultivar and a citrus cultivar, as an example. The gross margin of the whole farm is determined by summing the gross margin for each individual cultivar. This is shown in Annexure E, which presents a capital budget for the whole farm over a period of 25 years.

Table 4.8: Total gross margin for the typical farm in Robertson for all three models from year 1-5

Area	Gross margin for year 1 - 5				
	R/farm Year 1	R/farm Year 2	R/farm Year 3	R/farm Year 4	R/farm Year 5
Model 1	R2 704 228	R3 337 891	R3 542 473	R3 616 279	R3 642 228
Model 2	R2 440 770	R3 020 423	R3 223 269	R3 333 346	R3 494 600
Model 3	R2 810 848	R4 072 475	R4 918 110	R5 502 567	R5 687 900

The information in Table 4.8 is a projection of values for the first five years. The gross margins for the rest of the 25 years can be seen in Annexure E in the capital budget. The fluctuations in Table 4.8 is a factor of replacement schedules and subsequent variance in area under fully producing crops. Model 3 shows the gross margins assuming citrus is included from the start. Model 2 is the model that shows the transition from only wine grapes to a farm including citrus.

4.9. Whole-farm profitability

The models that was compiled for purposes of this research project was for a time period of 25 years. Therefore, whole-farm profitability is determined over a 25 year period. The process of developing the multi-period whole-farm budget is thoroughly discussed in Chapter 3. The two main financial indicators of whole-farm profitability are presented in Table 4.9, which is the NPV and the IRR. This was calculated based on the net cash flow of the funds in the capital budget.

Table 4.9: The Net Present Value (NPV) and the Internal Rate of Return on capital investment (IRR) for a typical farm in Robertson for all three Models

Model	Net Present Value (NPV)	Internal Rate of Return (IRR)
Model 1	-R161 017	2.37%
Model 2	R15 744 723	5.10%
Model 3	R33 364 677	9.45%

From the financial results presented in Table 4.9, the farm in Model 3 became more profitable over time, compared to the farm in Model 1. These results indicate that the incorporation of citrus can potentially have a positive impact on the profitability of the farm.

Despite the high water intensity demand, it is still expectedly more profitable to include citrus in the wine grape farm.

4.10 Scenarios

During the diversification process, the NPV and IRR are calculated based on the assumption that one hectare of citrus replaces one hectare of wine grapes. However, there are two factors that must be considered in these calculations. Firstly, the water requirement (m^3) for citrus is much higher (between 11 000m^3 – 13 000m^3) than the water requirement (m^3) for wine grapes (between 4 000m^3 – 5 500m^3). Secondly, during the irrigation season for citrus, farmers affected by the Brandvlei dam scheme, do not have access to water for the full time period, due to maintenance of the dam. Therefore, scenarios were developed that consider those factors into the models. To establish the effect on whole-farm profitability the replacement ratio between wine grapes and citrus is adapted. The first scenario contains the relationship ratio of 1:0.8. This means for each one hectare of wine grapes that are removed, 0.8 hectares of citrus will replace the wine grapes. The second scenario is the relationship ratio of 1:0.7. For each one hectare of wine grapes removed from production, 0.7 hectare of citrus will be planted. Tables 4.10 and 4.11 show the change in NPV and IRR due to these different replacement ratios, for Models 2 and 3, respectively.

Table 4.10: The Net Present Value (NPV) and the Internal Rate of Return on capital investment (IRR) for Model 2

	Net Present Value (NPV)	Internal Rate of Return (IRR)
Scenario 1: The implementation of ratio 1:0,8	R12 004 131	4.54%
Scenario 2: The implementation of ratio 1:0,7	R10 138 254	4.25%

Table 4.11: The Net Present Value (NPV) and the Internal Rate of Return on capital investment (IRR) for Model 3

	Net Present Value (NPV)	Internal Rate of Return (IRR)
Scenario 1: The implementation of ratio 1:0.8	R25 517 157	7.73%
Scenario 2: The implementation of ratio 1:0.7	R21 616 347	6.89%

These scenarios were developed based on the higher water demand associated with the production of citrus resulting in less hectares being planted than for wine grapes. The scenarios were incorporated in Models 2 and 3, and the impact of these changes are evident. The impact of these scenarios in Model 2 and three resulted in the NPV being approximately between R4 000 000 and R9 000 000 less than the original results obtained for the 1:1 ratio. The impact of the scenarios on the IRR is approximately between 2% and 3% lower for Models 2 and 3. Although the results of the scenarios are lower, the potential difference in profitability for a typical wine grape farm is still significant when diversifying to include citrus.

4.11. Conclusion

The main objective of this research project was to establish the financial implications of diversifying to include citrus in a wine grape farm in the Robertson area. This was further divided into smaller objectives, such as determining whole-farm profitability through two main financial indicators, the NPV and the IRR, as well as the cash flow projections and the infrastructure changes. Three whole-farm budget models for a time period of 25 years was constructed to determine the expected financial implications. For the purposes of this research project, a group of experts identified a typical farm size as 200hectares. The use of a typical farm allows for comparative evaluations with other projects and the impact of changes made to the models.

The capital investment required varied between R32 121 517 for Model 1, and R32 161 437 for Models 2 and 3. The financial results also indicated a significant increase in the total expected gross margin, as well as the gross production value of the whole farm. The profitability of the wine grape farm increased as the diversification process was incorporated. The NPV increased from –R161 017 in Model 1, to R33 364 677 in Model 3, while the IRR increased by 7.08% in Model 3. The original models were based on the ideal ratio of 1:1, however two different scenarios were considered to account for the disadvantages associated with the production of citrus in Models 2 and 3. The financial results still showed a significant increase in whole-farm profitability, indicating the impact of the disadvantages are not as severe as expected.

Chapter 5: Conclusions, Summary and Recommendations

5.1. Conclusions

Globally, farmers need to adapt to economic, environmental, social or political challenges to maintain sustainability, profitability and growth. There are numerous methods farmers can follow, however diversification is popular. Diversification in agriculture is seen as the change in traditional production, resources or markets towards the success of a farming operation. Farmers can diversify due to the respective challenges they are experiencing such as the lack of technology uses, poor financial management, poverty, insufficient production processes, and more lucrative alternative options. In Western Europe, farms were too small and did not have proper structure to maintain sustainable production, which led to poverty. Consequently, these farmers adopted a strategy such as diversification to cope with these problems. There are three types of diversification opportunity areas farmers could implement, namely; vertical, horizontal, and lateral diversification. There are many forms of structural and business diversification. Product diversification, agricultural diversification, structural diversification and income diversification are all examples of opportunities to diversify. Farmers can innovatively implement combinations of different forms of diversification. Innovative diversification offer numerous environmental, financial and management benefits.

The South African wine grape industry experienced numerous challenges, which led to financial instability, stagnated growth and basic unsustainability. Wine grape farmers were compelled to identify ways to generate alternative income. Consequently, wine grape farmers in the Robertson area diversified to include additional crops. Crops that are incorporated include plums, nectarines, almonds and citrus. Of these crops, citrus seems to be the preferred crop amongst producers. One of the advantages of citrus is that the harvesting season differs from wine grapes, allowing for improved use of machinery, labour and irrigation water. The goal of this research is to evaluate the financial implications associated with converting from wine grape farming in the Robertson area to include citrus.

A farm system is complex and consists of various interrelated components, making the system inherently difficult to understand. A systems thinking approach is a method that does not ignore complexity of a farming operation and can develop the knowledge of farmers towards more informed decisions. Simulation modelling accounts for the complexity of a farm system, deals with relational interaction between components and is ideal in terms of cost and time efficiency. Whole-farm budgets are in essence simulation models. The sophistication of budget models lies in the number of variables taken into consideration, as well as changes in the variables that might occur. This is achieved by the possible sequence of equations that can be linked to express the financial outcome of a physical/biological system managed to achieve a specific goal. These types of models are easy to understand by participants, user-friendly and easily adaptable by a farmer to meet alternative queries.

Three multi-period whole-farm budget models were compiled. The concept of a typical farm was employed to serve as a basis for comparison of the alternative cropping options. The first model represented a wine grape farm. The second model represented the gradual incorporation of converting from wine grape production, to incorporate citrus into the farm system. The third model illustrates a wine grape and citrus farm. The third model thus represents the diversified farm as if it exists from year one of the analysis. All three model measure the expected financial performance and show the potential success of diversifying. The change in the net cash flow was significant, as the cash inflow improved from Model 1 to Model 3. Additionally, the present value of the future expected cash flow of the farm also improved. The expected NPV shifted from –R161 017 in Model 1, to R15 744 723 in Model 2 and R33 364 677 in Model 3. The impact on the IRR was also evident as it increased from 2.37% in Model 1, to 5.10% in Model 2 and 9.45% in Model 3. According to the capital investment requirement, there was an approximately R70 000 difference from Model 1 to Model 2 or 3. The only change that occurred in infrastructure during the diversification process was the additional requirements of step ladders, bin trailers, picking bags and bins. The change in infrastructure was not substantial or financially meaningful in terms of total investment.

To conclude, the expected financial implications associated with the adaptation of diversification is positive for wine grape farms in the Robertson area. No major cost implications and infrastructure changes are expected. However, the results are for the assumption that wine grape farmers have a fair knowledge of citrus production and that management would be optimal. The incorporation of citrus with wine grapes can be challenging as it entails different production, irrigation and harvest processes. The knowledge requirement is needed to maintain and ensure sustainability. The projected results indicate a clear picture of the fruits of their labour that will be obtained by diversifying. Therefore, wine grape farmers in the Robertson area might benefit financially should citrus be included into the crop mix.

5.2. Summary

In recent years a number of wine grape farmers in the Robertson area have diversified operations to include citrus production. This presents a possibility that this kind of expansion could be adopted on a wider scale. A key question remained of providing evidence into the expected financial outcome of such a shift, as well as the potential cash flow challenge of the actual conversion process away from wine grape production. Consequently, the financial viability of this change was considered. Therefore, the research objective of this study was to evaluate the financial implications associated with diversifying a wine grape farm in the Robertson area to include citrus in the crop mix.

Chapter 2 consists of two main concepts. The first concept is a brief overview of diversification. In the past years diversification was successfully applied by a number of farmers to overcome challenges and to build resilience into the farm system. There are three types of diversification opportunities that a farmer could consider. The three types of diversification opportunities included vertical-, horizontal-, and lateral diversification. After establishing the diversification opportunity area, many forms of diversification could be applied that would depend on the objectives of a producer. These were identified as; product diversification, agricultural diversification, structural diversification and income diversification. Farmers could apply one or a combination of these options. Based on the various challenges of the South African wine grape industry in recent years, producers were compelled to identify sources of additional or alternative income. Consequently, wine grape farms in the Robertson area diversified to include citrus, plums, nectarines and almonds. Four trends were identified which contributed to this diversification trend. These are the reduction in area under wine grape vineyards, the increase in additional alternative crops, stagnated average wine grape prices and the impact of the drought that occurred in the Western Cape from 2015 to 2017.

The proposed method that was used is outlined in Chapter 3. The complexity of interrelated components and functionality of a farm system is difficult to understand. A systems thinking approach is a method which addresses such complexity by integrating the components and interrelationships within the farm system as a whole. This also potentially allows farmers to broaden their knowledge to make decisions more effectively. Whole-farm budgets are ideal as simulation models, as it can accommodate a number of variables, as well as the relationships and changes of those variables. This chapter concludes with an outline of the various components that the whole-farm budget models consist of. The information that is used in a simulation model is important. Data was obtained and validated by incorporating industry experts in the model structure, as well as the assumptions that simulate the various production strategies with and without citrus.

The financial results obtained for the three production strategies that were simulated was achieved by a long term, whole farm budget constructed for each strategy. The first was for a wine grape farm, the second for a farm that started off as a wine grape farm and diversified to include citrus and the final strategy simulated a situation where a farm had already diversified. The results consider the physical extent of the typical farm to the outcomes of the diversification process in terms of whole-farm profitability. Whole-farm profitability was presented through the two main financial indicators, the NPV (net present value) and IRR (internal rate of return on capital investment). The first set of these results was based on the replacement ratio of one hectare wine grapes : one hectare citrus. This meant that for every hectare of wine grapes removed, one hectare of citrus replaced it.

The expected financial results were positive, however the replacement of the assumed ratio was not necessarily realistic. This was due to two factors, firstly, the higher water demand of citrus compared to wine grapes and secondly, the Brandvlei scheme, which does not allow farmers to use water during the ‘off’ irrigation season, as it is earmarked for maintenance. Considering these two factors, two scenarios were developed to accommodate these factors, by changing the replacement ratio. This was incorporated into Models 2 and 3, which represented different NPV and IRR values.

5.3. Recommendations

There are a number of recommendations that arose from the outcomes of this research study. Based on the results obtained, the first recommendation is that wine grape farmers who want to maintain sustainability, profitability and growth, should diversify to include citrus, or even alternative crops. Given the current condition of the wine grape industry, and the impact of the numerous trends, as mentioned in Chapter 2, the industry was compelled to generate additional alternative income.

The method that was used in this research study was successful in evaluating the financial implications of diversification for wine grape farmers in the Robertson area; therefore, the second recommendation is that this method be applied for similar studies into the feasibility of diversification. This method is easily understandable and explainable by participants, allows for measuring impacts on specific variables to determine realistic outcomes and is user-friendly.

The final recommendation is that further research on diversification of wine grape farms in the Robertson area be done and include more in-depth focus on the Brandvlei scheme and its impact on citrus production. This will allow for better determination of a realistic replacement ratio. In addition, research should include the impact of changes such as removing vineyards due to damage or age on other wine industries such as wine cellars and trade markets.

6. Bibliography

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7. Personal communication

Louw, V. 2019. Personal communication. Director, Robertson.

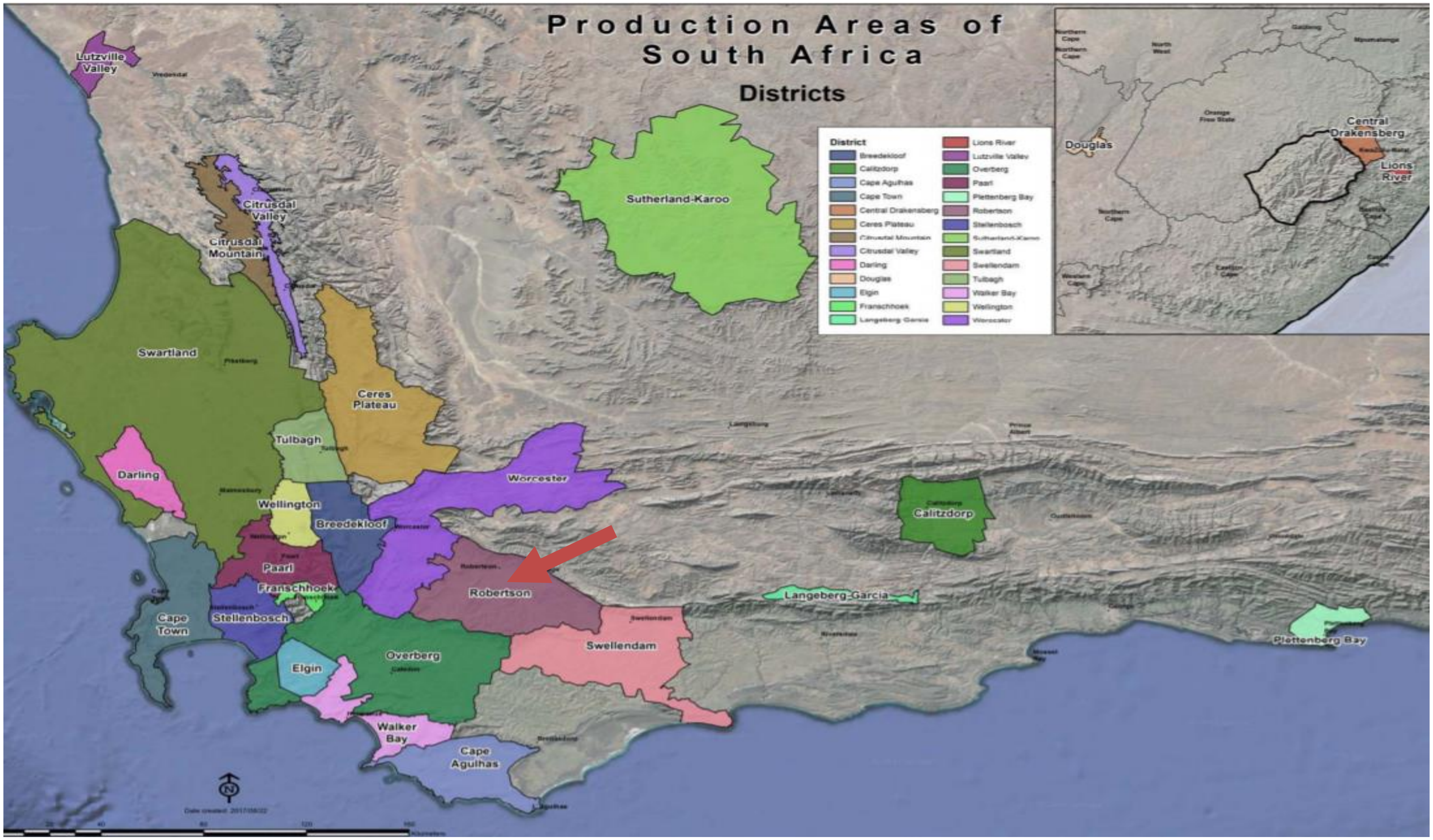
8. Annexures

Annexure A: A detailed summary of the increase and decrease of specific crops in the Western Cape

		Total Area 2017 (ha)	Beaufort West	Bergrivier	Bitou	Breede Valley	Cape Agulhas	Cederberg	City of Cape Town	Drakenstein	George	Hessequa	Kannaland	Knysna	Laingsburg	Langeberg	Matzikama	Mossel Bay	Oudtshoorn	Overstrand	Prince Albert	Saldanha Bay	Stellenbosch	Swartland	Swellendam	Theewaterskloof	Witzenberg
BERRIES	BLACKBERRIES	68	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-10	0	0	7	0	2	0	0
	BLUEBERRIES	824	0	-11	0	0	13	0	5	2	98	1	0	8	0	62	0	18	0	24	4	0	15	0	19	27	75
	RASBERRIES	121	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	-28	0	0	5	0	-11	4	0
	STRAWBERRIES	176	0	0	-9	0	0	0	0	-4	13	0	1	0	0	10	0	11	0	0	0	0	-28	0	1	0	-21
CITRUS	GRAPEFRUIT	17	0	3	0	0	0	-10	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1
	LEMONS	2 042	0	104	0	30	0	222	54	31	1	-1	10	0	0	599	2	1	-4	0	0	0	13	117	64	-20	-13
	LIMES	202	0	-2	0	0	0	18	-3	9	0	0	0	0	0	25	0	0	0	0	0	0	-4	3	1	0	0
	ORANGES	7 704	0	96	0	-37	0	-13	0	1	0	0	0	-5	-2	26	19	-15	-7	0	-1	0	6	37	-19	0	-9
	NAARTJIES	6 315	0	561	0	341	0	###	10	87	0	26	1	-2	0	615	2	0	0	0	0	0	26	113	166	-54	3
EXOTIC	FIGS	370	0	-38	0	22	-17	0	-3	-12	38	1	4	0	0	7	5	1	0	3	7	0	1	-1	2	0	3
	PERSIMMONS	354	0	-7	0	0	0	0	0	-9	0	5	0	-2	0	-27	0	0	0	0	0	0	-8	0	-26	-26	-1
	POMEGRANATES	715	20	-86	-1	7	-4	-15	-5	1	24	-68	22	0	0	-13	-6	2	-1	0	3	1	-1	32	-1	-10	15
	PRICKLYPEARS	143	42	1	0	3	19	14	0	1	4	21	0	0	0	5	1	0	1	0	1	1	0	15	0	2	11
NUTS	NUTS	436	5	12	4	31	0	14	4	20	141	41	3	1	14	84	31	36	-28	0	10	0	1	91	2	5	0
	DATES	9	0	0	0	0	0	0	0	0	-32	0	0	0	2	0	0	0	0	0	0	0	0	0	0	-4	1
OLIVES	OLIVES	6 207	18	-59	4	-45	0	22	44	-59	1	17	76	0	8	-6	12	-6	31	-1	91	9	1	-29	9	-6	-91
POME	APPLES	21 512	0	63	0	3	0	0	88	6	###	-2	3	0	0	-70	0	0	0	16	0	0	0	1	19	###	565
	PEARS	10 711	0	40	0	71	0	8	-25	-21	-6	3	2	0	2	98	0	0	0	-12	0	0	-30	-9	24	114	###
STONE	APRICOTS	2 729	0	10	0	-6	0	0	0	-6	1	-45	###	0	-21	###	-24	0	-16	0	-11	0	0	0	11	-5	84
	CHERRIES	157	0	0	0	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	118
	NECTARINES	1 515	0	-11	0	-46	0	-6	0	-53	-2	0	0	0	3	6	-4	0	-5	0	0	0	-3	8	9	22	-89
	PEACHES	6 848	2	###	0	67	0	82	0	-25	-12	-32	11	0	6	-96	26	0	0	-1	-2	0	-2	-5	###	-50	###
	PLUMS	5 644	0	-14	0	91	0	-6	-8	###	51	2	14	-1	3	417	0	0	0	1	-9	0	-13	-59	-42	###	-89
SUBTROP	AVOCADOS	242	0	1	0	0	0	7	0	0	8	15	0	0	0	2	0	75	0	0	0	0	0	0	0	0	0
	GRENDADILLAS	21	0	1	0	0	0	-18	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
	GUAVAS	801	0	-10	0	0	0	0	-22	12	0	0	0	0	0	3	1	15	0	0	0	0	-13	4	0	0	0
	MANGOS	111	0	-1	0	0	0	87	0	1	0	2	0	0	0	0	-4	-4	0	0	0	0	0	0	0	0	0
	MELONS	76	0	42	0	-11	0	-1	0	-2	0	0	10	0	0	0	-3	0	0	0	0	0	-2	20	0	0	0
	WATERMELLONS	158	0	46	0	16	0	13	1	9	0	0	8	0	0	0	1	0	1	4	0	0	-4	21	0	0	3
GRAPES	TABLE GRAPES	13 095	-2	###	-11	168	-14	105	28	-59	0	0	-12	0	-1	30	106	0	-8	-7	0	0	-18	75	0	1	33
	WINE GRAPES	91 221	6	###	52	###	-33	###	###	###	65	-63	###	0	-6	###	###	-30	-38	-61	-50	1	###	###	-30	###	###

Source: (Pienaar, 2018a)

Annexure B: Maps of the Western Cape Province (Wine production districts)



Source: (SAWIS, 2019)

Annexure C: Inventories of a typical farm
Inventory from model 1

Inventory: Land

Total						R 25 930 100,00

Inventory: Fixed improvements — **2017**

Item	Number	Age	Purchase price	Expected lifetime	Residual value %	Yearly		Annual maintenance (R)	Currently
						Per item	Total		
Not farming improvements									
House	1	30	1 000 000	30	0,15	-		5 000	1 000 000
Workers house									
Manager	2	10	600 000	30	0,15	-		10 000	1 200 000
Workers house	13	15	45 000	30	0,15	-		10 000	573 750
Farm buildings and installations									
Store	2	4	750 000	30	0,15	25 000	50 000	5 000	550 000
Poison store	1	5	40 000	30	0,15	1 333	1 333	5 000	33 333
Pumphouse	5	10	75 000	30	0,15	2 500	12 500	10 000	62 500
Other fixed improvements									
Pump and filter station	5	8	12000	20	0,1	600	24 000	3 000	36 000
Permanent irrigation			1 464 000						1 464 000
Dam			3 026 000						5 000 000
Total							87 833	48 000	9 919 583

Inventory: Vehicles, equipment and machinery — **2017**

Item	Number	Size/kilowatt	Age	Year purchased	Purchase price		Expected lifetime	Yearly usage	Yearly depreciation		Repair and maintenance			Current value		Residual value
					per item	total			Per item	Total	Rate	Per item	Total	Per item	Total	
Vehicles																
Bicycle							Km	Km			R/km					
2 wheels	2	250cc	6	2011	46 631	93 262	150000	10000	2 798	5 596	0,2	2 000,00	2 000	29 844	29 844	4 663
Bakkies											R/km					
LAA 2.4 Diesel	2		7	2010	220 000	440 000	250000	10000	7 920	15 840	0,6	6 000	6 000	164 560	164 560	22 000
Trucks											R/km					
8t Dropsides	1		12	2005	544 000	544 000	400000	12000	24 480	24 480	2,6	31 200,00	31 200	250 240	250 240	54 400
4ton	2		15	2002	306 000	612 000	400000	12000	27 540	55 080	3,1	37 200,00	37 200	198 900	198 900	30 600
Crusher	1		15	2002	2 450 000	2 450 000	400000	12000	100 227	100 227	5,1	37 200,00	37 200	946 591	946 591	245 000
Other selfdriven equipment																
Tractors							Hour	Hour			R/Hour					
Border & Vineyard	2	42kW	8	2009	313 000	626 000	15000	1000	14 085	28 170	0,3	300	300	200 320	200 320	31 300
Border & Vineyard	2	42kW	11	2006	313 000	626 000	15000	1000	14 085	28 170				158 065	158 065	31 300
Border & Vineyard	1	51kW	6	2011	368 000	368 000	15000	1000	16 560	16 560				268 640	268 640	36 800
Border & Vineyard	1	55kW	3	2014	384 000	384 000	2000	1000	17 280	17 280				332 160	332 160	38 400
Secondhand harvest tractor for the border	1	60kW	4	2013	390 000	390 000	15000	1000	17 550	17 550	0,1	100	100	319 800	390 000	39 000
Border	2	65kW	7	2010	450 000	900 000	20000	1000	20 250	40 500	0,1	100	100	308 250	308 250	45 000
Forklifter											R/Hour					
Forklifter	1		8	2009	130 000	130 000	20000	1080	7 800	7 800	2,5	2 700	2 700	67 600	67 600	13 000
Total vehicle and machinery														**3 244 970**	3 244 970	
Implements:																
Spray pumps							Year	Year			N/A					
Dragtype (1) 1500l	2		9	2008	135 000	270 000	10	1	10 125	20 250				43 875	43 875	13 500
Dragtype (2) 1500l	2		9	2008	100 000	200 000	10	1	7 500	15 000				32 500	32 500	10 000
Turbmatic 1500l	1		10	2007	88 000	88 000	10	1	6 600	6 600				22 000	22 000	8 800
Three point 400l (Herbicide)	1		12	2005	90 000	90 000	10	1	5 400	5 400				25 200	25 200	9 000
Tillage implement											N/A					
Scratcher	1		32	1985	2 000	2 000	30	1	60	60				320	320	200
Disc	1		16	2001	35 000	35 000	20	1	1 575	1 575				9 800	9 800	3 500
Ghrop	1		10	2007	20 000	20 000	20	1	900	900				11 000	11 000	2 000
Other																
Tipwa (Parsbucket) 3ton single axis	1		6	2011	76 000	76 000	20	1	3 420	3 420				55 480	55 480	7 600
Usual double trailor axis 6t dropsides	1		12	2005	98 000	98 000	20	1	4 410	4 410				45 080	45 080	9 800
Rovic Chalk spreader	1		8	2009	20 000	20 000	20	1	900	900				12 800	12 800	2 000
Bush implement	1		10	2007	10 000	10 000	20	1	450	450				5 500	5 500	1 000
Electrical mobile water pump	1		8	2009	30 000	30 000	20	1	1 350	1 350				19 200	19 200	3 000
Content of workshop and tools	1		9	2008	260 000	260 000	20	1	11 700	11 700				154 700	154 700	26 000
Total implements:										215 618			81 600,00	437 455	437 455	687 863
Total movable assets:															3 682 425	

Notes to the inventory:
1. For land and fixed improvements relative conservative values were used.
2. Depreciation is based on a straight line method.
3. Replacement value is replacement price minus scrap value.
4. All prices and costs is based on the "Guide to Machinery Costs 2010/2011"

Replacement schedule

Lifetime (jr)	Age	Remaining lifetime	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
15	6	9	0	0	0	0	0	0	0	0	0	41967,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41967,9	0	0
25	7	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	198000	0	0	0	0	0	0	0	0
20	12	8	0	0	0	0	0	0	0	0	489600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	15	5	0	0	0	0	0	275400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	275400	0
22	15	7	0	0	0	0	0	0	0	2205000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	8	12	0	0	0	0	0	0	0	0	0	0	0	0	281700	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	11	9	0	0	0	0	0	0	0	0	0	281700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	6	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	331200	0	0	0	0	0	0	0	0	0	0	0	0
20	3	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	345600	0	0	0	0	0	0	0	0	0
20	4	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	351000	0	0	0	0	0	0	0	0	0	0
20	7	13	0	0	0	0	0	0	0	0	0	0	0	0	0	405000	0	0	0	0	0	0	0	0	0	0	0	0	0
15	8	7	0	0	0	0	0	0	0	117000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117000	0	0	0	0
12	9	3	0	0	0	121500	0	0	0	0	0	0	0	0	0	0	0	121500	0	0	0	0	0	0	0	0	0	0	0
12	9	1	0	90000	0	0	0	0	0	0	0	0	0	0	0	90000	0	0	0	0	0	0	0	0	0	0	0	0	0
12	10	2	0	0	79200	0	0	0	0	0	0	0	0	0	0	0	79200	0	0	0	0	0	0	0	0	0	0	0	0
15	12	3	0	0	0	81000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81000	0	0	0	0	0	0	0	0
30	28	2	0	0	1800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	16	4	0	0	0	0	31500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31500	0	0
20	10	10	0	0	0	0	0	0	0	0	0	0	18000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	6	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68400	0	0	0	0	0	0	0	0	0	0	0	0
20	12	8	0	0	0	0	0	0	0	0	88200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	8	12	0	0	0	0	0	0	0	0	0	0	0	0	18000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	10	10	0	0	0	0	0	0	0	0	0	0	9000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	8	12	0	0	0	0	0	0	0	0	0	0	0	0	27000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	9	11	0	0	0	0	0	0	0	0	0	0	0	234000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total	0	90000	81000	202500	31500	275400	0	2322000	577800	323667,9	27000	234000	326700	495000	478800	121500	351000	345600	279000	0	0	0	117000	0	73467,9	275400	0

Inventory from model 3 (This is the same as in model 2)

Inventory: Land

Total						R 25 930 100,00

Inventory: Fixed improvements

Item	Number	Age	Cost price	Expected lifetime (year)	Residual value%	Yearly		Yearly	2017 Current
						Per item	Total		
Not farming improvements									
House	1	30	1 000 000	30	0,15	-		5 000	1 000 000
Workers housing									
Manager	2	10	600 000	30	0,15	-		10 000	1 200 000
Workers housing	13	15	45 000	30	0,15	-		10 000	573 750
Farm buildings and installations									
Storage	2	4	750 000	30	0,15	25 000	50 000	5 000	550 000
Poison storage	1	5	40 000	30	0,15	1 333	1 333	5 000	33 333
Pumphouse	5	10	75 000	30	0,15	2 500	12 500	10 000	62 500
Other fixed improvements									
Pump and filter stations	5	8	12000	20	0,1	600	24 000	3 000	36 000
Permanent irrigation			1 464 000						1 464 000
Dams			3 026 000						5 000 000
Totals							87 833	48 000	9 919 583

Inventory: Vehicles, Equipment and Machinery 2017

Item	Number	Size/kilowatt	Age	Purchase date	Purchase price		Expected lifetime	Yearly usage	Depreciation yearly		Repair and maintenance			Current value		Residual value
					per item	total			Per item	Total	Rate	Per item	Total	Per item	Total	
Vehicles																
Bicycles							Km	Km			R/km					
2 wheel	2	250cc	6	2011	46 631	93 262	150000	10000	2 798	5 596	0,2	2 000,00	2 000	29 844	29 844	4 663
Bakkies											R/km					
LAA 2.4 Diesel	2		7	2010	220 000	440 000	250000	10000	7 920	15 840	0,6	6 000	6 000	164 560	164 560	22 000
Trucks											R/km					
8t Dropsides	1		12	2005	544 000	544 000	400000	12000	24 480	24 480	2,6	31 200,00	31 200	250 240	250 240	54 400
4ton	2		15	2002	306 000	612 000	400000	12000	27 540	55 080	3,1	37 200,00	37 200	198 900	198 900	30 600
Parsmaschine	1		15	2002	2 450 000	2 450 000	400000	12000	100 227	100 227	5,1	37 200,00	37 200	946 591	946 591	245 000
Other motorized equipment																
Tractors							Hour	Hour			R/Hour					
Border & Vineyard	2	42kW	8	2009	313 000	626 000	15000	1000	14 085	28 170	0,3	300	300	200 320	200 320	31 300
Border & Vineyard	2	42kW	11	2006	313 000	626 000	15000	1000	14 085	28 170				158 065	158 065	31 300
Border & Vineyard	1	51kW	6	2011	368 000	368 000	15000	1000	16 560	16 560				268 640	268 640	36 800
Border & Vineyard	1	55kW	3	2014	384 000	384 000	2000	1000	17 280	17 280				332 160	332 160	38 400
Border (harvest tractors) second handed age	1	60kW	4	2013	390 000	390 000	15000	1000	17 550	17 550	0,1	100	100	319 800	390 000	39 000
Border	2	65kW	7	2010	450 000	900 000	20000	1000	20 250	40 500	0,1	100	100	308 250	308 250	45 000
Forklifter											R/Hour					
Forklifter	1		8	2009	130 000	130 000	20000	1080	7 800	7 800	2,5	2 700	2 700	67 600	67 600	13 000
Total vehicles and machinery														**3 244 970**	3 244 970	
Implements:																
Spraypumps							Year	Year			N/A					
trailor type (1) 1500l	2		9	2008	135 000	270 000	10	1	10 125	20 250				43 875	43 875	13 500
trailor type (2) 1500l	2		9	2008	100 000	200 000	10	1	7 500	15 000				32 500	32 500	10 000
Turbmatic 1500l	1		10	2007	88 000	88 000	10	1	6 600	6 600				22 000	22 000	8 800
Three point 400l (weed control)	1		12	2005	90 000	90 000	10	1	5 400	5 400				25 200	25 200	9 000
Tillage implements:											N/A					
Scraper Andrag	1		32	1985	2 000	2 000	30	1	60	60				320	320	200
Disc	1		16	2001	35 000	35 000	20	1	1 575	1 575				9 800	9 800	3 500
Ghrop	1		10	2007	20 000	20 000	20	1	900	900				11 000	11 000	2 000
Other																
Tipwa (Parsbak) 3ton single axis	1		6	2011	76 000	76 000	20	1	3 420	3 420				55 480	55 480	7 600
Usual wa dubble axis 6t dropsides	1		12	2005	98 000	98 000	20	1	4 410	4 410				45 080	45 080	9 800
Bin wagons	14		8	2009	18 000	252 000	20	1	540	7 560			0	13 680	13 680	1 800
Rovic Chalk spreader	1		8	2009	20 000	20 000	20	1	900	900				12 800	12 800	2 000
Bossieslaner	1		10	2007	10 000	10 000	20	1	450	450				5 500	5 500	1 000
Electric mobile water pumps	1		8	2009	30 000	30 000	20	1	1 350	1 350				19 200	19 200	3 000
Content of workshops and tools	1		9	2008	260 000	260 000	20	1	11 700	11 700				154 700	154 700	26 000
Border tools (stairs, picking bags, pruning scissors)	1		4	2013	32 000	32 000	20	1	1 440	1 440				26 240	26 240	3 200
Bins	6		0	2017	30 000	180 000	20	1	1 350	8 100				30 000	30 000	3 000
Total implements:										215 618			81 600,00	477 375	477 375	692 863
Total movable assets:															3 722 345	

Notes for the inventory:
1. Land and fixed improvements use relative conservative values
2. Depreciation is based on straight-line method
3. Replacement value is replacement price minus scrap value
4. All prices and costs is based on the "Guide to Machinery Costs 2010/2011"

Replacement schedule

Lifetime (year)	Age	Remaining Lifetime	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
15	6	9	0	0	0	0	0	0	0	0	0	41967,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41967,9	0	0
25	7	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	198000	0	0	0	0	0	0	0	0
20	12	8	0	0	0	0	0	0	0	0	489600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	15	5	0	0	0	0	0	275400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	275400	0
22	15	7	0	0	0	0	0	0	0	2205000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	8	12	0	0	0	0	0	0	0	0	0	0	0	0	281700	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	11	9	0	0	0	0	0	0	0	0	0	281700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	6	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	331200	0	0	0	0	0	0	0	0	0	0	0	0
20	3	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	345600	0	0	0	0	0	0	0	0	0
20	4	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	351000	0	0	0	0	0	0	0	0	0	0
20	7	13	0	0	0	0	0	0	0	0	0	0	0	0	0	405000	0	0	0	0	0	0	0	0	0	0	0	0	0
15	8	7	0	0	0	0	0	0	0	117000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117000	0	0	0	0
12	9	3	0	0	0	121500	0	0	0	0	0	0	0	0	0	0	0	121500	0	0	0	0	0	0	0	0	0	0	0
12	9	1	0	90000	0	0	0	0	0	0	0	0	0	0	0	90000	0	0	0	0	0	0	0	0	0	0	0	0	0
12	10	2	0	0	79200	0	0	0	0	0	0	0	0	0	0	0	79200	0	0	0	0	0	0	0	0	0	0	0	0
15	12	3	0	0	0	81000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81000	0	0	0	0	0	0	0	0
30	28	2	0	0	1800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	16	4	0	0	0	0	31500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31500	0	0
20	10	10	0	0	0	0	0	0	0	0	0	0	18000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	6	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68400	0	0	0	0	0	0	0	0	0	0	0	0
20	12	8	0	0	0	0	0	0	0	0	88200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	8	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16200	0	0	0	0
20	8	12	0	0	0	0	0	0	0	0	0	0	0	0	18000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	10	10	0	0	0	0	0	0	0	0	0	0	9000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	8	12	0	0	0	0	0	0	0	0	0	0	0	0	27000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	9	11	0	0	0	0	0	0	0	0	0	0	0	234000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	4	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28800	0	0	0	0	0	0	0	0	0	0
20	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total	0	90000	81000	202500	31500	275400	0	2322000	577800	323667,9	27000	234000	326700	495000	478800	121500	379800	345600	279000	0	0	0	133200	0	73467,9	275400	0

Annexures D: Example of a gross margin calculation in the enterprise budget

Enterprise budget of Colombar (wine grape cultivar) from model 3

Colombar

						Equal to 5 years																			
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Income																									
Expected returns (%)	0%	0%	30%	70%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Gross production value	0	0	21557	50299	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855
Direct Allocatable costs																									
Establishment costs:	166108,95	3381,76	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	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Soil preparation	30750,00	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	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Training system	69302,00	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	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Plant material	42271,95	3382	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	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Irrigation system	23785,00	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	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Chemical adjustments	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	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Before-harvest cost	4037,00	4037,00	6832,10	10558,90	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00	13354,00
Fertilizer	0,00	0,00	692,40	1615,60	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00	2308,00
Irrigation	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00	4037,00
Cover crops	0,00	0,00	77,40	180,60	258,00	258,00	258,00	258,00	258,00	258,00	258,00	258,00	258,00	258,00	258,00	258,00	258,00	258,00	258,00	258,00	258,00	258,00	258,00	258,00	258,00
Insect control	0,00	0,00	812,70	1896,30	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00	2709,00
Fungi control	0,00	0,00	29,70	69,30	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00	99,00
Weed control	0	0	413,4	964,6	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378	1378
Canopy management	0	0	769,5	1795,5	2565	2565	2565	2565	2565	2565	2565	2565	2565	2565	2565	2565	2565	2565	2565	2565	2565	2565	2565	2565	2565
Harvest cost	0,00	0,00	810,00	1890,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00
Packaging cost	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	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Coolroom cost	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	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Labour	0,00	0,00	810,00	1890,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00
Other direct allocatable cost	8507,30	370,94	341,61	527,95	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70
Diverse and unforseen cost	8507,30	370,94	341,61	527,95	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70	667,70
Total	178653,25	7789,69	7983,71	12976,85	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70	16721,70
Gross margin	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Gross income	0	0	21557	50299	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855	71855
Direct allocatable cost	178653	7790	7984	12977	16722	16722	16722	16722	16722	16722	16722	16722	16722	16722	16722	16722	16722	16722	16722	16722	16722	16722	16722	16722	16722
Gross margin	178653	7790	13573	37322	55133	55133	55133	55133	55133	55133	55133	55133	55133	55133	55133	55133	55133	55133	55133	55133	55133	55133	55133	55133	55133

Enterprise budget of Navels (Cambria) (citrus cultivar) from model 2

Navels (Cambria)

						Equal to year 5							
Year	1	2	3	4	5	6	7	8	9	10	11	12	13
Income													
Expected returns (%)	0%	0%	12%	31%	71%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Gross production value	**0,00**	**0,00**	**25948,80**	**67034,40**	**153530,40**	**216240,00**	**216240,00**	**216240,00**	**216240,00**	**216240,00**	**216240,00**	**216240,00**	**216240,00**
Direct allocatable cost													
Establishment costs	**182524,50**	**4189,04**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**
Soil preparation	66202,50	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Drainage	16888,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Training system	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
Plant material	52363,00	4189	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Irrigation system	33000,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Chemical improvements	6807,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Other	7264,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Before-harvest cost	**4350,00**	**3800,00**	**7921,67**	**14447,65**	**28186,56**	**38147,27**	**38697,27**	**38147,27**	**38147,27**	**38147,27**	**38147,27**	**38147,27**	**38147,27**
Fertiliser	0,00	0,00	597,78	1544,27	3536,87	4981,50	4981,50	4981,50	4981,50	4981,50	4981,50	4981,50	4981,50
Irrigation	3800,00	3800,00	3800,00	3800,00	3800,00	3800,00	3800,00	3800,00	3800,00	3800,00	3800,00	3800,00	3800,00
Insecticide	0,00	0,00	644,71	1665,51	3814,55	5372,60	5372,60	5372,60	5372,60	5372,60	5372,60	5372,60	5372,60
Fungicide	0,00	0,00	306,02	790,55	1810,62	2550,17	2550,17	2550,17	2550,17	2550,17	2550,17	2550,17	2550,17
Herbicide	0	0	57	147,25	337,25	475	475	475	475	475	475	475	475
Labour	0	0	900	2325	5325	7500	7500	7500	7500	7500	7500	7500	7500
Middle for breaks	0	0	272,16	703,08	1610,28	2268	2268	2268	2268	2268	2268	2268	2268
Fuel	0	0	912	2356	5396	7600	7600	7600	7600	7600	7600	7600	7600
Repair and maintenance	0	0	432	1116	2556	3600	3600	3600	3600	3600	3600	3600	3600
Consultants	550,00	0,00	0,00	0,00	0,00	0,00	550,00	0,00	0,00	0,00	0,00	0,00	0,00
Harvest cost	**0,00**	**0,00**	**324,00**	**837,00**	**1917,00**	**2700,00**	**2700,00**	**2700,00**	**2700,00**	**2700,00**	**2700,00**	**2700,00**	**2700,00**
Package costs	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
Coolroom costs	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
Labour	0,00	0,00	324,00	837,00	1917,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00
Other direct allocatable costs	**9343,73**	**399,45**	**396,08**	**722,38**	**1409,33**	**1907,36**	**1934,86**	**1907,36**	**1907,36**	**1907,36**	**1907,36**	**1907,36**	**1907,36**
Diverse and unforseen costs	9343,73	399,45	396,08	722,38	1409,33	1907,36	1934,86	1907,36	1907,36	1907,36	1907,36	1907,36	1907,36
Total	**196218,23**	**8388,49**	**8641,76**	**16007,03**	**31512,89**	**42754,63**	**43332,13**	**42754,63**	**42754,63**	**42754,63**	**42754,63**	**42754,63**	**42754,63**
Gross margin	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Gross income	0,00	0,00	25948,80	67034,40	153530,40	216240,00	216240,00	216240,00	216240,00	216240,00	216240,00	216240,00	216240,00
Direct allocatable costs	196218,23	8388,49	8641,76	16007,03	31512,89	42754,63	43332,13	42754,63	42754,63	42754,63	42754,63	42754,63	42754,63
Gross income	**196218,23**	**8388,49**	**17307,04**	**51027,37**	**122017,51**	**173485,37**	**172907,87**	**173485,37**	**173485,37**	**173485,37**	**173485,37**	**173485,37**	**173485,37**

Year	14	15	16	17	18	19	20	21	22	23	24	25
Income												
Expected returns (%)	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Gross production value	**216240,00**	**216240,00**	**216240,00**	**216240,00**	**216240,00**	**216240,00**	**216240,00**	**216240,00**	**216240,00**	**216240,00**	**216240,00**	**216240,00**
Direct allocatable cost												
Establishment costs	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**
Soil preparation	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Drainage	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Training system	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Plant material	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Irrigation system	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Chemical improvements	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	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Before-harvest cost	**38147,27**	**38147,27**	**38147,27**	**38147,27**	**38147,27**	**38147,27**	**38147,27**	**38147,27**	**38147,27**	**38147,27**	**38147,27**	**38147,27**
Fertiliser	4981,50	4981,50	4981,50	4981,50	4981,50	4981,50	4981,50	4981,50	4981,50	4981,50	4981,50	4981,50
Irrigation	3800,00	3800,00	3800,00	3800,00	3800,00	3800,00	3800,00	3800,00	3800,00	3800,00	3800,00	3800,00
Insecticide	5372,60	5372,60	5372,60	5372,60	5372,60	5372,60	5372,60	5372,60	5372,60	5372,60	5372,60	5372,60
Fungicide	2550,17	2550,17	2550,17	2550,17	2550,17	2550,17	2550,17	2550,17	2550,17	2550,17	2550,17	2550,17
Herbicide	475	475	475	475	475	475	475	475	475	475	475	475
Labour	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500
Middle for breaks	2268	2268	2268	2268	2268	2268	2268	2268	2268	2268	2268	2268
Fuel	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600	7600
Repair and maintenance	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600
Consultants	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Harvest cost	**2700,00**	**2700,00**	**2700,00**	**2700,00**	**2700,00**	**2700,00**	**2700,00**	**2700,00**	**2700,00**	**2700,00**	**2700,00**	**2700,00**
Package costs	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Coolroom costs	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Labour	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00	2700,00
Other direct allocatable costs	**1907,36**	**1907,36**	**1907,36**	**1907,36**	**1907,36**	**1907,36**	**1907,36**	**1907,36**	**1907,36**	**1907,36**	**1907,36**	**1907,36**
Diverse and unforseen costs	1907,36	1907,36	1907,36	1907,36	1907,36	1907,36	1907,36	1907,36	1907,36	1907,36	1907,36	1907,36
Total	**42754,63**	**42754,63**	**42754,63**	**42754,63**	**42754,63**	**42754,63**	**42754,63**	**42754,63**	**42754,63**	**42754,63**	**42754,63**	**42754,63**
Gross margin	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Gross income	216240,00	216240,00	216240,00	216240,00	216240,00	216240,00	216240,00	216240,00	216240,00	216240,00	216240,00	216240,00
Direct allocatable costs	42754,63	42754,63	42754,63	42754,63	42754,63	42754,63	42754,63	42754,63	42754,63	42754,63	42754,63	42754,63
Gross income	**173485,37**	**173485,37**	**173485,37**	**173485,37**	**173485,37**	**173485,37**	**173485,37**	**173485,37**	**173485,37**	**173485,37**	**173485,37**	**173485,37**

Annexure E: Capital budget for all three models

Capital budget from model 1

Capital budget

Year		1	2	3	4	5	6	7	8	9	10	11	12	13
Gross margin: Wine grapes														
Chenin Blanc		R 376 724,15	R 402 412,24	R 456 492,44	R 495 700,58	R 495 700,58	R 495 700,58	R 495 700,58	R 495 700,58	R 495 700,58	-R 118 856,77	R 351 054,85	R 376 724,15	R 402 412,24
Colombar		R 612 086,62	R 693 307,72	R 754 223,54	R 754 223,54	R 754 223,54	-R 45 326,45	R 539 026,91	R 612 086,62	R 693 307,72	R 754 223,54	R 754 223,54	R 754 223,54	-R 45 326,45
Sauvignon Blanc		-R 249 556,80	R 204 940,25	R 240 334,18	R 274 932,43	R 300 881,11	R 300 881,11	R 300 881,11	R 300 881,11	R 300 881,11	R 300 881,11	-R 249 556,80	R 204 940,25	R 240 334,18
Chardonnay		R 307 384,13	R 307 384,13	R 307 384,13	R 307 384,13	R 307 384,13	R 307 384,13	R 307 384,13	R 307 384,13	R 307 384,13	R 307 384,13	R 307 384,13	R 307 384,13	R 307 384,13
Cabernet sauvignon		R 192 954,40	R 265 211,09	R 319 403,60	R 319 403,60	R 319 403,60	R 319 403,60	R 319 403,60	R 319 403,60	R 319 403,60	R 319 403,60	R 319 403,60	R 319 403,60	R 319 403,60
Pinotage		R 291 080,99	R 291 080,99	R 291 080,99	R 291 080,99	R 291 080,99	R 291 080,99	R 291 080,99	R 291 080,99	R 291 080,99	R 291 080,99	R 291 080,99	-R 601 230,08	R 112 979,57
Shiraz		R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10
Merlot		R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10
Total farm gross margin (a)		**R 2 704 227,68**	**R 3 337 890,61**	**R 3 542 473,08**	**R 3 616 279,47**	**R 3 642 228,15**	**R 2 842 678,16**	**R 3 427 031,51**	**R 3 500 091,22**	**R 3 581 312,33**	**R 3 027 670,80**	**R 2 947 144,51**	**R 2 534 999,79**	**R 2 510 741,48**
Fixed cost														
Labour		R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00
Water rights		R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00
Bankcosts		R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00
Electricity		R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00
Auditors fees		R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00
Communication		R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00
Fixed improvements		R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00
Fuel		R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00
Repair and maintenance		R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00
Manager		R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00
Licence		R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00
Insurance		R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00
Other		R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56
Total fixed costs (b)		**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**
Factor cost														
Hired manager		R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Hired land														
Total factor costs ©		**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**
Capital items														
Land		**R 25 930 100,00**												
Fixed improvements														
House		R 1 000 000,00												
Workers house														
Manager		R 1 200 000,00												
Workers house		R 573 750,00												
Farm buildings and installations														
Store		R 550 000,00												
Poison store		R 33 333,33												
Pumphouse		R 62 500,00												
Other fixed improvements		R 36 000,00								R 60 000,00				
Total fixed improvements		**R 3 455 583,33**												
Removable assets														
Vehicle and machinery														
2 wheels		R 29 843,84	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 41 967,90	R 0,00	R 0,00
Bakkies														
LAA 2.4 Diesel		R 164 560,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Trucks														
8t Dropsides		R 250 240,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 489 600,00	R 0,00	R 0,00	R 0,00
4ton		R 198 900,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 275 400,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Other selfdriven equipment														
Tractors														
Border & Vineyard		R 200 320,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border & Vineyard		R 158 065,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 281 700,00	R 0,00	R 0,00
Border & Vineyard		R 268 640,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border & Vineyard		R 332 160,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Secondhand harvest tractor for the border		R 319 800,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border		R 308 250,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
0														
Forklifter														
Forklifter		R 67 600,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 117 000,00	R 0,00	R 0,00	R 0,00	R 0,00
Total vehicle and machinery		**R 2 298 378,84**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 275 400,00**	**R 0,00**	**R 117 000,00**	**R 489 600,00**	**R 323 667,90**	**R 0,00**	**R 0,00**
Implements:														
Spray pumps														
Dragtype (1) 1500l		R 43 875,00	R 0,00	R 0,00	R 0,00	R 121 500,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Dragtype (2) 1500l		R 32 500,00	R 0,00	R 90 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Turbmatic 1500l		R 22 000,00	R 0,00	R 0,00	R 79 200,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Three point 400l (Herbicide)		R 25 200,00	R 0,00	R 0,00	R 0,00	R 81 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Tillage implement														
Scratcher		R 320,00	R 0,00	R 0,00	R 1 800,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Disc		R 9 800,00	R 0,00	R 0,00	R 0,00	R 0,00	R 31 500,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Ghrop		R 11 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 18 000,00	R 0,00
Other														
Tipwa (Parsbucket) 3ton single axis		R 55 480,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Usual double trailer axis 6t dropsides		R 45 080,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 88 200,00	R 0,00	R 0,00	R 0,00
Rovic Chalk spreader		R 12 800,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Bush implement		R 5 500,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 9 000,00	R 0,00
Electrical mobile water pump		R 19 200,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Content of workshop and tools		R 154 700,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 234 000,00
Total implements:		**R 437 455,00**	**R 0,00**	**R 90 000,00**	**R 81 000,00**	**R 202 500,00**	**R 31 500,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 88 200,00**	**R 0,00**	**R 27 000,00**	**R 234 000,00**
Total movable assets:		**R 2 735 833,84**	**R 0,00**	**R 90 000,00**	**R 81 000,00**	**R 202 500,00**	**R 31 500,00**	**R 275 400,00**	**R 0,00**	**R 117 000,00**	**R 577 800,00**	**R 323 667,90**	**R 27 000,00**	**R 234 000,00**
Total capital (d)		**R 32 121 517,17**	**R 0,00**	**R 90 000,00**	**R 81 000,00**	**R 202 500,00**	**R 31 500,00**	**R 275 400,00**	**R 0,00**	**R 117 000,00**	**R 577 800,00**	**R 323 667,90**	**R 27 000,00**	**R 234 000,00**
Annual net flow (a-b-c-d)		**-R 31 049 324,06**	**R 1 705 856,05**	**R 1 820 438,52**	**R 1 903 244,91**	**R 1 807 693,59**	**R 1 179 143,60**	**R 1 519 596,95**	**R 1 868 056,66**	**R 1 832 277,77**	**R 817 836,24**	**R 991 442,05**	**R 875 965,23**	**R 644 706,92**
IRR		2,37%												
NPV	2,40%	-161 017												

Year	14	15	16	17	18	19	20	21	22	23	24	25
Gross margin: Wine grapes												
Chenin Blanc	-R 158 064,91	R 351 054,85	R 376 724,15	R 402 412,24	R 456 492,44	R 495 700,58	-R 118 856,77	R 351 054,85	R 376 724,15	R 402 412,24	-R 158 064,91	R 351 054,85
Colombar	R 539 026,91	R 612 086,62	R 693 307,72	-R 45 326,45	R 539 026,91	R 612 086,62	R 693 307,72	R 754 223,54	R 754 223,54	R 754 223,54	-R 45 326,45	R 539 026,91
Sauvignon Blanc	R 274 932,43	R 300 881,11	-R 249 556,80	R 204 940,25	R 240 334,18	R 274 932,43	R 300 881,11	-R 249 556,80	R 204 940,25	R 240 334,18	R 274 932,43	R 300 881,11
Chardonnay	R 307 384,13	R 307 384,13	R 307 384,13	-R 2 172 423,49	-R 94 722,68	R 56 134,15	R 199 705,56	R 307 384,13	R 307 384,13	R 307 384,13	R 307 384,13	R 307 384,13
Cabernet sauvignon	-R 722 845,24	R 121 220,71	R 192 954,40	R 265 211,09	R 319 403,60	R 319 403,60	R 319 403,60	R 319 403,60	R 319 403,60	R 319 403,60	-R 722 845,24	R 121 220,71
Pinotage	R 176 799,77	R 242 103,32	R 291 080,99	R 291 080,99	R 291 080,99	R 291 080,99	-R 601 230,08	R 112 979,57	R 176 799,77	R 242 103,32	R 291 080,99	R 291 080,99
Shiraz	R 585 043,10	-R 3 037 105,21	-R 132 424,79	R 125 070,62	R 387 912,04	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10
Merlot	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	-R 3 037 105,21	-R 132 424,79	R 126 111,02	R 390 339,64	R 588 511,10	R 588 511,10
Total farm gross margin (a)	**R 1 590 787,27**	**-R 513 863,37**	**R 2 067 980,88**	**-R 340 523,66**	**R 2 728 038,57**	**R 3 222 892,56**	**-R 1 658 850,96**	**R 2 048 107,20**	**R 2 850 629,56**	**R 3 241 243,75**	**R 1 120 715,14**	**R 3 084 202,89**
Fixed cost												
Labour	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00
Water rights	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00
Bankcosts	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00
Electricity	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00
Auditors fees	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00
Communication	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00
Fixed improvements	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00
Fuel	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00
Repair and maintenance	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00
Manager	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00
Licence	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00
Insurance	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00
Other	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56
Total fixed costs (b)	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**
Factor cost												
Hired manager	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Hired land												
Total factor costs ©	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**
Removable assets												
Vehicle and machinery												
2 wheels	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Bakkies												
LAA 2.4 Diesel	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 198 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Trucks												
8t Dropsides	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
4ton	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Other selfdriven equipment												
Tractors												
Border & Vineyard	R 281 700,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border & Vineyard	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border & Vineyard	R 0,00	R 0,00	R 331 200,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border & Vineyard	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 345 600,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Secondhand harvest tractor for the border	R 0,00	R 0,00	R 0,00	R 0,00	R 351 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border	R 0,00	R 405 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
0												
Forklifter												
Forklifter	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 117 000,00	R 0,00
Total vehicle and machinery	**R 281 700,00**	**R 405 000,00**	**R 331 200,00**	**R 0,00**	**R 351 000,00**	**R 345 600,00**	**R 198 000,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 117 000,00**	**R 0,00**
Implements:												
Spray pumps												
Dragtype (1) 1500l	R 0,00	R 0,00	R 0,00	R 121 500,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Dragtype (2) 1500l	R 0,00	R 90 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Turbmatic 1500l	R 0,00	R 0,00	R 79 200,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Three point 400l (Herbicide)	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 81 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Tillage implement												
Scratcher	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Disc	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Ghrop	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Other												
Tipwa (Parsbucket) 3ton single axis	R 0,00	R 0,00	R 68 400,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Usual double trailer axis 6t dropsides	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Rovic Chalk spreader	R 18 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Bush implement	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Electrical mobile water pump	R 27 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Content of workshop and tools	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Total implements:	**R 45 000,00**	**R 90 000,00**	**R 147 600,00**	**R 121 500,00**	**R 0,00**	**R 0,00**	**R 81 000,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**
Total movable assets:	**R 326 700,00**	**R 495 000,00**	**R 478 800,00**	**R 121 500,00**	**R 351 000,00**	**R 345 600,00**	**R 279 000,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 117 000,00**	**R 0,00**
Total capital (d)	**R 326 700,00**	**R 495 000,00**	**R 478 800,00**	**R 121 500,00**	**R 351 000,00**	**R 345 600,00**	**R 279 000,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 117 000,00**	**R 0,00**
Annual net flow (a-b-c-d)	**-R 367 947,29**	**-R 2 640 897,93**	**-R 42 853,68**	**-R 2 094 058,22**	**R 745 004,01**	**R 1 245 258,00**	**-R 3 569 885,52**	**R 416 072,64**	**R 1 218 595,00**	**R 1 609 209,19**	**-R 628 319,42**	**R 33 573 685,51**

Capital budget from model 2

Capital budget																									
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Gross Margin: Wine grapes																									
Chenin Blanc	R 321 702,60	R 343 638,87	R 389 820,51	R 423 302,20	R 423 302,20	R 423 302,20	R 423 302,20	R 423 302,20	R 423 302,20	R 317 476,65	R 317 476,65	R 317 476,65	R 317 476,65	-R 207 322,98	R 193 956,81	R 215 877,05	R 237 813,32	R 283 994,96	R 317 476,65	-R 207 322,98	R 193 956,81	R 215 877,05	R 237 813,32	-R 240 804,67	R 193 956,81
Colombar	R 522 689,76	R 592 048,30	R 644 067,21	R 644 067,21	R 644 067,21	-R 38 706,40	R 460 300,61	R 522 689,76	R 592 048,30	R 644 067,21	R 644 067,21	R 644 067,21	-R 38 706,40	R 460 300,61	R 522 689,76	R 592 048,30	-R 38 706,40	R 460 300,61	R 522 689,76	R 592 048,30	R 644 067,21	R 644 067,21	R 644 067,21	-R 38 706,40	R 460 300,61
Sauvignon Blanc	R 192 702,48	R 192 702,48	R 192 702,48	R 192 702,48	R 192 702,48	R 192 702,48	R 192 702,48	R 192 702,48	R 192 702,48	R 192 702,48	-R 277 342,53	R 110 774,03	R 140 998,58	R 170 543,66	R 192 702,48	-R 277 342,53	R 110 774,03	R 140 998,58	R 170 543,66	R 192 702,48	-R 277 342,53	R 110 774,03	R 140 998,58	R 170 543,66	R 192 702,48
Chardonnay	R 262 489,87	R 262 489,87	R 262 489,87	R 262 489,87	R 262 489,87	R 262 489,87	R 262 489,87	R 262 489,87	R 262 489,87	R 262 489,87	R 262 489,87	R 262 489,87	R 262 489,87	R 262 489,87	R 262 489,87	R 262 489,87	-R 1 855 135,32	-R 80 888,18	R 47 935,61	R 170 538,04	R 262 489,87	R 262 489,87	R 262 489,87	R 262 489,87	R 262 489,87
Cabernet sauvgignon	R 164 772,90	R 226 476,31	R 272 753,87	R 272 753,87	R 272 753,87	R 272 753,87	R 272 753,87	R 272 753,87	R 272 753,87	R 272 753,87	R 272 753,87	R 272 753,87	R 272 753,87	-R 617 271,79	R 103 516,11	R 164 772,90	R 226 476,31	R 272 753,87	R 272 753,87	R 272 753,87	R 272 753,87	R 272 753,87	R 272 753,87	-R 617 271,79	R 103 516,11
Pinotage	R 248 567,84	R 248 567,84	R 248 567,84	R 248 567,84	R 248 567,84	R 248 567,84	R 248 567,84	R 248 567,84	R 248 567,84	R 248 567,84	R 248 567,84	R 124 283,92	R 124 283,92	R 124 283,92	R 124 283,92	R 124 283,92	R 124 283,92	R 124 283,92	R 124 283,92	-R 637 702,77	-R 27 805,31	R 26 693,77	R 82 459,57	R 124 283,92	R 124 283,92
Shiraz	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	-R 3 037 105,21	-R 132 424,79	R 125 070,62	R 387 912,04	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10
Merlot	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	-R 3 037 105,21	-R 132 424,79	R 126 111,02	R 390 339,64	R 588 511,10	R 588 511,10
Gross margin: Citrus																									
Navels (Cambria)	-R 445 709,70	-R 19 054,46	R 39 312,95	R 115 908,66	R 277 162,78	R 394 072,02	R 392 760,23	R 394 072,02	R 394 072,02	R 394 072,02	R 394 072,02	-R 306 328,93	R 364 129,30	R 455 849,52	R 576 214,20	R 829 613,54	R 1 013 328,06	R 1 011 266,67	R 1 013 328,06	R 1 013 328,06	R 1 013 328,06	R 1 013 328,06	R 1 013 328,06	R 1 013 328,06	R 1 013 328,06
Mandirin (Nova)	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	-R 573 055,33	-R 24 498,59	R 91 657,69	R 255 232,62	R 599 600,89	R 849 267,88	R 847 581,29	R 849 267,88	R 849 267,88	R 849 267,88	R 849 267,88	R 849 267,88	R 849 267,88	R 849 267,88	R 849 267,88	R 849 267,88	R 849 267,88	R 849 267,88	R 849 267,88	R 849 267,88
Mandirin (Satsuma)	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	-R 445 709,70	-R 19 054,46	R 70 553,35	R 196 613,01	R 462 001,78	R 654 408,64	R 653 096,85	R 654 408,64	R 654 408,64	R 654 408,64	R 654 408,64	R 654 408,64	R 654 408,64	R 654 408,64	R 654 408,64	R 654 408,64
Total farm gross margin (a)	**R 2 440 769,94**	**R 3 020 423,41**	**R 3 223 268,93**	**R 3 333 346,33**	**R 3 494 600,45**	**R 2 355 680,75**	**R 3 401 932,70**	**R 3 581 789,92**	**R 3 814 723,39**	**R 3 659 575,33**	**R 3 865 852,55**	**R 3 517 205,45**	**R 3 662 860,88**	**R 3 133 696,67**	**R 1 030 935,56**	**R 3 870 194,07**	**R 2 036 092,15**	**R 4 692 810,09**	**R 5 146 242,24**	**R 447 959,41**	**R 4 037 742,79**	**R 4 760 814,48**	**R 5 132 969,73**	**R 3 351 093,37**	**R 5 027 808,57**
Fixed cost																									
Labour	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00
Water rights	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00
Bank costs	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00
Electricity	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00
Auditors fees	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00
Communication	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00
Maintain fixed improvements	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00
Fuel	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00
Repair & Maintenance	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00
Manager	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00
License	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00
Insurance	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00
Other	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56
Total fixed cost (b)	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**
Factor cost																									
Hired manager	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Hired land																									
Total factor cost (C)	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**
Capital items																									
Land	**R 25 930 100,00**																								
Fixed improvements																									
House	R 1 000 000,00																								
Workers housing																									
Manager	R 1 200 000,00																								
Workers housing	R 573 750,00																								
Farm buildings and installations																									
Storage	R 550 000,00																								
Poison storage	R 33 333,33																								
Pumphouse	R 62 500,00																								
Other fixed improvements	R 36 000,00								R 60 000,00																
Total fixed improvements	**R 3 455 583,33**																								
Movable assets																									
Vehicles and machinery																									
2 wheel	R 29 843,84	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 41 967,90	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Bakkies																									
LAA 2.4 Diesel	R 164 560,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 198 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Trucks																									
8t Dropsides	R 250 240,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 489 600,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
4ton	R 198 900,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 275 400,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Other motorized equipment																									
Tractors																									
Border & Vineyard	R 200 320,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 281 700,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border & Vineyard	R 158 065,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 281 700,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border & Vineyard	R 268 640,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 331 200,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border & Vineyard	R 332 160,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 345 600,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border (harvest tractors) second handed age	R 319 800,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 351 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border	R 308 250,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 405 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
0																									
Forklifter																									
Forklifter	R 67 600,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 117 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 117 000,00	R 0,00
Total vehicles and machinery	**R 2 298 378,84**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 275 400,00**	**R 0,00**	**R 117 000,00**	**R 489 600,00**	**R 323 667,90**	**R 0,00**	**R 0,00**	**R 281 700,00**	**R 405 000,00**	**R 331 200,00**	**R 0,00**	**R 351 000,00**	**R 345 600,00**	**R 198 000,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 117 000,00**	**R 0,00**
Implements:																									
Spraypumps																									
trailor type (1) 1500l	R 43 875,00	R 0,00	R 0,00	R 0,00	R 121 500,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 121 500,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
trailor type (2) 1500l	R 32 500,00	R 0,00	R 90 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 90 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Turbmatic 1500l	R 22 000,00	R 0,00	R 0,00	R 79 200,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 79 200,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Three point 400l (weed control)	R 25 200,00	R 0,00	R 0,00	R 0,00	R 81 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 81 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Tillage implements:																									
Scraper Andrag	R 320,00	R 0,00	R 0,00	R 1 800,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Disc	R 9 800,00	R 0,00	R 0,00	R 0,00	R 0,00	R 31 500,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Ghrop	R 11 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 18 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Other																									
Tipwa (Parsbak) 3ton single axis	R 55 480,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 68 400,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Usual wa dubble axis 6t dropsides	R 45 080,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 88 200,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Bin wagons	R 13 680,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 16 200,00	R 0,00
Rovic Chalk spreader	R 12 800,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 18 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Bossieslaner	R 5 500,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 9 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Electric mobile water pumps	R 19 200,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 27 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Content of workshops and tools	R 154 700,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 234 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border tools (stairs, picking bags, pruning scissors)	R 26 240,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 28 800,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Bins trailers for citrus	R 30 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Total implements:	**R 507 375,00**	**R 0,00**	**R 90 000,00**	**R 81 000,00**	**R 202 500,00**	**R 31 500,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 88 200,00**	**R 0,00**	**R 27 000,00**	**R 234 000,00**	**R 45 000,00**	**R 90 000,00**	**R 147 600,00**	**R 121 500,00**	**R 28 800,00**	**R 0,00**	**R 81 000,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 16 200,00**	**R 0,00**
Total movable assets:	**R 2 805 753,84**	**R 0,00**	**R 90 000,00**	**R 81 000,00**	**R 202 500,00**	**R 31 500,00**	**R 275 400,00**	**R 0,00**	**R 117 000,00**	**R 577 800,00**	**R 323 667,90**	**R 27 000,00**	**R 234 000,00**	**R 326 700,00**	**R 495 000,00**	**R 478 800,00**	**R 121 500,00**	**R 379 800,00**	**R 345 600,00**	**R 279 000,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 133 200,00**	**R 0,00**
Total Capital (d)	**R 32 191 437,17**	**R 0,00**	**R 90 000,00**	**R 81 000,00**	**R 202 500,00**	**R 31 500,00**	**R 275 400,00**	**R 0,00**	**R 117 000,00**	**R 577 800,00**	**R 323 667,90**	**R 27 000,00**	**R 234 000,00**	**R 326 700,00**	**R 495 000,00**	**R 478 800,00**	**R 121 500,00**	**R 379 800,00**	**R 345 600,00**	**R 279 000,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 133 200,00**	**R 0,00**
Net yearly flow (a-b-c-d)	**-R 31 382 701,79**	**R 1 388 388,85**	**R 1 501 234,37**	**R 1 620 311,77**	**R 1 660 065,89**	**R 692 146,19**	**R 1 494 498,14**	**R 1 949 755,36**	**R 2 065 688,83**	**R 1 449 740,77**	**R 1 910 150,09**	**R 1 858 170,89**	**R 1 796 826,32**	**R 1 174 962,11**	**-R 1 096 099,00**	**R 1 759 359,51**	**R 282 557,59**	**R 2 680 975,53**	**R 3 168 607,68**	**-R 1 463 075,15**	**R 2 405 708,23**	**R 3 128 779,92**	**R 3 500 935,17**	**R 1 585 858,81**	**R 35 587 211,18**

IRR		**5,10%**
NPV	**2,40%**	**15 744 723**

Capital budget from model 3

Capital budget																										
Year		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Gross Margin: Wine grapes																										
Chenin Blanc		R 320 215,53	R 342 050,41	R 388 018,57	R 421 345,49	R 421 345,49	R 421 345,49	R 421 345,49	R 421 345,49	R 421 345,49	-R 101 028,26	R 298 396,62	R 320 215,53	R 342 050,41	-R 134 355,18	R 298 396,62	R 320 215,53	R 342 050,41	R 388 018,57	R 421 345,49	-R 101 028,26	R 298 396,62	R 320 215,53	R 342 050,41	-R 134 355,18	R 298 396,62
Colombar		R 520 273,62	R 589 311,56	R 641 090,01	R 641 090,01	R 641 090,01	-R 38 527,48	R 458 172,87	R 520 273,62	R 589 311,56	R 641 090,01	R 641 090,01	R 641 090,01	-R 38 527,48	R 458 172,87	R 520 273,62	R 589 311,56	-R 38 527,48	R 458 172,87	R 520 273,62	R 589 311,56	R 641 090,01	R 641 090,01	R 641 090,01	-R 38 527,48	R 458 172,87
Sauvignon Blanc		-R 212 123,28	R 174 199,21	R 204 284,05	R 233 692,56	R 255 748,95	R 255 748,95	R 255 748,95	R 255 748,95	R 255 748,95	R 255 748,95	-R 212 123,28	R 174 199,21	R 204 284,05	R 233 692,56	R 255 748,95	-R 212 123,28	R 174 199,21	R 204 284,05	R 233 692,56	R 255 748,95	-R 212 123,28	R 174 199,21	R 204 284,05	R 233 692,56	R 255 748,95
Chardonnay		R 261 276,51	R 261 276,51	R 261 276,51	R 261 276,51	R 261 276,51	R 261 276,51	R 261 276,51	R 261 276,51	R 261 276,51	R 261 276,51	R 261 276,51	R 261 276,51	R 261 276,51	R 261 276,51	R 261 276,51	R 261 276,51	-R 1 846 559,97	-R 80 514,28	R 47 714,03	R 169 749,73	R 261 276,51	R 261 276,51	R 261 276,51	R 261 276,51	R 261 276,51
Cabernet sauvignon		R 164 011,24	R 225 429,42	R 271 493,06	R 271 493,06	R 271 493,06	R 271 493,06	R 271 493,06	R 271 493,06	R 271 493,06	R 271 493,06	R 271 493,06	R 271 493,06	R 271 493,06	-R 614 418,45	R 103 037,61	R 164 011,24	R 225 429,42	R 271 493,06	R 271 493,06	R 271 493,06	R 271 493,06	R 271 493,06	R 271 493,06	-R 614 418,45	R 103 037,61
Pinotage		R 247 418,84	R 247 418,84	R 247 418,84	R 247 418,84	R 247 418,84	R 247 418,84	R 247 418,84	R 247 418,84	R 247 418,84	R 247 418,84	R 247 418,84	-R 511 045,57	R 96 032,64	R 150 279,80	R 205 787,82	R 247 418,84	R 247 418,84	R 247 418,84	R 247 418,84	-R 511 045,57	R 96 032,64	R 150 279,80	R 205 787,82	R 247 418,84	R 247 418,84
Shiraz		R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	-R 3 037 105,21	-R 132 424,79	R 125 070,62	R 387 912,04	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10	R 585 043,10
Merlot		R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	R 588 511,10	-R 3 037 105,21	-R 132 424,79	R 126 111,02	R 390 339,64	R 588 511,10	R 588 511,10
Gross margin: Citrus																										
Navels (Cambria)		R 173 245,42	R 605 253,81	R 664 353,54	R 741 910,28	R 905 187,62	R 1 023 563,69	R 1 023 563,69	R 1 023 563,69	R 1 023 563,69	R 1 023 563,69	R 1 023 563,69	R 1 023 563,69	R 1 023 563,69	R 1 023 563,69	R 1 023 563,69	R 1 023 563,69	R 1 023 563,69	R 1 023 563,69	R 1 023 563,69	-R 307 369,25	R 368 817,78	R 461 321,72	R 582 714,87	R 838 279,41	R 1 023 563,69
Mandirin (Nova)		R 90 574,93	R 252 217,54	R 592 517,77	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	R 839 235,44	-R 566 285,80	-R 24 209,19
Mandirin (Satsuma)		R 72 401,43	R 201 763,12	R 474 103,52	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	R 671 550,31	-R 457 384,68	-R 19 553,57
Total farm gross margin (a)		**R 2 810 848,44**	**R 4 072 474,62**	**R 4 918 110,08**	**R 5 502 566,71**	**R 5 687 900,43**	**R 5 126 659,01**	**R 5 623 359,36**	**R 5 685 460,12**	**R 5 754 498,05**	**R 5 283 902,76**	**R 5 215 455,41**	**R 4 865 132,40**	**R 4 844 512,83**	**R 4 062 551,76**	**R 1 730 276,47**	**R 4 360 546,14**	**R 2 351 941,60**	**R 4 999 645,70**	**R 5 449 841,25**	**-R 574 416,13**	**R 3 688 387,40**	**R 4 501 815,71**	**R 4 994 865,22**	**R 943 249,92**	**R 3 777 406,52**
Fixed cost																										
Labour		R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00	R 445 104,00
Water rights		R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00	R 2 160,00
Bank costs		R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00	R 24 000,00
Electricity		R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00	R 276 000,00
Auditors fees		R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00	R 14 400,00
Communication		R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00	R 36 000,00
Maintain fixed improvements		R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00	R 48 000,00
Fuel		R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00	R 96 000,00
Repair & Maintenance		R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00	R 108 000,00
Manager		R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00	R 216 000,00
License		R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00	R 39 600,00
Insurance		R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00	R 264 000,00
Other		R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56	R 62 770,56
Total fixed cost (b)		**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**	**R 1 632 034,56**
Factor cost																										
Hired manager		R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Hired land																										
Total factor cost (C)		**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**
Capital items																										
Land		**R 25 930 100,00**																								
Fixed improvements																										
House		R 1 000 000,00																								
Workers housing																										
Manager		R 1 200 000,00																								
Workers housing		R 573 750,00																								
Farm buildings and installations																										
Storage		R 550 000,00																								
Poison storage		R 33 333,33																								
Pumphouse		R 62 500,00																								
Other fixed improvements		R 36 000,00								R 60 000,00																
Total fixed improvements		**R 3 455 583,33**																								
Movable assets																										
Vehicles and machinery																										
2 wheel		R 29 843,84	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 41 967,90	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Bakkies																										
LAA 2.4 Diesel		R 164 560,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 198 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Trucks																										
8t Dropsides		R 250 240,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 489 600,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
4ton		R 198 900,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 275 400,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Other motorized equipment																										
Tractors																										
Border & Vineyard		R 200 320,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 281 700,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border & Vineyard		R 158 065,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 281 700,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border & Vineyard		R 268 640,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 331 200,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border & Vineyard		R 332 160,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 345 600,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border (harvest tractors) second handed age		R 319 800,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 351 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border		R 308 250,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 405 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
0																										
Forklifter																										
Forklifter		R 67 600,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 117 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 117 000,00	R 0,00
Total vehicles and machinery		**R 2 298 378,84**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 275 400,00**	**R 0,00**	**R 117 000,00**	**R 489 600,00**	**R 323 667,90**	**R 0,00**	**R 0,00**	**R 281 700,00**	**R 405 000,00**	**R 331 200,00**	**R 0,00**	**R 351 000,00**	**R 345 600,00**	**R 198 000,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 117 000,00**	**R 0,00**
Implements:																										
Spraypumps																										
trailor type (1) 1500l		R 43 875,00	R 0,00	R 0,00	R 0,00	R 121 500,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 121 500,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
trailor type (2) 1500l		R 32 500,00	R 0,00	R 90 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 90 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Turbmatic 1500l		R 22 000,00	R 0,00	R 0,00	R 79 200,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 79 200,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Three point 400l (weed control)		R 25 200,00	R 0,00	R 0,00	R 0,00	R 81 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 81 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Tillage implements:																										
Scraper Andrag		R 320,00	R 0,00	R 0,00	R 1 800,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Disc		R 9 800,00	R 0,00	R 0,00	R 0,00	R 0,00	R 31 500,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Ghrop		R 11 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 18 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Other																										
Tipwa (Parsbak) 3ton single axis		R 55 480,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 68 400,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Usual wa dubble axis 6t dropsides		R 45 080,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 88 200,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Bin wagons		R 13 680,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 16 200,00	R 0,00
Rovic Chalk spreader		R 12 800,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 18 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Bossieslaner		R 5 500,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 9 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Electric mobile water pumps		R 19 200,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 27 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Content of workshops and tools		R 154 700,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 234 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Border tools (stairs, picking bags, pruning scissors)		R 26 240,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 28 800,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Bins		R 30 000,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00
Total implements:		**R 507 375,00**	**R 0,00**	**R 90 000,00**	**R 81 000,00**	**R 202 500,00**	**R 31 500,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 88 200,00**	**R 0,00**	**R 27 000,00**	**R 234 000,00**	**R 45 000,00**	**R 90 000,00**	**R 147 600,00**	**R 121 500,00**	**R 28 800,00**	**R 0,00**	**R 81 000,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 16 200,00**	**R 0,00**
=Inventory!A82		**R 2 805 753,84**	**R 0,00**	**R 90 000,00**	**R 81 000,00**	**R 202 500,00**	**R 31 500,00**	**R 275 400,00**	**R 0,00**	**R 117 000,00**	**R 577 800,00**	**R 323 667,90**	**R 27 000,00**	**R 234 000,00**	**R 326 700,00**	**R 495 000,00**	**R 478 800,00**	**R 121 500,00**	**R 379 800,00**	**R 345 600,00**	**R 279 000,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 133 200,00**	**R 0,00**
Total Capital (d)		**R 32 191 437,17**	**R 0,00**	**R 90 000,00**	**R 81 000,00**	**R 202 500,00**	**R 31 500,00**	**R 275 400,00**	**R 0,00**	**R 117 000,00**	**R 577 800,00**	**R 323 667,90**	**R 27 000,00**	**R 234 000,00**	**R 326 700,00**	**R 495 000,00**	**R 478 800,00**	**R 121 500,00**	**R 379 800,00**	**R 345 600,00**	**R 279 000,00**	**R 0,00**	**R 0,00**	**R 0,00**	**R 133 200,00**	**R 0,00**
Net yearly flow (a-b-c-d)		**-R 31 012 623,30**	**R 2 440 440,06**	**R 3 196 075,52**	**R 3 789 532,15**	**R 3 853 365,87**	**R 3 463 124,45**	**R 3 715 924,80**	**R 4 053 425,56**	**R 4 005 463,49**	**R 3 074 068,20**	**R 3 259 752,95**	**R 3 206 097,84**	**R 2 978 478,27**	**R 2 103 817,20**	**-R 396 758,09**	**R 2 249 711,58**	**R 598 407,04**	**R 2 987 811,14**	**R 3 472 206,69**	**-R 2 485 450,69**	**R 2 056 352,84**	**R 2 869 781,15**	**R 3 362 830,66**	**-R 821 984,64**	**R 34 336 809,13**
IRR		**9,45%**																								
NPV	**2,40%**	**33 364 677**																								