

Analysis of Smallholders' Farm Diversity and Risk Attitudes in the Stellenbosch Local Municipal Area

By

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ABSTRACT

The objective of this study was to consider whether smallholders operate within homogenous or differentiated farming systems i.e. a similar “one type” system or a system that could be described as a smallholder typology consisting of a number of farming types. The enquiry firstly described and analysed farm diversity and then developed risk attitude profiles of smallholder farmers in the Stellenbosch local municipal area in the Western Cape province of South Africa. The problem statements, directing this study is that there is a general misconception that smallholders are all “the same” and that they all operate within one “representative farming model”; and that the majority of smallholders are risk averse. These views also argue that all smallholder farmers are not primarily directed at profit objectives, but that social considerations are most relevant and that different social orientations are shaping farming systems. These views are investigated in this study and the hypotheses directing this analysis is that smallholders in the study area are not a homogenous group; rather types within a broader farming typology, with different orientations and objectives and with different risk attitude profiles.

The study originated as part of an international collaborative investigation – the South African Agrarian Diagnoses project, a joint research project of the Agro Paris Tech/Agence Francaise de Development, the Standard Bank Centre for Agribusiness Development and Leadership, Stellenbosch University and the University of Pretoria in to farmer diversity and farmer typologies in South Africa. This investigation looked at smallholder farming in different agro-geographical areas in South Africa, with this particular study focussing on potential smallholder farmer diversity in the Stellenbosch local municipal area. The Stellenbosch local municipality and Western Cape Department of Agriculture provided logistical support, information to this investigation and participated in focus group sessions.

Smallholder activity in this study was defined to include both small scale farming activities and the mobilisation of smallholders/farm workers in so-called “farm worker equity schemes” – a type not included in the other regions. Data was collected from eight smallholders’ farming communities and the four different farm workers’ equity share schemes through surveys and interviews. The following towns and hamlets: Franschhoek, Kylemore, Lanquedoc (Herbal View and Spier Corridor), Pniel, Jamestown, Raithby, Lynedoch and Koelenhof; and four farm

workers' equity share schemes were: Swartvriër vineyard project, Koopmanskloof vineyard project, Enaleni Trust and Poker Hill vineyard project.

Personal interviews and focus group discussions were conducted and cluster analysis was used for the diversity (typology) analysis and the Likert scale was employed to measure risk attitude profiles. A non-probability sampling approach was used to select a sample size of 49 respondents. The reason for using non-probability sampling technique was that when one wants to do the diversity analysis, one must try to include many respondents in the sample and the farmers that are included must be representative of the population from which they are selected.

The variables selected as determinants of farm diversity included information about: demographics and households, land ownership and occupation, farming activities, farming objectives, agricultural inputs, labour, equipment, farming constraints, access to markets, financial support services, educational and training services, extension services and reasons for quitting farming activities. From this, different farming types and typologies were identified, described and structured. Preference indications for different risk management strategies were then used to measure and describe the risk attitudes of different types of smallholder farmers using the Likert risk attitudinal scale.

The results and findings confirmed the study hypotheses relating to diversity in smallholder farming in the target area, namely that smallholders in this geographical area are not a homogenous group and rejects the stated hypotheses that most smallholder farmers are risk averse. A Stellenbosch smallholder typology, with six different farming types were established viz: type 1 – farmland-occupying but non-farming households (10.2% of the sample), type 2 – pensioner – livestock farmers (16.3% of the sample), type 3 – part-time cattle farmers (14.3% of the sample), type 4 – commercial equity share farmers (16.3% of the sample), type 5 – retirement planning crop producers (20.4% of the sample), and type 6 – commercial crop producers (22.5% of the sample).

With regard to risk profiles, risk attitudes varied between these types and also within each type, hence risk attitudes for smallholders are also not found to be similar.

The results revealed that those smallholder farmers moving on a development path towards commercial agriculture (types 4, 5 and 6) were risk preferring; less commercially orientated farm

types (types 1, 2 and 3), showed risk averse and risk neutral orientations. The risk profile percentages of farmers interviewed were 43.2%, 34.1% and 22.7%, respectively for risk preferring, risk neutral and risk averse; this finding rejects the stated hypotheses.

From these results, a number of issues, relevant to development support programmes, were proposed for further agricultural economic research. The most important of these are related to: appropriate development support strategies related to farm types and the potential development paths for each type; and the structuring of appropriate “risk management instruments” for each type, in particular to support smallholder farmers; with a development trajectory towards commercial farming, i.e. to support emerging commercial farmers – an important category of farming listed in current government policy and in the National Development Plan.

OPSOMMING

Die doelwit van hierdie studie was om ondersoek in te stel na die tipe kleinboere-stelsel (smallholder farming systems) wat voorkom in die Stellenbosch munisipale gebied in die WesKaap provinsie van Suid Afrika en die eenvormigheid al dan nie daarvan te ontleed. Eerstens is plaasdiversiteit ondersoek en ontleed; en daarna die risikohoudings van sondagie kleinboere. Die ontledings is dan gebruik om uitspraak te gee oor die eenvormigheid of diversiteit van kleinboerestelsels in die geografiese gebied.

Die probleemstelling wat hierdie studie gerig het, was dat daar 'n algehele wanbegrip mag bestaan dat kleinboere almal “dieselfde” is, of binne n “eenvormige verteenwoordigende boerderymodel” funksioneer; en dat, gekoppel hieraan, die meerderheid kleinboere risiko-afkerig is. Hierdie sienings hou ook voor dat alle kleinboere nie noodwendig op winsdoelwitte fokus nie, maar dat maatskaplike oorwegings ook relevant is en dat verskillende oriëntasies boerderystelsels vorm.

Hierdie sienings word in hierdie studie ondersoek en die hipotese wat die analise rig, is dat die kleinboere in die studie nie 'n eenvormige of homogene groep is nie, eerder verskillende soorte/tipes kleinboere met verskillende oriëntasies en doelwitte en dus ook met verskillende risikohoudings.

Die studie het sy oorsprong as deel van 'n internasionale samewerkende ondersoek – die *South African Agrarian Diagnoses*-projek van die Agro Paris Tech/Agence Francaise de Development, die Standard Bank Sentrum vir Agribesigheidsontwikkeling en Leierskap, Universiteit van Stellenbosch endie Universiteit van Pretoria oor die diversiteit en tipologieë van kleinboere in Suid Afrika. Hierdie ondersoek het gekyk na verskillende agro-geologiese gebiede in Suid-Afrika, met hierdie studie wat gefokus het op die potensiële diversiteit van boere in die Stellenbosse plaaslike munisipale gebied. Die Stellenbosche Munisipaliteit en Departement van Landbou in die Wes Kaap het ondersteunend gestaan met logistiek en deelname aan fokusgroep gesprekke.

Kleinboeraktiwiteit in hierdie studie is gedefinieer om beide kleinskaalse boerderyaktiwiteite op klein grond persele, as ook die mobilisering van kleinboere/plaaswerkers in sogenaamde gedeelde boerdery - eienaarskapskemas in te sluit – n unieke tipe wat nie in die ander streke

ondersoek is nie.. Data is vanuit agt kleinboergemeenskappe en die vier verskillende gedeelde eienaarskapskemas vir plaaswerkers deur middel van opnames en onderhoude bekom. Die boerderygemeenskappe was in die volgende dorpe en klein dorpies gevestig: Franschhoek, Kylemore, Lanquedoc (Herbal View en Spier Corridor), Pniel, Jamestown, Raithby, Lynedoch en Koelenhof; en die vier gedeelde eienaarskapskemas vir plaaswerkers was: die Swartrivier wingerdprojek, die Koopmanskloof wingerdprojek, Enaleni Trust en die Poker Hill wingerdprojek.

Persoonlike onderhoude en fokusgroepbesprekings is gehou en cluster analise is gebruik vir die diversiteit (tipologie) analise en die Likertskaal is gebruik risiko houding profiele te meet. 'N nie-waarskynlikheidsteekproefneming benadering is gebruik om 'n steekproefgrootte van 49 respondente te kies. Die rede vir die gebruik van nie-waarskynlikheidsteekproefneming tegniek was dat wanneer 'n mens die diversiteit ontleding te doen, moet 'n mens probeer om soveel respondente in die monster en die boere wat ingesluit is, moet verteenwoordigend van die bevolking waaruit hulle gekies word om te sluit.

Onderhoude is gedoen met sulke kleinboere en trosanalise is gebruik vir die analise van diversiteit (tipologie), en die Likert-skaal is gebruik om risikohoudingsprofiele te meet. Die veranderlikes wat as determinante van plaasdiversiteit gekies is, het inligting oor demografie en huishoudings, grondeienaarskap en -besetting, boerderyaktiwiteite, boerderydoelwitte, landboukundige insette, arbeid, toerusting, boerderybeperkings, marktoegang, finansiële ondersteuningsdienste, opvoedkundige en opleidingsdienste, uitbreidingsdienste en redes hoekom boerdery laat vaar is, ingesluit. Hieruit is verskillende boerderytipes geïdentifiseer en gekonstrueer. Voorkeure opsies vir verskillende risikobestuurstrategieë is gebruik om die risikohoudings van die deur middel van die Likert risikohoudingskaal te meet.

Die resultate van hierdie studie het die hipotese oor die aanwesigheid van diversiteit bevestig, naamlik dat kleinboere in hierdie geografiese gebied nie 'n homogene groep is nie n verwerp die gestelde hipoteses dat die meeste kleinboere is risiko-sku. 'n Stellenbosch-tipologie, bestaande uit ses verskillende boerderytipes, is vasgestel: tipe 1 – huishoudings wat nie boer nie maar wat op landbougrond woon (10.2% van die monster), tipe 2 – pensioenaris-veeboere (16.3% van die monster), tipe 3 – deeltydse veeboere (14.3% van die monster), tipe 4 – kommersiële gedeelde

eienaarskapskema boere (16.3% van die monster), tipe 5 – gewasprodusente wat aftrede beplan (20.4% van die monster), en tipe 6 – kommersiële gewasprodusente (22.5% van die monster).

Met betrekking tot risikoprofiel het risikohoudings tussen die tipes en ook binne elke tipe gewissel, dus is die risikohoudings van kleinboere ook nie gevind om dieselfde te wees nie.

Die resultate toon dat kleinboere wat in die rigting van kommersiële landbou beweeg (tipes 4, 5 en 6) risiko-voorkeurend is; daarenteen het minder kommersieel gerigte plaastipes (tipes 1, 2 en 3) risiko-afkerige en risiko-neutrale instellings getoon. In die geheel was die persentasies 43,2%, 34.1% en 22.7% vir risiko-voorkeurend, risiko-neutraal en risiko-afkerig onderskeidelik, wat ook die diversiteitshiptese ondersteun.

Vanuit hierdie bevindings word 'n aantal kwessies wat relevant is vir ontwikkelingsondersteuningsprogramme vir kleinboere op verskillende ontwikkelingstrajekte, voorgestel vir verder elandbou ekonomiese navorsing. Die belangrikste hiervan hou verband met die aangewese ontwikkelingstrajekte per kleinboer tipe en daarmeegepaardgaande gepaste “risikobestuurinstrumente” – veral vir die ondersteuning van kleinboere met 'n ontwikkelingstrajek na kommersiële boerdery, m.a.w. opkomende kommersiële boere – 'n belangrike boerderykategorie wat in huidige regeringsbeleid en in die Nasionale Ontwikkelingsplan geprioritiseer word.

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CHAPTER 1 – INTRODUCTION

1.1 Background

There is a general perception, related to matters such as farming objectives, management strategies, risk preferences and constraints experienced conception that smallholders operate in a manner that would classify their farming type as “similar”, i.e. that smallholders are all operating within a “similar representative farming model” (Alvarez-Lopez, Riverio-Valino, & Marey-Perez, 2008; Anseeuw, Laurent, Modiselle, Carstens & Van der Poll, 2001). This study explores the validity of such a general view of a “one-type only” smallholder farming model by asking the following questions: are there any significant differences to justify a broader smallholders’ typology that consists of different types; and are risk attitudes different between different farmers/groups and is such differences an important source of knowledge in the decision on the development of support programmes for smallholder farmers? This study intends to provide answers to these broad questions.

This study intends to provide answers to these broad questions and is motivated by the possibility that the implementation of agricultural policy and strategy, public intervention, expert knowledge, extension, decision support systems in regional or local planning, recommendations and support of governmental and non-governmental organisations, and other external support activities often do not sufficiently take into account the diversity of the farming systems at smallholder farming level to which these actions may be applied (Meert *et al.*, 2005). Approaches therefore, conventionally are directed to the “average/typical farmer” or to a “single representative farming system”, which may be far from reality (Madry *et al.*, 2010).

Generic/common support structures and incentives might be efficient in some farming systems and completely inadequate in others, mostly due to specific environmental, economic, social and technical constraints, which vary widely among farmers, and can influence the economic and biophysical performance of innovations in that environment (Pardos *et al.*, 2008). Characterising the socio-economic orientation and variability of farming systems within a target region should thus be viewed as a key step in the efficient design and implementation of demand-based support (public and private support and policies) (Madry *et al.*, 2010).

This study was initiated as a component of the South African Agrarian Diagnostic Project, a collaborative research initiative between Agro Paris Tech, Agence Francaise de Development, the University of Pretoria and Stellenbosch University, in which theories, methodologies and case studies were used to describe and analyse diversity in smallholder farming in South Africa. Two inter-related aspects referred to above were attended to: viz. the reality/ or not of smallholder farmer diversity; and different farmers' risk attitudes related to such diversity as it manifests with smallholder farmers in the Stellenbosch local municipal area in South Africa.

1.2 Recognising diversity

The focus of this study require a sound understanding of diversity in the farming environment; not all farms in a similar agro-ecological area produce the same crops, nor do they apply the same practices or are they based on similar socio-economic characteristics; they do not generate the same income levels nor do they have the same farming objectives or same life expectancy. According to Laurent *et al.*, (1999), diverse policy statements, focussed strategy proposals and particular project activities to serve diverse groups of farmers efficiently are required; not a “one fits all” approach.

The question that arises therefore is, how to give operational and practical content to such diversity requirements, and how to avoid those technical farming systems could be prescribed without properly recognising such farming diversity and without contextualising such technical relationships in the wider social, economic and political environment. This implies that, whenever one is thinking of an agricultural policy or strategy to assist farmers (smallholders), one must think of the diversity of farmers and the implications thereof at the outset of the planning process (Laurent *et al.*, 1999; Modiselle, 2001).

Diversity recognises that people (smallholders) manage by doing many different things, rather than just one or a few things the same (Ellis, 2000). Diversity is viewed as a manifestation of the capacity of the agricultural system, including the farm producer entity, to adapt and sustain different situations based on unique circumstances. Laurent *et al.*, (1999) state that such an approach recognises diversity as an important element to be noted and interpreted in the design of rural and urban development policy and planning, especially for agriculture.

The important function of farm diversity analysis is to describe and understand the different types of farming systems operating within a broader typology and then to design appropriate support systems to serve such different types efficiently. In order to serve farmers effectively and efficiently, it thus is of great importance to start describing the diversity of the different types operating within a typology, and to analyse each in order to provide support accordingly.

According to Duvernoy (2000), the general way of assessing the diversity of farming systems in an area is through farm typology analysis. Farm typologies are a means of categorisation diversity that enables us to organise reality from a point of view that is relevant to the objectives of the study being undertaken (Duvernoy, 2000). The use of farm typology analysis therefore counters a view of agricultural development in which diversity (structural and agricultural activities) is not embraced and is considered to be an obstacle or constraint to the modernisation of the agricultural system (Laurent *et al.*, 1999).

The typology approach will be used in this study to consider aspects of smallholder farmer diversity in the Stellenbosch local municipality area.

1.3 Risk attitudes

Smallholder farmers' risk attitudes/profiles were the second and related diversity aspect that required investigation. Agricultural production is subject to risk, and the attitudes of farmers towards risk influence their choices and these choices affect agricultural production (Picazo-Tadeo & Wall, 2010). Agricultural production is inherently a risky business, and farmers face a variety of weather, pest, disease, input supply and market related risks (Skees, Hazell & Miranda, 1999). Risk attitudes may also be affected by certain socio-economic characteristics of producers and institutional aspects.

Ayinde, Omotesho and Adewumi (2008) state that production decisions in farming are generally made in an environment of risk and uncertainties. Every decision taken by a farmer has its consequences in the future, and one cannot be absolutely sure of what the consequences will be in the future. This implies that the future is uncertain. It is important for a farmer to understand risk and relate decision-making to it - the future is uncertain. According to Hardaker *et al.*, (2004), it is often said that, in business, profit is the reward for bearing risk –“no risk means no

gain””. According to Ayinde *et al.*, (2008), risks arise because uncertainty impacts directly on the decision process through the decision-makers’ attitudes towards risk.

Bard and Barry (2000) state that theory suggests that risk attitudes influence the way farmers manage risk. Therefore, it is hypothesised that attitudes towards mechanisms or tools used for managing risk reflect the producers’ underlying construct of a risk attitude. According to Bard and Barry (2000), one’s risk attitude is a unique reflection of a one’s personality and business. Risk attitude is influenced by socio-economic factors and life experiences. Diversity in the farming system will thus be likely to be transferred to diversity in the risk profiles of farmers. Due to these interactions and how these interactions manifest their influences, “true risk attitudes” are not always apparent. Therefore, risk attitudes are usually measured indirectly.

Actions are undertaken in anticipation of future benefits that may not be realised. Pennings and Leuthold (2000) find that there are large differences in the risk attitudes of managers of corporations and farmers.

In terms of how smallholders respond to or manage the risks that are involved in farming, it is believed that they will respond or manage differently in differentiated environments and if their farming systems are not the same. This implies that different types of smallholders within a broader typology respond differently or have different risk attitudes/ profiles.

It thus is important to describe and analyse the diversity that could exist among smallholders and the possible relationship to differences in their risk attitudes towards farming, as important components to design effective support programmes and policy formulations.

1.4 Defining smallholders and smallholder agriculture

The term smallholder is widely used on the assumption that there is a common understanding of what it means. Despite the widespread reference to smallholder farming in agricultural and rural development literature, the definition remains vague – perhaps due to the large diversity occurring within this grouping or typology of farmers. The situation in South Africa is quite similar.

After the democratisation of South Africa in 1994, agricultural policy aimed to create a new unified agricultural economy, in which both large and small farm enterprises compete harmoniously in local and international commodity markets (Van Averbeke & Mohamed, 2006). An important concern has been the development of a black commercial smallholder sector group (Vink & Kirsten, 2003).

In the South African context, smallholders are generally defined as black farmers, operating on small holdings with a restricted resource supply, whom reside in the former homelands and around rural towns. Van Averbeke and Mohamed (2006) state that smallholders in South Africa are a large and diverse group. This implies that smallholders are not just one type, and that there is diversity in the farming systems used by South African smallholders. It is also noted that not every black farmer is a smallholder, and that smallholders are not a homogenous group (Machethe *et al.*, 2004).

The physical size of farms should also not be seen as the definitive factor in the classification of farmers, because a large percentage of white South African farmers that are referred to as commercial farmers, are farming successfully and profitably on small farms of less than 10 ha (Kirsten & Van Zyl, 1998).

Smallholder agriculture is found in a wide range of locations, including the “deep rural areas” of the former homelands, in townships and cities, and on large-scale commercial farms (Lahiff & Cousins, 2005). On large-scale commercial farms, smallholder agriculture could be viewed as “ring fenced” type of farming activities designated to farm workers for their own benefit. One interesting recent and typical South African model comprise “farm equity share schemes” in which farm-workers obtains a “business” share in a commercial farm (Knight, Lyne & Roth, 2003) and sometimes also, sometimes practise “own farming” on this farm land.

For this study, a smallholder is defined as a previously disadvantaged black farmer (Black, Indian or Coloured), who has access to a piece of farm land for farming purposes and grows crops and/or keeps livestock, with limited resource endowment. The smallholders analysed in this study were involved in farming in and around the rural towns of the Stellenbosch local municipal area. Farm-workers active on farm equity-share schemes in the Stellenbosch local municipal were also included in this study.

1.5 Research problem

Generally there is a common convenience based notion among agricultural planners and policy makers, i.e. those designing policy and support programmes that all farmers in an agro-ecological region should operate according to homogenous production functions and development paths and driven by the same objective functions in order to “optimise”. However, a common mistake in agricultural and rural development programmes is to assume that smallholders are all an undifferentiated group that could be accurately defined with mean and median (Modiselle, 2001; Laurent *et al.*, 1999; Singini & Van Rooyen, 1995). According to Eckert and William (1995) the diversity that exists among smallholders is believed to have an impact on their decision-making processes and thus the required support system.

For whatever development initiative one wants to undertake, either as relief intervention or economic development planning, it will clearly be more achievable if one can build on the knowledge of different types of farmers or diversity of farming systems that exist in the area and the risk management strategies of those participating farmers. Agricultural planners, advisors and policy makers, with the support of researchers, therefore have to build a picture of any development and/or policy making based on the diversity of the farmers, grouping such types in operationally useful entities (Perret, 2000).

South Africa became a democratic country in 1994, the new political era in the country came up with a new appreciation of the role of and support to smallholder farming in the rural development of the country. The diversity among the farming systems of smallholders was however in most cases not taken sufficiently into account when “new” agricultural policies and support programmes were designed for different types of smallholders (Perret, Anseeuw & Mathebula, 2005).

Farmers’ diversity is, however, a complex issue as it does not include only economic determinants but also determinants such as family, community and social cohesion or non-cohesion, the determinants of farmer decision-making, households’ characteristics and land-holdings, but also the totality of physical, social, economic, biological and institutional setting in which the farmer operates (Modiselle, 2001).. Therefore, it is essential for the study to consider a farmer household and its response to the entire environment in which it operates. Variability

amongst smallholders and their preferences (attitudes/profiles) for risks need to be well understood so that support services can be adapted appropriately provided the information reflects reality. Indications are that such diversity and variability is seldom sufficiently accounted for in policy, strategy and planning support to smallholders.

Hardaker *et al.*, (2004) state that risk and uncertainty permeate almost every aspect of the agricultural production sector. With the background given above reality of diversity, farmers have to make decisions in a risky agricultural environment, there is no way they can escape or avoid this environment, hence need to deal with it by employing different risk management strategies. The agricultural risk environment can be managed through instruments like enterprise diversification, agricultural insurance, etc. These instruments however need to be appropriate to the reality faced by farmers. Farmers, in response to such diversity, employ different risk management strategies trying to deal with the risky agricultural environment and to better their farming situation, hence there should be an accommodation of diversity in risk attitudes of smallholders and related management strategies..

The risk attitudes of smallholders are often generalised as that smallholder farmers are ““single minded”” risk averse whereas this is not always the case (Modiselle, 2001). This means that in many cases, the general view of risk attitudes of smallholders may not reflect the reality of diversity in farming systems and perhaps also in attitudes towards risk.

Diversity and risk attitudes of smallholders are the focus of this study and set the framework for the research questions and hypotheses guiding this study.

1.6 Research questions

- To what extent is there diversity in farming by smallholders in the Stellenbosch local municipal area – i.e. different smallholder farming types in operation?
- What are the risk attitudes or risk profiles of such different types of smallholders in the Stellenbosch local municipal area?
- How can different types of smallholders be served better by development support strategies and services, including risk management instruments?

1.7 Study objectives

1.7.1 Overall objective

The overall objective of the study was to consider, examine, describe and analyse farm diversity, in contrast to the view of a homogenous farm type; and the related risk attitudes of smallholders in the Stellenbosch local municipal area. This examination was done against the back drop of the general view that smallholder farming is homogenous in nature. Diversity in both these factors is viewed as important inputs in the planning of support systems for smallholders. The following specific objectives directed the study.

1.7.2 Specific objectives

- To describe and provide evidence of the diversity of farming by smallholders in the Stellenbosch local municipal area;
- To describe and analyse the risk attitudes (risk profiles) of such different types of smallholders in the Stellenbosch local municipal area; and
- To produce relevant knowledge about the smallholders' agricultural typologies in order to provide relevant information to design, implement and assess policy, strategy and planning measures, including risk management strategies.

1.8 Hypotheses

The main view of the study is that smallholders in the Stellenbosch municipal area do not operate as a homogenous farming type, but rather as diverse types within a broader typology and that different types of smallholders types have different attitudes towards risk i.e. have different risk attitudes/risk profiles.

The hypotheses of this study are thus stated as:

- i) There is diversity among smallholder farmer types in the Stellenbosch local municipal area. This is based on the ecological context and related farming systems, farming objectives and social considerations; and

- ii) Diversity is also found in varied risk attitudes/profiles towards farming types i.e. risk-averse, risk-neutral and risk-preferring farmers. Most of the smallholder farmers' show risk averse profiles.

1.9 Justification of the study

Few South African studies that have looked at the differentiation between smallholders' farming systems. The study of risk attitudes (risk profiles) of different types of smallholders is also restricted. There consequently is a lack of reality based information on the diversity among smallholders and related information on the risk attitudes of different types of smallholders.

The study attempted to provide a well-considered base for the development of representative farming models for different types of smallholder farmers in the Stellenbosch local municipal area by attending to the stated research questions and the hypotheses. Understanding smallholders' farm diversity and their risk attitudes is important for designing effective support services such as extension services, marketing advice, technical skills, etc. and also financial support services, including suitable agricultural insurance packages for different types of smallholders.

1.10 Limitations of the study

The study was limited by two factors:

- (a) The typology analysis focused only on smallholder farming in a particular area (Stellenbosch in this case). It thus can only be used to a limited degree for general interpretation in the wider South African environment.
- (b) The Stellenbosch area includes many different farming types, mostly commercial, intensive large-scale farming. The study focuses only on developing a typology of smallholder farmer related activity in the Stellenbosch local municipal area. This being said, the smallholders are not assessed in isolation, as their relationship with other farmers (including commercial farmers) and broader value-chains are taken into consideration.

1.11 Study outline

The background contextualising the study in terms of farm diversity and risk attitude/profile aspects, the definition and description of smallholders, and the problem statement, objectives and hypotheses of the study, is discussed in Chapter 1. The second chapter provides an overview of the literature on farming diversity, farm typology and the risk attitudes of smallholder farmers. In Chapter 3, a four step framework of analysis will be proposed and the research methodologies applied in the study and the data collection process and interviews with the smallholders for the Stellenbosch typology study will be discussed. Chapter 4 gives the background to and the situation of the Stellenbosch local municipal area, which will include a description of the study area and agricultural situation of the research site.

Chapter 5 provides an analysis of the results, i.e. a description and analysis of diversity and; a description and analysis of the risk attitudes of different types of Stellenbosch smallholders.

Chapter 6 records the major findings, conclusions and recommendations.

CHAPTER 2 – LITERATURE REVIEW

2.1 Introduction

A major feature of the heterogeneity of South African agriculture is the huge structural gap that was created before and during the apartheid period between “white commercial agriculture” and small-scale farming, characterised by smallholder types of agriculture (Brand, Christodoulou, Van Rooyen & Vink, 1992; Vink, Van Rooyen & Karaan, 2012). The latter were largely neglected, with limited government support and support services, with the Farmer Support Programme (FSP) of the Development Bank of Southern Africa (DBSA) in the mid-1980’s to mid-1990’s being an exception to this rule, (Van Rooyen, Vink & Christodoulou, 1987; Singini & Van Rooyen, 1995). However this changed, at least conceptually, with the democratic transition in South Africa in the mid-1990s and smallholder farmers were positioned as important in the new agricultural structure and policies of South Africa (Anseeuw *et al.*, 2001).

To develop new policy measures focused on the needs of smallholders and to assess their possible impact, an accurate description of the reality of smallholders is needed. Anseeuw *et al.*, (2001) and Modiselle (2001) state that, in the group of smallholders, it is known that micro level diversity is high, due to the unequal distribution of the means for farming production (access to resources, markets, knowledge, etc.) as well as strategies and structural characteristics of farming households. The transitional forces observed in many rural communities (migration, migrant labour, cultural changes) also accentuate these differences.

To properly assess diversity one should thus examine the question in all its dimensions. Agriculture includes households engaged in farming, herding, livestock production, fishing and aquaculture (Organization for Economic Co-Operation and development [OECD], 2006), and also driven by different motives, objectives, resource endowments and environments. Agricultural activity can be viewed as a “total social fact” (Laurent *et al.*, 1999; Modiselle, 2001), which means a phenomenon that involves a large number of institutions, which has multiple (social, economic, financial, technical, legal, political, etc.) dimensions, and concerns different groups in the agricultural sector.

Theoretically, farm diversity can be assessed in different ways including farming styles theory, agrarian systems analysis and farming systems analysis.

2.2 Farm diversity

Throughout rural economics it is emphasised that the lifecycle of the households, also in farms, affects its production organisation: the age of each individual-changes and the number of individuals contributing to production as well as their potential to do so are modified/changed (Modiselle, 2001). Thus, objectives pursued and decisions made on the farms will vary accordingly. A farm household is also not a stable entity. Farms are characterised by diversity of land use and production models, a variety of farm sizes and climate, considerable geographical dispersion (Alvarez-Lopez *et al.*, 2008) and also unique development paths (Laurent *et al.*, 1999).

A farm household is generally represented as a unified entity functioning as a homogenous decision-making centre, Perret (1999); Modiselle (2001); Laurent *et al.*, (1999) and Anseeuw *et al.*, (2001) state, however that, such representations assume that there is unanimity among the members of the farm household regarding the pursued objectives. This can be considered as ““abusive simplifications”” of the reality (Katz, 1999). Within a household or farm, particular positions concerning the activities of production, consumption and accumulation can and often do exist. The household’s behaviour thus can be defined as a combination of the different behaviours of the members of the household, and not as the result of hypothetical undifferentiated family rationality. The unified farming entity may be an approximation, which is not acceptable when different entities and decision levels are combined (Laurent *et al.*, 1999; Van der Ploeg, 1994).

Farm households diversify strategies by combining several gainful activities, which can be related to agriculture and sometimes not. This allows mitigating risks and uncertainties by diversifying the source of income while keeping the possibility of food production for home consumption (Van der Ploeg, 1994). Farming households are not inserted in agriculture, but also are integrated in a broader economic system that includes: farm activities and non-farm activities.

If diversity in smallholder farming is recognised, this implies that smallholders may be served accordingly, as they would respond more directly towards more appropriate developmental support initiatives. Understanding the reasons for different smallholders’ behaviour can provide

means for analysing farmers' reactions to different conditions, and hence for predicting the consequences of policy interventions (Modiselle, 2001). Such an understanding needs a holistic picture of smallholders' diversity, meaning that the behaviour of the smallholders is not only influenced by economic criteria, but also by social, technical or legal matters (Laurent *et al.*, 1999).

Risk attitude plays a major role in understanding the farm decision-maker's behaviour. Risk attitude is a personal characteristic and deals with the decision-maker's interpretation of the risk and how much he dislikes the outcomes resulting from the risk (Pennings & Leuthold, 2000). According to Hardaker *et al.*, (2004), risk attitude is the extent to which a decision-maker seeks to avoid risk (i.e., risk aversion) or prefers to face risk (i.e., risk preference).

Risk is an important aspect of the farming business (Hardaker *et al.*, 2004). This is as a result of weather, yields, prices, government policies, global markets and other factors that can cause wide swings in farm income. All these are important in agriculture, where unreliable rains, pests and disease outbreaks cause large variations in resource availability and in crop and livestock yields (Hardaker *et al.*, 2004; Salimonu & Falusi, 2009). Salimonu & Falusi (2009) state that much of the farm income of smallholders is highly vulnerable to risk and uncertainties.

Farmers can be exposed to the same risk in agriculture, but farmers can be affected differently by the same risk because of differences in the attitudes and farming types they develop, hence different risk attitudes in different types of farmers. Different types of smallholder farmers have different resource endowments and, social and, economic environments which will most likely lead to different risk attitudes/profiles and risk management strategies employed by different farmer types and hence they will have different attitudes towards the risks involved in farming (Laurent *et al.*, 1999).

2.2.1 Farming styles theory

Farming styles theory, as developed in 1990s by Jan Douwe van der Ploeg and co-workers at the Department of Rural Sociology at Wageningen University in Netherlands (Van Averbek & Mohamed, 2006), has been used mainly to study, characterise and explain diversity in farming. The point of departure of the farming styles theory is to grasp the heterogeneity among farmers. Van der Ploeg (1994) defines a farm as a social (and therefore goal-orientated) co-ordination of a

whole range of tasks, which together constitute the totality of the farm labour process, and that such co-ordination implies the on-going observation, interpretation, and evaluation of similar and different forms of social co-ordination (i.e. one's own and the farming practice of others). In this view, a farm is regarded and understood as a system of activities or practice, linked to the goals of the actor(s)/farmer(s) involved. Farming styles theory aims to identify and group farmers according to their common worldviews and/or management practices (Vanclay, Mesiti & Howden, 1998).

The individual practice of a farm is developed within the framework of logically and, socially constructed farming styles, which Van der Ploeg (1993) defines as follows: "farming styles refer to a cultural directory, a composite should be done". A style involves a specific way of organising the farm enterprise: the farmer's practice and development are shaped by a cultural directory, which in turn is tested, affirmed and, if necessary, adjusted through practice. Therefore, a style of farming is a concrete form of praxis (practices), a particular unity of thinking and doing, of theory and practice (Van der Ploeg, 1993).

The concept of farming styles allows for an understanding of the range of world views about how to farm. Appreciating the existence of a range of world views is important. Different farmers may have different priorities, different understandings, different values, different ways of working/producing and different problems. Agricultural planners, policy makers and extension officers must address the needs of all styles (Vanclay, 2004).

A farming style is created through socio-cultural dynamics (strategic notions, values, shared insights on how to farm), as well as the through response to structural forces (structuring of farm practice and links between the farm enterprise and relevant external context) (Vanclay *et al.*, 2006). Farming styles, as developed by Van de Ploeg in the Netherlands, are based on the assumption that, in a farming community, there is a set of discrete styles (strategies of farming) of which farmers are aware and from which they actively choose a specific strategy to guide their own practice (Vanclay *et al.*, 2006). The styles are created not only through socio-cultural dynamics, but also as a response to environmental and, structural forces, including politics, and different styles potentially exist for different market situations of different farmers (Vanclay *et al.*, 1998).

A farming style is an integrating concept that shows a particular way of practicing agriculture. Van Averbeke and Mohamed (2006) define farming style as an expression of how farmers combine and order the elements that are used in the process of agricultural production. For policy development, farming styles are particularly useful and helpful, because they provide insights into the real world of agriculture as farmers experience it. Farming styles refer to specific farming strategies, which are the conscious responses of farmers to the prevailing ecological and socio-economic conditions (Van Averbeke & Mohamed, 2006).

Farming styles research conducted in Europe and Australia where agriculture is at the core of the livelihoods of participants, showed that deriving adequate income from farming was the overall objective in all the farming styles that were identified (Van Averbeke & Mohamed, 2006). In the South African smallholder world, the overall objective of farming is not necessarily at the “core of livelihoods” and primarily viewed as the generation of monetary income. Reasons for farming may vary from farming for commercial purpose and, making a partial contribution to the food requirements of a family, to providing full livelihoods (Modiselle, 2001). Traditional smallholder farming systems are also generally characterised by low yields and high risks of crop failure (Magombeyi *et al.*, 2012). Van Averbeke & Mohamed (2006) therefore state that, diversity is expected in smallholder farming styles should reflect the differing objectives of farming.

The development of farming styles examines farmers from a holistic point of view, combining not only situational, location, agronomic and environmental factors (Vanclay *et al.*, 1998), but also the need to understand farmer behaviour. This includes consideration of the drivers of personal change. In this study it therefore will be important to examine individual values, attitudes (i.e. risk attitudes) and behaviour that affect the uptake of current farming practices and future innovations.

2.2.2 Agrarian system analysis

Agrarian systems analysis provides a methodology for understanding the diversity and complexity of agricultural practices. According to Freguin-Gresh (2009), an agrarian system provides a research and planning tool that allows us to better understand each form of agriculture (farming system) and to roughly establish the characteristics of the historical transformations and

geographical differentiations of a rural society. This helps when defining appropriate policies, strategies, support programmes and projects that are related to rural and agricultural development (Freguin-Gresh, 2009).

The agrarian system is a concept used to describe the combination of productions techniques implemented by a society in order to meet its needs (Pasquet, 2007). An agrarian system is a way of using an agro-ecosystem that is historical defined and sustainable, adapted to the bioclimatic conditions of a given area, and responding to the social needs and conditions of the moment (Cheveau, Hoornaert & Cochet, 2011).

The agrarian systems approach takes a historic perspective by taking into account the spatial and temporal limits of an agrarian system. It tries to understand the organisation, the operation, the renewal and the differentiation of the past (Freguin-Gresh, 2009). This in turn helps to provide a better understanding of the complexity of the present dynamics, the socio-economic structures and the mode of exploitation/utilisation of the ecosystem. The mode of exploitation (utilisation) consists of the farm work, the inert production means (equipment, tools, etc.) and the living production means (crop seeds, reproductive animals, etc.) that perpetuate a cultivated environment.

Pasquet (2007) states that agrarian system is a social product, the result of the relations between different actors whose objectives can be identical, complementary, and/or contradictory.

According to Freguin-Gresh (2009), the methodology of the agrarian systems survey is based on:

- The analysis of agro-ecological, technical, social and economic elements and their interactions. Agriculture is a complex combination of diverse parameters.
- The study of a limited number of different situations. The diversity and complexity of agricultural situations can be surveyed by a limited number of well-chosen case studies.
- Looking at different scales, from the international level down to the plot levels. Like climate, local agricultural situations can be seen as the product of the general situation and local particularities. The agrarian systems survey is conducted from a general to a local scale.

- Studying the evolution of farming systems at different times. Agriculture is changing and appropriate interventions cannot be proposed without understanding the trends that already exist.
- Using simple tools such as landscape observations and discussions with farmers. Agricultural landscapes and farmers' knowledge are the best and largest source of organised information.
- Using an iterative approach. Information from observations or interviews is crosschecked and verified so hypotheses can be tested and adapted.

According to Pasquet (2007), agrarian system analysis and diagnosis is carried out through direct observation of the agrarian landscape and farming practices, as well as a series of interviews with villagers and farmers. An iterative approach makes it possible to validate successive hypotheses about the evolution of the agrarian system and the functioning of the farm holdings (Freguin-Gresh, 2009; Pasquet, 2007).

The agrarian system approach allows characterising smallholders and estimating the assets they have (land, workforce, water system), their type of production, their yields, the destination of the products (percentage of sales, type of buyer), and on-farm and off-farm incomes (Cheveau *et al.*, 2011). The agrarian system helps to identify the constraints facing farmers who are not able to continue farming or sometimes to continue farming viably. It also helps to better understand the rural and community realities for the better targeting of smallholders. As agriculture is changing, appropriate interventions cannot be proposed without understanding the trends that already exist and the reality that exists in the area (Freguin-Gresh, 2009). The agrarian system approach therefore provides a useful framework for this study.

2.2.3 Farming system analysis

The farming system is defined as a population of individual farms that have broadly similar resource bases, enterprise patterns, household livelihoods and constraints, and for which similar development strategies and interventions would be appropriate (Dixon, Gulliver & Gibbon, 2001). According to Freguin-Gresh (2009), a farming system can be defined by a particular combination of means of production to conduct different cropping and animal raising systems to reach farmers objectives (i.e. farms using a hired labour force, tractors, 1 ha irrigated fields and 2

ha of other fields to produce vegetables). A single farming system is defined as a group of intertwined activities and lines of production that a farmer and farm household conduct according to their objectives and needs, depending on changing environmental, economic, technical and cultural conditions and constraints (Pasquet, 2007).

Most of the decisions that determine the success or failure of rural development programmes for smallholder farming are taken at the level of the land holding. This necessitates the assessment of the level of organisation to a gain good understanding of the operation of the farms, even if it is partly governed by external factors dependent on higher levels of organisation (village, community, region and nation). The farming system is a coherent combination of time and space, dedicated by means of production (land, labour, equipment, and capital) dedicated to plant and/or animal production (Perret & Mercoiret, 2003).

The farming system can be interpreted as a structured set of means of production combined to provide crop and/or animal production to meet the objectives and requirements of the operator (farmer) and his/her family. The structural characteristics of farming systems are:

- The family group (composition according to gender, age and occupation). It should be noted that farm work in developing countries is generally allocated according to age and gender
- The means of production (labour force, land, equipment, and capital)
- The farm production and/or processing patterns (cropping systems and crop management sequences, livestock production system, on-farm post-harvest systems)

Analysing farming systems does not mean addressing each of these elements separately. It supposes a comprehensive study of their relationships. The complex system model applies to the farm. The farm does not organise itself to produce, but to solve the problems it senses, thus to decide of its behaviour (Kirsten *et al.*, 2006). Study of the farming system cannot be restricted to production aspects. Connected to this, two subjects have to be studied in particular, namely the decision system and the social system of the farm. Thus, the aims of an assessment at farm level will be: i) an analysis of the decisions by farmers, which determine the overall operation of their land holding, and ii) the use of this system to understand their motivation and strategies, to

highlight their constraints and needs, and to identify the factors and possibilities of improvement (technical change and overall evolution at farm level).

The farming system is most relevant at the intermediate scale analysis of production and family units. It permits an analysis of the cropping and/or livestock systems a farmer uses based on the available means of production and workforce. The concept can be applied at the individual enterprise level to help understand how the farm functions and thus enable the formulation of personalised advice. It is more efficient to apply the production system concept to a group of farms with the same resources (same surface area, same level of mechanisation, same size of labour force) in similar socio-economic contexts, and that have a similar crop mix-in sum, a group of farms that can be represented by the same model (Cheveau *et al.*, 2011).

Dixon *et al.*, (2001) state that one could say that a farming system is an inter-linking field of study, that links studies focused on farmers' practices (for technical change and decision-making support at farm level) and studies about the diversity of farming and rural activities' system (for development planning and decision-making support at regional level).

2.3 Analysing farm diversity

Farming diversity must be viewed as representing a complex set of relationships and circumstances. Zoning and typology analysis techniques are generally used to describe and analyse farm diversity (Lhopitallier, Perret & Caron, 1999; Perret & Kirsten, 2000; Laurent, *et al.* 1999; Perret, 2000)

2.3.1 Zoning technique

Zoning is a geographical delineation (mapping) of spatial units representing an acceptable degree of homogeneity, according to some relevant criteria and to the scale of the analysis.

The zoning technique is used to provide information on diversity and dynamics, on a spatial basis (Lhopitallier *et al.*, 1999). An understanding of diversity and dynamics is an essential prerequisite to any planning operation. If planning operations do not take into account the different situations that exist in the planning area, chances are high for the plan to fail. Applying a uniform recipe to a diverse environment is bound to result in failure and a great waste of

money (Kirsten *et al.*, 2006). The building up of policies and strategies for rural development entails choices and arbitration by decision-makers.

Zoning entails the division of an area into smaller units that have similar characteristics. The objective of zoning activity is the identification and localisation of agro-ecological and socio-economic constraints and potentialities that interfere with the dynamics of the different systems (farming systems) within a particular locality (Food and Agricultural Organization of the United Nations [FAO], 1999). The key notions of zoning are:

- i) The characterisation of the diversity in terms of *homogenous spatial units* (HSU): an area where available resources, their use and the constraints related to productive activities form a homogenous problematic at the chosen scale
- ii) The use of relevant criteria to identify the HSU: choosing a combination of variables that best reflect the diversity one wants to highlight in a given area.

Zoning relies heavily upon secondary data (topographic maps, statistical rainfall data, and earlier surveys) and the knowledge of local people about the place, and is essentially an overlay of both kinds of knowledge (FAO, 1999). The type of information that is collected through zoning includes information about soil types, climate, demographic data, agricultural production volumes, infrastructure, and the transport and network system that exists in the area. Such information can be obtained through a key informant and from the existing data. A key informant is an individual who is accessible, willing to talk, and has a great depth of knowledge about an area, the crops and livestock grown and kept in the area, credit, marketing and other agricultural/rural problems of the area (Lhopitalier *et al.*, 1999).

Lhopitalier *et al.*, (1999) state that the objective of zoning is to organise the available information in order to produce and map all operational elements needed for rural development planning. Zoning also attempts to stimulate the participation of rural stakeholders in the planning process by creating a dialogue around development prospects and issues.

2.3.2 Typology technique

A typology is any conceptual classification scheme. It may or may not be exhaustive within its empirical frame of reference. The role and utility of any typology is relative to the theoretical or practical perspective from within which it is formulated (Jary & Jary, 1995). A typology is simply the study and interpretation of types. The term typology designates both: i) the procedure that leads to the building up of types, designed to help analyse a complex reality and to order objectives which, although different, are of one kind (household/farm for instance), and ii) the system of types itself resulting from this procedure (Perret, 2000).

Perret and Kirsten (2000) state that typology is usually an attempt to group activity units according to their main modes of operation and their characteristics. This allows the definition of recommendation domains for technical advice or training purposes and support services (financial support services and policy support services). Further to this, typologies can give decision-makers and planners at the regional/local level a useful picture of the diversity in the socio-economic fabric (Perret & Kirsten, 2000). They can also become frameworks to extrapolate (or conversely to seek) local technical references.

In the context of intensive production, agricultural typologies usually focus on farming systems, modes/ways of operation and farmers' strategies (Perret, 1999; Landais, 1998). They tend to be extended to rural households in the context of developing rural areas. Since the diversity first originates from nodes of activity and sources of income (farming, non-farming, off-farm activities), it therefore is difficult to properly highlight the modes of operation and the strategies (Perret, 1999). Typologies seek to constitute a range of types (or "farm styles" according to van der Ploeg, 1993) that simplify reality whilst accounting for the main particularities that allow each type in a collection that is to be studied, to be classified and analysed. Landais (1998) states that the main issue is to make comparisons between farms considered sufficiently similar to allow them to be classified in the same type, and for their functioning to be analysed using a single reference base.

The typology approach recognises diversity as an important element to be noted and interpreted in rural development planning and policy. The typology approach does not contest that differences in economic size (capital, hired labour, land) are a source of inequality in economic

performance, but rejects the principle that there is such a thing as “‘one best way for all’” i.e. “‘a tailor made solution’” (Laurent *et al.*, 1999). Within the same range of economic size, it is accepted that good economic and technical performances can be obtained through different ways of production and farm organisation.

2.4 Farm typologies

Farm typology will be discussed further below as it is the practical way that will be used in this study to analyse the farm diversity of the Stellenbosch smallholders.

2.4.1 Description of farm typologies

Although the presumption of homogeneity is prevalent in the policy community, rural sociologists have long advanced awareness of the diversity or heterogeneity of farmers (Keshavarz, Karami & Kamgare-Haghighi, 2010). Farming communities are not homogenous. There are young and old; early innovators in the life cycle or late in the life cycle; high mortgage and small mortgage; propensity to adopt new ideas (innovator); farmers who take risks in farming (risk-takers); and farmers who avoid to take risks (risk-averse farmers) with a propensity to retain tried and true methods. Vanclay (2004) states that farmers can be categorised according to every single variable that logically considered in conjunction with farming. This means there are no single problems, no single solutions, no single extension strategies, no single agricultural insurance packages and no best medium that extension should utilise solely.

A farm typology categorises farms into more homogenous groups than classification based on one variable, for example, sales volumes alone, producing a more effective policy development tool (United States Department of Agriculture [USDA], 2000). This implies that farm typologies analyse farm diversity based on different and many variables, unlike focusing only on one variable. According to Wiffels (1996), farms are often grouped together only on the basis of farm sizes. However, farms can also be grouped on the basis of many and different criteria ranging from socio-economic (e.g. farmer objectives) to biophysical (e.g. soil types). Farm typology refers to a stratification of farms that are homogenous, generally according to more than one criterion relevant to support programmes and policies (Andersen *et al.*, 2007).

There is a need for constructing farm typologies that are based on the identification and description of groups of farms with similar features. Policy makers, planners and service providers can then use these typologies to describe and classify categories of farmers with common needs and requirements with regard to policy, programme and project interventions.

2.4.2 Use and utility of farm typologies

The use of typologies has a long lineage in social analysis. Perret and Kirsten (2000) state that typologies have been used in rural sociology primarily to distinguish the social and economic characteristics of farming. Farm typology research has become popular as a way of segmenting farmers into groups to assist in developing targeted farm extension programmes (Schwarz, McRae-Williams & Park, 2009). Farm typology sometimes offers a tool for synthesising the assessment of the farm management indicators. Andersen *et al.*, (2007) state that a farm typology approach is essential when assessing farm management indicators within an agricultural policy context.

A farm typology approach offers a tool for assessing and designing more differentiated farming policies taking into account the wide range of differences between different farm types (Andersen *et al.*, 2007).

Laurent *et al.*, (1999) argue that a better knowledge of local rural diversity might avoid the exclusion of certain farmers from development projects, ignoring their specific circumstances and needs. The use of typological approaches may contribute to a better understanding of the broader agricultural environment and of the reasons for the existing diversity.

Thus, it may better help to assess the issues of alternative policy choices and to avoid the exclusion of certain types of farming households due to the ignoring of specific constraints they face (Anseeuw *et al.*, 2001). Moreover, farm typologies can give the decision-makers at the regional/local level a useful picture of the diversity in the socio-economic fabric. Farm typologies based on the operation of farms represent a real investment for local development (Landais, 1998).

Farm typologies in France for example, have provided tools that the French agricultural development services have put to various uses (Perret & Kirsten, 2000). They offer a framework

for analysing technical issues in agricultural production, developing a range of relevant solutions adjusted to the needs and means of different types of farms, and planning development operations. Farm typologies also contribute to improving the efficiency of the two basic remits of agricultural advisors, viz. carrying out diagnoses of farm functioning and advising farmers on techno-economic matters (Perret, 1999).

2.4.3 Strengths of farm typology analysis

According to Schwarz *et al.*, (2009), farm typology has the following strengths and weaknesses:

- It provides more qualitative results that can be more convincing for extension officers and policy designers/makers (depending on the circumstances);
- It measures the structural changing of agriculture
- It provides a practical way to capture the diversity of farmers and their respective farming styles for further analysis and policy development ; and
- It identifies types of farmers on the basis of an evaluation of various plausible ‘paths of development’, which determine the long-term direction of agriculture.

2.4.4 Weaknesses of farm typology analysis

- Farm typology formulation consumes time because it requires and takes much time to collect and analyse data;
- It is expensive to carry out such a kind of study because it requires more time and money;
- Researchers sometimes say it does not contribute to the science; and
- Sometimes it is too complex and too diverse.

2.5. Farmer typologies in South Africa

Partly due to historical occurrences, the different types of farmers in South Africa range from large-scale commercial farmers and, small scale-agriculture to subsistence farmers in communal areas. In this context the South African agricultural sector is furthermore characterised by great inequalities. Inequality exists between large-scale commercial (mostly white) farmers and farmers in the communal areas, among farmers in the commercial agricultural sector, and among farmers in the communal areas. The difference between commercial and small-scale

(smallholder) farmers forms the basis of a broad based typology of farmers in South Africa, developed by Vink and Van Rooyen, 2009.

This typology (Vink and Van Rooyen, 2009) (see Table 2.1) will be a point of departure for the Stellenbosch study (typology of Stellenbosch smallholders). There is a need for a typology for the Stellenbosch local municipal area, because the one developed by Vink and Van Rooyen (2009) is a general broad based typology representing farming systems for the whole of South Africa, with the possibility of a rather limited application in the Stellenbosch environment. There is most likely a need for an adjustment of Vink and Van Rooyen's (2009) typology in order to take into account the localised situation in Stellenbosch and also to accommodate characteristics such as demographic information, land ownership, farming activities, farming objectives, agricultural inputs, farming constraints, access to markets, support services, adjacent farming and economic activities and also the risk attitudes of smallholder farmers.

Table 2.1: Farmer typologies in South Africa

Production unit	Turnover	Ownership and management	Number	Binding constraint	Support required
Large commercial on private property	>R3 million	Family-owned but incorporates multiple farms Rent in land – professional management	± 5 400	Market size Equity capital	Export market access Financial market innovation
Medium commercial on private property	R1 million to R3 million	Family owned, could be incorporated. Some renting in of land – family management	17 000	Land Capital Management	Mortgage capital for land access Management training
Small commercial on private property	<R1 million	Family owned, generally part time Some lifestyle farming (game ranches, weekend farms)	24 000	Management time	
Commercial in communal areas	> R1 million	Communal ownership Development projects Private ownership	-	Capital Management Infrastructure	Grants for land access Property rights Comprehensive farmer support Credit Physical infrastructure
‘Emerging’ commercial in communal areas	< R1 million	>20 hectares Communal ownership Small farmers in development project Private ownership	35 000	Land (property rights) Capital labour management Employment opportunities	Grants for land access Property rights Comprehensive farmer support Physical infrastructure Institutional infrastructure
Subsistence farmer in communal areas Allotments Market gardens	-	<20 hectares Communal ownership Private ownership Little formal market participation	1.256 million	Employment opportunities	Social welfare transfers

Sources: Vink (2014); Vink and Van Rooyen (2009)

Table 2.1 shows that the large-scale commercial farmers with turnover of more than R3 million annually are at the one end of the spectrum. These enterprises are generally found in the high-potential parts of the country and comprise: large-scale field crop producers, or export-oriented and irrigated horticulture producers, or intensive livestock operations. Many of the largest of these enterprises will farm on more than one non-contiguous farm, and some of the land will be rented in. They hire both labour and managers. These farmers are constrained largely by the size of the domestic and export market and by the difficulties that they face in accessing equity capital. One could argue that they require no more than the government support afforded to business enterprises generally in South Africa, including assistance in gaining export market access and an environment that is conducive to investment.

Just more than a third of the commercial farmers (some 17 000 farmers) had a turnover of between R1 million and R3 million in 2012 (Vink, 2014). These enterprises are largely family farms, but many are incorporated as private companies or closed corporations. They generally are large, extensive livestock enterprises in the drier parts of the country, medium-scale field-crop producers, or smaller irrigation farms. They are characterised by some renting in of land, are mostly managed by family members while farm workers are hired in, and they usually live on the farms. Their binding constraints are invariably access to mortgage finance for land purchase, more smoothly functioning land rental markets and management capacity. Government support could probably be limited to access to mortgage financing via the Land Bank, while they depend on the private sector for other services.

About half of all commercial farmers in South Africa had a turnover of less than R1 million in 2012 (Vink, 2014). They include a wide variety of overlapping categories of farms, many in peri-urban areas. Some are part-time and many can be classified as ‘lifestyle’ farming (game ranches, weekend or part-time farmers, etc.). The binding constraint in this instance most probably is management time, which in most cases is restricted by choice, it is not clear whether any targeted development efforts are required by the state.

The final three rows in Table 2.1 describe farmers in the communal areas of South Africa. Commercial farming operations in these areas include a spectrum of enterprises with turnover size greater than R1 million. Confusingly, there are farms in the communal areas under private ownership (i.e. farms that predate the 1913 Land Act or that were part of the ‘homeland

consolidation' that took place during the 1970s and 1980s). This category also includes development projects, mostly managed and financed by provincial Departments of Agriculture or their development agencies. There are also an unknown (but generally considered small) number of large-scale farms on communal land.

Row 5 in Table 2.1 includes farmers in the communal areas who farm for profit, albeit on a very small scale. Some of the farms will be operating on privately owned land, while others farm on agricultural development projects such as irrigation schemes. These farmers do not face a single binding constraint; rather they farm under circumstances that do not guarantee success. Land holdings are too small, property rights are insecure, and access to financial or other support services is limited.

Given the population distribution in these areas, with most of the able-bodied either employed or seeking employment in the modern economy, these farmers usually face labour constraints. They are often far away from even the most rudimentary infrastructure, making them inaccessible even to public servants such as extension officers and, veterinarians, who are supposed to help them. Furthermore, they lack political voice, and hence the ability to organise and to lobby for benefits from the state. These farmers require the full slate of farmer support services. They are, by definition, almost entirely reliant on the state rather than on the private sector, unless they can gain access to land in the commercial farming areas under the land reform programme. In this event, they, along with farm workers, could become the prime beneficiaries of land reform and AgriBEE projects. The smallest farms in the communal areas (row 6) are usually homestead gardens farmed by women and the elderly.

The farmers' typology of Vink and Van Rooyen (2009) was useful to this study, because it confirms that there is diversity between the farmers in South Africa, it deals with important factors to determine diversity and these factors include: production unit, turnover, land ownership, the number of farmers, binding constraint and the support required by each type. These will be considered for the development of a Stellenbosch Smallholder typology.

2.6 Farm equity share schemes/projects in South Africa – a new typology for agricultural planning and development

According to Knight *et al.*, (2003), farm equity share schemes are described as a method of redistributing land without affecting the operation of individual farms or overall production levels. Farm equity share schemes are a form of organisational structure that can serve different purposes and could also be implemented under different circumstances by various role players (Ralehoko, 2005). With better job satisfaction and greater participation, productivity should increase on farms where workers are also co-owners. They can also be used to empower farm-workers through active participation and ownership in the operation of the farm as land reform beneficiaries. In this context it provides a new typology for the South African agricultural development and transformation context.

All the role players share in the risk of the operation of a farming enterprise or the entire farm. The schemes also serve as incentives as workers possess assets on the farm (Ndlozi, 2005). Gray, Lyne and Ferrer (2004) describe farm equity share schemes as the agreements freely entered into by the parties involved, whereby farm-workers (employees) become beneficiaries of the farm they work on by owning shares in the farm or in an enterprise on the farm. Thus, these schemes allow farm-workers to acquire shares in the farm while they are still employees receiving salaries.

In the arrangement of farm equity share schemes, farm-workers use their land reform grants or make loans with the Department of Agriculture, Department of Land Affairs and Department of Rural Development, in order to buy shares from the farm they are working in. Farm workers buy shares in the farms with subsidies from the government, or through access to credit as a result of a long-term relationship with the company or farm. The money is invested in the operating company of the farm in return for a share of dividends (KingHo, 2011).

KingHo (2011) states that farm-worker equity share schemes are popular and of high value in the agricultural sectors, especially in the wine industry, and the reason for this is due to the capital intensiveness and high land prices. According to Anseeuw *et al.*, (2001), agricultural and land reform programmes are currently viewed as important aspects of development. The schemes are likely to be important programmes for growth with an equity strategy in South African

agriculture (Van Rooyen, Ngangweni & Njobe, 1994). Farm equity share schemes are seemingly a most viable option to integrate the poor into the ownership of business entity and land.

Farm equity share schemes, with farm-workers as their main target group, have been used in South Africa since democratisation. These schemes are meant to solve a relative number of past indifferences with the aim of increasing production while transforming land ownership to the previously disadvantaged (Ralehoko, 2005). The schemes exist for the purpose of empowering farm-workers, alleviating poverty, and increasing skills in the rural communities. They offer the potential for redistribution of land ownership, increased incomes, worker participation in decision making, and re-capitalisation of farm operations.

Knight and Lyne (2002) state that, in most cases, the schemes are privately owned farming operations that are generally restructured as companies with the original owner of the farm and the farm-workers as shareholders. The idea in South Africa was initiated by the private sector in the early 1990s (Knight & Lyne, 2002). These schemes promote partnerships between farm owners and farm-workers for the benefit of both. Hence, successful schemes should show certain positive benefits for all parties involved.

These schemes have several benefits, such as that they economically empower the previously disadvantaged groups, and broaden their access to assets and support systems. These benefits are achieved through sharing responsibilities in management and giving shareholders access to land and other farm assets with minimal costs, as opposed to investing in a new establishment or business venture (Ralehoko, 2005). Knight and Lyne (2002) emphasise that farm equity share schemes should distribute wealth and future benefits, empower workers, retain or attract quality management and attract capital from the private sector to finance investment.

The farm equity share schemes typology is not strictly a “smallholder”- model. The reason for including it in the Stellenbosch typology is because this represents a new development model to link emerging farmers’ types (farm worker shareholders) to commercial farm production through a share in the farming business. This type provides a scope for transforming farming ownership, and is viewed by Stellenbosch local municipal area as an important for the possible accommodation of smallholders in the Stellenbosch farm typology and therefore a potential development strategy to accommodate, mobilize and support the commercialisation of smallholder/new farmers in the area.

2.7 Farmers’ risk attitudes

2.7.1 Introduction

Farmers’ risk attitudes are an important factor in agriculture, but often are under-scored for various reasons. In this section, attention will be paid to the risk attitude factor and its relation to typology analysis. The risk attitude factor is one of the most important factors in farming, as it is a key to directing farm activities and the investment of time, effort and capital and as such the structuring appropriate support programmes for farmers, to operate more efficient and effective, i.e. to include different risk management support systems for different types of smallholders in those support programmes.

Farmers generally do not get into risky situations unless there is a probability of producing food and/or making money (Hardaker *et al.*, 2004). Higher profits are typically associated with higher risks. It is to their advantage that these risky but potentially profitable situations be managed as carefully as possible. According to Bard and Barry (2000), effective risk management strategies involve anticipating possible difficulties and planning to reduce their consequences, not just reacting to unfavourable events after they occur. Bard and Barry (2001) mention that agricultural producers (farmers) make decisions in a risky environment resulting from production (weather, disease and pests), market and price (including input and output), and financial (interest rates) uncertainty. How farmers manage these risks is greatly influenced by their attitudes toward or willingness to take risk.

Risk attitude has more to do with the individual’s psychology than with his/her financial status or circumstances (Bard & Barry, 2000). As all decisions taken in farming have an element of

uncertainty about them (Hardaker *et al.*, 2004), all farm decision makers are risk takers. This implies that, generally, all farmers are risk-takers, for the fact that they are involved in farming activities because we all know that farming is a risky business and that qualifies a farmer to be a risk taker. The degree to which farmers enjoy taking risk depends on individual attitudes. Understanding farmers' attitudes and responses to agricultural risks is important for designing financial support services (insurance packages) and effective extension services (Demiryurek, Ceyhan & Bozoglu, 2012).

It is generally said that farmers' risk attitudes are assumed to be risk averse, especially for smallholders, but Tae-Hun (2008) says it is not always the case that farmers are risk averse, sometimes they are risk preferring and their attitudes towards risk change over time.

Other studies show that farmers' risk attitudes are risk loving, although risk aversion cases are more frequent. This implies that different smallholders or different types of smallholders have different attitudes towards the risks involved in farming (Ayinde *et al.*, 2008; Bard & Barry, 2000).

Knowing how different types of farmers react to risk is important to farmers, industry stakeholders and policy-makers. If farmers' risk attitudes are known, risk management strategies and educational programmes about risk can be tailored to the farmers' tolerance for risk (Bard and Barry, 2001). Industry stakeholders or service providers such as insurance companies, seed companies, lenders and financial counsellors benefit from knowing farmers' attitude toward risk when developing appropriate insurance policies, marketing new seed varieties, and creating financial services, respectively (Bard and Barry, 2001).

2.7.2 Characterisation of farmers' risk attitudes

According to Hardaker *et al.*, (2004) and Tae-Hun (2008), risk attitude means decision makers' or farmers' response to risk, such as being: risk averse, risk neutral or risk preferring.

2.7.2.1 Risk aversion

Risk aversion is defined as the unwillingness to deal with any level of uncertainty (Bond & Wonder, 1980). This means that risk-averse farmers want to take action or decisions only in activities that they are certain about or at least have an idea about the future concerning that

action. A risk-averse person is an individual who is afraid or sensitive to risk and he/she would trade a gamble for a sure amount that is less than the expected value of the gamble (Hardaker *et al.*, 2004). An individual is described as risk averse if he/she prefers a situation in which a given outcome and income is certain to a situation yielding the same expected value for income but that involves uncertainty (Dadzie & Acquah, 2012).

A risk-averse farmer is a farmer who is not comfortable with uncertainty, and desires to avoid or reduce threats and exploit opportunities to remove uncertainty. Risk-averse decision-makers are not willing to accept whatever risk, no matter what increase in return.

Dadzie and Acquah (2012) define risk premium as the measurement of how much an individual is willing to give up in order to receive the average outcome for certainty, rather than some risky chance at the average outcome. A decision-maker is said to be risk averse if the risk premium (R) is positive ($R > 0$). Intuitively, a decision-maker (farmer) is risk averse if he/she is willing to pay a positive amount of money (as measured by a positive risk premium: $R > 0$) to eliminate risk. This positive willingness-to-pay means that he/she is made worse off by risk exposure, thus the term risk averse. Individuals who find risk undesirable are commonly referred to as risk averse.

2.7.2.2 Risk neutral

The risk-neutral person (farmer) is someone who is indifferent about taking the risky decision, or is someone who is in between risk averse and risk lover. A risk-neutral individual is uncomfortable with uncertainty in the long term, and hence is prepared to take whatever short-term actions are necessary to deliver a certain long-term outcome. According to Dadzie & Acquah (2012), a risk-neutral person is a decision maker who is indifferent between certain and uncertain outcomes with the same expected outcome and value of income. A decision maker is said to be risk neutral if the risk premium (R) is zero ($R = 0$). A farmer is risk neutral if he/she is made neither better off nor worse off when his/her risk exposure is modified (Hindi, 2009). Individuals with no risk premium are called risk neutral. Individuals who do not care are commonly referred to as risk neutral

2.7.2.3 Risk seekers/takers/preferring

A risk seeker is an individual who is willing to deal with the uncertainty. This implies that this type of person is willing to take risky decision and take chances of gaining from his/her decisions. A risk seeker is willing to accept risk even for a marginal increase in return. A risk- preferring/seeking person is a person who is willing to take the risk of doing better than expected while being aware of the possibility of doing less-well than expected because of the risk involved in the decision and actions (Dadzie & Acquah, 2012). A decision-maker is said to be a risk lover if the risk premium (R) is negative ($R < 0$). Individuals with a negative risk premium are called risk preferring. Alternatively, a decision-maker (farmer) is a risk lover if he/she must be compensated ($R < 0$) when his/her risk exposure is eliminated. This implies that a farmer likes risk (thus the term risk lover) and is made worse off when risk is removed. Individuals who find risk desirable are often referred to as risk preferring or loving.

2.8 Link between farm diversity and farmers' risk attitudes

Farming systems developed by different smallholders are believed to vary from one another and also risk management strategies used by different smallholders, hence risk attitudes for different smallholders from different farm types and also agro-ecological zones and farming environments are expected not to be similar (Van Averbeke & Mohamed, 2006; Harderker *et al.*, 2004). Different smallholder types with different resource endowments would be supposed to respond differently to risks involved in farming.

Risk management strategies in agriculture vary with farm characteristics – style, systems, etc. and the prevailing risk environment (Hope & Lingard, 1992), and that leads to different attitudes towards risks by different farmers and farm types. Farmers' risk perceptions, risk attitudes, objectives as well as the available resource base, influence their decisions and actions.

Diversity in terms of farmers risk attitude that exist between different types of smallholders ranges from risk averse, risk neutral to risk preferring (Harderker *et al.*, 2004). If, however, it can be shown that there is diversity in farmers risk attitudes between different types of smallholders, policy makers should take this diversity into consideration. When agricultural planners and policy makers plan and design policies and support programmes for smallholders, and such

diversity of smallholder farming systems and risk attitudes can be taken into consideration, support programmes will be more effective as they will be designed based on the true reflection and reality of smallholder farming styles. This aspect will be explored further in the study.

2.9 Summary

Literature on farm diversity and farmer typologies has been reviewed in this chapter. Diversity was described and it has been demonstrated that there are different methods that can be used to analyse farm diversity. These methods include: farming styles theory, agrarian systems and farming systems. Farming styles theory came up as the method that is used mainly to study and explain diversity in farming. Farming systems was another important method to analyze farm diversity that was discussed, as it analyses the cropping and/or livestock systems a farmer uses based on the available means of production and workforce.

Two different practical approaches to describe and analyse farm diversity were identified viz. zoning and the typology techniques.

Risk attitudes of farmers were also discussed, giving a better understanding of different types of farmers risk attitudes. The linkages between farm diversity (farm typology) and farmers risk attitudes was considered, indicating that if these two concepts (farm diversity and farmers' risk attitudes) are related concepts, they need to be accommodated in smallholder development support policy, strategy and planning design.

CHAPTER 3 – ANALYTICAL FRAMEWORK AND METHODOLOGY

3.1 Introduction

This chapter provide the framework for describing and analysing the farm diversity and risk attitudes of Stellenbosch smallholders. This framework depicts (a) the objectives and structure of the study; (b) the different steps directed; and (c) the methods of data collection and data analysis are presented in this chapter. The Stellenbosch smallholders' interview/survey process and the implementation of the field work for the typology study will also be described in this chapter. The research site and agricultural situation study area will also be described and discussed in this chapter.

3.2 Framework of analysis

A framework of analysis consisting of four steps was developed to describe and analyse farm diversity and the risk attitudes of Stellenbosch smallholders, (see Figure 3.1).

Step 1: Defining farm diversity, farm typology, risk attitudes and smallholders: This step is important, as it focuses on defining the important concepts of the study. The definition of farm diversity, farm typology, risk attitudes and smallholders will guide the choice of methodology (data analysis methods) and consequently the type of data needed and the gathering process. In chapter one and two of this study, these concepts were defined as follows:

- Farm diversity is a concept to describe and understand the different farming types and systems and help in designing appropriate support systems to serve such different types effectively;
- Farm typologies are a means of categorising different farm types, which makes it possible to organise reality from a point of view relevant to the objectives of the study. The general, common way of assessing farm diversity in an area is through farm typologies;
- Risk attitudes are defined as farmers' responses to risk, such as risk averse, risk neutral and risk preferring; and

- Smallholder is defined as a previously disadvantaged black farmer (Black, Indian or Coloured), who has access to a piece of farm land for farming purposes and grows crops and/or keeps livestock, with limited resource endowment.

Step 2: Determining smallholder diversity: The definition of diversity, as described in step 1, provides the framework for quantitative and qualitative data collection. Data sets will be completed through a questionnaire, individual interviews and focus group discussions.

Step 3: Description of smallholder diversity: The third step is to describe the different types of smallholders and their risk profiles, within the typology of the Stellenbosch local municipal area

Step 3.1: Description of different types of smallholders: The description of different types of smallholders, within the typology, will be done through the application of selected criteria and variables and the analysis thereof using both quantitative and qualitative analysis.

Step 3.2: Description of risk attitudes or risk profiles per type: After the description of different types of smallholders, the description of risk attitudes or risk profiles of different types of smallholders or risk attitudes per type will be studied. The risk attitudes for different types of smallholders will be done through an analysis of risk attitudes per smallholder type, which will be done through qualitative analysis. Data on risk preferences will be gathered from Stellenbosch smallholders by an interview survey using questionnaires.

Step 4: Conclusions and recommendations: Step four of the framework will deal with conclusions and recommendations and strategies, inter alia based on most likely development trajectories/paths and differences in risk profiles per type, with related recommendations. Personal consultations, focus group discussions informed this process.

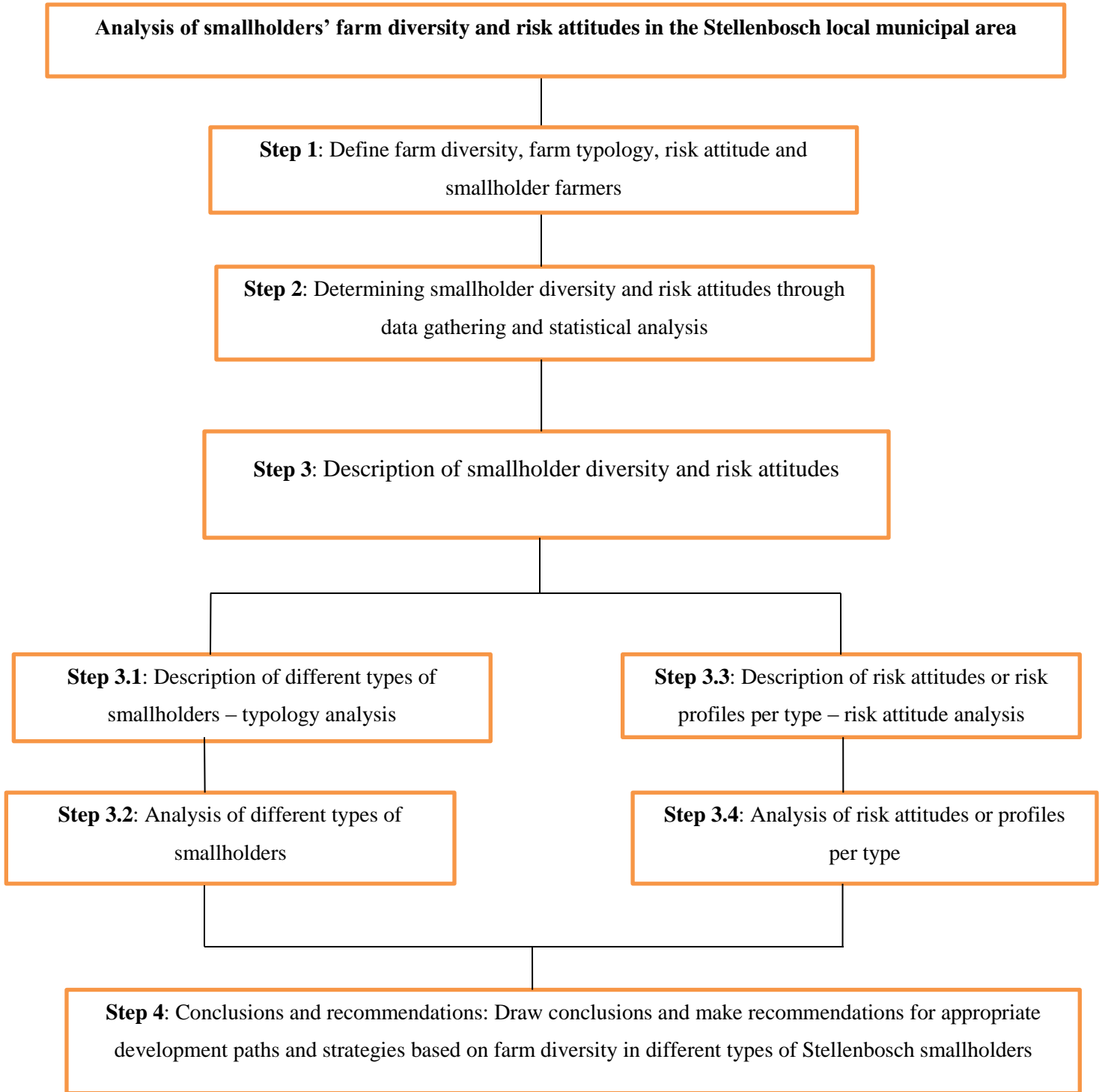


Figure 3.1: A framework for analysis of smallholders' diversity and risk attitudes in the Stellenbosch local municipal area

3.3 Study initiation, site identification and survey procedure

The study was linked to the South African Agrarian Diagnosis Project, with participants from Stellenbosch University; the University of Pretoria and Agro Tech Paris of France. The project commenced with a workshop (which took place at the University of Pretoria in March 2012), where relevant theoretical concepts, the analytical framework and data collection methods and analysis were considered. Some of these were incorporated into this Master's study.

Diversity and risk attitudes were examined for smallholders in the Stellenbosch local municipal area in the Western Cape province of South Africa. The reasons for choosing this area were because it was observed that there are smallholders operating in the area and it is a priority focus of the municipality management; and significant diversity was observed among these Stellenbosch smallholders, including in cultural, historical, social and natural environmental factors. The presence of farm worker equity schemes also extended the relevant farm typology in the area. All these features also made the inclusion of the “Stellenbosch smallholders typology” an interesting case for the “Agro Paris Tech/Agence Francaise de Development” project.

Consultation with officials from the Stellenbosch local municipal area and the Department of Agriculture, Western Cape Province followed the Pretoria workshop. The purpose of the consultation with the Municipality and the Department of Agriculture officials was to situate the study and to obtain permission and support to gather the required information about smallholder farmers in the Stellenbosch local municipal area, from the Stellenbosch Municipality officials. Information was gathered about different places and rural hamlets where smallholders are active, the boundaries of the municipality, and the status of the land farmed i.e. commonage land or privately owned land. From the Department of Agriculture officials, contact details of those smallholders (name of the smallholder, name of the place where is he/she farming and phone numbers) were obtained in order for the researcher to make appointments with them.

3.3.1 Data collection

Both primary and secondary data was used in this study. Primary data was collected from smallholders using a semi-structured questionnaire, and secondary data was obtained from the existing and relevant literature.

Two primary data collection phases were employed in this research: firstly, through interviews with key informants, asking generally about the area and place of farming (the zoning phase) and secondly, in-depth interviews with selected smallholders.

The questionnaire used to gather data for this study was developed and formulated in the Pretoria workshop for the South African Diagnostic Project. To make sure that the questionnaire was valid, it was tested through a pilot study and was validated (see Annexure 1).

The questionnaire was semi-structured in nature in order to allow for some flexibility to probe and follow up on interesting points. Another reason for a semi-structured questionnaire was to allow room for participants to elaborate freely on various key points that they deemed important. This was done through the use of strategically placed open-ended questions, with specific probes placed to assist participants in formulating a response. Questionnaires were interview-administered to alleviate the problem of misinterpretation or the misunderstanding of words or questions by the respondents. This implies that data was collected through face-to-face interviews with farmers.

Data collected from Stellenbosch smallholders included both qualitative and quantitative information: the demographic information of the smallholders and their household members; professional information; land ownership and occupation; farming activities; financial situation of the household; access to markets; institutions and support; problems and constraints related to farming activities markets; and information related to risks involved in farming; risk management strategies employed by smallholders; and risk attitude.

3.3.2 Sampling method/selection of respondents, fieldwork and surveys

Table 3.2: Where smallholders interviewed

Zones (Places)	Number of operational smallholders per area	Number of smallholders interviewed per area
Klapmuts	7 smallholders	7 smallholders
Kylemore	8 smallholders	8 smallholders
Lanquedoc plus Pniel	No farming activities happening at the moment, arable land is lying idle	2 non-farming households
Jamestown	3 smallholders	3 smallholders
Herbal View	1 smallholder	1 smallholder
Raithby	4 smallholders, but only 2 active smallholders	2 smallholders plus 2 non-farming households
Franschhoek	3 smallholders	3 smallholders
Spier Corridor (Annandale Road) - Lynedoch	13 smallholders, but 12 smallholders that are active	12 operational smallholders plus 1 non-farming household
Farm worker equity share schemes		
Swartrivier Vineyard Project	1 manager 66 shareholders (permanent farm-workers)	1 manager plus 2 shareholders
Meerlust	No farming activity Only having shares in storage facilities	0 smallholders
Koopmanskloof Vineyards Project	1 manager 68 shareholders (permanent farm-workers)	1 manager plus 2 shareholders
Enaleni Trust	1 manager 13 shareholders (permanent farm-workers)	1 manager plus 2 shareholders
Poker Hill Vineyards	1 manager 38 shareholders (permanent farm-workers)	1 manager plus 2 shareholders
		Total = 49 participants were interviewed

Source: Own survey data

3.3.2.1 Sampling method

A non-probability sampling method was used to select smallholders to be included in the sample. Perret (2000) states that the sampling method for typology is basically a non-probability sampling method. As typology is not a census, the selection tends to avoid the methodological illusion of statistics and of sampling representativeness according to demography or space size, but favours the criteria of diversity, consistency and relevance to the purpose. However, part of the sampling process relies on the existing data about agricultural activities in the targeted area. Smallholders included on the farm survey were households that were believed to represent different farming systems or the diversity that exists amongst smallholders in Stellenbosch local municipal area.

Non-probability sampling was done for the data collection, as the researcher included all the available and accessible smallholders in the Stellenbosch local municipal area that he managed to reach and interview during the data collection period.

Not all the places referred in Table 3.2 have active smallholders, namely Pniel and Lanquedoc, which have had active smallholders before, but no longer. At Raithby there were four smallholders, but only two smallholders were active and still practising farming, so two smallholders were no longer participating or active in farming activities and were of the non-farming type. In the Spier Corridor (Farm 502) there were 13 smallholders in total who each have 5 ha of arable land on 65 ha and, one smallholder stopped participating in farming activities in 2011, since he was not generating “sufficient income” from the farming activities. This person was thus included in the farm-land occupying but non-farming type smallholders. This type was included to gain information about the reasons for farming any more.

In the Pniel, Raithby and Spier Corridor, households that used to participate in farming were also interviewed in order to discover the reasons that led them to stop farming, and what advice that could be formulated, for instance on things like future farming activities. The Meerlust equity share scheme differs from other schemes, because the Meerlust shareholders are not involved or taking any part in farming activities as part of the scheme. They have shares in agribusiness value adding viz: a storage and packaging company located on the farm. Therefore, the Meerlust

scheme was not included in the list of shareholders of farm-worker equity share schemes that were interviewed.

3.3.2.2 Fieldwork and surveys

Interviews were done with a total of 49 participants (44 active smallholders and 5 non-farming households) in the Stellenbosch local municipal area. Non-probability sampling was done in the data collection period, and the researcher included all the available and accessible smallholders in the Stellenbosch local municipal area that could be reached and interviewed during the data collection period.

The field work for this study took place from September 2012 to November 2012. Data collection comprised two phases.

First phase: the researcher visited each place where there were smallholders, observed the places and also talked to a key informant. The objective of the first phase visit was to gain a clear background about agriculture related activities occurring in those places where there were smallholders. The type of information that was gathered during this phase included information about the infrastructure, farming activities taking place, etc. The duration of the first phase was at the maximum of two weeks.

Second phase: in-depth interviews were conducted with Stellenbosch smallholders to collect the information on the different farming systems and the risk attitudes of Stellenbosch smallholders. The in-depth interviews with Stellenbosch smallholders took more time compared with the first phase, as each questionnaire took almost one and a half hours to complete. This meant that the researcher managed to do only three to five interviews per day, as the time was a limiting factor and a constraint.

Personal interaction: at the beginning of the data collection for this study, it was not easy to interact with the Stellenbosch smallholders and to gather information. The reasons was that the Stellenbosch smallholders were reluctant to talk and share the information with the researcher, and some were saying it was a waste of their time, as they did not see how they were going to benefit directly from the study. The turnaround strategy the researcher used to convince the Stellenbosch smallholders to participate was to tell them that the study would be of primary

benefit to them because the outcome of study would address and discuss the crucial issues and challenges they faced in farming, i.e. marketing challenges and risk attitudes, and propose what could be the suitable support programmes for different farm types of the Stellenbosch smallholder typology. They eventually agreed to participate in the study, on an individual bases through interview sessions.

Feedback sessions with the officials from the Stellenbosch Municipality and the Western Cape Department of Agriculture were conducted as “focus group sessions” to consider progress and responses. After the collection of the data, the data was sorted and coded using Microsoft Excel spreadsheet. Statistical analysis (how to identify different types of smallholders using cluster analysis) was conducted and the results obtained are analysed in Chapter 5. The support of Dr. J. Harvey (from the Department of Statistics Consultation Centre – Stellenbosch University) in the data analysis is acknowledged.

3.4 Data analysis

Different methods were utilised in analysing the data and in attempting to achieve the research objectives. Microsoft Excel and the Statistical Package for the Social Sciences (SPSS Version 20) were used to analyse the data. To group different smallholders into one type/group, a multivariate analysis, to be specific a cluster analysis, was used to group similar smallholders in one group and to group different smallholders into the different groups/types in which they belong, and to show the characteristics that explain each type. A multivariate analysis is when one uses more than one variable to categorise the different types of smallholders. The cluster analysis technique is used to form homogenous groups, i.e., those that present great homogeneity within the group and great heterogeneity between groups.

The more variables used to categorise different types of smallholders, the more precise a typology will be and the better it will reflect the reality. The cluster analysis technique (to analyse farm diversity and identify different types of smallholders) and the Likert risk attitudinal scale (to analyse the risk attitudes of smallholders) were used to analyse the data of the study while, trying to achieve the objectives of the study, trying to answer the questions of the study, and also trying to prove and accept or reject the hypotheses of the study.

3.4.1 Typology development analysis

Data from Stellenbosch smallholders was collected and analysed, and the smallholders' farm typologies were constructed using multivariate statistical analysis. Variables were recorded from interviews with smallholders that were analysed in order to build typologies of smallholders and to analyse the risk attitudes of those different types. Multivariate analysis was used to formulate different types of smallholder farming systems.

Multivariate analysis is a statistical tool for determining the relative contributions of different causes to a single case (Katz, 1999). The multivariate technique is used to form homogenous groups, i.e., those that present great homogeneity within the group and great heterogeneity between groups. The more variables used to categorise different types of smallholders, the more precise a typology will be and the better it will reflect the reality. The type of multivariate analysis that was employed in this study is called cluster analysis.

3.4.2 Cluster analysis (CA)

The multivariate analysis, to be specific, cluster analysis, as used by Tryon (1939) and also by Arabie and Hubert (1992), will be used in this study. The CA method is defined as the convenient method for identifying homogenous group of objects (smallholders) called clusters. This type of method divides data into groups/types that are meaningful, useful or both (Held, 1996) and will be used to cluster different smallholder farm types and analyse them to show the diversity that exists between the farming systems used by Stellenbosch smallholders. CA is a statistical technique used to group individuals or objects into homogeneous sub-groups based on responses to variables. In order to get results of farm diversity from smallholders in the Stellenbosch local municipal area, statistical analysis will be performed using SPSS software (version 20). From the statistical analysis, results on different types of Stellenbosch smallholders and their risk attitudes/risk profiles will be established.

Mooi and Sarstedt (2011) define cluster analysis as a convenient method for identifying homogenous groups of objects (smallholders), called clusters or types. Cluster analysis divides data into groups/types that are meaningful, useful or both (Held, 1996). Objects (or cases, observations) in a specific type share many characteristics, but are very dissimilar to

objects/smallholders not belonging to that cluster/type. Different steps of how to conduct a cluster analysis are shown in Figure 3.2 and will be discussed in further details.

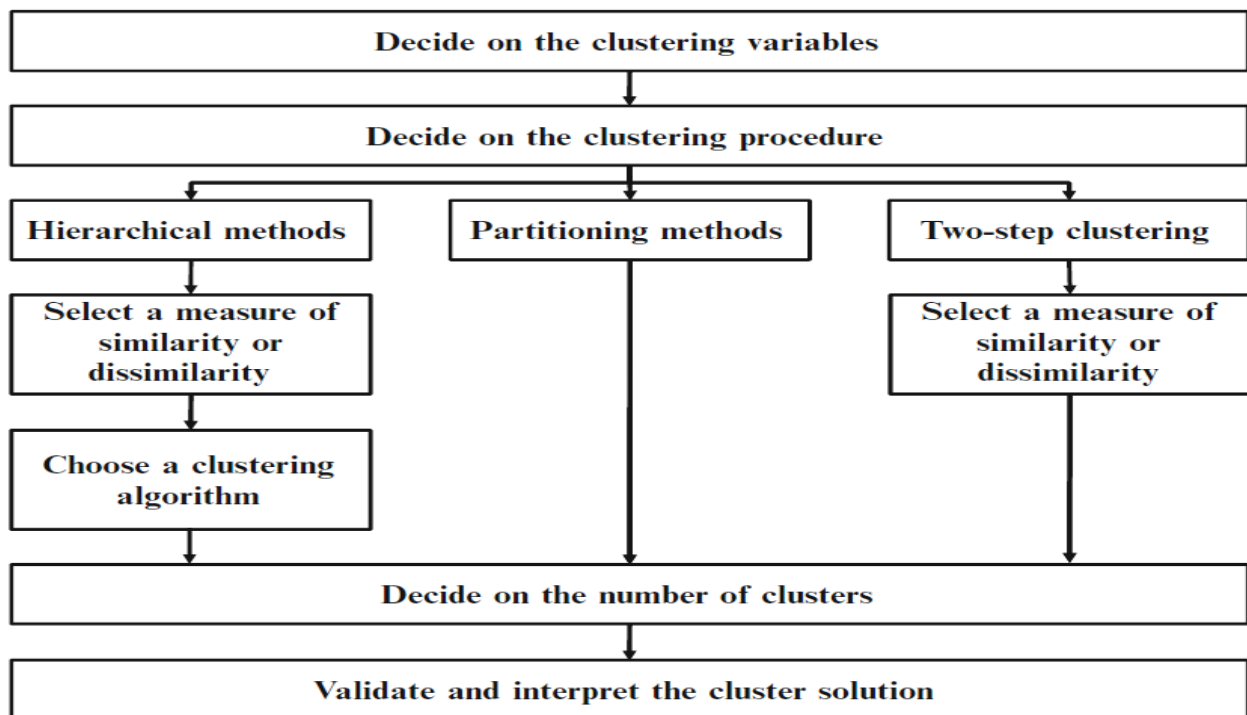


Figure 3.2: Steps in a cluster analysis

Source: Mooi and Sarstedt (2011)

3.4.2.1 Clustering variables

At the beginning of the clustering process, one has to select appropriate variables for clustering/grouping similar objects/smallholders. The types of variables used for cluster analysis provide segments/groups and, thereby, influence groups targeting strategies and support programmes (Mooi & Sarstedt, 2011). In some cases, the choice of clustering variables is apparent from the nature of the task at hand. Whichever clustering variables are chosen, it is important to select those that provide a clear-cut differentiation between the types regarding a specific objective.

3.4.2.2 Clustering procedure

By choosing a specific procedure, one determines how groups/types are to be formed. This always involves optimising some kind of criterion. The procedure could address the question of how to determine the dis-(similarity) between objects (smallholders) in a newly formed cluster and the remaining objects in the data (Mooi & Sarstedt, 2011).

There are many different clustering procedures and also ways of classifying the objects/smallholders into different groups. According to Held (1996), the different clustering methods include hierarchical clustering, partitioning clustering, and two-step clustering.

The partitioning and two-step clustering methods will not be discussed in details in this study, simply because the study did not utilise them, only the hierarchal clustering method was used. Hierarchical clustering is one of the most straightforward methods. Hierarchical cluster analysis begins by separating each object into a cluster (group/type) by itself. At each stage of the analysis, the criterion by which objects are separated is relaxed in order to link the two most similar clusters until all of the objects are joined in a complete classification tree.

Hierarchical clustering procedures are characterised by the tree-like structure established in the course of the analysis. Dibb (1999) states that most hierarchical techniques fall into a category called *agglomerative clustering*. In this category, types are consecutively formed from objects (smallholders). Initially, this type of procedure starts with each object (smallholder) representing an individual type. These clusters are then sequentially merged according to their similarity. First, the two similar types (i.e., those with the smallest distance of dissimilarity/difference between the first two clusters) are merged to form a new cluster at the bottom of the hierarchy (Mooi & Sarstedt, 2011). In the next step, another pair of clusters is merged and linked to a higher level of the hierarchy, and so on. This allows a hierarchy of types to be established from the bottom up.

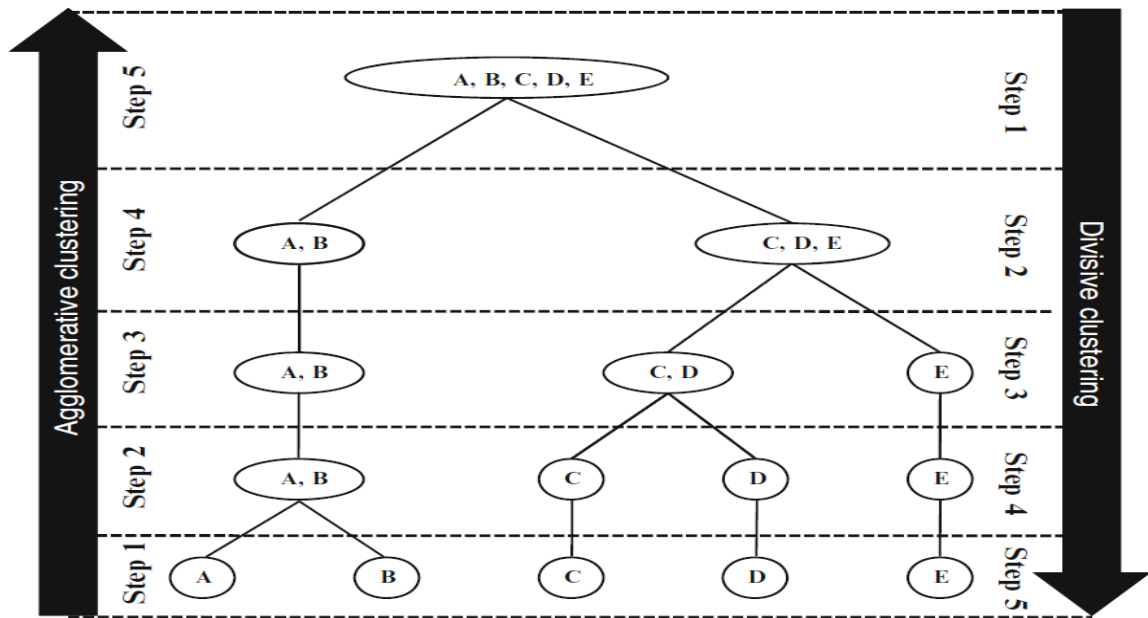


Figure 3.3: Agglomerative and divisive clustering

Source: Mooi and Sarstedt (2011)

Figure 3.3 shows how agglomerative clustering assigns additional objects (smallholders) as the cluster size increases. A cluster hierarchy can be generated top-down. In the *divisive clustering*, all objects (smallholders) are initially merged into a single cluster, which is then gradually split up. Figure 3.3 illustrates this concept (right-hand side). In both agglomerative and divisive clustering, a cluster on a higher level of the hierarchy always encompasses all types from a lower level. This means that if an object (a smallholder) is assigned to a certain type, there is no possibility of reassigning this object to another cluster. This is an important distinction between this type of clustering and the partitioning method (Mooi & Sarstedt, 2011). For this study the agglomerative hierarchical clustering method was used.

An agglomerative hierarchical clustering method uses a bottom-up strategy. It typically starts by letting each object (smallholder) form its own cluster and iteratively merging clusters into larger and larger clusters, until all the objects are in a single cluster or certain termination conditions are satisfied (Mooi & Sarstedt, 2011). The single cluster becomes the hierarchy's root. For the merging step, it finds the two clusters that are closest to each other (according to some similarity measure), and combines the two to form one cluster. Because two clusters are merged per iteration, where each cluster contains at least one object, an agglomerative method requires at

most n iterations. Different iterations in which clusters merge is normally shown by a table called an *agglomeration schedule*. Different clusters/types formed through agglomerative clustering method shown by a *dendrogram* diagram.

Using the dendrogram: The basic criterion for any clustering is distance/dissimilarity (Forina, Armanino & Raggio, 2001). Objects (smallholders) that are near each other, in terms of set criteria, should belong to the same cluster/type, and objects that are far from each other should belong to different clusters/types. A common way to visualise the hierarchal cluster analysis's progress is by drawing a *dendrogram*, which displays the distance (dissimilarity) level at which there is a combination of objects (smallholders) and clusters (Mooi & Sarstedt, 2011). Dibb (1999) states that a dendrogram shows how the types are merged and can also be used to decide on the number of clusters, each differing significantly from the other, to be formed from the data.

The results of a clustering technique are generally reported in a plot/graph called the dendrogram of similarities (Forina *et al.*, 2001). In this section we shall consider a graphical representation of a matrix of distances (dissimilarities) which is perhaps the easiest to understand – a dendrogram, in which the objects (smallholders) are joined together in a hierarchical fashion from the closest, that is most similar as per the selected criteria, to the furthest apart, that is the most different (Schonlau, 2002). A dendrogram is used to classify and understand diversity that exists between the objects (smallholders) (Clewly, 1998). A dendrogram is a branching diagram that represents the relationships of similarity or dissimilarity among a group of entities. It shows how different objects (smallholders) are grouped together/ separated, i.e. it provides a method to capture diversity. If one wants a visual representation of the distance (dissimilarity) at which clusters/types are combined, one can look at a display called the dendrogram. In cluster analysis a dendrogram is a “tree graph” that can be used to examine how clusters/types are formed in hierarchical cluster analysis (Everitt & Dunn, 1991). Each leaf in the dendrogram represents an individual observation and start by treating each object (smallholder) as a cluster/type.

A hierarchical tree diagram, called a dendrogram can be produced to show the linkage points. The clusters/types are linked at increasing levels of dissimilarity (Clewley, 1998) and the results

of the cluster analysis are shown by the dendrogram, which lists all of the sample observations and indicates at what level of similarity any two clusters/types are joined.

The horizontal axis of the dendrogram represents the distance or dissimilarity between clusters/types. The vertical axis represents the objects (smallholders) and clusters/types. The dendrogram is fairly simple to interpret. Remember that the main interest is in similarity and clustering. Each joining (fusion) of two clusters/types is represented on the graph by the splitting of a horizontal line into two horizontal lines (Schonlau, 2002). The horizontal position of the split, shown by the short vertical bar, gives the distance (dissimilarity) between the two clusters/types.

These concepts are applied in Chapter 5 and illustrated in Figure 5.11 to indicate the current scope of diversity in smallholder farming types in the Stellenbosch local municipal area.

3.4.2.3 Validate and interpret the cluster solution

Tonks (2009) states that, before interpreting the cluster solution, one has to assess the solution's stability and validity. Stability is evaluated by using different clustering procedures on the same data and testing whether these yield the same results (Jacobs and De Man, 1996). In hierarchical clustering, one can likewise use different measures. However, it is common for results to change even when the solution is adequate. How much variation one should allow before questioning the stability of the solution is a matter of taste (Dibb, 1999). When using hierarchical clustering, it is worthwhile changing the order of the objects in the dataset and re-running the analysis to check the stability of the results.

Assessing the solution's reliability is closely related to testing the stability of the clustering solution, as reliability refers to the degree to which the solution is stable over time (Mooi & Sarstedt, 2011). If clusters/types quickly change their composition or their members their behaviour, targeting strategies or support programmes are likely not to succeed. Therefore, a certain degree of stability is necessary to ensure that the strategies/support programmes can be implemented and produce adequate results. This can be evaluated by critically revisiting and replicating the clustering results at a later point in time.

The final step of any cluster analysis is the interpretation of the clusters/types. Interpreting clusters/types always involves examining the cluster centroids, which are the clustering variables' average values of all objects (smallholders) in a certain cluster/type (Mooi & Sarstedt, 2011). This step is of the utmost importance, as the analysis sheds light on whether the groups are conceptually distinguishable. Only if certain clusters/types exhibit significantly different means in these variables are they distinguishable – from a data perspective, at least.

By using this information, one can also try to come up with a meaningful name or label for each cluster/type; that is, one that adequately reflects the objects/smallholders in the cluster/type.

3.4.3 Risk attitudes analysis

King and Robison (1981) noted that preferences (farmers' risk attitudes/preferences) are difficult to measure accurately enough to permit the reliable evaluation of alternative choices. There are several techniques that are used to ensure that the risk attitudes of farmers are measured (Health and Safety Executive [HSE], 2009). Farmers' risk attitudes are studied using different methods or various estimation techniques, including: direct elicitation of utility function (the von Neumann-Morgenstern method, modified von Neumann-Morgenstern method, Ramsey method and interval approach); experimental procedures with hypothetical questions (experimental gambling approach); and indirect approach, which is the Likert risk attitudinal scale method (Lagerkvist, 2005; Hardaker *et al.*, 2004; Binswanger, 1980; Dillon & Scandizzo, 1978; Anderson, Dillon & Hardaker, 1977; Moscardi and De Janvry, 1977). But for this study, the Likert risk attitudinal approach/method was used.

Likert scale method

The literature states that risk attitudes influence the way farmers manage risk. Therefore, it is hypothesised that attitudes towards mechanisms or tools used for managing risk reflect the producers underlying construct of a risk attitude (Hardaker *et al.*, 2004). Therefore, to measure smallholders' risk attitudes in this study, a Likert scale was employed, which is a risk attitudinal scale approach. The methodology for developing a risk attitudinal scale is applied to assess farmers' attitudes towards risk in production agriculture (Bard & Barry, 2000). The scale assesses risk attitudes by eliciting farmers' opinions on risk management strategies/tools using a Likert procedure. A Likert scale is a response scale used primarily in questionnaires to obtain

participants' preferences or degree of agreement with a statement or set of statements (Tae-Kun, 2008). Respondents are asked to indicate their level of agreement with a given statement by way of an ordinal scale.

The Likert scale method (risk attitudinal scale) as developed by Likert (1932), used also by Bard and Barry (2000); and by Roslan *et al.*, (2012), will be used in this study to analyse the risk attitudes of Stellenbosch smallholders. Risk attitudes will be assessed by eliciting smallholders' opinions on proposed risk management strategies using a Likert procedure.

A Likert scale was selected as the measurement format, due to its appropriateness for assessing risk attitudes. The advantage of this approach is that the statements are short, easy and straightforward, to the point and can be answered relatively quickly. The Likert scale was found to be a better predictor of actual individual behaviour in the face of risk in various social contexts than other measures of risk attitude (Uematsu & Mishra, 2011).

Hindi (2009) states that a number of empirical studies have utilised a Likert scale to measure risk attitudes of farmers and obtained theoretically consistent results.

Statements addressing different methods for managing risk were formulated. Responses to the statements indicate the degree to which the farmer agrees or disagrees with the tool's utilisation. The respondents were asked to indicate their level of agreement with a particular statement on a 5-point Likert response scale. The respondents rated each item, thus conveying their risk attitudes towards the underlying variable. The respondents' ratings of the multiple items were summed to yield an average score for the individual. The average score was then scaled for comparison with other respondents' scores.

The respondents were asked to choose a number between 1 and 5 on a Likert scale to represent the level of risk with which they were comfortable when making decisions, with 1 being "avoid risks as much as possible" and 5 being "take risks as much as possible." Any proposed measurement of risk attitude is never free from contradiction with empirical evidence, which is also subject to inconsistent findings (Lagerkvist, 2005).

The results of this study will be of relevance because different types of smallholders and their risk attitudes were described and analysed, which means that support programmes and communication approaches for extension services or policy makers can be improved.

3.5 Variables used to build farm types of the Stellenbosch smallholder typology

Different variables were used to identify and develop a number of farm types within the Stellenbosch smallholder typology. The variables considered for this classification were sourced from various literature studies including Laurent *et al.*, 1999; Modiselle, 2001; Perret, 2000; Perret & Kirsten, 2000; Vink and Van Rooyen, 2009. Such variables were discussed in the South African Agrarian Diagnosis project. Variables selected for the Stellenbosch typology and included in the cluster analysis to determine diversity in the Stellenbosch smallholder typology and to build different smallholder types were the following: age of the farmer; gender; education qualification; occupation; household size; number of family members employed; number of jobs before becoming a farmer; form of land ownership; when started farming; how the farmer acquired land; how the farmer got involved in farming; reason(s) for quitting farming; area per field; how the farmer ploughs; how the farmer harvests; who takes decisions on the farm; what the farmer produces; what the farmer does with the produce; where the farmer sells the produce; whether the farmer keeps livestock; which livestock enterprise(s) the farmer keeps; people looking after the livestock; what s/he does with livestock production; to whom s/he sells the livestock; objectives of farming; whether s/he hires labour; whether labour is full time or part time; equipment; non-agricultural sources of income; total non-agricultural income; total farm costs; total farm income; whether farm profit is positive or negative; whether non-agricultural income is an important source of income; type of shops and markets they sell their crops to; means of transport; problems with access to markets; problems in accessing financial support; whether s/he has a farm bank account; necessary knowledge and skills; how skills were acquired; whether farmers contact extension officers; how frequently; kind of help farmers expect from extension officers; problems and constraints in farming; when the farm equity scheme was initiated; by whom was the scheme initiated; formal meetings before initiation of the scheme; reason(s) for establishing the scheme; factors that motivated farm-workers to join the scheme; who initially financed the scheme; organisational form of the scheme; criteria used to qualify

farm-workers to become shareholders; whether farm-workers participate in decision making and stay in farm houses; whether farmers affiliated to trade unions.

The validity/applicability of these variables was determined in discussions with participants and the status of each was determined through the primary data collection process and, where available, was also acquired through the consultation of the secondary data sources.

3.6 Risk management measurement and analysis

This study adapted a methodology formulated in the social sciences to develop a scale for measuring the Stellenbosch smallholders' attitude toward risk (Bard & Barry, 2000; Bard & Barry, 2001; Dadzie & Acquah, 2012). The scale assesses risk attitudes by eliciting smallholder farmers' opinions on risk management using a Likert procedure.

The scale consists of either questions or statements (called items) that correspond to or are influenced by the socio-psychological attribute. Respondents rate each item, thus conveying their attitudes toward the underlying variable. The respondents' ratings of the multiple items are summed to yield a score for the individual. The score can then be scaled for comparison with other respondents' scores (Bard & Barry, 2000)

Drawing upon previous research (Roslan *et al.*, 2012; Pennings & Garcia, 2001; Bard & Barry, 2000), 23 statements addressing different methods for managing risk were formulated. Responses to the statements indicate the degree to which a farmer agrees or disagrees with the tool's utilisation.

A Likert scale was selected as the measurement format due to its appropriateness for assessing attitudes (Bard & Barry, 2000). Each scale item (statement or question) for a Likert scale measures something that has an underlying, quantitative measurement continuum, thus measuring the hypothesised relationship between the item and the underlying latent. The responses are then summed to form a total/average score.

An item for a Likert scale is a declarative sentence with responses indicating varying degrees of agreement with, or endorsement of, the statement. The number of responses must be broad

enough to co-vary, provide the respondent with the ability to discriminate meaningfully, and be odd numbered to permit a neutral attitude. In this study, the responses consisted of five levels of agreement ranging from strongly agree to strongly disagree.

The scale consisted of statements about the management of sources of agricultural production risk financial, marketing and production. Besides risk attitude, other factors that may influence responses to the statements could be management policies the farmer chooses to implement, marketing strategies driven by the industry, or production constraints (Roslan *et al.*, 2012; Bard & Barry, 2000).

The statements were constructed in such a way that a score of higher than 3 (neutral) would represent risk-seeking attitudes, while less than 3 would be risk averse. To eliminate bias responses, some of the statements were worded negatively and were reversed during analysis.

For this study, 23 risk management statements were used to measure the risk attitudes of different farm types of Stellenbosch smallholders, as they illustrated and discussed in Chapter 5, Table 5. 10.

3.7 Summary

The analytical framework discussed in this chapter depicted the different steps that directed the study in a systematic and scientifically logical manner and the methods and data used in the study in order to achieve the research objectives, answer the research questions and to accept or reject the study hypotheses.

Meetings were held with different representatives from the Department of Agriculture – Western Cape (Elsenburg) and representative from the Stellenbosch Municipality to situate the study. This was followed by, a series of personal interactions and semi-structured interview sessions with identified Stellenbosch smallholders and a number of “focus group” feedback sessions with the various official stakeholders.

CHAPTER 4 – RESEARCH SITE DESCRIPTION

4.1. Introduction

In this section the Stellenbosch local municipal area as a research site for the study of smallholder diversity will be described, referring to different rural hamlets/areas, the relevant weather (including temperatures and rainfall) and types of soils.

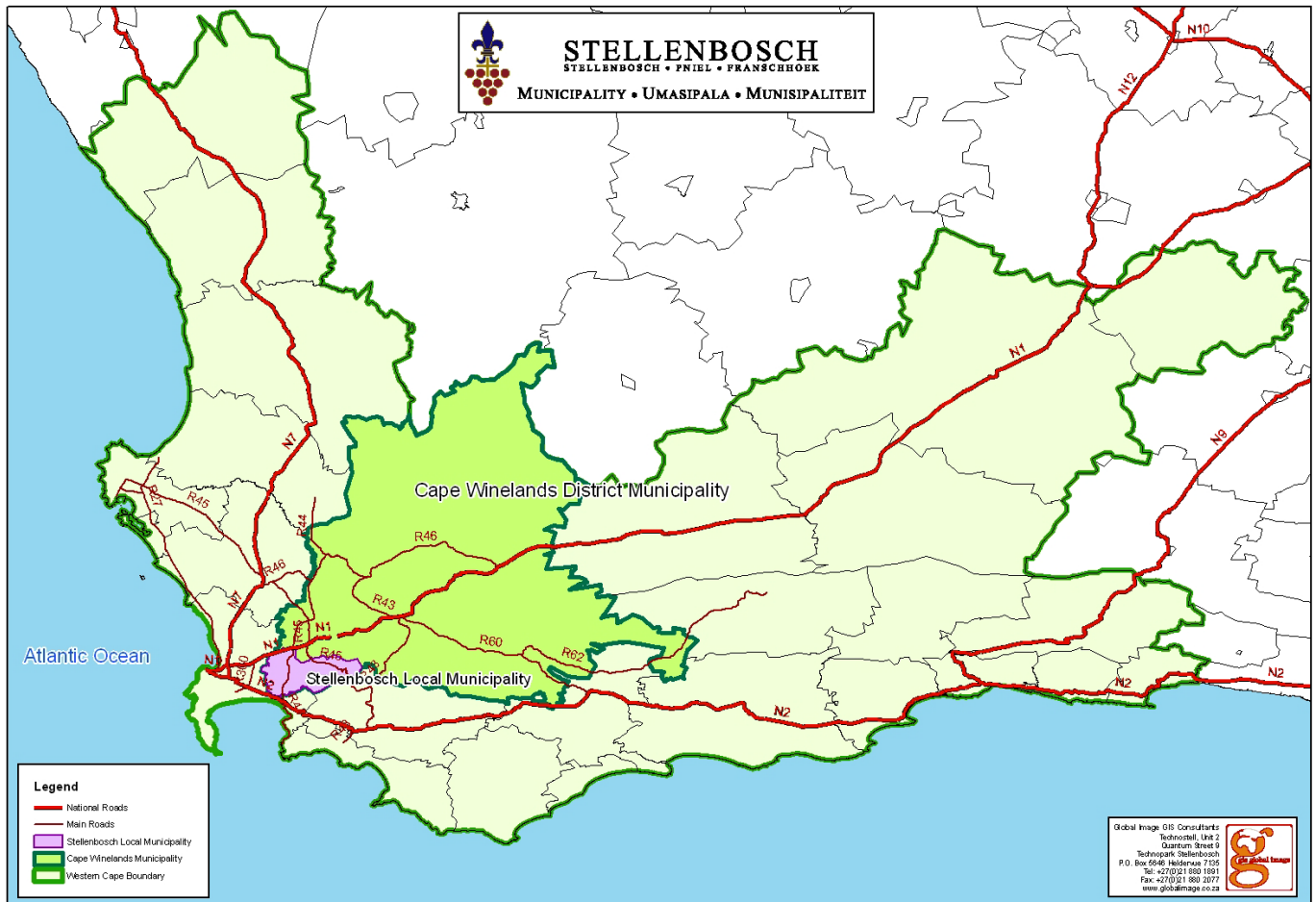


Figure 4.4: Map of the Stellenbosch local municipal area

Source: Stellenbosch Municipality Report (2011)

The Stellenbosch municipal area is local municipality falling under Cape Winelands District Municipality of the Western Cape. Stellenbosch is undoubtedly one of the most scenic places in South Africa. The population of the Stellenbosch municipal area is estimated at 200 527 (2007)

and growing at an average rate of 2% per annum (Stellenbosch Municipality Report, 2011). A significant number of 25 000 people (18%) comprise students and academics at Stellenbosch University (Stellenbosch Municipality Report, 2011). Stellenbosch is an area where a great deal of revenue comes from farm (wine) estates, luxurious hotels, spas and a range of cultural activities, and where leafy green suburbs exist side by side with unemployed and poor households (much due to influx from poor areas) resident in underdeveloped townships situated beyond the main industrial, commercial and, entertainment areas and spaces of leisure (Stellenbosch Municipality Report, 2011).



Figure 4.5: Different towns and rural hamlets in the Stellenbosch local municipal area

Source: Stellenbosch Municipality Report (2011)

The Stellenbosch local municipal area includes the towns of Stellenbosch (2006 estimated population 580 000) and Franschhoek (9 000). The rural hamlets (most with a population of less than 5 000) include Muldersvlei, Klappmuts, Elsenburg and Koelenhof to the north; Johannesdal, Kylemore, Pniel, Lanquedoc and Great Drakenstein to the east; and Vlottenburg, Lynedoch,

Raithby and Jamestown to the south. Not all the rural hamlets or townships of the Stellenbosch municipal area are shown in Figure 4.5, as no farming activities take place in them. The town of Stellenbosch is fondly referred to as the “Eikestad” (City of Oaks) and, together with Franschhoek and the surrounding world-renowned wine farms, forms the centre of the wine industry in South Africa. It is also the home of Stellenbosch University (Stellenbosch Municipality Report, 2011).

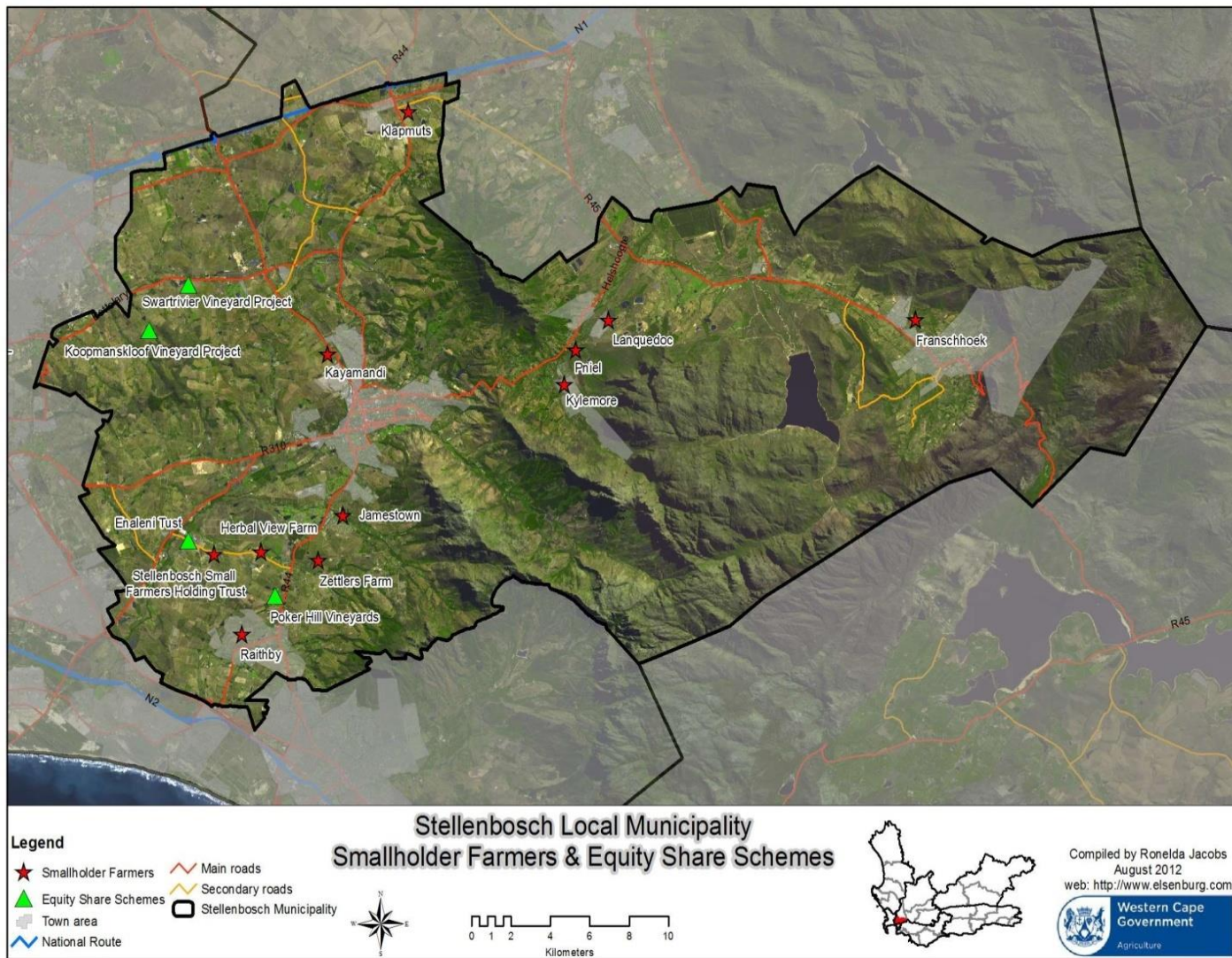


Figure 4.6: The localities where smallholders are situated in the Stellenbosch local municipal area

Source: Jacobs (2012)

Smallholders are however not found in all the places or in all the rural hamlets of the Stellenbosch local municipal area but mainly in the places shown in Figure 4.6. Farm-worker equity share projects shown in Figure 4.6 are vineyard projects and shareholders include commercial farm owners and permanent farm-workers.

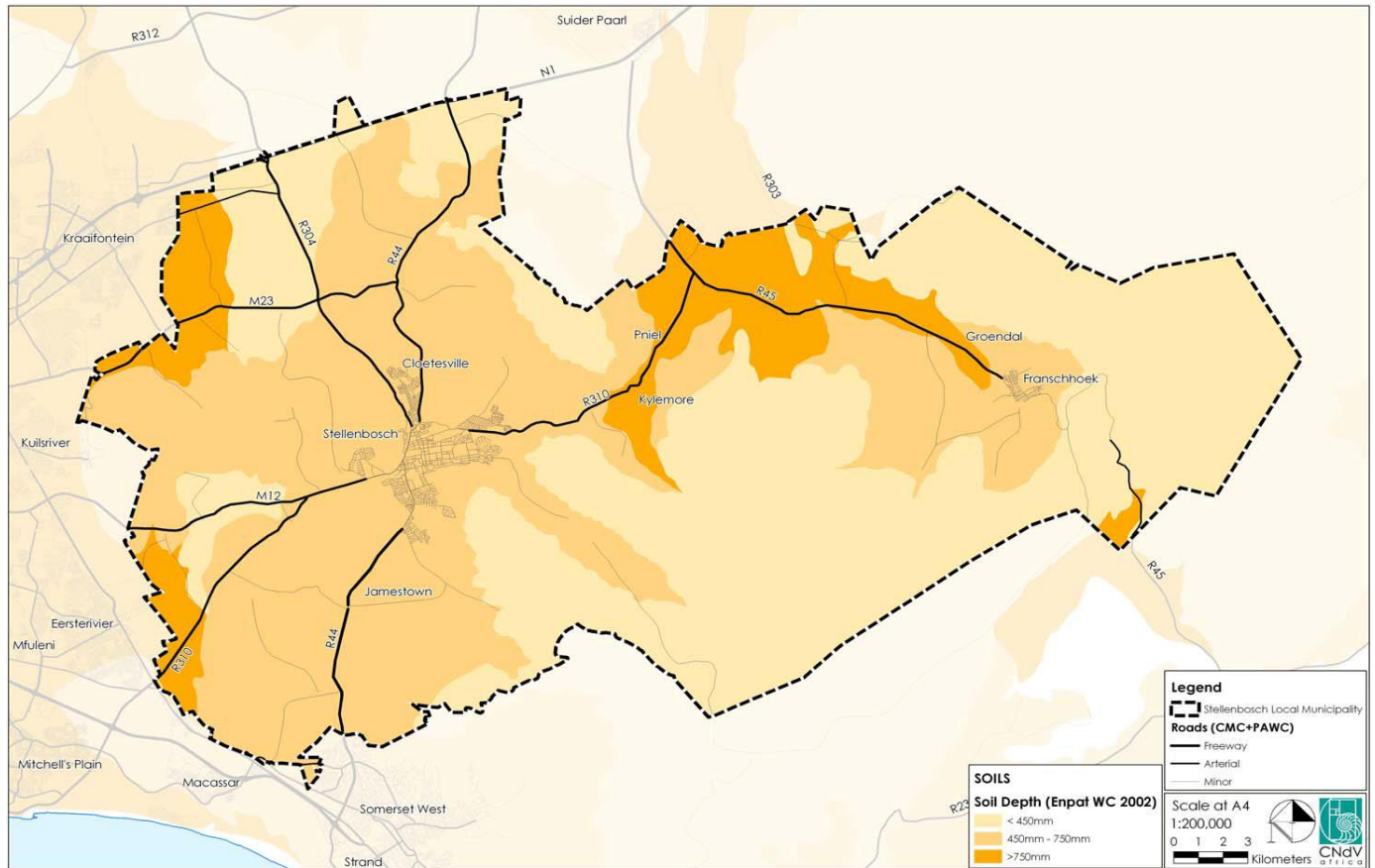


Figure 4.7: Soil depth in the Stellenbosch local municipal area

Source: Stellenbosch Municipal Status Quo Report (2010)

Figure 4.7 shows that the area including Jamestown, Raithby, Stellenbosch town, Klappmuts and Franschhoek has soils of a depth between 450 mm and 750 mm. The Dwars River Valley (i.e. Kylemore, Pniel and Lanquedoc to Groendal) and the western most areas of the Stellenbosch local municipal area have soil depths of greater than 750 mm. The south and north eastern areas of Stellenbosch Local Municipal area generally have soil depths below 450 mm.

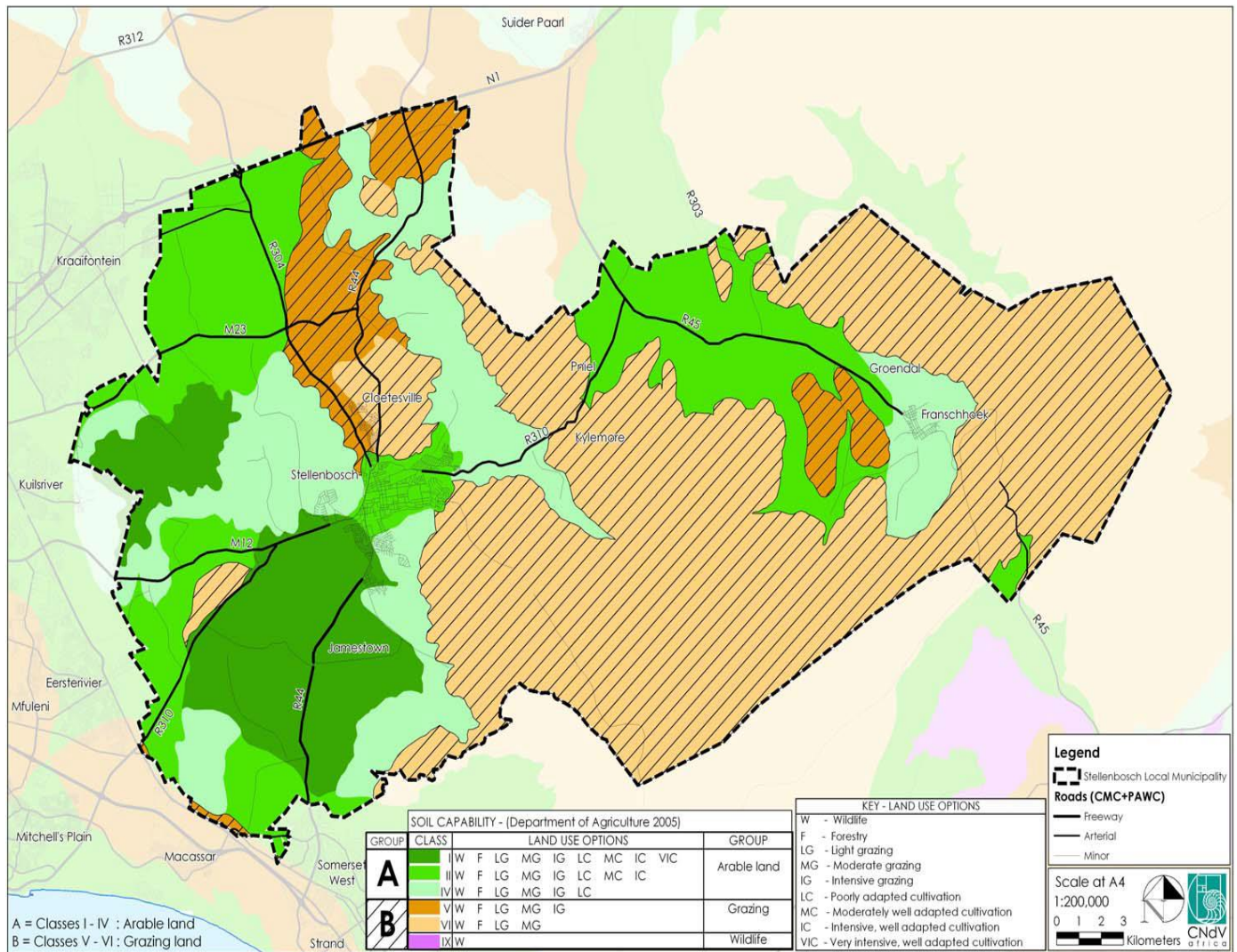


Figure 4.8: Soil capabilities in the Stellenbosch local municipal area

Source: Stellenbosch Status Quo Report (2010)

Figure 4.8 shows the soil capability or type of land uses possible given the soil depth. The area of Jamestown and Raithby, and the Dwarf River Valley around Kylemore, Pniel and Lanquedoc along the R45 towards Franschoek, the area generally west of Stellenbosch town and a band north-west to south-east to the east of Stellenbosch town comprise soils ideally suited for arable (intensive) agriculture (Stellenbosch Status Quo Report, 2011). Grazing areas are generally in the shallower soils underlain by the arenite rock formations in the eastern areas, and in the porous sedimentary strata in between Stellenbosch town and the N1 Freeway (i.e. Klapmuts). However, there are many vineyards in this area where farmers have improved the underlying soil capability.

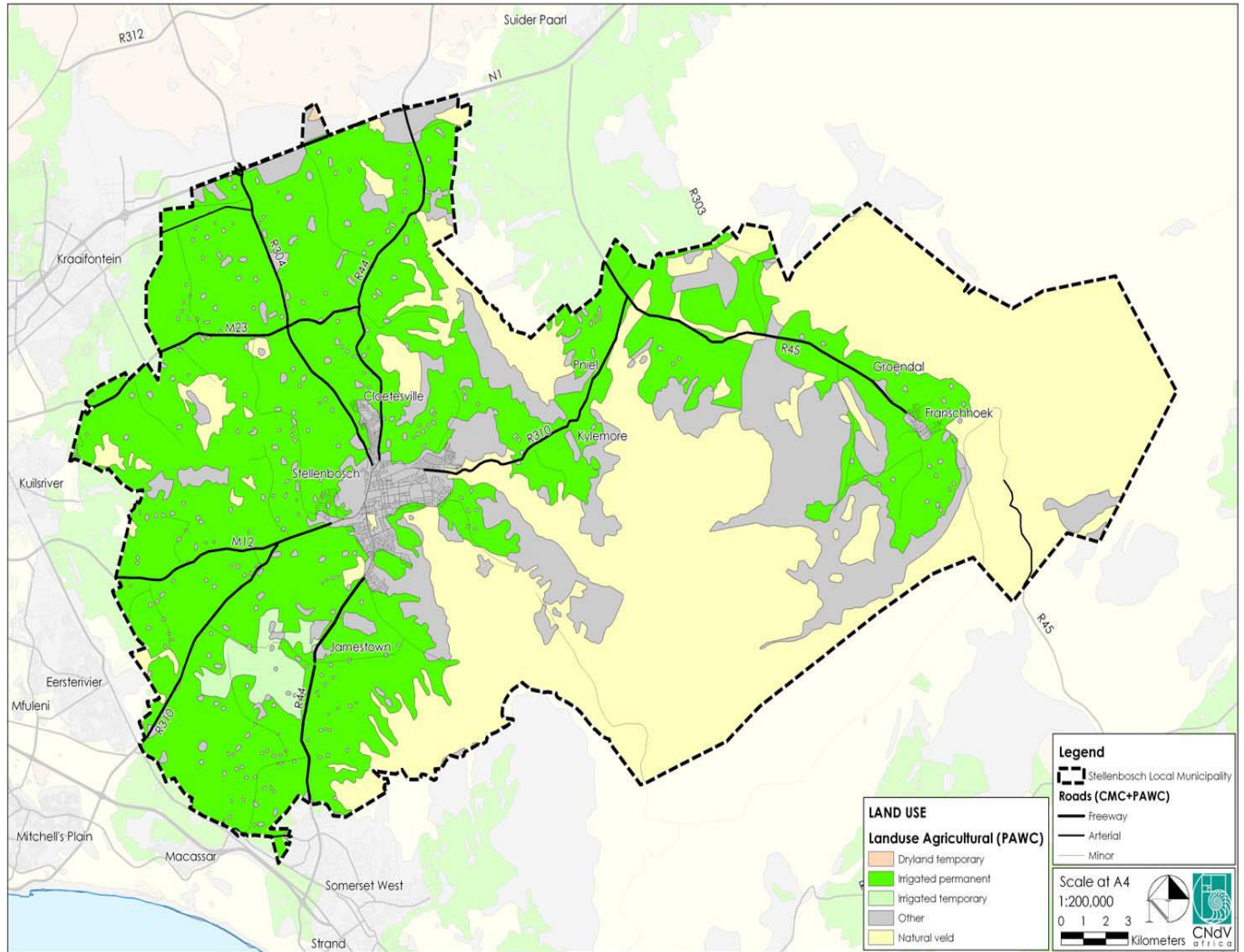


Figure 4.9: Agriculture in the Stellenbosch local municipal area

Source: Stellenbosch Report (2011)

Figure 4.9 shows that most of the cultivated land (agricultural land) in the Stellenbosch local municipal area is under irrigation, as it is shown by the lime colour. This implies that more water is used in the Stellenbosch area for irrigation and more water is needed for irrigation purposes, as most agricultural land is permanently under irrigation (Stellenbosch Report, 2011). Most of the farmers in Stellenbosch area - vineyards farmers (wine grape farmers) and fruit producers - have dams on their farms, other use water from underground boreholes. Smallholders generally have water supply problems on their farms and, sometimes even have to carry water from their residence to the farm in order to irrigate the plots on which they are farming.

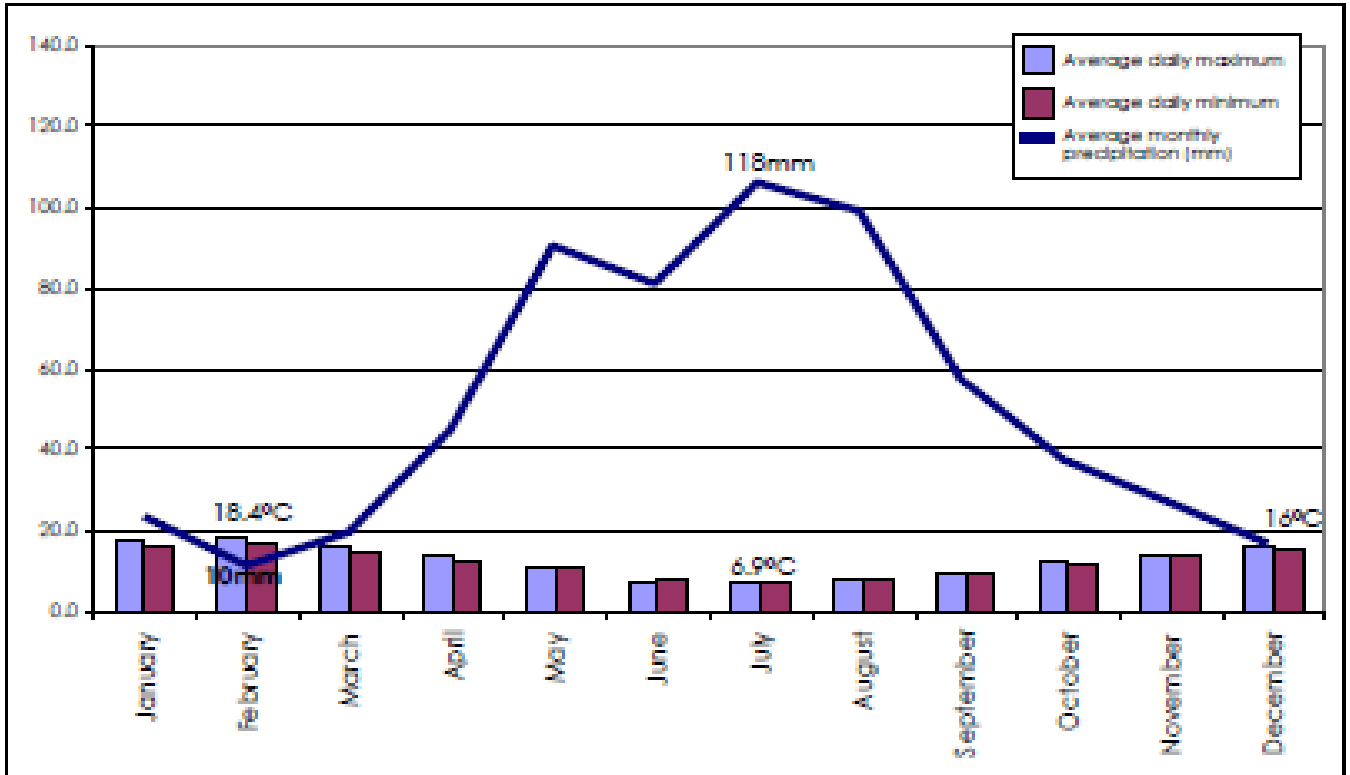


Figure 4.10: Annual rainfall and temperatures in the Stellenbosch local municipal area

Source: Stellenbosch Status Quo Report (2010)

The Stellenbosch local municipal area is located in a Mediterranean climate zone. The Mediterranean climate has hot dry summers and cold wet winters. This climate is mostly ideal for growing wine grapes and fruit (Stellenbosch Municipality Report, 2011). The highest rainfall experienced in Stellenbosch local municipal area is between May and August, with July being the wettest month at an average of 118 mm. The rainfall period from May to August (winter) measures about 418 mm in total. The lowest rainfall period is between December and March, with February having the lowest rainfall on average with 10 mm. The Franschhoek Valley area, the eastern most part of the Municipality, has an average rainfall of between 1 000mm and 2 000 mm per annum (Stellenbosch Municipality Report, 2011). The south-western part of the Municipality has the lowest rainfall, below 500 mm per annum. The Municipality on average receives rainfall of 750 mm per annum. The average winter low temperature in the Municipality is approximately 6.9°C, and the average summer high temperature is about 18.4°C.

4.2 Summary

In the description of the study area, maps showing different localities where smallholders are situated in the Stellenbosch local municipal area and graphs were used to provide a clear visual picture of the study area.

CHAPTER 5 – ANALYSIS AND FINDINGS

5.1 Introduction

This chapter reports on the analysis, major findings and results of the study. The main focus is on constructing a Stellenbosch typology of diversity of smallholder farming types and analysing the risk attitudes of smallholders active in the municipal area, testing the hypotheses that the farming behaviour of Stellenbosch smallholder types as well as their risk attitudes are diverse. Some strategic implications of such diversity will be discussed in the next chapter (Chapter 6).

5.2 The typology of Stellenbosch smallholders

The degree of diversity in the Stellenbosch smallholder typology as reflected by various farm types, is shown on a dendrogram in Figure 5.11 below. Each identified farm type identified is named with a descriptive title indicating its main features.

The dendrogram in Figure 5.11 represents the relationships of similarity and dissimilarity between Stellenbosch smallholders. It enables the identification of different smallholders' farm types and how these different types were identified and grouped.

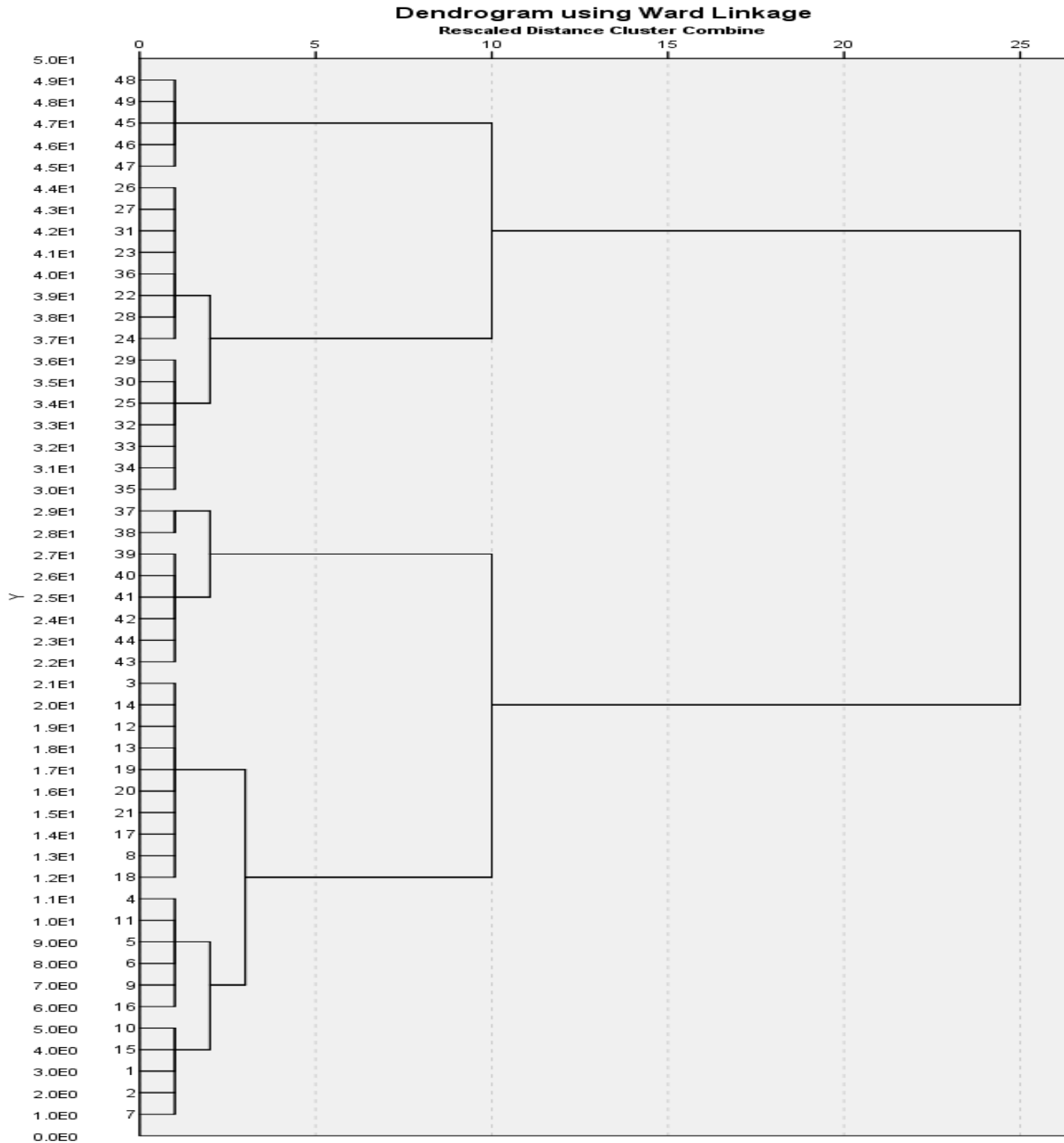


Figure 5.11: Dendrogram applied on survey data showing different smallholder farm groupings in the Stellenbosch local municipal area

Source: Own survey data

Each “number leaf” (i.e. 48, 49, 45, etc.), on the vertical axis of Figure 5.11 (also refer to Chapter 3, page 49) represents an individual smallholder observation and starts by treating each smallholder as a unique type in its own right. Then, smallholder types that are close to each other are regrouped into one single, “logical style” i.e. a new identity or “type” because they share similar characteristics; smallholder that are far removed from each on the vertical axis in Figure 5.11 have different characteristics, thus do not belong together in a type; rather in different types.

By continuing this process of grouping “logical styles” together, a number of new similar farm types are clustered. The typology formed for Stellenbosch smallholder farm types is based on three major drives: social focus, economic focus and business focus. Table 5.3 (a) and Table 5.3 (b) summarises the newly clustered and grouped farm types into a single Stellenbosch smallholder typology.

Based on the analysis of the dendrogram, the Stellenbosch smallholders typology were grouped into six different types, ranging from non-farming households occupying agricultural land, to commercial crop producers. Each type of Stellenbosch smallholders is discussed in further detail below. The support programmes that can assist these different farm types are also shown in Table 5.3. These support programmes were formulated based on their farming (binding) constraints and in consultation with the relevant types and supporting officials and will be referred to again in chapter 6.

Figure 5.11 and Table 5.3 (a & b) below, show the six different types of Stellenbosch smallholders that were identified from the data analysis and give an indication of smallholder type diversity in the study area. The reading from the top left to the bottom of the dendrogram diagram in Figure 5.11 (on the vertical left side of the dendrogram) includes:

Type 1 – farmland-occupying but non-farming households (five households)

Type 2 – pensioner livestock holders (eight farmers)

Type 3 – part-time cattle farmers (seven farmers)

Type 4 – commercial equity share farming (eight sharing farmers)

Type 5 – crop farmers in process of retirement planning (ten farmers) and

Type 6 - commercial crop farmers (eleven farmers)

Table 5.3 (a): Farm types and farm typologies of the Stellenbosch smallholders

Stellenbosch types	Land ownership	Farming objectives	Binding constraint	Support required
Type 1 Farmland-occupying but non-farming households	Family owned; Communal ownership; Renting land	-	Cannot generate sufficient income from farming; Lack of finance and water; No interest in farming	Incentivise farming activity; Financial support services; Water supply; Release land through rental/compensation arrangements to willing smallholder farmers
Type 2 Pensioner livestock holders	Community land, owned by Municipality. They do not rent the land i.e. free land access	For own consumption; Culture related issues; Preparing for returning from other economic activities	Grazing land space; Livestock disease problems; Lack of financial support services	Capital for land; Access to grazing land; Financial support services; Animal husbandry and management training
Type 3 Part-time cattle farmers	Community land owned by Municipality; Leasing land from large-scale farmland owners	Take farming as an investment; For commercial purposes	Financial support; Lack of information (new technologies, potential markets); High input costs	Financial support services; Market access; Animal husbandry and management training
Type 4 Commercial equity share farming	Private share ownership; Partnership lease with commercial farm owners	To generate commercial income	Slow process of financial/loan application and approval	Local and export market access; Credit or loans
Type 5 Crop farmers in process of	Family owned; Renting land	For own consumption/ commercial purposes; Preparing their come	Water scarcity problem; High transportation costs to product	Secure water rights and water supply; Physical infrastructure

retirement planning		back from other economic activities currently involved in on a fulltime basis	markets	<ul style="list-style-type: none"> - storage facilities - Irrigation system Technical advice; Market access information; Management training
Type 6 Commercial crop farmers	Renting the land from large-scale commercial farm owners and from Stellenbosch Municipality	Primarily for commercial purposes; and also for household consumption	Water scarcity problem; High transportation costs to product markets; Market information; Capital	Secure water rights and water supply; Increased landholding; Market access information; Physical infrastructure <ul style="list-style-type: none"> - storage facilities - Irrigation system Financial support services

Source: Own survey data

Table 5.3 (b) below adds more information to the description of the types in Table 5.3 (a)

Table 5.3 (b): Stellenbosch smallholder farm types

Stellenbosch types	Overall income	Farm income	% Contribution of farm income	Occupation of the farmers	Crops produced or livestock kept
Type 1	-	-	-	Pensioners and have part-time jobs	-
Type 2	R150 000 – R180 000	R10 000 – R20 000	Contributed 7 to 11%	Pensioners and keeping livestock	Cattle – 6 to 15; Goats – 5 to 12; Sheep – 4 to 10; Pigs – 2 to 4 and Chickens and ducks – 7 to 14
Type 3	R165 000 – R240 000	R15 000 – R40 000	Contributed 10 to 17%	Permanent and part-time jobs; and keeping livestock	Cattle – 8 to 17
Type 4	R105 000 – R140 000	R25 000 – R40 000	Contributed 14.3%	Farm-workers and co-owners in the equity share schemes	Wine grapes and guava fruit
Type 5	R160 000 – R240 000	R20 000 – R40 000	Contributed 14 to 20%	Early pensioners and active farmers	Cabbages, spinach, peppers, lettuce, broccoli, carrots, beetroot, pumpkins, butternuts, green beans, tomatoes, onions, strawberries and flowers
Type 6	R170 000 – R280 000	R40 000 – R100 000	Contributed 24 to 36%	Full-time farmers	Strawberries, cabbage, spinach, peppers, lettuce, broccoli, carrots, beetroot, green beans and herbs (coriander, parsley, thyme, mint, sweet basil and red basil).

Source: Own survey data

Each farm type will be discussed in more detail below.

5.2.1 Type 1: Farmland occupying but non-farming households

This type is made up of five households out of 49 respondents interviewed, and represents 10.2% of the sample that was interviewed.

Table 5.4: Characteristics of type 1

Variable	Description
Number	Five households
Average age	57 years
Gender	All men
Education level	Range from primary to high school level
Marital status	Married and divorced
Average household size	Average of five household members
Average number of family members working	Two family members
Economic status	Pensioners and have part-time jobs. Landholders, occupied in non-farming economic activities
Locality	Lanquedoc, Pniel, Raithby and Spier Corridor (Lynedoch)
Non-agricultural sources of income	Social grants, wages and salaries
Land tenure/ownership	Family owned/private ownership Community land Others lease the land from the Spier Wine Farm and Municipality
Size of the arable land	0.5 - 5 ha
Reason(s) for not farming	i) Not generating sufficient income from farming ii) They have water scarcity problems for irrigation purposes iii) No interest; or got a job outside agriculture and decided to quit farming iv) No significant support from Municipality and Department of Agriculture (i.e. for soil testing and recommendations on which types of crops are suitable for the area)

Source: Own survey data

The age group for this type ranged from 40 to 65, with an average age of 57 years, and all decision makers were married men. Their education level ranged from primary to high school and their household size ranged from four to seven household members, with an average of five household members. The number of family members working off farm in this type was between two and three members, with an average of two members. Households in this type have access to arable land, and the form of land tenure/ownership for the households ranged from family

owned/private ownership, part of community land which they neither rented nor owned and leasing the land from Spier wine farm.

Reasons for the households of this type not participating in farming activities at the time varied and included: a) high operational costs/-price cost squeeze problem: not interested and/or not generating enough net income or profit from farming business in order for the survival of their families, so they decided to quit and leave farming and to look for other job opportunities that will lead to better standards of living for their families; b) severe resource constraints: struggled with water problems (water unavailable to irrigate) and the farming business ended up not doing well enough as the costs were constantly increasing while the farming income/profit was decreasing, as they were producing less and poor quality products. After realising that they are running at a loss, they decided to quit farming until the water problem could be solved. They were willing to continue with farming; c) interest in farming and the succession problem: there was no one interested and willing to take over and continue with the farming activities that had been practised by the farmers after they took over another job; d) bureaucracy problems: some are still waiting for the municipality and Provincial Department of Agriculture to conduct soil tests and make recommendations - on which type of crops suitable for the area.

5.2.2 Type 2: Pensioner livestock holders

This type is made up of eight farm households from 49 respondents interviewed, and represents 16.3% of the sample.

Table 5.5: Characteristics of type 2

Variable	Description
Number	Eight smallholders
Average age	65 years
Gender	All men
Education level	Ranged from primary to high school level
Marital status	Married and divorced
Average household size	Six household members
Occupation of the farmers	Pensioners (retirement pension and old age pension) and keeping livestock
Average number of family members working	One to two family members
Land tenure/ownership	Community land owned by Municipality and they are not

	renting it
When started farming	Started keeping livestock in early 1990s
How did they get involved in farming	Inherited, keeping livestock from their parents and it is culture related for a man to keep some livestock, especially the ones originally from the Eastern Cape province
Crops and/or livestock produced	Livestock – including cattle, goats, sheep, pigs and some chickens
Number of livestock owned	Cattle – 6 to 15 Goats – 5 to 12 Sheep – 4 to 10 Pigs – 2 to 4 Chickens and ducks – 7 to 14
Locality	Klapmuts, Kylemore and Franschhoek
Implements (resources)	Kraal in the backyard and dips
Non-agricultural sources of income	Social grants, retirement pension and remittances
Livestock supervision and management	Farm owners and their sons, with family labour
Farm income	R10 000 – R20 000
Off - farm income	R140 000 – R160 000 per annum
Total household income	R150 000 – R180 000 per annum
Percentage of farm income to total household income	Farm income contributed between 7% and 11% to household income
Farming objectives	For own consumption, it's their culture to keep livestock and for selling the livestock
Decision maker on the farm	Farmer
Markets selling the produce to	Informal markets, i.e. to local people
Access to educational and training services	They do not have access to both educational and training services related to livestock farming
Access to extension services	They do not consult extension officers, they use their traditional (indigenous) farming knowledge when taking livestock farming decisions
Farming skills	They do not have any farming skills, except applying the traditional farming knowledge they gathered from their parents
Farming/binding constraints	Grazing land problems (limited grazing space); Disease problems (especially ticks); and Lack of financial support services/innovation

Source: Survey data

The age group for farmers in this cluster (type) ranged from 58 to 70 years, with an average age of 65 years, and they were all male farmers, with the majority being married. Education level ranged from primary and high school level till tertiary level. These farmers were receiving

pensions (retirement pension and old age pension). The household size for this type is between five and nine household members, with an average of six and the number of family members who were working was between one to two members.

These farm households had access to grazing land and the form of land ownership was part of community land; and they were not renting or owning the land on which their livestock grazed. This type started farming with livestock or keeping livestock in the early 1990s and the land on which they practised farming is part of the community land owned by the Stellenbosch Municipality

Livestock enterprises that this type is involved in include cattle, goats, sheep, pigs and some chickens and ducks. These livestock holders practise livestock diversification, i.e. keeping different livestock and not specialising or focusing on one enterprise only. The livestock are owned by the male household heads and the household heads and their sons are generally the ones who look after the livestock. Enterprises such as pigs and chickens are generally owned and looked after by the wives of the household heads, and they take decisions related to these livestock enterprises. The livestock keeper, who is the head of the household, decides on when to sell and when to slaughter the livestock.

The goals or objectives of this type to keep livestock varied and included: for own consumption; it is their culture for a man to keep livestock; and occasionally for sales/commercial purpose. The focus is thus rather livestock-holding not directly motivated by commercial considerations.

Some livestock was sold to local people through informal markets (sell from households/farms only). Farmers in this type do not have access to training and courses related to livestock farming, but make use of traditional/informal farming knowledge they gathered from their parents, friends and other farmers. These farmers are generally not interested in new practices and market access and information. They do not readily contact extension officers for advice; they rather use their traditional/informal farming knowledge.

Constraints faced by this group of livestock keepers included: restricted grazing land (limited space of grazing land), animal diseases (especially problem with ticks in the summer, when temperatures are high), lack of financial support, expensive medication (dip medicine, vaccinations and spraying machines), and rights for the farmers to farm with livestock

(Municipality is saying these livestock holders are not allowed to keep livestock close to the residential area). This farm type kept their livestock in kraals and sheds during the night, and during the day they let the livestock out to graze. The livestock are collected in the evening and during the day there is no one looking after them.

The cash income received from farming activities was between R10 000 and R20 000 per year. Non-agricultural sources of income for this type were social grants, retirement pensions and remittances. Total non-farming income for thus ranged between R140 000 and R160 000 per annum. The total household income ranged between R150 000 and R180 000 per year, or R25 000 – R30 000 per capita for the household with farming income contributing only between 7 and 11%.

5.2.3 Type 3: Part-time cattle farmers

This farm type included seven farm households from the 49 respondents and represents 14.3% of the sample interviewed.

Table 5.6: Characteristics of type 3

Variable	Description
Number	Seven smallholders
Average age	53 years
Gender	All men
Education level	Range from high school to tertiary level
Marital status	Married and widowed
Average household size	Five household members
Occupation of farmers	Permanent and part-time jobs; and keeping livestock
Average number of family members working	Three to four family members
Land tenure/ownership	Community land owned by Stellenbosch Municipality and not renting the land; and Leasing land (camps) from large-scale farm owners
When started farming	Started keeping livestock in the mid-2000s
How did they get involved in farming	Farming with livestock is an investment (easy to convert to cash immediately when there is a cash related problem)
Crops and/or livestock produced	Livestock – farming with cattle only
Number of livestock owned	Cattle – 8 to 17
Locality	Kylemore and Klapmuts
Resources	Kraal in the backyards; grazing land and dips

People looking after livestock	Farm owners and hired labour
Type of labour used/employed	Family labour and hired labour
Non-agricultural sources of income	Social grants (child support grants) and Salaries and wages by working family members
Farm income	R15 000 – R40 000
Off-farm income	R150 000 – R200 000
Total household income	R165 000 – R240 000
Percentage of farm income to total household income	Farm income contributed about 10% to 17% of household income
Farming objectives	Commercial purposes; and investment
Decision maker on the farm	Farmer
Markets selling the produce to	Auction markets and to local people
Access to educational and training services	They do attend workshops and training offered by the Department of Agriculture
Access to extension services	They do consult extension officers for advice
Farming skills	They have technical farming skills and traditional farming knowledge
Farming/binding constraints	Lack of financial support from the government Lack of information related to new and potential markets High input costs (e.g. livestock medication)

Source: Own survey data

The average age of part-time cattle livestock holders in this type was 53 years, with marital status ranging from married to widowed. Education levels ranged between high school and tertiary level. These cattle livestock holders have jobs (some permanent and others part-time) besides keeping cattle. Their average household size was five household members, with an average of three family members working off the farm.

Livestock holders in this type have access to grazing land and the form of land tenure/ownership is part of community land, while others have partnership leases with large scale-commercial farm owners, where they are renting a piece of land on which they keep their livestock. Part-time cattle livestock holders started keeping livestock from the 2000s and still are active.

Livestock holders of this farm type keep cattle only. Livestock owners and hired labour look after the livestock. Livestock owners are the decision makers and the livestock they keep serves two purposes: for sales and for consumption (i.e. milk from the cows). The farming objective for this type is business related: farming with livestock for commercial purposes; keeping livestock

as an investment; and own consumption (consume milk). Cattle are sold both to local people and at auctions.

Non-agricultural sources of income for this type included: salaries and wages and social grants (child support grants), and the total non-agricultural income for this type ranged between R150 000 and R200 000 per year. Total farm income for this group ranged between R 15 000 and R40 000. Total household income ranged between R165 000 and R240 000 or R33 000 – R48 000 per capita (5 members in household) and farm income contributed between 10 and 17 % of total household income.

Constraints faced by these cattle livestock holders include: lack of financial support and capital; and lack of information related to potential new markets. Livestock holders from this farm type are experienced, have and use traditional farming knowledge, and also have technical farming skills. They do contact extension officers for advice.

5.2.4 Type 4: Commercial equity share farming

Type four is made up of eight farming households from 49 households interviewed and represents 16.3% of the interviewed sample.

Table 5.7: Characteristics of type 4

Variable	Description
Number	Eight shareholders
Average age	43 years
Gender	Four men and four women
Education level	Range from never went to school to high school level
Average household size	Eight household members
Occupation of the shareholders	Farm-workers
Marital status	All married
Average number of family members working	Three family members
Land tenure/ownership	Partnership lease with the commercial farm owner
Size of the arable land	Ranges between 40 ha and 100 ha
When started farming	Since 2001
Reason(s) for establishing the scheme	To improve workers' incomes and better their standard of living; To improve workers' job security; and To empower workers through skills transfer

Criteria used to qualify workers to become shareholders	The permanency of farm workers by the time the scheme was established
Members/shareholders of the scheme	Include the commercial farm owner, farm workers and sometimes a third partner
Shareholders' percentage of the scheme	In all cases the farm-workers always have a bigger share (more than 50%) than any other shareholders to in the scheme
Time spent on the farm	Average of 8 hours per day
Type of labour used/employed	Both permanent (shareholders) and casual labourers
Crops and/or livestock produced	Crops – they farm with vines (wine grapes) and sell wine, and one scheme was also producing guavas
Name of the equity share schemes included in the study	Swartrivier Vineyard Project; Koopmanskloof Vineyard Project; Enaleni Trust; and Poker Hill Vineyards
Locality	Koelenhof, Bottelary Road, Lynedoch and Helderberg area
Implements (resources)	Hire all the implements from the commercial farm owner
Farming objectives	To generate income or for commercial/business purposes
Decision maker(s) on the scheme	Commercial farm owner and farm-worker representatives in the Trust
Farm income	R25 000 to R40 000 per farm-worker shareholder
Non-agricultural sources of income	Social grants (old age pension, disability grant and child support grants); and Wages and salaries earned by other working family members
Off farm income	R90 000 – R120 000
Total household income	R105 000 – R140 000
% of farm income	Farm income contributed about 14.3% to household income
Markets selling the produce to	For guavas – to local street vendors For wines – to both local and international markets, using the same brand and agents used by the commercial farm they operating under
Access to financial support services	They do have access to financial support services (i.e. from Department of Rural Development and Land Reform and from farm owners through loans)
Access to educational and training services	They have access to and attend workshops and training services offered by government departments, wine industry and Vin-Pro
Access to extension services	They do consult extension officers for advice
Skills they have	Technical farming skills, management skills and traditional farming knowledge for producing wine and guavas
Main constraints to farming	Slow progress of the financial application forms to be processed by government departments (i.e. Rural Development and Land Affairs)
Marketing constraints	There is high competition in the market as there are many wine

	suppliers especially in Stellenbosch local municipal area
Affiliated to trade unions	Yes, they are affiliated to trade unions as farm-workers

Source: Own survey data

In the schemes operating in the Stellenbosch environment and included in this study on typology, a number of generalised features were viewed as prominent.

The age of the members of this type ranged from 30 to 65 years, with an average age of 43 years. This type was made up of both men and women in terms of gender. The farm-worker shareholders were all married and their level of education ranged from never went to school and, primary to high school. The full-time occupation of these shareholders was that they were farm workers on commercial vineyard farms, together with being commercial farming shareholders. The average household size for this type was eight household members, with an average of three working members per household.

Members of this farm type have access to arable land and the form of land ownership was through partnership leases with the commercial farm owner. Members of this type became involved in farming between the years 2001 and 2010 and they acquired the arable land on which they practise farming through the land distribution of the Land Reform programme. The criterion that was used to qualify a farm-worker to be a shareholder of the schemes was their permanency on the farm by the time the scheme was initiated.

All the shareholders of the schemes were jointly responsible for the strategic decision making in the scheme; through general consultations and attending members/shareholders meetings. The shareholders in the schemes were organised into a trust structure. Selected farm workers also represented general shareholders at the operational management level. In general farm worker shareholders own 50% or more of shares in the scheme, with the owner owning less. In a few cases (e.g. the Koopmanskloof vineyard project) there also was a third partner who had shares in the scheme, i.e. outside investors.

The objective of farming for this farm type is for commercial/business purposes and to generate income from farming. Crops generally produced were grapes; with wine produced from some, with the other wine grapes being sold. Wine was sold both on the local and international markets. These schemes also marketed wine produced by the equity share schemes under the same

name/brand as that of the commercial farm and they used the same agents and markets used by the commercial farm.

Another scheme (Swartrivier vineyard project) also produced fruit crop guavas, in addition to wine grapes. The guavas were locally sold and/or to local street vendors.

Non-agricultural sources of income for this type included social grants (child support grants, disability grants and old age pensions) and wages and salaries. Total non-agricultural income for this type ranged between R90 000 and R120 000 per annum. Farm income received by members of this type ranged between R25 000 and R40 000. Total household income for this type ranged between R115 000 and R160 000, and farm income contributed about 23% to total household income.

Constraints related to farming activities faced by this farm type were mostly related to typical commercial farming aspects, such as lack of market outlets/information about new markets. This type also made use of financial support from government departments, and complained about poor administration and slow, constrained service delivery. Their major complaint was the slow progress (government “red tape”) with the application forms being processed and approved, as it took a long time before the money (grant) was received and they could proceed with the project.

The farm-worker shareholders had the required technical farming knowledge, acquired through working on the commercial farm. They also gained from workshops and training and from the coaching and mentorship of their commercial farm owner partner. Participants were also involved in regular consultations with extension officers and specialists. The farm-worker shareholders in this farm type are affiliated to trade unions.

5.2.5 Type 5: Retirement planning crop farmers (crop farmers planning for their retirement)

This type is made up of ten smallholders out of 49 respondents interviewed and represented 20.4% of the interviewed sample.

Table 5.8: Characteristics of type 5

Variable	Description
Number	Ten smallholders
Average age	61 years
Gender	All men
Education level	Ranges from high school to tertiary level
Marital status	Married
Average household size	Five household members
Occupation of farmers	Early pensioners and active farmers
Average number of family members working	Two family members
Land tenure/ownership	Family owned; private ownership; and leasing the land from a wine farm (Spier)
Size of the arable land	0.5 - 5 ha
When started farming	Started farming in late 1970s
How did they become involved in farming	Inherited from their parents and others were farm workers and were given land by the wine farm (Spier) and are renting the land
Time spent on the farm per day	6 – 8 hours per day
Crops	Crops produced included cabbages, spinach, peppers, lettuce, broccoli, carrots, beetroot, pumpkins, butternuts, green beans, tomatoes, onions, strawberries and flowers
Locality	Raithby, Jamestown, Lynedoch (Spier Corridor) and Kylemore
Implements (resources)	Spades, forks and hand-hoes; Make use of hired tractor; Green houses; and Pipes, watering cans and irrigation systems
Non-agricultural sources of income	Social grants, retirement pension, and wages and salaries
Farm income	R 20 000 – R 40 000
Off-farm income	R 140 000 – R 200 000
Total household income	R 160 000 – R 240 000
Percentage of farm income to total household income	Farm income contributed between 14% and 20% to household income
Type of labour used	Farmer and hired labour (on part-time basis)
Farming objectives	Farming for household consumption and others are preparing

	their retirement (coming back from other sectors)
Decision maker on the farm	Farmers are the decision makers on the farm
Markets selling the produce to	The produce is sold to local people and local supermarkets (e.g. Fruit and Veg supermarkets)
Access to educational and training services	They have access to and attend training and workshops offered by Department of Rural Development and Land Affairs
Access to extension services	They do consult extension officers and ask for advice
Farming skills	They have traditional farming knowledge and technical farming skills
Farming/binding constraints	Water scarcity problem for irrigation purposes High transportation costs when they take their products to the market

Source: Own survey data

The age for this farm type ranged from 40 to 70 years with an average age of 61 years, and the farmers of this type were all men, married and with education levels ranging between high school and tertiary level. The household size for this type ranges between three and seven household members, with an average of five household members, and the average number of household members employed off the farm was two.

Members of this type have access to arable land and the form of land ownership was family ownership (inherited from their parents), private ownership, and leasing the land from Spier wine farm. Farmers of this type started farming in late 1970s, but the majority of farmers of this type started farming between the years 2001 and 2010, generally to start to prepare for their imminent retirement. Farmers of this type became involved in farming because they inherited farms from their parents, and others were working on the farm and were given land by the Spier wine farm in preparation for their retirement.

The farmers take decisions on the farm (i.e. on what to plant, when to plant it, when to harvest and how much to charge per product). The different crops grown include strawberries, cabbages, spinach, peppers, lettuce, broccoli, carrots, beetroot, pumpkin, butternuts, green beans, tomatoes, onion and flowers. The crops produced were used for household consumption and for sale purposes. The produce was sold locally and to supermarkets. Farming objectives were household consumption and for sale purposes, while some farmed as a hobby, i.e. they did not depend on the farming income for the survival of their household.

Non-farming income sources for this type included: social grants, retirement pension and salaries and wages. Total non-agricultural income ranged between R140 000 and R200 000, with an average of R170 000 per year. Total farm income for this type ranged between R20 000 and R40 000 per year, with an average of R30 000 per year. Total household income for this type ranged between R160 000 and R240 000 or R32 000 – R48 000 per capita (five persons per household), with farm income contributing 14 to 20% to total household income. These farmers were relatively better off than other types; however their extended family commitments could not be determined.

Farmers in this type made use of part-time hired labour; they used hired tractors during planting season, and for the transportation of the produce to the market they made use of hired transport.

These farmers possessed good farming skills, including financial, management and technical farming skills, and experience acquired on the farms they worked, and through workshops offered by the Department of Rural Development and Land Affairs. Knowledge was also acquired by assisting their parents with the farming activities whilst they were growing up. These farmers contacted extension officers regularly for advice.

Farming constraints faced by this type included water scarcity, lack of access to market outlets and information, stiff competition (as the type of market structure they operate under is perfect competition), and high transportation costs to deliver products to the market and, from time to time, problems of poor quality of products and reduced quantity.

5.2.6 Type 6: Commercial crop producers

Farm type 6 is made up of eleven farm households out of the 49 interviewed respondents and represented 22.5% of the sample interviewed.

Table 5.9: Characteristics of type 6

Variable	Description
Number	Eleven smallholders
Average age	55 years
Gender	Men and women
Education level	Ranged from primary school and, high school to tertiary level
Marital status	Varied between single, married and divorced
Average household size	Seven household members

Occupation of farmers	Full-time farmers
Average number of family members working	Three household members
Land tenure/ownership	Leasing the land from Spier wine farm, from large-scale commercial farm owners and from the Municipality
Size of the arable land	1 – 5 ha
When started farming	From late 1990s to early 2000s
Time spent on the farm per day	Maximum of 8 hours per day
Crops and/or livestock produced	Crops – cabbage, spinach, peppers, lettuce, broccoli, carrots, beetroot, green beans, strawberries and herbs (coriander, parsley, thyme, mint, sweet basil and red basil)
Locality	Lynedoch (Herbal View and Spier Corridor) and Kylemore
Implements (resources)	Spades, forks and hand-hoes; Make use of hired tractor; and Green houses Pipes, watering cans and irrigation system
Non-agricultural sources of income	Social grants (child support grants), salaries and wages and remittances
Farm income	R40 000 – R100 000
Off farm income	R130 000 – R180 000
Total household income	R170 000 – R280 000
Percentage of farm income to total household income	Farm income contributed between 24 and 36% of household income
Type of labour used/employed	Family labour and hired labour (full-time and part-time basis)
Farming objectives	Primary aim of farming is for commercial/business purposes, and for household consumption
Decision maker on the farm	Farmers
Markets selling the produce to	Formal markets – e.g. restaurants, Fruit and Veg. supermarkets and Epping market Informal markets – i.e. to local people and local hawkers
Access to educational and training services	They had access to and attended training and workshops provided by the Department of Agriculture
Access to extension services	They consulted the extension officers for advice
Farming skills	Traditional farming knowledge, technical farming skills and management skills
Farming/binding constraints	Water scarcity problem for irrigation purposes and farm land for expansion Lack of financial support and cost of capital; and High transportation costs

Source: Own survey data

The age group for this type ranged between 40 and 65 years, with an average of 55 years. They were men and women and their marital status included single, married and divorced. Education level varied from primary and high school to tertiary level. The household size for this group was from four to nine household members, with an average of seven household members, and the employed household members varied from two to three with an average of three members working off farm per household.

The farmers had access to arable land and the form of land ownership was leasing land from Spier wine farm and from the Stellenbosch Municipality. Farming activities started between the 1990s and early 2000s. The farmers were the main decision makers and crops grown included strawberries, cabbage, spinach, peppers, lettuce, broccoli, carrots, beetroot, green beans and herbs (coriander, parsley, thyme, mint, sweet basil and red basil).

The produce was mainly for commercial purposes, with some for household consumption purposes. Farmers sold their produce to both formal and informal markets, including restaurants around Stellenbosch, the Fruit and Veg. Supermarket and the Epping market, and informally to local people and hawkers. To transport the produce to the markets, farmers made use of hired transport, and some used their own transport (bakkies).

The farming objectives were commercial and for own consumption. The farmers employed family labour – some on a full-time basis and others part-time during the planting season, weeding period and during harvesting. They also hired tractors and equipment during the planting and harvesting seasons.

Non-agricultural sources of income for the farmers in this type included social grants (child support grants), salaries and wages of the working household members, and remittances. Total non-farming income for this type ranged between R130 000 and R180 000 per annum. Total farm income per year for farmers of this type ranged between R40 000 and R100 000. Total household income ranged between R170 000 and R280 000 per annum or R24 286 – R40 000 per capita, with farm income contributing between 24 and 36% of total household income.

Farmers of this type had a range of necessary farming skills, which were acquired while they were working on commercial farms. They also attended workshops and training sessions and contacted extension officers regularly for advice on farming-related matters.

Constraints experienced by members of this type are high transportation costs, water scarcity problems and lack of financial support services and capital.

4.3 Smallholders' risk attitudes

Having described the diversity of smallholder farm types in the Stellenbosch typology, the next step was to determine and analyse risk attitudes/risk profiles.

The risk attitudes, of Stellenbosch smallholders were measured on the basis of the surveyed farmers' responses to the set of risk management statements listed in 3.5. The responses were then summed to yield an aggregate (average) score, presented in Table 5.10. The range of responses was from “strongly agree” (1) to “neither agree nor disagree” (3) to “strongly disagree” (5).

Table 5.4: Rating of risk management statements

Statement	Average score for smallholders	Standard deviation	Minimum	Maximum
1. The crops and/or livestock I produced are concentrated in one or two enterprises	1.02	1.931	1	5
2. I take environmental consideration in my production	2.86	0.816	1	5
3. I practice crop rotation and plant cash crops during winter seasons	1.89	1.199	1	5
4. I use fertiliser to increase nutrients in the soil instead of manure	1.67	1.625	1	5
5. I use chemical weed, pesticides, insecticides and fungicides to control weed	1.98	1.119	1	5
6. I do not plough seeds if I know it is not going to rain or there is drought possible	2.00	1.151	1	5
7. I do not plough late during the planting season	1.69	1.227	1	5
8. I do not rely heavily on market information	2.82	1.192	1	5
9. I use forward contracting for commodities I produce	4.41	1.254	1	5

10. I do not trust the information available on the internet that is used for operational decision making in the farm	2.69	1.187	1	5
11. I do consult a production extension specialist before and even now before taking major decisions in my farm	1.55	1.733	1	5
12. Off farm income is not an important source for financial survival of my family	3.73	1.310	1	5
13. In case of emergency, I do have sufficient back-up management or labour to carry on production	1.71	0.958	1	5
14. I am always one of the first producers in the area to adopt new technology	4.23	1.757	1	5
15. I am reluctant in adopting new ways of doing things	2.00	1.979	1	5
16. I consider myself to be a low-cost producer	2.75	0.837	1	5
17. I am more concerned about large loss in my operation than missing a large gain	2.92	1.110	1	5
18. I do invest in the farm operation to create opportunities for expansion	3.82	1.239	1	5
19. I do call in a veterinarian to my livestock production	0.96	1.755	1	5
20. My animals are kept in a looked after environment and graze in wild areas whilst someone is looking after them	1.16	1.940	1	5
21. I keep my livestock in a kraal and in a shed	1.45	0.790	1	5
22. I do have agricultural (crop) insurance	5.00	1.529	1	5
23. I am willing to take number of risks to be successful in farming business	4.39	1.605	1	5

Source: Own calculations

Table 5.10 shows the different risk management attitudes of the smallholders per type and also within each type. Farm households from type one were not included in the risk attitude analysis because they were no longer participating in farming and there are no farm level risk management strategies were employed by this farm type. Table 5.11 classify risk attitudes according to farming

Table 5.5: Risk attitudes of Stellenbosch smallholder farm types

Smallholder types		Risk attitudes of Stellenbosch smallholders		
Types	Number of smallholders per type	Risk averse	Risk neutral	Risk seekers/takers
Type 1	5	n/a	n/a	n/a
Type 2	8	4	3	1
Type 3	7	4	1	2
Type 4	8	1	2	5
Type 5	10	4	2	4
Type 6	11	2	2	7
TOTAL	49	15 (34.1%)	10 (22.7%)	19 (43.2%)

n/a = not applicable

Source: Own calculations

5.3.1 Risk-averse smallholders

The lower the individual/farmer risk management statement score (risk management score ranging from 1 to 2), the more likely that the farmer agreed with the implementation of or utilised this as a risk management strategy. An aggregate (average) score from 1 to 2 thus implied that the individual was conservative towards risky situations i.e. risk averse. In this case, fifteen smallholder farmers were risk averse, representing 34.1% of the sample interviewed.

Interesting differences were observed between farm types. Farm types 2 and 3 had the biggest percentage of risk-averse producers/farmers – 4/8 and 4/7 respectively. Farm types 4, 5 and 6 had less risk-averse farmers – 1/8, 4/10 and 2/11 respectively.

Risk-averse smallholder farmers' showed that they employed risk management strategies, trying to avoid the impact of uncertainty and risk involved in farming. The risk-averse farmers agreed mostly with the use of enterprise diversification (farming with different enterprises), crop rotation and planting cash crops during winter, the use of fertiliser instead of manure to increase the nutrients in the soil, use of chemicals, pesticides and fungicides trying to control weeds and pests, and they were not only focusing on farming activities for the survival of their families. They always planted early or during the right time of the season, they did not make the mistake of letting the right time of planting pass and take the risk of planting late.

For farming-related issues that they did not understand correctly, they asked or consulted the extension officers or sometimes their colleagues (other farmers) that had better farming

knowledge and more farming experience. Risk-averse smallholder farmers stated that, in the case of “bad times” and “hard seasons”, they have sufficient back-up management or labour to carry on production. These statements provided an average score of between 0.96 and 2.00, which correlates with risk averse on the scale for risk management statements.

Risk-averse livestock farmers kept livestock in a looked-after environment, they treated their animals well, they purchasing medicines, including vaccinations, spraying machines and dips to try to control ticks and diseases, especially in cattle. Among the risk-averse smallholders, the use of agricultural insurance was not mentioned by any smallholder as a risk management strategy they were using. Risk-averse smallholders said the reason for them not considering agricultural insurance as a risk management strategy was because risk premiums were too high to afford.

Generally, keeping livestock was a risk-mitigating activity, more than farming with crops. This implies that smallholders keeping livestock generally are risk-averse farmers, as there are relatively fewer risks involved in farming with livestock compared to farming with crops. Both types 2 and 3 were livestock keeping smallholders.

The risk averseness of type smallholders can also partly be explained by “age life cycle” considerations i.e. pensioners still farming to “keep going” and rather securing what assets and income streams they already have access to.

5.3.2 Risk-neutral smallholders

An average statement score of 3 implies that the respondents neither agree nor disagree with the risk management statement i.e. a risk-neutral attitude. Ten smallholder farmers were risk-neutral, representing 22.7% of the sample that was analysed for risk attitudes. Relatively low numbers were recorded for all farm types, except for farm type 2 with 3/8, positioning it as risk-neutral; the other scores were relatively lower than this.

Risk neutrality characteristics however do not dominate any of the types in the typology. Even the risk-neutral smallholders indicated that the use of agricultural insurance was not part of the risk management strategies they employed.

5.3.3 Risk-preferring/taking smallholders

The higher the individual statement score (aggregate/average score from 4 to 5), the less the smallholder farmer agreed with the implementation of, or utilised, the particular risk management strategy i.e. a risk-taking attitude. An aggregate score of 4 to 5 implies that the respondents disagreed with the risk management statement/strategy or did not utilise the strategy.

Nineteen smallholder farmers were risk takers, representing 43.2% of the sample that was analysed for risk attitudes. What is interesting is that the majority of the farmers in farm types 4, 5 and 6 were rated as risk takers – 5/8, 4/10 and 7/11 respectively, i.e. those farm types that had a greater orientation towards entrepreneurial activity, as often required by commercial farming objectives.

Stellenbosch smallholders strongly disagreed with the following risk management statements: smallholders were not willing to take insurance for their crops; were willing to take a number of risks to be successful in farming business; did not use forward contracting for commodities they produced; took the risk of investing in the farm operation to create opportunities for expansion; were always amongst the first producers in the area to adopt new technology; did not use crop diversification; and only focused on and farmed with one enterprise (i.e. the farm worker equity share schemes only farm with one enterprise which was grapes).

The shareholders of the equity share schemes (type 4) were risk-takers because they operate as shareholders in an established commercial farming environment and had access to better and stronger support systems. These statements' average scores were between 3.73 and 5.00, which correlates with disagree to strongly disagree on the scale, i.e. favouring risk-preferring/taking behaviour. They however could also be somewhat unaware of the risk managing practises followed by the farm owner or company i.e. be somewhat uninformed of the real risks facing their farming situation. This type however must be viewed as a particular case in the Stellenbosch typology, not closely related to the other types.

Risk-preferring smallholder farmers (types 5 and 6) believed and used the business slogan that says “high risk high returns”. These smallholders hoped that, by taking risky decisions, they would increase their chances and opportunities for doing well commercially. Entrepreneurial activities associated with risk and uncertainties are clearly viewed as part of commercial

agriculture and “not something to be afraid of”. It is often said that, in business, profit is the reward for bearing risk, i.e. “no risk means no gain”. However risk, if not managed in an appropriate manner, risk could also result in disaster, ending a career and prospects for a future in commercial agriculture (Hardaker *et al.*, 2004).

Support strategies to manage risk wisely thus would be in the “development paths” of emerging commercial farmers - farm types 4, 5 and 6.

5.4 Conclusion

A Stellenbosch smallholder farm typology based on different drivers – social, economic and business yielded six different types of smallholder farming households. This proves the study’s hypotheses that, there is a clear diversity amongst the farming systems of Stellenbosch smallholders: firstly, that smallholders are not a homogenous group, and secondly, that these different types of smallholders have different risk attitudes.

Farm diversity amongst smallholders in the Stellenbosch area is largely reflected in the different ways farming households view agriculture/farming and practise agricultural activities. Such differences cannot be ignored, as they point to specific constraints and opportunities faced by each type and would thus, also lead to the formulation of ideal support systems for each farm type.

Furthermore, the diverse risk attitudes would have an impact on such ideal support systems. In the Stellenbosch local municipal area, smallholder farmers’ risk attitudes were determined individually and for each farm type.

The distribution of Stellenbosch smallholders’ risk attitudes per type was as follows: (type1, non-farming households, were not analysed).

The overall risk attitude for smallholders of farm type 2 (pensioners - mixed livestock holders) was risk averse: 50% of farm type 2; type 3 (part-time cattle livestock holders) were even more risk averse (57%). This conforms to the literature that farming with livestock is generally considered as a less risky farming activity compared with crop farming; and that “old age” pensioner situations call for risk averse attitudes.

More commercially oriented farmers were stronger risk takers. Type 4 (commercial equity share scheme farmers), type 5 (retirement-planning crop producers) and type 6 (commercial crop producers) generally were risk preferring farmers.

Type 4, the equity share schemes farmers, were risk takers (62.5%) because they operated in a well-established commercial farming environment and had access to better and stronger support systems for their farming activities. Of type 5, only 40% were risk averse (with 40% being risk-preferring farmers and 20% being risk neutral). Type 6 were the most risk preferring farmers (63.6%), hoping to increase their chances and opportunities for doing well in the commercial farming business, i.e. willing to take some risks in order to increase their chances of becoming successful and generating more profit.

From Table 5.3 (a) and Table 5.3 (b), one further can conclude that of the 44 smallholder farmer respondents that were interviewed for risk attitude analysis purposes, the majority (19/44) were risk preferring/takers, followed by those who were risk averse (15/44), with the minority being risk-neutral smallholders (10/44).

These results proved that diversity in smallholder agriculture is also carried to the risk attitudes of Stellenbosch smallholders, ranging from risk preferring (43.2%) to risk neutral (22.7%) and risk averse (34.1%). This finding counters the common notion that all smallholders generally are risk averse (Ihli, Chiputwa, Bauermeister & Musshoff, 2013; Hindi, 2009; Van Averbeké & Mohamed, 2006; Bard and Barry, 2000; Binswanger, 1980).

A better understanding of farmers' risk preferences and the linkages thereof to farm diversity, should thus be viewed as important for gaining insight into the dynamics of how risk affects decision behaviour and agricultural outcomes in order to design more appropriate policies and support strategies. This will be important for the development of insurance instruments to mitigate the negative effects of risk taking by smallholders operating on a commercial farmer development trajectory.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter summarise the most important findings of this study, come to conclusions on the research problem and research questions, comment on the stated hypotheses and propose/recommend support strategies for Stellenbosch agricultural smallholders (step 4 of the analytical framework – Figure 3.1).

The main objective of this study was to consider and confirm or otherwise the hypotheses that there is diversity among Stellenbosch smallholders and their risk attitudes. It thus would be incorrect to assume homogeneity of farm styles within this particular farm typology. The reason for focusing on farm diversity and risk attitudes of Stellenbosch smallholders was because there is a general lack of understanding and related information on this category of farmers, while the Municipality and the Western Cape Department of Agriculture currently are prioritising the design of support to such types/groups, potentially treating the all as operating as a homogeneous type of farming. The results that were obtained from this study therefore are of importance to agricultural stakeholders i.e. to know and understand better the types of smallholders operate in the Stellenbosch local municipal environment and what kind of policies and support systems can be designed and implemented to benefit these smallholder farmers.

6.2 Summary

This section summarises the essential aspects of the study as attended to in the previous chapters.

6.2.1 Setting the scene

Generally there is a common notion among agricultural planners and policy makers, i.e. those designing policy and support programmes, that all smallholder farmers in an agro-ecological region are homogenous or similar, i.e. operating according to homogenous production functions and development paths and driven by the same objective functions, but this is not always true, nor does it reflect the reality at grass-roots level. The objective of this study was to consider this “homogenous model” and describe and analyse the farm diversity and risk attitudes of smallholders in the Stellenbosch local municipal area.

In achieving the set objective of the study, different questions were asked: where are smallholders situated in Stellenbosch municipality? How to describe and analyse diversity? To what extent does diversity in farming exist among Stellenbosch smallholders? What are the risk attitudes of such farm types among Stellenbosch smallholders? How can these different smallholders' types be served better with support strategies?

6.2.2 Literature review

Literature notes that the major feature of the heterogeneity of South African agriculture is the huge structural gap that was created before and during the apartheid period between “white commercial agriculture” and some residual “black” and “coloured” smallholder farms (Vink *et al.*, 2012; Anseeuw *et al.*, 2001), resulting in a broad generic South African typology (Table 2.1). However, to develop new and particular policy measures to democratise and transform agricultural support; and also to achieve the needs of the current smallholder farmers, a more accurate description of the reality of smallholders is needed. This will provide direction to design relevant assistance and services, based on homogeneity within the farm type and heterogeneity between the farm types. If diversity is recognised between farmers, it implies that farmers may be served better, as they would respond differently to any development support initiative. Attitudes towards risks involved in farming are also likely to vary between different farm types, ranging from risk averse to risk neutral and risk seeking/preferring. The degree to which farmers enjoy taking risk also depends on individual attitudes. Understanding farmers' attitudes and responses to agricultural risks therefore is also important for designing financial support services and effective extension activities (Demiryureke *et al.*, 2012).

6.2.3 Research methodology

The study formed part of the South African Agrarian Diagnoses project and was carried out in the Stellenbosch local municipality, one of the five local municipalities in the Cape Winelands District Municipality in the Western Cape province of South Africa. The work was conducted in collaboration with the Stellenbosch Municipality and the Western Cape Department of Agriculture, along with selected smallholders.

A four step framework was followed to structure the enquiry:

Step 1: Defined farm diversity, farm typology and risk attitudes

Step 2: Statistical analysis was performed/carried out

Step 3.1: Described and analysed different types of Stellenbosch smallholders

Step 3.2: Described and analysed risk attitudes or risk profiles per type

Step 4: Draw conclusions and made recommendations

A non-probability sampling approach was used to select a sample size of 49 respondents. The reason for using non-probability sampling technique was that when one wants to do the diversity analysis, one must try to include many respondents in the sample and the farmers that are included must be representative of the population from which they are selected.

Two data collection phases were employed in this research. The first phase was the zoning phase (when the researcher was investigating the different places where smallholders are situated in the Stellenbosch local municipality, the maps of the different areas, the infrastructure of the different zones, etc.), and the second phase was the in-depth interviews. Both primary and secondary data were used in this study. Primary data was collected from the Stellenbosch smallholders using a semi-structured questionnaire, and secondary data was obtained from existing and relevant literature.

To analyse the data collected, Microsoft Excel and SPSS were used. Two methods or techniques were employed to analyse the data, namely the cluster analysis method and the Likert risk attitudinal scale method. The cluster analysis method was used to build and formulate the different types of Stellenbosch smallholders. The Likert risk attitudinal scale was used to measure the risk attitudes of the different types of Stellenbosch smallholders.

6.2.4 Study results and findings

6.2.4.1 The Stellenbosch smallholder typology

The Stellenbosch smallholder typology consisted of variations in types of farmers' production objectives, resource endowment, cultivated crops and livestock kept, describe the diversity of the Stellenbosch smallholder farmer types in the Stellenbosch local municipal area. This study found

six different types of smallholder farmers in the Stellenbosch areas, based on the variables that were selected. These types were: type 1 – farmland-occupying but non-farming households, type 2 – pensioner livestock farmers, type 3 – part-time cattle farmers, type 4 – commercial equity share farmers, type 5 – retirement planning crop producers and type 6 – commercial crop producers.

The empirical results of this study provide a framework to analyse the problems and constraints faced by the different types of Stellenbosch smallholders and a potential development for each. Besides the classification of farms according to diversity, this farm typology provides insight into the needs for diversification as it relates to support policy, services and services.

6.2.4.2 Risk attitude results

The results of the study showed that different types of Stellenbosch smallholders have different risk attitudes, both between types but also within types. Generally, one can conclude that, among 44 respondents interviewed for the risk attitude analysis, the majority (19/44) were risk takers, followed by risk-averse farmers (15/44) and risk-neutral farmers (10/44), represented 43.2%, 34.1% and 22.7% of the farmers respectively. The risk taking types were generally more orientated to commercial farming and the entrepreneurial actions related to such farming; the risk-averse type were in their pensioning age life cycle and preferred to keep livestock as an agricultural activity.

6.3 Development trajectories/paths for smallholder farming in the Stellenbosch local municipal area

The final step (Step 4) in this analysis required the proposal of appropriate development support strategies and services for smallholder farmers in the Stellenbosch local municipal area, recognising the different farming types as described.

The concept of development trajectories/paths provide a “futuristic” framework for the agricultural development of each type as it is firstly based in the current reality as experienced by each such type (intra-type reality); and also provides a directive towards future growth towards other types in a particular typology, again based on the reality within these other types (inter-type realities). The potential development for each type must thus be considered.

Type 1: From a development trajectory consideration, this type of households can move to type 5 (retirement planning crop producers) should they have an opportunity to practise farming activities again and if there are reserves on the farms on which they used to practise agriculture, including crop enterprises as they used to do before they stopped practising farming activities.

The risk diversity orientation and “age life cycle” reality of this type may render an alternative strategy, in context of agricultural development and which may be viable and more progressive could be considered. This would entail the possible release of farm land, against formal compensation, to commercial orientated smallholders, enabling this type to expand their commercial aspirations. For type 1 this would entail “a moving out of farming strategy”; they will be compensated on a cash (rental) basis, securing their income flows and thus reducing risk. It will however be important to secure such compensation payments. A government supported (“rental insurance”) scheme, aimed at releasing high potential lands, from such types, for productive farming would address such risks.

Type 2: The smallholders in this type are pensioners, retired from their jobs and are ageing. From an agricultural development viewpoint a “moving out of farming strategy” as proposed for type 1 and with similar support could equally be considered here, inter alia in view of the high risk-aversity of this type.

The “hand-over” of their farming activities to their sons/daughters could also be considered, again moving the resources to a younger generation with more commercial farming aspirations and related risk attitudes, i.e. in the direction of a type 6 system. A scheme to support the securing of a type of rental income will also be required in this development path.

There is a possibility that the members of this type can continue to practise farming activities and using hired labour to look after the livestock. This however is likely to evolve to a type 1 situation.

Type 3: Members of this type can be expected move to type 2 (pensioner - livestock farmers) as these livestock holders are getting old and will retire from their jobs and become pensioners (include retirement pension and old age pension). A similar development path i.e. “moving out of farming” could also be considered, again releasing land to more productive type 6 farmers.

Where type 3 smallholders choose to continue farming, services to alleviate constraints, listed in Table 5.6 could be considered.

The high risk-aversity of such smallholders however may favour a structured “moving out of farming” strategy similar to type 1 and 2.

Type 4: In general it can be expected that this type will secure its own unique development trajectory, much in line with corporate institutional growth and development. The reduction of “red tape” and related bureaucratic measures will be relevant. The strategic promotion of this black economic empowerment model, leading to higher BEE Score Card status, is likely to secure this type as a typology in its own right, consisting of different farm equity share types.

There could be a possibility for members of this type to embark on a development path leading to “independent” type 6 (commercial crop producers), if such farm worker shareholder can acquire a piece of arable land, as their primary farming objective already is to generate income (commercial purposes) from the farming activities they practise. In such a case “exit arrangements” from the scheme will be important; and if a previous worker could maintain shareholding, the move towards type 6 could be viable.

In generally available business related risk management strategies will be applied in such types.

Type 5: There be a strong drive to support smallholders in this type to move to type 6 (commercial crop producers), by focussing on the alleviation of the farming constraints, in particular the major problems listed in Table 4.8 viz: water scarcity, technical farm production training and extension and market access - dealing with the listed problems of poor quality and low quantity of the produce for commercial markets.

These farmers could also benefit from the “release of farm land” by the proposed “moving out of farming” strategy for types 1, 2 and 3. This would render possible economies of scale advantages in their farming endeavours.

Type 6: Members of this type (type 6) can generate more income from their farming activities, which could contribute more to the total household income. The development support should focus on the alleviation of constraints listed in Table 4.9.

If this type could sell more of their produce to formal markets, i.e. gain secure access to lucrative markets; and the state can help the farmers with their water problems, farm income could improve for these farmers. Support from the private sector with contacting to value chains and retail outlets and the related quality and quantity support services would be crucial in this strategy.

From a more strategic perspective smallholder in this type should be strong candidates for selection and support gain access to larger farm land holdings, inter alia through “‘land reform initiatives’”, in order to grow their commercial farming enterprise and experience economies of scale advantages.

6.4 Recommendations for smallholder support policy and strategies

The study findings of diversity in smallholder farming, albeit based on a particular “‘case study’”, do have implications for smallholder development policy strategies in general. The following recommendations can be considered by agricultural policy makers, planners, development initiators:

- Farming development strategies should recognise the diversity that exists in smallholder farming types and plan and implement differentiated support strategies and services.
- A clear understanding and description of the various farm types within area/zone typology is important as a starting point to provide effective support services. A clear perspective on the most likely development trajectories/path for each farm type will also be required to structure appropriate support strategies. Development of such strategies should encompass participation, mobilisation and capacity development of the communities involved, together with the intended/targeted beneficiaries (types).
- It should be noted that, as farming does not occur in isolation, its development has to occur in an integrated development context, directed by sound policies and support mechanisms. For example for effective farming to place there has to be infrastructural development related to transportation, etc. together with various support services focussing on particular farming types.
- The institutional support system is equally important, and it should include appropriate services as required per a designated type viz: credit/financial support, extension

services, input supply and human capital development. Support service should thus not be rendered through a one-dimensional approach, (i.e. the introduction of extension services needs other support like financial support and human capital development for the success of the farming process).

- The agricultural extension efforts will be effective once there is adequate knowledge about diversity as it manifests in the typology/types of farmers who are to be served their particular requirements and constraints and their environments. Knowledge of the agricultural resource base of different farmers is also important, for example the composition of the crops grown and livestock held. Such information suggests that technical advice is different for different types within an area.
- For a coordinated approach, service providers (public and private) would like to know who to target when providing particular kinds of services. With knowledge of the farm type diversity in a community, agricultural development planners and policy makers including extension services can understand how practical training and workshops can be formulated for improving the different farming systems.
- Financial institutions (insurance companies) should be encouraged to collaborate with government to create appropriate risk management products to fit the needs and risk profiles of different farm types, i.e. types 1, 2 and 3; types 4, 5 and 6.

6.5 Future research

This study focused only on farm diversity and the risk attitudes of smallholders in the Stellenbosch local municipal area. Although thus not representative of the province or country at large, this study can be considered as a framework and baseline for related studies in order to assist the design of typology based develop support programmes and services for various types of smallholder farmers. This study together with the studies by Laurent *et al.*, 1999; Modiselle, 2001; Anseeuw *et al.*, 2001, can be used in this context, i.e. to give direction and a framework for the investigation in to the smallholder farmer diversity in other cases.

This theme links to recent work on the topic of agricultural diversity, but is relatively unexplored in agricultural economics and agricultural development economics in particular for new type of support services, such as risk managing instruments for smallholders. The topic of risk

attitudes/profiles and appropriate risk management strategies and instruments provide an interesting area for future investigation.

Much may also be gained by further research to describe and analyse the diversity and risk attitudes of more farmer types (including both commercial large-scale and smallholder farmers) in different administrative and agro-ecological settings. Links between smallholder farmers and large-scale farmers and agribusiness could also be explored in this context.

Another possible angle for future research can be to start with a factor analysis in farm diversity analysis, which will reduce the number of variables to be retained in the cluster analysis.

6.6 Major conclusions

The study aimed to describe and compile an understanding of the farm diversity of Stellenbosch smallholders and to illustrate that such diversity in planning and agricultural development initiatives. The study hypothesised that the behaviour of Stellenbosch smallholders is diverse and this diversity is reflected in the way smallholders view agriculture and practise agricultural activities. Following from this, it was argued that such differences should be accounted for in agricultural development strategies and planning efforts.

The results support the stated hypotheses that smallholder farmers are not a homogenous group or one type; it conforms to farming styles theory that there is diversity in smallholder farming. The findings regarding risk attitudes of different types of Stellenbosch smallholders rejects the study hypotheses that most smallholders in the Stellenbosch local municipal environment are risk-averse and most Stellenbosch smallholder farmers were found to be risk preferring/taking: results showed that 43.2%, 34.1% and 22.7% were risk preferring/taking, risk averse and risk neutral respectively.

The diversity characteristics of smallholder agriculture will have a complicated impact on the design of support policies, strategies and services. Information gathered in this study about farm diversity, proved to be relevant for use by institutions designing and implementing farmer development support inter alia to consider appropriate support interventions and development paths for different smallholder types. Each smallholder farming household can however not be

treated individually due to the high cost of such an individualistic approach. A more economic approach is to group households/farmers together in farm types, as was done in this study; and then to develop appropriate strategies for each type according to the experienced binding constraints and viable development paths

References

- Alvarez-Lopez, C.J., Riverio-Valino, J.A. & Marey-Perez, M.F. 2008. Typology, classification and characterisation of farms for agricultural production planning. *Spanish Journal of Agricultural Research*, 6 (1): 125-136.
- Andersen, E., Elbersen, B., Godeschalk, F. & Verhoog, D. 2007. Farm management indicators and farm typologies in a changing policy environment. *Journal of Environmental Management*, 82:353-362.
- Anderson, J.R., Dillon, J.L. & Hardaker, J.B. 1977. *Agricultural decision analysis*. Ames: Iowa State University Press.
- Anseeuw, W., Laurent, C., Modiselle, S., Carstens, J. & Van der Poll, S. 2001. Diversity of the rural farming households and policy issues: An analysis based on a case study in the Northern Cape Province, South Africa. Paper delivered at the conference on 25th IAAE Conference, Durban [2003, August 16-22].
- Arabie, P. & Hubert, L.J. 1992. Combinatorial data analysis. *Annual Review of Psychology*, 43:169-203.
- Ayinde, O.E., Omotesho, O.A. & Adewumi, M.O. 2008. Risk attitudes and management strategies of small-scale crop producers in Kwa State, Nigeria: A ranking approach. *African Journal of Business Management*, 2(12):217-221.
- Bard, S.K., and Barry, P.J. 2000. Developing a scale for assessing risk attitudes of agricultural decision makers. *International Food and Agribusiness Management Review*, 3(1):9-25.
- Bard, S.K. & Barry, P.J., 2001. Assessing farmers' attitude toward risk using the closing-in method. *Journal of Agricultural and Resource Economics*, 26 (1):248-260.
- Binswanger, H.P. 1980. Attitudes toward risk: Experimental measurement in rural India. *American Journal of Agricultural Economics*, 62:395-407.
- Bond, G.E. & Wonder, B. 1980. Risk attitudes amongst Australian farmers. *Australian Journal of Agricultural Economics*, 24(1):16-34.

Brand, S.S., Christodoulou, N.T., Van Rooyen, C.J. & Vink, N. 1992. *Agriculture and redistribution: Growth with equity*. In Schrire, R. (Ed), *Wealth or poverty? Critical choices for South Africa*. Cape Town: Oxford University Press.

Cheveau, A., Hoornaert, C. & Cochet, H. 2011. Development perspective for an Ethiopian agrarian system sinking into crisis [Online]. Available:

http://www.interaide.org/pratiques/sites/default/files/Agrarian_Diagnosis_Kambatta_Ethiopia_120409_thesis_0.pdf [2012, July 17].

Clewley, J.P. 1998. A user's guide to producing and interpreting tree diagrams in taxonomy and phylogenetics. *Communicable Disease and Public Health Journal*, 1(1):64-72.

Dadzie, S.K.N. & Acquah, H.G. 2012. Attitudes toward risk and coping responses: The case of food crop farmers at Agona Duakwa in Agona East District of Ghana. *International Journal of Agriculture and Forestry*, 2(2): 29-37.

Demiryurek, K., Ceyhan, V. & Bozoglu, M. 2012. Risk attitudes of organic and conventional hazelnut producers in Turkey. *Human and Ecological Risk Assessment, an International Journal*, 18(2):471-482.

Dibb, S. 1999. Criteria guiding segmentation implementation: Reviewing the evidence. *Journal of Strategic Marketing*, 7(2):107-129.

Dillon, J.L. & Scandizzo, P.L. 1978. Risk attitudes of subsistence farmers in North East Brazil: A sampling approach. *American Journal of Agricultural Economics*, 60(3):425-435.

Dixon, J., Gulliver, A. and Gibbon, D. 2001. *Farming systems and poverty: Improving farmers' livelihoods in a changing world*. Rome and Washington, DC: FAO and World Bank Book.

Duvernoy, I. 2000. Use of land cover model to identify farm types in the Misiones agrarian frontier (Argentina). *Agricultural Systems*, 64(3):137-149.

Eckert, J.B., and William, W. 1995. Identifying serious farmers in the former Ciskei: Implication for small-scale farm research and land reform. *Agrekon*, 34(2):50-58.

- Ellis, F. 2000. Rural Livelihoods and diversity in developing countries. 1st Edition. New York: Oxford University Press.
- Everitt, B.S. & Dunn, G. 2001. Applied multivariate data analysis. 2nd Edition. Manchester: John Wiley & Sons.
- Ferrer, S.R.D., Hoag, D.L. & Nieuwoudt, W.L. 1997. Risk preferences of KwaZulu-Natal commercial sugar cane farmers. *Agrekon*, 36(4):484-492.
- Food and Agriculture Organisation of the United Nations (FAO) 1999. Guidelines of agrarian systems diagnosis [Online] Available: <http://www.ufrgs.br/pgdr/arquivos/562.pdf> [2012, June 23].
- Forina, M., Armanino, C. & Raggio, V. 2001. Clustering with dendrograms on interpretation variables. *Analytica Chimica Acta*, 454:13-19.
- Freguin-Gresh, D. 2009. Using agrarian system diagnosis to understand rural realities. Presentation – NAMC Contract Farming Project Workshop. Postgraduate School of Agriculture and Rural Development, University of Pretoria, Pretoria.
- Gray, B., Lyne, M. & Ferrer, S. 2004. Measuring the performance of Equity-Share Schemes in South African Agriculture: A focus on financial criteria. *Agrekon*, 43(4):377-395.
- Hardaker, J.B., Huirne, R.B.M. Anderson, J.R. & Lien, G. 2004. Coping with risk in agriculture. 2nd Edition. South New Wales: CABI Publishers.
- Health and Safety Executive (HSE). 2009. *Understanding and influencing farmers' attitudes*. Research Report No. 700, HSE, United Kingdom.
- Held, J.R. 1996. Clusters as an economic development tool: Beyond the pitfalls. *Economic Development Quarterly*, 10(3):249-261.
- Hindi, M.A.S. 2009. Attitudes of Vegetable farmers towards risk in the Jordan Valley. *Emirates Journal of Food and Agriculture*, 21(2):51-63.

Hope, J. and Lingard, J. 1992. The influence of risk aversion on the uptake of set-aside: a MOTAD and CRP approach. *Journal of Agricultural Economics*, 43(3):401-411.

Ihli, H.J., Chiputwa, B., Bauermeister, G.F. & Musshoff, O.2013. Measuring risk attitudes of smallholder farmers in Uganda: How consistent are results of different methods? Paper presented at the Second International Agricultural Risk, Finance, and Insurance Conference [2102, August 19], Vancouver, British Columbia.

Iturrioz, R. 2009. *Agricultural Insurance*. The World Bank Issue No. 12, Washington DC.

Jacobs, D. & De Man, A.P. 1996. Clusters, industrial policy and firm strategy: A menu approach. *Technology Analysis and Strategic Management*, 8(4):425-437.

Jacobs, R., 2012. Personal communication. [2012, July 28]. Elsenburg, Western Cape.

Jary, D. & Jary, J. 1995. Dictionary of sociology. Glasgow: Harper Collins Publications.

Katz, M.H. 1999. Multivariate analysis: A practical guide for clinicians. 1st Edition. London: University Press.

Keshavarz, M., Karami, E. & Kamgare-Haghighi, A.A. 2010. A typology of farmers' drought management. *American-Eurasian Journal of Agriculture and Environmental Science*, 7(4):415-426.

King, R.P. & Robison, L.J. 1981. An interval approach to measuring decision makers' preferences. *American Journal of Agricultural Economics*, 63(3):510-520.

KingHo, H.O. 2011. Land reform in the South African wine industry: Reviewing equity sharing scheme in Stellenbosch. Master's thesis. Utrecht: Universiteit of Utrecht.

Kirsten, J. & Van Zyl, J. 1998. Defining small-scale farmers in the South African context. *Agrekon*, 37(4):560-571.

Kirsten, J., Perret, S., De Lange, A., & D'Haese, L. (Eds.). 2006. *Rural development: Focusing on small scale agriculture in Southern Africa*. Pretoria: Department of Agricultural Economics, Extension and Rural Development, University of Pretoria.

Knight, S. and Lyne, M. 2002. Perceptions of farm-workers equity-share schemes in South Africa. *Agrekon*, 41(4):356-374.

Knight, S., Lyne, M. and Roth, M. 2003. Best institutional arrangements for farm workers equity-share schemes in South Africa. *Agrekon*, 42(3):228-251.

Lagerkvist, C.J. 2005. Assessing farmers' risk attitudes based on economic, social, personal, and environmental sources of risk: evidence from Sweden. Paper presented at American Agricultural Economics Association Annual meeting. [2005, July 24-27], Rhode Island.

Lahiff, E. and Cousins, B. 2005. Smallholder agriculture and land reform in South Africa. *Institute of Development Studies Bulletin*, 36(2):127-131.

Landais, E. 1998. Modelling farm diversity: New approaches to typology building in France. *Agricultural Systems*, 58(4):505-527.

Laurent, C., Van Rooyen, C.J., Madikizela, P., Bonnal, P. & Carstens, J. 1999. Household typology for relating social diversity and technical change. The example of rural households in the Khambashe area of the Eastern Cape province of South Africa. *Agrekon*, 38:190-206.

Lhopitallier, L., Perret, S. & Caron, P. 1999. *Participatory zoning techniques: As support to rural development planning and management*. Working Paper No. 66, CIRAD Team, University of Pretoria, Pretoria.

Lien, G. 2002. Non-parametric estimation of decision makers' risk aversion. *Agricultural Economics*, 27(1):75-83.

Likert, R. 1932. A technique for the measurement of attitudes. *Archives of Psychology*, 22 (140):1- 55.

Machethe, C.L., Mollé, N.M., Ayisi, K., Mashatola, M.B., Anim, F.D.K. & Vanasche, F. 2004. *Smallholder irrigation and agricultural development in the Olifants river basin of Limpopo province: management, transfer, productivity, profitability and food security issues*. WRC Report 1050/1. Pretoria: Water Research Commission.

- Madry, W., Gozdowski, D., Roszkowska-Mądra, B., Dabrowski, M., & Lupa, W. 2010. Diversity and typology of farms according to farming system: A case study for a dairy region of Podlasie province, Poland. *Electronic Journal of Polish Agricultural Universities (EJPAU)*, 13 (2):03.
- Magombeyi, M., Morardet, S., Taigbenu, A.E. & Cheron, C. 2012. Food insecurity of smallholder farming systems in B72A catchment in the Olifants River Basin, South Africa. *African Journal of Agricultural Research*, 7 (2):278-297.
- Mahul, O. & Stutley, C.J. 2011. Government Support to Agricultural insurance: Challenges and options for developing countries. World Bank Report, Washington, DC.
- Meert, H., Van Huylbroeck, G., Vernimmen, T., Bourgeois, M. & Van Hecke, E. 2005. Farm household survival strategies and diversification on marginal farms. *Journal of Rural Studies*, 21 (1):81-97.
- Modiselle, D.S. 2001. Rural household diversity in the Leliefontein district of the Northern Cape Province of South Africa. Master's thesis. Pretoria: University of Pretoria.
- Mooi, E. & Sarstedt, M. 2011. A concise guide to market research: The process, data, and methods using IBM SPSS statistics. 15th Edition. Berlin: Springer.
- Moscardi, E. & De Janvry, A. 1977. Attitudes toward risk among peasants: An econometric approach. *American Journal of Agricultural Economics*, 59(4):710-716.
- Ndlozi, V. 2005. Evaluating the performance of farm-worker participation schemes in the Western Cape Province. Master's thesis. Stellenbosch: Stellenbosch University.
- Organisation for Economic Co-operation and Development (OECD). 2006. *Promoting Pro Poor Growth Agriculture*. Paris: OECD. [Online]. Available: <http://www.oecd.org/development/povertyreduction/37922155.pdf> [2012, April 05].

Pardos, L., Maza, M.T., Fantova, E. & Sepulveda, W. 2008. The diversity of sheep production systems in Aragon (Spain): Characterisation and typification of meat sheep farms. *Spanish Journal of Agricultural Research*, 6(4):497–507.

Pasquet, J. 2007. Participatory management of irrigation systems (PMIS): Farming systems research. Final Report. Urgence Rehabilitation Development Group, France.

Pennings, J.M.E. & Garcia, P. 2001. Measuring Producers' Risk Preferences: A Global Risk-Attitude Construct. *American Journal of Agricultural Economics*, 83(4):993-1009.

Pennings, J.M.E. & Leuthold, R. 2000. The role of farmers' behavioural attitudes and heterogeneity in futures contracts usage. *American Journal of Agricultural Economics*, 82(4): 908-919.

Perret, S. 2000. Socio-economic and technical assessment of the farming systems and rural households: Typological techniques. [Online].

Available: <http://web.up.ac.za/sitefiles/File/48/2052/2000-07guide.pdf> [2012, April 28].

Perret, S. 1999. *Typological techniques applied to rural households and farming systems: Principles, procedures and case studies*. Working Paper No. 2. Pretoria: University of Pretoria/CIRAD.

Perret, S.R. & Kirsten, J. 2000. *Studying the local diversity of rural livelihoods systems: An application of typological techniques for integrated rural development support in the Eastern Cape (South Africa)*. Working Paper No. 5. Pretoria: University of Pretoria.

Perret, S.R. & Mercoiret, M.R. 2003. *Supporting small-scale farmers and rural organisations: Learning from experiences in West Africa. A handbook for development operators and local managers*. 1st Edition. Menlo Park: Protea Book House

Perret, S.R., Anseeuw, W. & Mathebula, N. 2005. Poverty and livelihoods in rural South Africa: Investigating diversity and dynamics of livelihoods. Case studies in Limpopo. Unpublished Project Report No.01. Pretoria: University of Pretoria.

Picazo-Tadeo, A.J. & Wall, A. 2010. Production risk, risk aversion and the determination of risk attitudes among Spanish rice producers. *Agricultural Economics*, 42:451-464.

Ralehoko, E.N. 2005. Evaluation of the performance of equity-sharing schemes administered by the Department of Land Affairs, Worcester District Office of the Western Cape Province. Master's thesis. Stellenbosch: Stellenbosch University.

Roslan, N.A., Abdullah, A.M., Ismail, M.M. & Radam, A. 2012. Determining risk attitudes of paddy farmers in KETARA granary, Malaysia. *International Journal of Social Science and Humanity*, 2(3):225-231.

Salimonu, K.K. & Falusi, A.O. 2009. Sources of risk and management strategies among food crop farmers in Osun State, Nigeria. *African Journal of Food Agriculture Nutrition and Development (AJFAND)*, 9(7):1591-1605.

Schwarz, I., McRae-Williams, P. & Park, D. 2009. Identifying and utilising a farmer typology for targeted practice change programs: A case study of changing water supply in the Wimmera Mallee. *Extension Farming System Journal*, 5(1):33-42.

Schonlau, M. 2002. The Clustergram: A graph for visualising hierarchical and non-hierarchical analyses. *The Stata Journal*, 2(4):391-402.

Singini, R. & Van Rooyen, C.J. 1995. Serving small-scale farmers: an evaluation of the DBSA's farmer support programmes. *Development Southern Africa*, 12(3):451-453.

Skees, J., Hazell, P. & Miranda, M. 1999. New approaches to crop yield insurance in developing countries. IFPRI Discussion Paper No. 5. IFPRI: Washington, DC.

Stellenbosch Municipality Report. 2011. Integrated Development Plan (IDP). 2nd Generation – Revision 4 [Online]. Available: www.stellenbosch.gov.za/jsp/util/document.jsp?id=4031 [2012, May 08].

Stellenbosch Municipal Status Quo Report. 2010. Stellenbosch Municipal Spatial Development Framework: The current status of Stellenbosch Municipality [Online]. Available: www.stellenbosch.gov.za/jsp/util/document.jsp?id=2978 [2012, May 09].

Tae-Hun, K. 2008. The measurement of farmers' risk attitudes using a non-structural approach. *Journal of Rural Development*, 31(2):63-80.

- Tonks, D.G. 2009. Validity and the design of market segments. *Journal of Strategic Marketing*, 25(3-4):341-356.
- Tryon, R.C., 1939. *Cluster analysis: Correlation profile and orthometric (factor) analysis for the isolation of unities in mind and personality*. Ann Arbor, Michigan: Edwards Brothers.
- Uematsu, H. & Mishra, A. 2011. Learning by doing, risk aversion, and use of risk management strategies. Paper presented at the Agricultural & Applied Economics Association's 2011 (AAEA) & NAREA Joint Annual Meeting [2011, July 24-26], Pittsburgh, Pennsylvania.
- United States Department of Agriculture (USDA). 2000. Farm typology for a diverse agricultural sector. Agriculture Information Bulletin No. 759, USDA.
- Van Averbeke, W. & Mohamed, S.S. 2006. Smallholder farming styles and development policy in South Africa: The case of Dzindi Irrigation Scheme. *Agrekon*, 45(2):136-157.
- Vanclay, F., Howden, P., Mesiti, L. & Glyde, S. 2006. The social and intellectual construction of farming styles: Testing Dutch ideas in Australian agriculture. *Sociologia Ruralis*, 46(1):61-80.
- Vanclay, F. 2004. Social principles for agricultural extension to assist in the promotion of natural resource management. *Australian Journal of Experimental Agriculture*, 44: 213-222.
- Vanclay, F., Mesiti, L. & Howden, P. 1998. Styles of farming and farming subcultures: Appropriate concepts for Australian rural sociology? *Rural Society*, 8(2):85-125.
- Van der Ploeg, J.D. 1994. Styles of farming: An introductory note on concepts and methodology, in J.D. Van der Ploeg & A. Long (Eds), *Born from within: Practice and perspective of endogenous rural development*. Netherlands: Van Gorcum: 7-30.
- Van der Ploeg, J.D. 1993. Rural Sociology and the new agrarian question: A perspective from the Netherlands. *Sociologia Ruralis*, 33 (2): 240-260.
- Van Rooyen, C.J., Ngqangweni, S. & Njobe, B. 1994. Comments on possible impact of the Reconstruction & development programme on agriculture in South Africa. *Agrekon*, 33(4).

Van Rooyen, C.J, Vink, N. & Christodoulou, N.T 1987. Access to the agricultural market for small farmers in South Africa: The farmer support programme. *Development Southern Africa*, 4(2): 207-223.

Vink, N. 2014. Personal consultation. [2014, March, 11]. Stellenbosch: Stellenbosch University.

Vink, N., Van Rooyen, C.J. & Karaan, M. 2012. Farmer support programmes: Lessons from implementation. Paper presented at the Carnegie 3 Conference, University of Cape Town: Cape Town [2012, September 04].

Vink, N. & Van Rooyen, C.J. 2009. *The economic performance of agriculture in South Africa since 1994: Implications for food security*. Development Planning Division Working Paper Series No.17, DBSA, Midrand.

Vink, N. & Kirsten, J. 2003. Agriculture in the national economy, in L. Nieuwoudt, & J. Groenewald (Eds.). *The challenge of change: agriculture, land and the South African economy*. Pietermaritzburg: University of Natal Press.

Wiffels, M. 1996. Farm typology incorporating land use: A low-data input approach for the Guanacaste province, Costa Rica. REPOSA Report No. 107, Guanacaste Province, Costa Rica.