ROLES AND IMPACTS OF EXTENSION SERVICES ON THE LIVELIHOODS OF SMALLHOLDER FARMERS DURING DROUGHT PERIODS IN THE WESTERN CAPE, SOUTH AFRICA

by

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DECLARATION

I, Coleridge Paul Recardo Carelsen, declare that the contents of this dissertation represent my own unaided work and that the dissertation has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

11 November 2020

Signed **Date**

ABSTRACT

The Western Cape Province of South Africa has experienced extreme droughts for the past century. The livelihoods of the rural communities have been affected the worst, especially smallholder farmers. Supporting smallholder farmers is an essential element in sustaining their livelihoods and poverty alleviation in rural South Africa. Understanding the different types of smallholder farmers would allow service providers to act according to the needs of the farmers. The study was conducted in the districts of the Overberg and the West Coast of the Western Cape Province. The objectives of the study were to characterise and classify smallholder farmers, to investigate the roles of public and private sector institutions in supporting smallholder farmers during drought periods and to investigate the effectiveness of public and private extension services in supporting smallholder farmers in these two districts. Questionnaires were used to collect quantitative data, while focus group discussions were used to collect qualitative information. Findings revealed that the farmers were a highly heterogeneous group as reflected by the diversity in terms of education levels and the contribution of farming income to their livelihoods. Organisations struggled with bureaucratic procedures of the government and were largely reactive in terms of their responses to managing drought. The bureaucratic processes of the government also undermined non-governmental organisations that were linked with farmer organisations and could organise farmers locally and respond more robustly to disasters such as droughts. The extension staff from the public sector participated in the implementation of the Extension Recovery Plan and successfully improved their education levels and resources to address the quality of extension services delivered to the smallholder farmers in the study area. Private extension services were profit-driven and rendered cost-recovery extension services. It is recommended that extension services consider the diversity of smallholder farmers when drafting farmer support programmes and policies. A range of support programmes and opportunities should be made available when supporting smallholder farmers to render such support services relevant because the needs of these farmers vary. The government needs to invest and provide more support for the implementation of disaster management strategies and policies, especially at a local level and to empower non-government organisations to assist with disaster response programmes that include droughts.

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DEDICATION

This dissertation is dedicated to my wife and children, Mrs. Lealani Carelsen, our children Carla Carelsen and Colan Carelsen who believed in me and supported all my efforts unconditionally.

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ABBREVIATIONS AND ACRONYMS

BGCMA	Breede-Gouritz Catchment Management Agency
CASP	Comprehensive Agricultural Support Programme
CoCT	City of Cape Town
DAFF	Department of Agriculture, Forestry and Fisheries
DRDLR	Department of Rural Development and Land
ERP	Extension Recovery Plan
FAO	Food and Agriculture Organisation
Grain SA	Grain South Africa
GVA	Gross value add
ha	Hectare
ICT	Information Communication Technology
NDP	National Development Plan
NGO	Non-Governmental Organisation
NPC	National Planning Commission
NPO	Non-Profit Organisation
NQF	National Qualifications Framework
ODM	Overberg District Municipality
SACNASP	South African Council for Natural and Scientific Professions
SASAE	South African Society for Agricultural Extension
SMS	Short message service
SPSS	Statistical Product and Service Solutions (originally Statistical Package for the Social Sciences)
TWK	Theewaterskloof Municipality
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
WCDoA	Western Cape Department of Agriculture
WFP	United Nations World Food Programme
WRC	Water Research Commission

CHAPTER 1
INTRODUCTION

1.1 Background

The Southern Africa region is richly endowed with natural resources and industries that include agriculture, hydro energy and fisheries (Nhamo et al., 2018a). Unfortunately, the very same industries are exposed to multiple natural-disasters that include droughts and floods (Nhamo, et al., 2018b). Recently the Southern African Development Countries (SADC) countries were exposed to one of the worst droughts on record during 2015/16 season (Vogel & Oliver, 2018). Agriculture as the main contributor towards livelihoods of rural communities (in access of 60%) in the region, was severely affected by the drought (De Waal & Vogel, 2016, Nhamo et al., 2018a). More than 40 million people were food insecure most of them receiving international assistance (Nhamo et al., 2018a, Rembold et al., 2019).

The South African agrarian sector is confronted by extreme challenges and difficulties; for example, trade rates, fuel increments and imports of sponsored produce at less than cost price in local terms compromise the sustainability of the sector (Fare Panel Report, 2013). At the local level, some provinces in South Africa were severely affected by the drought which caused reduced rainfall and extremely hot environmental temperatures that led to drying up of rivers, a declining groundwater table, deteriorated water quality, drylands and animal mortalities (Rakgwale & Oguttu, 2020). The livestock producers in the Free State Province were adversely affected by the drought (Muthelo, 2018). Veld degradation, increase expenditure on feeds for animals and irrigation cost were some of the effects that the Free State farmers have to bear. The reduce of livestock numbers and the relocation of stock to other areas in the province expose the farmers to more threats that include livestock theft and complicate farm management activities in the Free State Province of South Africa (Muthelo, 2018). The increased intensity and severity of climate change events such as droughts are a threat to both human and natural livelihoods systems in the Limpopo province (Rakgwale & Oguttu, 2020).

The robustness of the Western Cape agricultural sector has been challenged in the last few years by various disasters and outbreaks. These include floods, fires, drought (2009-2011) and the farmworker strikes/protest actions during 2012 and 2013, followed by the devastating drought in the 2015–2018 period and the most recent social unrest in Hermanus and elsewhere in the province. These challenges result in loss of billions of rands in damages to property, loss of income, farmers leaving the industry, factories closing down and job losses almost forcing the sector to close down (Fare Panel Report, 2013; Agri SA, 2016; Botai et al., 2017; Williams, 2017; Western Cape Department of Agriculture [WCDoA], 2018).

Studies reported losses of close to R6 billion for the 2017/18 production season in the Western Cape (Pienaar & Boonzaaier, 2018; van der Walt, 2018). The two districts of the West Coast

and Central Karoo were declared agricultural drought disaster areas (Botai et al., 2017) and the widespread effect of the drought over the entire Western Province compelled authorities to declare a Provincial Drought in October 2017. The Eastern Cape and Northern Cape provinces also experienced the same drought conditions that resulted in the national government declaring a National Disaster in February 2018 (WCDoA, 2018). The livelihoods of the rural communities were affected the worst, especially smallholder farmers. Reports presented to Parliament in October 2017 disclosed that factories in Saldanha Bay needed to be closed because of water shortages and ultimately this could result in job losses of between 4 000 to 6 000 in the West Coast region and surrounding areas. A tomato-processing factory in Lutzville had to close down (Williams, 2017).

The effect of the drought was exacerbated by the fact that there are currently no proactive drought response programmes in place in most provinces, including programmes for smallholder farmers in the Western Cape. The drought plan that was developed by the National Department of Agriculture in 2005 has not reached the implementation stage. The Western Cape government and other stakeholders tried to support smallholder farmers through the Drought Relief Fund but it was too late in many instances. The results of Pienaar and Boonzaaier (2018) attest to this, the fact that various commodities suffered severely because of the prevailing drought conditions in the Western Cape.

> *In aggregate, the grain industry in the Western Cape's gross value add (GVA) decline is valued at R2.8 billion. When looking at the fruit sectors, the grape industries will incur the greatest losses due to the drought. The Western Cape table grape industry is set to lose around R787 million, whilst the wine grape industry another R591 million at the primary level* (Pienaar & Boonzaaier, 2018).

However, only limited relief efforts for livestock producers are provided in current policies and legislation. Since the drought relief policies do not allow relief support for farmers involved in other commodities such as grain, fruit and vegetable production, these farmers are neglected. This gap in policy and legislation renders the government relief programmes ineffective (Pienaar & Boonzaaier, 2018). The role of extension services and other support organisations were also not effective and the assistance failed to reach many smallholder farmers on time (Agri SA, 2016). It is not clear why relief efforts and extension services remain so ineffective even though policies and strategies for implementation are well documented. Therefore, the effective management of drought remains a challenge to farmers and the government at large (Ncube & Lagardien, 2015; Maluka, 2017).

1.2 Problem statement and justification of the study

Recent studies done by the Water Research Commission (WRC) on the Breede-Gouritz Catchment Management Agency (BGCMA) in the Western Cape indicate that there is a diverse group of farmers whose needs are different and there is no understanding of how these farmers

can be effectively assisted (Ncube & Lagardien, 2015; Ncube, 2017). The diverse characteristics of smallholder farmers are not recognised or considered by the government and other role-players involved in supporting the farmers (Fanadzo & Dube, 2018). The blanket approached followed by the government when supporting smallholder farmers has not yielded the anticipated success (Maluka, 2017; Fanadzo & Dube, 2018). Supporting smallholder farmers is essential to the sustainability of their livelihoods and poverty alleviation in rural South Africa. A range of opportunities should be available when supporting smallholder farmers to render such support services relevant because the needs of these farmers differ (Thamaga-Chitji & Morojele, 2014). Understanding the different types of smallholder farmers would allow service providers to act according to the needs of the farmers (Fanadzo & Dube, 2018).

Various extension and advisory services are available to the smallholder farmers in the Western Cape. Non-profit organisations (NPOs) like Grain South Africa (Grain SA) and the National Wool Growers Association, commodity groups such as Hortgro and Potatoes South Africa and commercial input suppliers such as cooperatives and public extension services, all provide extension services to the farmers of the Western Cape (Koch & Terblanchè, 2013). These service providers attempt to support the smallholder farmers of the Western Cape during the prolonged drought without or with minimum coordination amongst themselves, hence, their impacts are fragmented (Agri SA, 2016). Recent studies by scholars and researchers indicate that the extension personnel of South Africa are mostly from the young and middle age groups, thus rendering a vibrant extension service generation who are fully equipped to serve the growing population of farmers, especially in information communication technology (ICT), a new and innovative component of the service (Lukhalo, 2017). According to the Norms and Standards for Extension and Advisory Services in Agriculture, extension officers have to obtain a minimum qualification of a four-year degree or equivalent qualification to practise as an extension officer (Department of Agriculture, Forestry and Fisheries [DAFF], 2005). Lukhalo (2017) reports a significant improvement in the qualifications of extension staff from 20% compliance in 2007 to 70% compliance in 2017, which indicates the level of improvement in extension staff to deliver effective extension services in South Africa. However, the same study highlights the skewed distribution of extension to farmer ratio of 1:3030, compromising the effectiveness of extension service delivery. Understanding the different roles and the effective coordination of these service providers would enhance the benefits to the livelihoods of the smallholder farmers significantly. Therefore, extension and advisory services should be more focused on the needs of different extension clients.

1.3 Purpose and significance of the study

The purpose of this study was to formulate an understanding of the different roles and approaches that public, private and NPOs play in providing agricultural extension and advisory

services to support the smallholder farmers of the Overberg, West Coast North and West Coast South districts of the Western Cape during long drought periods.

The study attempted to contribute towards new extension policy interventions and possible approaches when drafting policies to capacitate the smallholder farmers of the Western Cape. It will also provide relevant information on how to support the diverse extension clients of the Western Cape effectively. The study will add to the existing body of knowledge regarding drought management by smallholder farmers and other stakeholders. The findings will engender a greater understanding of smallholder farmers in the Western Cape, foster their support and development and offer tailor-made solutions to prepare and cushion smallholder farmers in times of drought.

1.4 Aims, objectives and research questions

The study aimed to formulate an understanding of the roles and effectiveness of extension services on the livelihoods of smallholder farmers affected by drought in the Western Cape. Smallholder farmers are perceived as homogeneous, which has resulted in support services taking a 'one size fits all' approach (Fanadzo & Dube, 2018). Understanding the diversity amongst smallholder farmers would allow extension services to design policies and implement programmes to address their needs effectively and efficiently to enhance sustainable livelihoods for them (Fanadzo & Dube, 2018).

The objectives of this study were to:

i) Characterise and classify the smallholder farmers in the study area.
ii) Investigate the roles of public and private sector institutions in supporting smallholder farmers in Western Cape during drought periods.
iii) Evaluate the effectiveness of public and private extension services in supporting smallholder farmers in the study area.

The research questions were:

- What is the definition of smallholder farmers in the context of the Western Cape Province?
- What are the characteristics of smallholder farmers in the study area?
- What are the specific roles of public and private extension and advisory services in supporting smallholder farmers during drought periods in the Western Cape Province?
- What is the perception of smallholder farmers in general and in particular of extension and advisory services in the selected districts of the Western Cape Province?
- What are the needs of the smallholder farmers during drought periods in the Western Cape Province?

- To what extent do extension and advisory services satisfy the needs and contribute to the livelihoods of smallholder farmers in the study area during drought periods?

1.5 Study limitations

During the collection of the data, various challenges were experienced. Firstly, the questionnaire and the focus group questions were written in English yet the vast majority of the smallholder farmers in the study area are Afrikaans speakers. The questions were translated into Afrikaans for the farmers to understand and the responses of the farmers were translated back into English for the project team to understand. This process contributed to the lengthy period spent on data collection. The project team had access to a small vehicle during the data collection period. The study areas were remote and access to farmers was a challenge. One site in the West Coast district had to be cancelled and an alternative site was identified because it was not possible to access the participants by car. It was also very difficult to make appointments with some participants as they had limited livelihood strategies and abandoned appointments when opportunities to generate income arises. One group left home on the day of the group discussion for work outside town and another group left to collect their government grant.

1.6 Outline of the dissertation

The study is structured in six chapters as outlined below.

Chapter 1

This chapter introduces the study and discusses the major issues that underpin this study. It focuses primarily on the background to the research problem, problem statement, research questions and objectives of the study.

Chapter 2

Chapter 2 reviews existing literature under the headings of classification of smallholder farmers in South Africa, roles of institutions in drought periods and the provision and effectiveness of extension services to smallholder farmers.

Chapter 3

Chapter 3 outlines the research design and methodology applied in this dissertation.

Chapter 4

Chapter 4 presents the results of the data collected during the study.

Chapter 5

Chapter 5 discusses the data collected. The Livelihoods Approach was used to characterise and classify the smallholder farmers in the study area. The roles of extension services are assessed as perceived by the extension practitioners in the study area. The effectiveness of

extension services is discussed in alignment with the five pillars of the Extension Recovery Plan (ERP).

Chapter 6

Chapter 6 presents the conclusions drawn from the key findings. Recommendations are advanced for support to smallholder farmers, especially during droughts.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

The South African agricultural sector has experienced various transformation processes over the past 25 years, from a supported predominantly white sector to a black sector with an emphasis on development programmes by government and investors (Kirsten & van Zyl, 1998; Vink & van Rooyen, 2009; National Planning Commission [NPC], 2011; Pienaar, 2013; Hendriks, 2014). With the new constitution in 1994 came the deregulation of core functions of the government, although some responsibilities still reside in the national government. Government portfolios were rearranged into either national or provincial skills, with agrarian capacities classed as common capabilities (Oettle et al., 1998; van Niekerk, 2012). Currently, the Department of Agriculture, Forestry and Fisheries (DAFF) is responsible for legislation and policy design while provincial Departments of Agriculture implement the policies and legislation at the local level (van Niekerk, 2012).

The NPC (2011) and Tshuma (2014) demonstrated how the current national and provincial governments are committed to supporting the smallholder farming sector through various interventions that include food security and land reform programmes, amongst others. Centre to the policies and development programmes is the complete inclusion of female and youth agriculturists (Hart & Aliber, 2012). Extensive legislation (the 1995 White Paper on Agriculture, the 1998 Agricultural Policy in South Africa discussion document, the 2001 Strategic Plan for South African Agriculture and the 2004 Comprehensive Agricultural Support Programme (CASP)) echoed the empowerment of the most vulnerable (women and youth). Government interventions aim to rectify the injustices of the past and to foster the development of rural communities (Aliber & Cousins, 2013). The remote location of rural communities limits their access to formal markets and job opportunities; therefore, these communities rely on agricultural production for their livelihoods (Stewart et al., 2015). The government and investors rely on smallholder farmers to produce food for their own households and to create jobs for rural communities (Stewart et al., 2015).

The efforts of government and relevant stakeholders to eradicate poverty and enhance rural economic development through agricultural development are under constant critique (Hart & Aliber, 2012; Chikazunga & Paradza, 2013; Tshuma, 2014). However, during the developmental initiatives, new challenges emerged. The challenges include the vulnerability of smallholder farmers in climate change, natural disasters and social unrest, including land reform programmes that fail (Ubisi et al., 2017). The fact that policies are designed by the national government and the implementation of the policies are the responsibility of the provincial government render the response programmes to disasters ineffective and the

smallholder farmers are disadvantaged (Agri SA, 2016). The recent drought in South Africa is a case in point. There is, therefore, a need to create a common understanding of the challenges that are faced by smallholder farmers so that appropriate response programmes can be developed for periods of disaster.

2.2 Classification of smallholder farmers in South Africa

2.2.1 General classification of smallholder farmers

The agricultural sector in South Africa is well known for its duality, with a strong commercial farming component on the one hand and the smallholder component on the other hand (Kirsten & van Zyl, 1998; Mmbengwa et al., 2012; Pienaar, 2013; Hendriks, 2014; Thamaga-Chitja & Morojele, 2014). The commercial sector is dominated by white farmers who are the drivers of the agricultural economy, with access to export markets and sustainable investment arrangements, hence the commercial sector is perceived as the successful farming sector in South Africa (Mmbengwa et al., 2012; Hendriks, 2014; Tshuma, 2014). The success is attributed to support granted to these farmers by the South African government for very many years (Tshuma, 2014).

The development of the rural agricultural sector has garnered a lot of interest since 1994 with the advent of the new government (Cousins, 2013a; Pienaar, 2013; Thamaga-Chitja & Morojele, 2014). The South African government's focus is on the capacity building of smallholder farmers, as outlined in the National Development Plan (NDP) (Pienaar, 2013). The government intends to streamline support services to the smallholder farmers to achieve the food security goals, including job creation and income generation for households. The remote location of rural communities limits their access to formal markets and job opportunities and as a consequence, the communities rely on agricultural production for their livelihoods (Stewart et al., 2015). The NDP argues that the smallholder farming sector can build the rural economy through adequate extension and advisory services, increased irrigated agriculture and cultivation of unproductive land in rural areas (NPC, 2011; Cousins, 2013a; Mvelase, 2016).

The private sector has also contributed to the development of smallholder farmers (Koch & Terblanchè, 2013). Different support services are rendered to the farmers, such as extension and support services, training and mentoring and credit facilities where possible (Fanadzo & Ncube, 2018). However, the different stakeholders or partners in development find it difficult to streamline their support services to the desired target groups because there is no clear classification of smallholder farming (Pienaar, 2013; Tshoni, 2015; Fanadzo & Dube, 2018). Cousins (2010) argues that literature fails to define smallholder farming because the different types of smallholder farmers are not considered. Van Averbeke et al. (2011) identifies smallholder farmers as a group of households and individuals with a number of limiting factors that undermine their ability to embark on profitable interventions in the agricultural sector.

Various scholars and researchers (van Averbeke et al., 2011; Cousins, 2013b; Thamaga-Chitja & Morojele, 2014) attempt to define the smallholder farmers of South Africa. Farmer typologies are used to categorise farmers into groups and to classify them (Duvernoy, 2000). The diversity of farmers is assessed by variables to group farmers into different types (Duvernoy, 2000). Farmer typologies have been designed by academics, while the National Government also tries to categorise the smallholder farmers of the country. Even though the government at large promoted the continuous support of smallholder farmers for the past 22 years, information on these smallholders remains lacking (Okunlola et al., 2016). Furthermore, Okunlola found significant differences amongst various groups of agriculturists who are frequently lumped together and identified by common traits that cut across their activities. Therefore, the term 'smallholder' or 'small-scale' is not helpful or enlightening, "and we need a more nuanced typology of black farming in South Africa" (Okunlola et al., 2016).

Pienaar and Traub (2015) highlight the notion of referring to smallholder farmers by using different words that include *small, small-scale, family, subsistence, emerging* and *smallholder*. Smallholder farming households who rely on government grants as main sources of income are actively involved in agricultural production activities, mainly to supplement diets and reduce spending by buying less food from outlets (Pienaar & Traub, 2015). Smallholder farmers are not a homogeneous group of farmers who practice agriculture in the same fashion; instead, they are diverse and their farming needs differ according to their livelihood needs. This diversity amongst smallholder farmers makes it difficult to define smallholder farmers (Pienaar, 2013; Tshoni, 2015; Fanadzo & Dube, 2018). The WCDoA argues that the farming practices of the different producers are complex and their livelihood strategies are diverse; therefore, support services targeted at these groups of farmers should be considered on the farm level, taking into account the actual needs of the producers (WCDoA, 2017). The WCDoA continues, highlighting that these producers should not be limited to government support but should be serviced by all the relevant actors in the sector (WCDoA, 2017).

Farmer typologies and definitions of smallholder farmers have been formulated in an attempt to understand the smallholder farmers (Cousins, 2013b; Greenberg, 2013). However, little evidence exists of studies that examine livelihood strategies as a mechanism to characterise and classify smallholder farmers. This gap in the literature may be because smallholder farmers are classified into groups but support services are not considered during the classification of these farmers.

For the South African Government to successfully formulate support programmes and design policies to create a vibrant smallholder-farming sector, it is important to define the smallholder farmer (Fanadzo & Dube, 2018). Fanadzo and Dube (2018) propose the consideration of farm typologies or farming styles in an attempt to give guidance and solutions upon establishing the

smallholder farmers in South Africa. Kirsten and van Zyl (1998) discredited the attempt to define smallholder farmers by using the size of the land as a variable because a high-value crop can deliver commercial outputs on a small 1-hectare (ha) piece of land, while 500 ha of inferior quality land elsewhere in the Western Cape might deliver low outputs. Kirsten and van Zyl (1998) describe smallholder farmers as "…one whose scale of operation is too small to attract the provision of the services he/she needs to be able to significantly increase his/her productivity."

With the size of the land proven as an undesirable method to define smallholder farmers, Kirsten (2011) suggests that when defining smallholder farmers based on an economic variable such as gross farm income, an amount of R500 000 and less farm income per year should be applicable. However, this definition of smallholder farmers added to the existing complications. Greenberg (2013) identifies two emerging issues from this definition. Firstly, using the economical variable to define smallholder farmers includes subsistence producers or backyard farmers (farmers who maintain production only to supply food for their families). Secondly, all races are included in such a definition for smallholder farmers and therefore it changes the landscape of the smallholder sector (Greenberg, 2013).

Smallholder farmers do not only produce food for the markets, they also produce food for their own consumption (van Averbeke & Khosa, 2007). The production of food by smallholder farmers in rural communities becomes very important because of its dual function (income generation and the supply of food for the family), thereby contributing to the rural economy (van Averbeke & Khosa, 2007). Greenberg (2013) places rural agricultural production development in the hands of the South African government. The contribution of smallholder farmers to food security in the rural areas has resulted in the government and private sector acknowledging the smallholder sector as important in South Africa. However, two of the main characteristics of these farmers are their low education levels and the limited access to land, with some smallholder farmers having access to less than one ha of land for agricultural production (Tshuma, 2014). These characteristics, accompanied by lack of finance, pose challenges for the farmers to continue to produce sustainably, especially during long periods of drought. Smallholder farmers have limited capabilities to cope with drought while the commercial farmers are better prepared to cope under the same conditions (Ncube, 2017).

The literature clearly illustrates the diversity amongst smallholder farmers. However, during natural disasters, the South African government continues to use a blanket approach when supporting smallholder farmers. This may be due to the lack of a clear understanding of the smallholder farmers' needs. This gap in the literature demonstrates the need to develop a better understanding of smallholder farmers and their needs, especially during drought periods.

2.2.2 Classification of smallholder farmers in the Western Cape

The WCDoA has categorised the farmers of the province. Different descriptions of farmers coupled with support interventions are articulated in the document (WCDoA, 2018). Table 2.1 shows the WCDoA's classification of farmers. In subsistence and smallholder farmers there are four categories and in addition, there is a group called small commercial farmers.

Table 2.1: Classification of farmers by the Western Cape Department of Agriculture (adapted from WCDoA, 2018)

#	Characteristics/Criteria	Subsistence farmers		Smallholder farmers		Commercial farmers		
		Urban/peri-urban agriculture	Survival farmers	Lifestyle smallholder farmer	Smallholder farmers with commercial aspirations	Small commercial farmers	Medium commercial farmers	Large commercial farmers
1		**Taxation**						
	VAT registration	No	No	No	No	Some but voluntary registration	Yes, compulsory VAT registration– turnover is above SARS specified amount (R1m in 2010)	Yes, compulsory VAT registration– turnover is above SARS specified amount (R1m in 2010)
	Qualify for income tax deduction	No	No	No	No	Yes	Yes	Yes
2		**Production intent**						
	Production for consumption or sale	Predominantly production for consumption or sale	Predominantly production for consumption or sale	Predominantly production for consumption or sale	Predominantly production for consumption or sale	Predominantly production for consumption or sale	Predominantly production for consumption or sale	Predominantly production for consumption or sale
	Intent to farm	Food security	Food security	Way of living	Commercial aspiration	Farm for profit	Farm for profit	Farm for profit
	Market	Home	Home / informal	Formal	Formal	Commercial	Commercial	Commercial
	Depend on Agric (cash)	10%	10%	10–50%	10–50%	Yes	Yes	Yes
3		**Access to resources**						
	Access to land	No	Limited/Communal	Limited	Limited	Yes	Yes	Yes
	Access to capital/credit	No	No	Yes	No	Yes	Yes	Yes
4		**Other general characteristics**						
	Source of labour	Own/family	Own/family	Own/family/hired	Own/family/hired	Hired	Hired	Hired
	Level of technology	Low	Low/indigenous	Some modern technology	Some modern technology	Modern technology	Modern technology	Modern technology

The definitions indicate that there is no all-encompassing definition for smallholder farmers in South Africa. The fact that it is difficult to define and classify the smallholder farmers also makes it difficult for the South African government to respond to the needs of these farmers, especially during disaster events that including droughts. The current classification of farmers into the different categories of subsistence, smallholder and commercial does not assist because there is a lack of information necessary to respond effectively to the needs of the different classes of farmers during disasters such as droughts.

There is a need to consider other variables of the farmers to characterise and classify them. The farmer characterisation and livelihoods approach might be one such approach. However, little evidence has been found of smallholder farmer studies conducted in the Western Cape (Ncube & Lagardien, 2015; Tshoni, 2015: Ncube, 2017), especially to examining smallholder farmer characteristics in the province. This gap in the literature could be because the Western Cape is well known for the commercial farming industry that is dominated by white farmers (Pienaar, 2013; Hendriks, 2014; Nel, 2015). The Western Cape Province is known for fruit and wine exports. Commercial farmers in the Western Cape share in the value chain of commodities produced on their farms that include grain, livestock and berry production. Furthermore, the Western Cape commercial farming sector is known for its employment-creation opportunities for people from various parts of South Africa, especially during the fruit-harvesting season (Nel, 2015). Therefore, there is a need to study the smallholder farmers in the Western Cape.

The following definition of smallholder farmers by Cousins (2013b) was adopted for this study.

> *Smallholders are small-scale farmers who use farm produce for home consumption to some degree and use family labour in the farming operation to some degree but for whom farming contributes a highly variable amount of cash income via marketing of farm produce. Levels of mechanization, capital intensity and access to finance are also variable amongst such farmers.*

2.3 Roles of institutions during drought periods

2.3.1 Roles of institutions in supporting smallholder farmers during drought periods

Institutions are phenomena designed by people to develop their collective goals and aspirations in a personal and social context (Madzwamuse, 2010). Institutions are mainly classified into three groupings, namely public (local, provincial and national governments), civil society (membership and cooperative organisations) and the private sector (services and business organisations) (Mukheibir & Sparks, 2005). Institutions are either formal or informal bodies that assist smallholder farmers in different ways when responding to climate change and natural disasters (Agrawal & Perrin, 2009). The authors further highlighted the different ways in which institutions affect the livelihoods of smallholder farmers when responding to

natural disasters and adapting to climate hazards. Firstly, institutions focus on distributing the risks associated with natural disasters. The impact of climate hazards is minimized through a wider distribution of the risks. Smallholder farmers from Ghana in West Africa have access to the drought-index insurance packages through Index-Based Micro-Insurance schemes that protect farmers during drought periods (Abugri et al., 2017). Although the drought-index insurance programmes are subsidised by the government or private institutions to assist farmers with risk transfer and building climate change resilience the uptake of insurance is still lacking among farmers who simply cannot afford the insurance packages (Abugri et al., 2017). Similar findings were reported by Muthelo et al. (2019) in a study conducted in the Free State Province of South Africa where smallholder farmers adopted insurance packages as adaptation strategies to droughts. Institutions also mobilise smallholder farmers into adopting new technologies for them to overcome the threats of climate change. Furthermore, institutions negotiate services and interventions from external sources to benefit smallholder farmers collectively and empower them to sustain their livelihoods in environments that are uncertain and variable (Agrawal & Perrin, 2009). Allahyari (2009) promoted extension services in India through the adoption of learning institutions concept, a situation where extension workers acted as learning agents responding to changes in the internal and external environment of the organisation, therefore, avoiding unsustainable practices that include top-down extension approach. The increasing vulnerabilities associated with climate extreme events such as droughts, floods and heatwaves compel researchers and stakeholders to work together in the collective creation of effective climate change-related decision support systems, diffuse the results to farmers and assist the farmers with the successful implementation of the decision support systems (Yorgey et al., 2017). Novkovic et al. (2013) describe the roles of extension services as a two-way transfer of agricultural production and management knowledge to farmers and information to institutions on the needs and problems of the farmers that need to be considered during the creation of new agricultural policies. Furthermore, the role of extension services should also change to facilitate learning processes, where collective learning and innovation development prosper among institutions and farmers (Allahyari 2009). Smallholder farmers and rural households are most vulnerable to drought and climate-related hazards (Wilhite et al., 2014). These communities are poor, with limited resources to cushion and prepare them for uncertainty and extreme events (Ncube, 2017). Ultimately, they become dependent on government and other stakeholder relief aid during natural disasters such as drought (Wilhite et al., 2014). Recent studies on drought management indicate that the South African government has no proactive programmes in place but has only responded to the after-effects of drought, even though South Africa has a long history of drought and is known to be a drought-prone country (Baudoin et al., 2017). The Natural Disaster Management Plan of 2002 regulates the response to natural disasters but decentralises the functions of preparedness and mobilisation of local institutions. These institutions include local

governments (municipalities and provincial departments), civil society (Agri SA) and the private sector (markets and cooperatives) to solicit long-term strategies to build resilience, mitigation and preparedness programmes at a local level (Wilhite et al., 2014). However, institutions are hampered by government bureaucracy when responding to drought (Baudoin et al., 2017). The government prescribes to these institutions and they have to follow three levels of reporting with regard to risk management and responding to disasters (Baudoin et al., 2017). The time taken in complying with government bureaucracy is lengthy and responses with relief aid arrive too late. The roles of institutions are not clearly defined in responding to disasters and they are not well informed on procedures before, during and after disasters (Baudoin et al., 2017; Baudoin & Ziervogel, 2017). The government should support institutions and empower them to enhance service delivery. Local institutions can mobilise communities and stakeholders. They are responsible for facilitating regular interventions between various stakeholders and therefore can disseminate information to beneficiaries very effectively (Sebudubudu, 2010; Baudoin & Ziervogel, 2017). The WCDoA, in partnership with industry organisations, including Agri Western Cape, responded with relief efforts to support the farmers affected by the drought (WCDoA, 2017). The WCDoA (2017) reports two main support interventions in the form of feed provision for livestock farmers and maintenance of irrigation infrastructure to limit water losses. A study conducted by Ngaka (2012) on the 2007/2008 drought in the Eastern Cape and Northern Cape provinces reported government drought relief support in the form of feed for livestock. A review of the Drought Management Plan for the Northern Cape Province (DAFF, 2014) found that drought relief provided by the South African government was in the form of feed for livestock but did not include support services to farmers who do not farm with livestock.

The notion of only supporting livestock farmers and abandoning farmers involved with other commodities is a matter of great concern because the drought is not selective and affects all farmers. The reactive approach of government and institutions during periods of drought is not documented in the literature and it is alarming why the players have no proactive systems and approaches in place because the drought is not a new event in South Africa. The current study strives to create an understanding of the different roles of institutions in supporting smallholder farmers during drought periods in the Western Cape Province. The effective coordination of the various institutions when preparing and responding to drought disasters would ensure a more robust support service to the smallholder farmers.

2.3.2 Institutional development for drought preparedness

Globally, countries, including the United States and Australia, have graduated from a crisis management approach to drought to long-term drought response plans. The United States implemented a comprehensive and proactive drought management strategy (Cai et al., 2017). Cai et al. (2017) elaborate that legislation such as the National Drought Preparedness Act has

created a National Drought Council and developed a National Office of drought preparedness, which work as a collective during drought periods. These institutions are supported by the United States Geological Survey, an agency that manages the National Integrated Drought Information System in the collection of data and monitoring of droughts in the United States (Cai et al., 2017). The interventions recognise a multipronged approach to include relevant stakeholders from local communities, civil society and government as a collective to prepare continually for drought events and mitigate its effects (Mount et al., 2016).

The Australian government accepts climate variability as a natural phenomenon that is part of normal farming management operations (Wilhite, 2005; Marshall & Alexandra, 2016). This resulted in the Australian government itself not responding to drought events but empowering farmers with skills and various interventions to cope and adapt with drought conditions as part of their normal farming management practices (Stone, 2014). Droughts are viewed as disasters because of the governments and the community's reactive approaches to drought (Vogel et al., 2009). The management of drought needs to be a long term intervention. Australian farmers had a history of successful drought management strategies that allowed them to cope during drought periods (Yihdego et., 2019). However, climate change started to affect the geographical and agrological zones to such an extent that it undermines the current agricultural activities (Yihdego et al., 2019). For example, the rapid decrease in agricultural water availability forced farmers to change from irrigated agriculture to dryland farming. Mushtaq (2018) described such interventions as a transformational change.

Underdeveloped countries in Asia suffer severely during drought periods (Miyan, 2015). Victims of droughts in Bangladesh have to sell their assets including properties to buy food. The government and NGO's also buy food for distribution at subsidised prices to affected people coupled with employment creation and financial aid relief to drought victims in an attempt to avoid famine (Miyan, 2015). The countries started to developed measures for adaptation and coping strategies like the Standing Orders for Disasters for awareness and capacity building, that included the changing of habits, lifestyle and cropping patterns. The Bangladesh Climate Change Resilience Fund (BCCRF) approved $153million on projects to fight the adverse impacts of climate change (Miyan, 2015). Studies by Murendo et al. (2010) and Aryal et al. (2020) found that informal institutions (churches, youth groups and elderly groups) supported smallholder farmer households during drought periods due to a lack of formal institutions involvement.

The high dependency on rain-fed agriculture to sustain livelihoods coupled with extreme poverty conditions render sub-Sahara Africa as one of the most vulnerable regions in the world for climate change events such as droughts (Juana & Kahaka, 2013; Nhamo et al., 2018a; Nhamo et al., 2018b; Makate et al., 2017; Ngcamu & Chari 2020). Extension institutions and

credit institutions are the leading climate change service providers in Africa (Juana & Kahaka, 2013). Juana & Kahaka (2013) highlighted multiple studies from African countries including South Africa, Zambia, Ghana, Nigeria and northern Ethiopia, which all found that access to extension services and credit were the main institutional determinants for climate change information and adaptation to climate change. Malawi, Madagascar, Mozambique and Zimbabwe were the countries in the SADC region that are the most exposed to droughts with an average of droughts occurring every three years since 1960 to 2016 (Guha-Sapir et al., 2017). More importantly, although the four countries are the most exposed to droughts a study conducted by Nhamo et al. (2018a) reported that none of these countries has a drought policy. Recent studies conducted by Hassan et al. (2019) in Yobe State, Nigeria revealed that there is no proper drought mitigation and management framework in Yobe State. Nhamo et al. (2018a) found that these countries have institutional arrangements available that are poorly equipped with limited human capacity ultimately their drought preparedness was also limited. Ngcamu & Chari (2020) reported that the highest prevalence of undernourishment has been experienced in African countries that include Eritrea, Ethiopia, Angola, Sudan including sub-Saharan countries. This situation becomes worse during drought periods when food production decrease as a result of drought.

During drought periods, the South African government is the first responder with relief to affected farmers but only after the event has been declared a disaster (Ziervogel, 2018). The more severe the drought became and the longer it prevailed, more and more institutions became involved (Schiermeier, 2018). Support efforts were not limited only to farmers or the agricultural sector but escalated to greater communities and cities receiving aid that included food and water (Ziervogel, 2019). However, drought management in South Africa remains a crisis management intervention (Ziervogel, 2018). Little evidence exists in the literature on sound drought mitigation strategies and response planning.

2.3.3 Institutional responses during drought events in South Africa

The South African Government has a complex governance environment (Madzwamuse, 2010; Pasquini et al., 2013). Three spheres of government consisting of national, provincial and local government are involved in different stages of policy formulation and implementation (Madzwamuse, 2010). The national government has the function of policy formulation and Provincial and Local governments are responsible for policy implementation (Madzwamuse, 2010; van Niekerk, 2012; Pasquini et al., 2013). However, institutions find it challenging to implement climate change policies due to various limitations. During a study conducted in the Western Cape on the roles of municipalities in climate change adaptation and mitigation, Pasquini et al. (2013) found that the Western Cape municipalities are not involved in climate change activities. Furthermore, it was highlighted that financial policies that govern the financial resources of municipalities are the main constraint to municipality involvement in

climate change activities (Ziervogel & Parnell, 2012). In some instances, the roles of the different institutions in managing disaster conditions are not clear.

Ziervogel (2019) states that the shared responsibility of the City of Cape Town (CoCT) and the national Department of Water and Sanitation to manage water resources collectively, created uncertainty. Ziervogel further argues that should the water sources of the CoCT run dry, the CoCT cannot rely or depend on the National Department of Water and Sanitation to provide water because should the department fail to supply water, the CoCT remains responsible for the provision of water. The problem is that while water remains a national resource that is managed by the National Department of Water and Sanitation, the responsibility to provide water to local households and businesses resides with the local municipalities.

Municipality investment in water infrastructure and water management to provide for disaster periods becomes compromised when the National Department of Water and Sanitation has the right to claim such resources for deployment elsewhere in the country (Ziervogel, 2019). This indicates a lack of collaboration and partnership amongst different institutions. The silo mentality of some institutions remains one of the major barriers to social cohesion (Baudoin & Ziervogel, 2017). Institutions must be able to change and adapt to foster crisis management and embrace drought preparedness and proactive responses to drought conditions (Baudoin & Ziervogel, 2017; Vogel & Oliver, 2018; Ziervogel, 2019). Limited studies are available about institutional preparedness for drought conditions, especially in the Western Cape Province. This might be because institutions manage drought reactively and do not prepare for drought conditions.

2.4 Extension services

2.4.1 Effectiveness of extension services

Van Niekerk (2012) outlines the main role of agricultural extension services as the education of farmers that includes the distribution of information and awareness programmes on climate change (mitigation and adaptation to climate change). The educational services are provided to the farmers to enable them to cope with the ever-changing climate and to sustain their livelihoods (Maponya & Mpandeli, 2013). Davis (2009) suggests:

> *Extension agents can help farmers to prepare for greater climate variability and uncertainty, create contingency measures to deal with exponentially increasing risk and alleviate the consequences of climate change by providing advice on how to deal with droughts and floods. Extension services can also help with mitigation of climate change. This assistance may include providing links to new markets, information about new regulatory structures and new government priorities.*

Exclusion of smallholder farmers from formal markets left them with no option but to supply their produce to the informal market in developing countries. Research reports that close to

90% of smallholder farmers' produce is sold through the informal market system. Informal markets encompass transactions starting at the farm gate, road sales, village markets and sales in main urban wholesale and retail markets (Akinyemi & Mushunje, 2017). These markets accept all produce supplied by smallholder farmers, especially lower quality produce rejected by the formal markets (Koech et al., 2015). The informal market is known for its low grades, no traceability and limited standard measures (Ferris et al., 2014). The formal markets are characterised by sustainable indicators, providing continued revenue and the commercial smallholder farmers also gain access to multiple support services. However, the limiting and excluding factors to such markets are the high-quality standards and volumes of produce at a lower price offered compared to informal markets (Ferris et al., 2014; Muchopa, 2013). For example, a study conducted by Barham & Chitemi (2009) in the northern highland of Tanzania identified groups of farmers who farmed with favourable commodities and had access to natural resources such as water, land and good soils are custodians of improved market performance but had limited access to markets. In Laikipia County, Kenya, Wairimu et al. (2016) found that marketing in groups was enabling factors. Smallholder farmer groups had multiple benefits like access to credit, extension services and buying in bulk at reduced prices. Moreover, their collective sale of produce resulted in increased output price from negotiation power.

Opportunities can become available to smallholder producers to supply through formal government procurement systems. Internationally, different aid organisations venture into contracts with producers to supply produce to countries in need. These organisations include the United Nations World Food Programme (WFP), the United States Agency for International Development (USAID) and the United States Department of Agriculture (USDA). Locally, the government engages in the procurement of agricultural produce for institutions such as prisons, hospitals, schools, police and the military. The government tends to procure from local smallholder producers (Ferris et al., 2014). The role of extension services to link farmers with markets can empower smallholder farmers to fill this gap. That smallholder farmers are excluded from supplying produce to formal markets and cannot freely participate in the value chain of their commodities illustrates a gap that motivates service providers to enhance effective extension service delivery through empowering smallholder farmers' participation in formal markets and value chains. Extension services can empower smallholder farmers to produce the quality and volumes for markets contracts.

Top-down technology transfer extension models with opposite results were studied by Taylor & Bhasme (2018) in south India. Researchers in Mandya district of Karnataka developed a new hybrid rice cultivar with superior properties that will increase production and economic benefits to possible adopters in the area. However, the transfer of this technology requires new production processes that are different from the traditional methods employed by the local

farmers. Although, extension services followed a top-down approach, contrary to popular belief the diffusion of the new hybrid rice variety was implemented successfully. From research institution, extension services and model farmer to a group of smallholder farmers in Mandya district, with local and national publicity of success stories for research and extension services that culminated to commercial contracts for smallholder farmers (Taylor & Bhasme, 2018). The second village in Karnataka was subjected to the same knowledge transfer practices of hybrid rice varieties as previously mentioned. However, this model farmer stopped cooperating with researchers and extension agents and decided to move back to traditional cultivars and practices Khadse et al. (2018) leaving extension services attempts to transfer technology unsuccessfully (Taylor & Bhasme, 2018). The lesson learned from this intervention was that the local conditions (natural and economic) were different from the previous group. The developers of new technology were also not able to adapt to the new environment that the farmers faced in the area.

National and provincial governments together strive to empower smallholder farmers to produce sustainably (Theron, 2018). Since 2008, the national and provincial governments have implemented the ERP to drive the public extension programme to better service delivery (Mmbengwa et al., 2012). The focus areas of the ERP are the human capacity building of public extension officers and financial resources to provide accountable, visible and effective extension service to the resource-poor farmers of the Republic (DAFF, 2011; Mmbengwa et al., 2012; Liebenberg, 2015; Lukhalo, 2017). Proactive extension services to cope during long drought periods are part of the quality extension services needed by smallholder farmers. The commodity partners base their extension services on natural science with little or no focus on extension science, however, in contrast, the public sector bases extension services on extension science (Terblanchè, 2013), resulting in ineffective processes for smallholder farmers. Effective support for smallholder farmers is needed from both public and private sector service providers. The public and private sectors need to service smallholder farmers as a collective and complement each other's work. The successful implementation of such a collective support base would result in vibrant systems that serve the needs of smallholder farmers.

Hart and Aliber (2012) argue that the public extension service is not effective and does not address the needs of the female and youth agriculturists in the country. The authors outline some reasons why extension services fail the most marginalised and vulnerable part of society. The public service employs predominantly male extension agents, resulting in most female farmers being excluded from support programmes and other inputs compared to their male counterparts. The level and relevance of education of extension staff were also raised as a limiting factor that hampers service delivery (Fanadzo & Ncube, 2018).

2.4.2 The effectiveness of extension services in supporting smallholder farmers

The smallholder farmers of South Africa have been supported by various organisations for the past 24 years in the new democracy. The public and private sectors have invested in the implementation of various support programmes for the development of smallholder farmers (Raidimi, 2015). The land reform programme has seen numerous changes in direction to strive for successful implementation but with little or no success (Cousins, 2013a). Access to land remains a challenge for both land reform programmes and smallholder farmers (Aliber & Cousins, 2013). Other support programmes to smallholder farmers also strive to develop the new agriculturists. The well-known CASP programme of the public sector, SABMiller and Grain SA, to mention a few, have had positive impacts on the development of smallholder farmers (Stevens, 2016). The lack of a well-structured and coordinated self-sustainable approach to climate change and its effects when supporting smallholder farmers renders the current efforts of extension service providers ineffective (Sonwa et al., 2016). The reactive response programmes of the South African government are not effective and the support and relief efforts to smallholder farmers remain a challenge (Gillespie & Mitchell, 2016).

The new extension system implemented by the public sector to support all the farmers in the country has numerous challenges. The client to extension official ratio, as stipulated in the Agricultural Norms and Standards for Extension services, is not met (Lukhalo, 2017). The lack of appropriate skills of public extension officers to provide advice to the commercial farmers is well documented (van Niekerk, 2012; Greenberg, 2013). The lack of clear policy guidelines for the past two decades renders the extension services of both public and private sector uncoordinated and their impacts are also limited (Kgaphola, 2016). The roles of the different extension service providers are unclear and result in uncoordinated and scattered relief efforts, especially during disaster periods (Suvedi & Ghimire, 2015). This emphasises the need to clarify the different roles of extension service providers and to create a well-coordinated approach to improve relief and support efforts during disaster periods such as drought.

2.4.3 Information communication technology and extension services

The lack of technological and market information systems seems to be the cause of low agricultural production in the greater Africa region (Asenso-Okyere & Mekonnen, 2012). Bolarinwa et al. (2014) highlight the fact that ICT extension services allowed smallholder farmers in Oyo State Nigeria to enter the commercial value chains. However, the new technology innovations presented challenges for smallholder farmers, such as ICT illiteracy and relevant localized content that needed to be addressed by service providers to improve technology adoption rates by smallholder farmers (Bolarinwa et al., 2014; Emmanuel & Sife, 2008).

Asenso-Okyere & Mekonnen (2012) identified five Sub-Sharan African countries; that are taking the lead in the adoption of telecom services in Africa. These are Mauritius, Botswana,

South Africa, Gabon, and Seychelles. These countries had close to 90 per 100 inhabitants that had access to mobile subscriptions in 2007 compared to less than 10 per 100 inhabitants in the remaining 13 countries having access to the same service. During a study conducted in southern Ethiopia by Yimer (2015), it was found that rural communities could not be excluded from developing opportunities based on their illiteracy levels because the effective use of ICT systems allowed information to flow in the communities. As a result, access to extension programmes was secured. ICT proved to be a reliable and valuable resource to share market information with smallholder farmers (Yimer, 2015). The farmers were informed daily about the market performance of their commodities, sales concluded and other services through local ICT sources (Asenso-Okyere & Mekonnen, 2012).

Worldwide, the smallholder sector is growing. For these farmers to be accessed and assisted by extension services, the services need to explore innovative ways to inform the farmers about new technologies and information processes that include marketing. One of the tools to overcome such a challenge is ICT, which includes mobile phones, innovative community radio and television programmes, videos, information kiosks and farmer call centres (Mabe & Oladele, 2012; Tinsley & Agapitova, 2017). ICT-based agriculture exposes farmers to a completely new world and opens opportunities to embrace development (Asenso-Okyere & Mekonnen, 2012; Tata & McNamara, 2016).

Bell (2015) highlights that extension services (both public and private) face challenges when attempting to service all the smallholder farmers. Bell argues that in the case of a good extension system, extension services reach only 10% of the farmers. Limited staff and resources were cited as factors that crippled the effective delivery of extension services to the greater smallholder farming community (Lukhalo, 2017). The introduction of ICT agriculture that focuses on the dissemination of technical information on livestock and crops will ease the burden on extension agents. Millions of smallholder farmers access credible and relevant information through ICT systems (Burman et al., 2013).

The use of ICT agriculture through web-based programmes enables farmers to send voice messages and short message services (SMS) reporting their challenges, while an expert responds to the farmers. This method is useful for farmers that can take photos of their crops, send it to the website and then receive expert advice (Bell, 2015). Public and private partnerships are a catalyst for the successful development of smallholder farmers (Stirzaker et al., 2017). Stirzaker et al. (2017) report that smallholder farmers who are supported by institutions and other actors in the service delivery chain are more successful than smallholder farmers who attempt to function without external support services. The successful implementation of innovative ICT-agriculture processes requires role players to act in coordination in supplementing current extension service structures, thereby empowering

smallholder farmers (Bell, 2015). Akinyemi and Mushunje (2017) report that the rural agricultural sector comprises predominantly adults in the 50-year age group who have challenges in using certain devices. An example of such challenges is the SMS message from a cell phone because of illiteracy. Akinyemi and Mushunje explain that the farmers struggle to read and respond to SMSs. The cost of purchasing airtime is also a challenge for farmers who have limited resources and cannot afford to maintain ICT systems. The participation of the youth is also an area of concern, as their role in building the rural economy through the agricultural sector remains unexplored. The youth tend to view the sector as being backwards and they would rather seek employment opportunities elsewhere. Lastly, networks and connections are also a problem in remote rural areas where the farmers reside (Akinyemi & Mushunje, 2017; Swaminathan & Swaminatha, 2018).

The effectiveness of extension services remains open to criticism. Since 2008, the South African government has invested in the public extension system to improve its effectiveness, while numerous studies have investigated the effectiveness of extension services. However, only a few studies have been conducted in the Western Cape Province. This gap in the literature may be due to the relatively small staff complement of the WCDoA in comparison to other provinces. This highlights the need to study the effectiveness of extension services in the Western Cape Province, especially during drought periods.

2.5 Conclusion

This chapter reviewed the characteristics and classification of smallholder farmers and how they are supported during drought periods. The homogeneous concept employed by extension service providers when supporting smallholder farmers during drought periods is ineffective. A lack of clear understanding of the roles of institutions when responding to support smallholder farmers' needs during droughts ultimately renders the extension service providers' support and response inadequate. Characterising and classifying smallholder farmers using the livelihood-approach promises a more effective service delivery tool because it recognises the smallholder farmers' entitlements, endowments and capabilities.

During disaster periods like droughts, the government and local institutions respond with relief and aid services to smallholder farmers. However, this relief is reactive, being provided to the smallholder farmers only after a disaster has been declared. It is noteworthy that only livestock farmers receive drought relief support, while farmers of other commodities such as fruit, grain and vegetables, do not. Institutions are limited by bureaucratic processes that hamper their effective responses to disasters. The literature highlights the lack of a clear understanding of the roles of institutions in responding to disaster periods. Institutions can fulfil a much more vibrant role, including implementing proactive training programmes for smallholder farmers.

Little evidence is found in the literature of the involvement of local municipalities in climate change programmes. The literature clearly shows that municipalities are not involved in climate change programmes although they are the custodians of natural resources like water and land that are directly influenced during disaster periods like droughts. Furthermore, the South African government lacks a robust proactive response programme to disasters and climate hazards. The review of the literature illustrates the importance of an effective extension services system that supports and assists smallholder farmers. Extension service support to smallholder farmers includes the facilitation of access to markets, production inputs, training and capacity building. Training and capacity building of extension staff are cited as a prerequisite for effective extension service delivery. Since 2008, the South African Government employed the ERP with its focus on the reskilling and training of extension staff to become professionals in providing adequate and effective extension services. This emphasises the importance of the current study to investigate the prevailing state of extension services in the Western Cape, especially the effectiveness of extension services provided to the smallholder farmers during disaster periods like droughts.

CHAPTER 3
METHODOLOGY

3.1 Description of the study area

3.1.1 Location of the Overberg and West Coast districts

The locations of the Overberg District and the West Coast District of the Western Cape Province are illustrated in Figure 3.1.

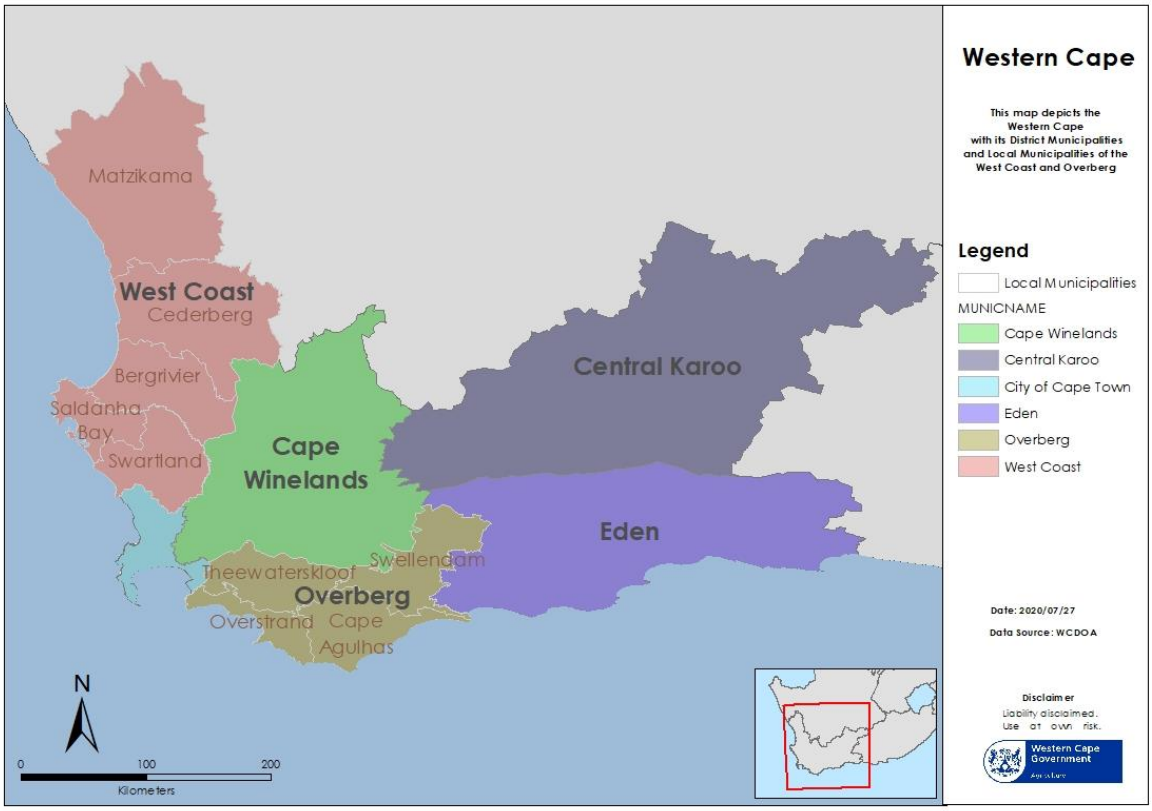

Figure 3.1: Location of the Overberg and West Coast districts in the Western Cape Province

3.1.2 Agriculture in the Overberg District

Farmers in the Overberg District are endowed with a favourable climate that allows for fruit and grain production. The Grabouw and Villiersdorp areas in the Theewaterskloof municipality are well known for deciduous fruit production. The Buffelsjagsrivier area in the Swellendam municipality is well located for citrus production (Overberg District Municipality [ODM], 2018). Producers from this region participate in the value chain and through the infrastructural arrangements (pack houses) on their farms and they are allowed to export their produce (Hendriks, 2014).

The economy of the Overberg District is agriculture-based (ODM, 2018). The agricultural sector in the district has strong links with other sectors that include processing raw materials for the manufacturing of products. The manufacturing sector produces Appletiser (apple juice) and oil products from apples and canola respectively (ODM, 2018). Furthermore, input suppliers, transportation businesses and machinery companies all benefit from the agricultural sector through supplying various services (ODM, 2018). The animal feed produced in the district is not solely for animal production in the district but is also distributed to other provinces in the country, thereby generating revenue for the farmers of the district (Theewaterskloof Municipality [TWK], 2018; Zwane, 2019). Caledon, the main town of the Theewaterskloof Municipality, hosts a malting plant where the processing of barley for brewing takes place, while the brewing of the malts takes place elsewhere in the province (ODM, 2018). The total area under barley production is 55 630 ha, with the majority in Cape Agulhas (22 334 ha), Swellendam (20 272 ha) and Theewaterskloof (12 224 ha) areas (ODM, 2018). According to ODM (2018), the Overberg District has 36 408 ha under canola production, encompassing Swellendam (13 593 ha), Theewaterskloof (11 492 ha) and Cape Agulhas (10 871 ha). Although canola production peaked to a total production of 123 000 tons during 2014, the volumes produced dropped from 2015 by 20% due to drought in the district.

3.1.3 Agriculture in the West Coast District

The Swartland area of the West Coast District is well-known for small grain production and is therefore the country's breadbasket (Barends, 2016; Smidt, 2018). The climate and soils of the district vary. On one side of the district, in the Swartland area, the climate is cool with fertile soil, while the climate on the northern side is dry and hot with low-quality soils (Smidt, 2018; WCDoA, 2018). The northern side is dominated by small stock production and farmers employ extensive livestock production practices (Smidt, 2018; WCDoA, 2018).

The West Coast district contributes significantly to the Western Cape agricultural gross income with horticulture contributing 43%, field crops - 25% and livestock - 16% (WCDoA, 2018). The Matzikama municipal area is home to the Olifants River, which supplies water to the agricultural sector across the area through an extensive canal system (WCDoA, 2018). The Cederberg mountains in the district are the capital of rooibos tea production in the country. South Africa is the only country in the world that produces and exports rooibos tea (Department of Rural Development and Land Reform [DRDLR], 2017). The registration of the "rooibos" trademark in 2014 was an economic milestone for the Cederberg area, now being the sole owner of the trademark (West Coast District Municipality [WCDM], 2018). Although the recent drought negatively impacted the wine grape producers with a reduction of 50% in volume produced, the price increase for wines internationally by R351 per ton during 2018 compensated in some instances (WCDoA, 2018).

3.1.4 Economy of the Overberg and West Coast districts

The economy of three local municipalities in the West Coast district contracted during 2016—Matzikama (-1.7%), Bergrivier (-1.3%) and Swartland (-0.3%) (Western Cape Provincial Treasury [WCPT], 2018a). This was mainly attributed to the prevailing drought in the district. However, the remaining two local municipalities of Cederberg and Saldanha Bay showed positive economic growth of 0.1% and 0.9% respectively. Furthermore, the West Coast District recorded the highest economic growth rate of 3.2% in 2017 due to the vigorous growth in the agriculture, fisheries and forestry sectors that contributed 75.5% output for the year (WCPT, 2019). Despite the drought, the agriculture, fisheries and forestry sectors were positively influenced by increased exports. Two municipalities, Saldanha Bay (27.9%) and Swartland (25.3%), were most favourable for employment during 2016 in the West Coast District. The remaining three municipalities (Matzikama 15.7%, Cederberg 14.6% and Bergrivier 16.5%) also contributed to employment during 2016, although on a smaller scale (WCPT, 2018a).

WCPT (2018a) indicated that all four local municipalities (Theewaterskloof 0.3%, Swellendam 1.4%, Overstrand 0.9% and Cape Agulhas 0.8%) in the Overberg District grew at equivalent rates, which shows the strong connections between the local economies during 2016. Although the economy of the Overberg District grew at a slower rate, the actual growth of 2% for 2017 was significantly higher than the 2016 average rate of 0.7% (WCPT, 2018a). The two municipalities that led with regards to employment creation in the Overberg District were Theewaterskloof at 47% and Overstrand at 27.5% during 2016 (WCPT, 2018a). Swellendam and Cape Agulhas municipalities contributed 12.2% and 13.3% respectively to employment creation in 2016. WCPT (2018b) estimated that 3 037 jobs were created during 2017, mainly in the Theewaterskloof and Overstrand municipal areas, making up for job losses during 2016.

3.2 Research design and approach

This study used both qualitative and quantitative research methodologies, involving the use of interviews and focus group discussions collecting data to characterise a social phenomenon. Gill et al. (2008) describe different types of research interviews, namely structured, semi-structured and constructed. Structured interviews are verbally administered with predetermined questions. Unstructured interviews are designed to probe for in-depth information. There is no formal set of questions and the interview may start with the experience of the respondent in a certain field, continuing the interview based on responses received. Semi-structured interviews contain key questions to help clarify which different areas need to be explored. This type of interview may be diverse to gain more insight from the interviewee (Gill et al., 2008).

Questionnaires aim to collect quantitative data during interviews and qualitative data during focus group discussions (McLafferty, 2004). Creswell (2014) explains that questionnaires

consist of a set of questions designed to elicit responses from respondents to answer the research questions. Questionnaires may contain both open-ended and closed-ended questions (Creswell, 2014). Close-ended questions focus on collecting demographic data such as gender, age group and education level of the respondents, while open-ended questions seek to investigate respondents' perceptions of specific issues (Frechtling, 2002).

The livelihoods approach was used to characterise the farmers according to their assets. A livelihood consists of the capabilities, assets and activities required in making a living. A livelihood is sustainable when the farmers can cope with and recover from stresses and shocks and maintain or enhance capabilities, assets and activities, both now and in the future, without undermining the natural resource base (Mazibuko, 2013). The sustainable livelihoods approach offers frameworks for analysing livelihoods of rural communities. It was developed by the Department for International Development that puts people at the centre stage of their own development, surrounded by their five assets (human, natural, financial, social and physical) that constitute their livelihoods, creating a safety net during shocks (drought, floods) and stressors (seasonality). For example, family members relying on seasonal employment are supported by other family members during off-season periods (Huffman et al., 2015).

Ethical consideration approval to conduct the research (Reference No: 195080343, Appendix B) was obtained from the Research Ethics Committee of the Faculty Applied Science of the Cape Peninsula University of Technology before the study commenced. In addition, authorisation to carry out a survey amongst farmers in the Overberg and West Coast Districts of the Western Cape province was granted by the Western Cape Department of Agriculture. Participants were informed and briefed about their participation in the study by the local extension officers and were told that their involvement was voluntary and that they were free to exit the study at any time. The assurance of the confidentiality of all participants was confirmed in the participant's consent form. To ensure that the participants remained anonymous, personal identification information was not included in the results.

3.2.1 Methodology for Objective 1

Characterisation and classification of the smallholder farmers

Data were collected in the two districts from December 2017 to April 2018. The smallholder farmers practising dryland farming were interviewed. Interviewees comprised 100 farmers, 50 in each district. Questionnaires were administered on a one-on-one basis and both closed-ended and open-ended questions were posed. The closed-ended questions focused on data for an analysis of the livelihoods of the respondents. The open-ended questions focused on the coping and adaptation strategies adopted by the respondents during drought periods. The sustainable livelihoods approach was used to collect data.

The formal interviews were followed by focus group discussions to further probe, fill in gaps and seek clarification of some missing data. This process also acted as validation and triangulation for the results obtained during interviews. The quantitative data were recorded in Microsoft Excel spreadsheets and analysed using Statistical Product and Service Solutions (SPSS) software (previously known as Statistical Package for the Social Sciences). Atlas.ti software was used to analyse qualitative data from the open-ended questions and focus group discussions. Through coding of concepts, the grouping of documents (for example, academic articles) and creating memoranda leading to networks and links, reports were created in different forms. Thereafter, tables were exported into MS Excel format, text or graphic files from which to draw conclusions.

3.2.2 Methodology for Objective 2

Investigation of the roles of public and private sector institutions in supporting smallholder farmers in the Western Cape during drought periods

Data collection started with a review of the literature and policies regarding extension services. The field research began with informal interviews of key-informants (senior managers and district managers) at the WCDoA. This approach aimed to set the stage and gain valuable insight into the smallholder farming sector in the Western Cape, the different commodities and in-depth information on the selected study areas of the Overberg and West Coast districts. Semi-structured questionnaires that contained both closed-ended and open-ended questions were used to collect data from the extension officers and managers. In addition, extension officials from the study area were interviewed to gain insight into their understanding of the roles of extension services in servicing smallholder farmers.

Predesigned questionnaires were e-mailed to the respondents between July 2018 and December 2018. Open-ended questions were included in the questionnaires to capture an understanding of the officials' roles and responsibilities in developing or assisting the drought-affected smallholder farmers in the Western Cape. Twenty-four extension officials responded to the questionnaires. Atlas.ti was used to analyse qualitative data from the open-ended questions and focus group discussions. Through coding of concepts, the grouping of documents (for example, academic articles) and creating memoranda leading to networks and links, reports were created in different forms. Thereafter, tables were exported into MS Excel format, text or graphic files from which to draw conclusions.

A preselected sample of farmers was invited to participate in the focus group discussions. These were facilitated by the researcher from 8th to 12th May 2018 in the Overberg District and from 15th to 18th May 2018 in the West Coast District. The focus group discussions aimed to investigate the farmers' perceptions of the challenges they experience with organisations that deliver extension services during drought periods.

3.2.3 Methodology for Objective 3

Evaluation of the effectiveness of public and private extension services in supporting smallholder farmers

Data were collected through interviewing extension officers that service the smallholder farmers in the study area. Semi-structured questionnaires were emailed to the extension service respondents from July 2018 to December 2018. Closed-ended and open-ended questions were used to collect data from the extension officers and managers. The closed-ended questions were asked to get information on the qualifications and experience of extension service staff. Twenty-four respondents completed the questionnaires and emailed them back to the researcher. The quantitative data were captured and analysed using Microsoft Excel and SPSS. A combination of spreadsheets, tables and graphs were used to present the data. The National Framework for Extension Recovery Plan (DAFF, 2011) was adopted to evaluate the current state of readiness of extension workers to deliver an effective extension service to the smallholder farmers in the study area.

CHAPTER 4

RESULTS

4.1 Introduction

This chapter analyses and presents the results of the study for the following:

- Data collected for smallholder farmer's livelihoods;
- Roles of institutions in supporting the farmers; and
- Effectiveness of the extension services in supporting the farmers.

4.2 Characteristics of smallholder farmers in the Overberg and West Coast Districts

The characteristics of the smallholder farmers are presented using the five elements of the sustainable livelihoods framework, namely human, financial, natural, physical and social.

4.2.1 Human assets

Figure 4.1 shows the age distribution of smallholder farmers in the Overberg and West Coast districts.

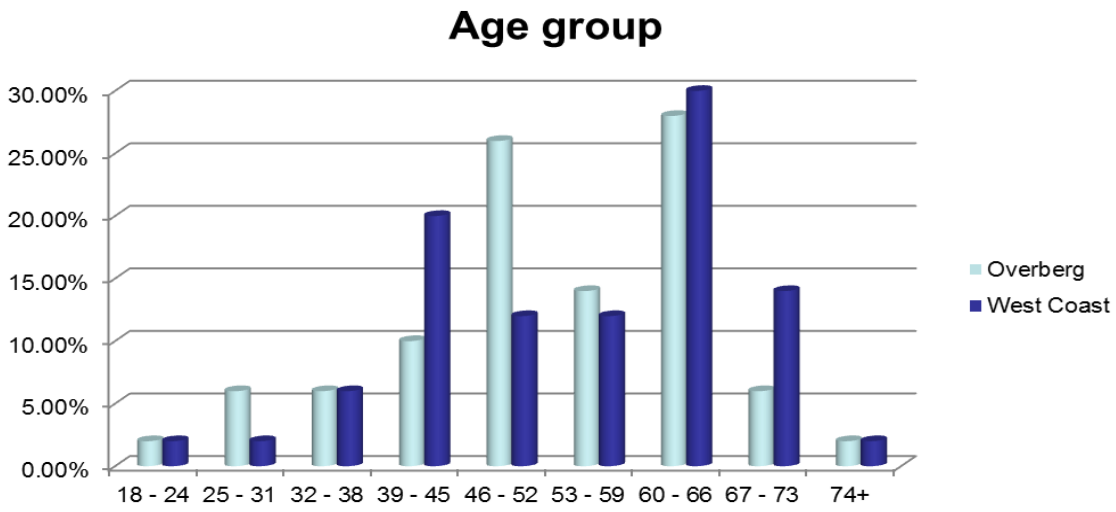

Figure 4.1*:* The age group of the smallholder respondents in the Overberg and West Coast districts

Youth respondents made up 14% and 10% in Overberg and West Coast districts respectively. Most of the smallholder respondents were middle-aged (50% in Overberg, 44% in West Coast) but there was also a significant number of older farmers (36% in Overberg, 46% in West Coast). There were more males than females in both districts.

Figure 4.2 shows the gender distribution of smallholder farmer respondents. Both districts were dominated by male farmers (90% in Overberg, 78% in West Coast) compared to the female respondents (10% in Overberg, 22% in the West Coast).

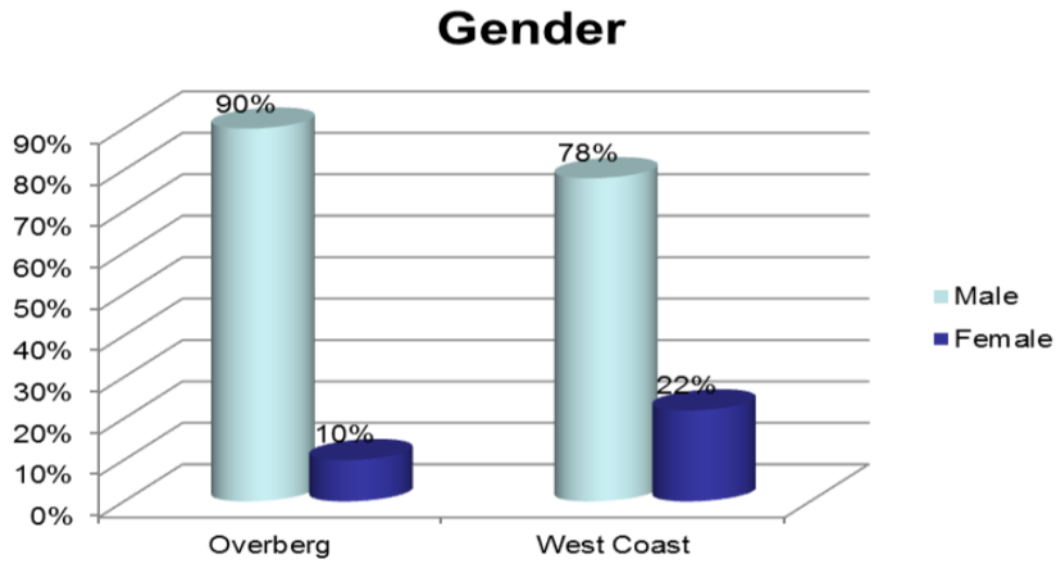

Figure 4.2*:* The gender of the smallholder respondents in the Overberg and West Coast districts

Table 4.1 shows the size of smallholder respondent families in the study area.

Table 4.1: Size of smallholder respondent families in the West Coast and Overberg districts

Size of family	West Coast District (n=50)	Overberg District (n=50)
	Percentage (%)	Percentage (%)
1 - 3	28	44
4 - 6	62	54
7 and above	10	2

The majority of families had between 4 to 6 members in both districts (62% in West Coast, 54% in Overberg), followed by smaller numbers in family size of between 1 to 3 members (28% in West Coast, 44% in the Overberg). A few larger families were noted with 7 or more members (10% in the West Coast, 2% in the Overberg).

4.2.2 Financial assets

Table 4.2 shows the results of access to credit by the smallholder respondents.

The results indicate that the smallholder respondents had limited access to credit (West Coast 16%, Overberg 32%). The majority (84%) of the West Coast respondents had no access to credit compared to 68% in the Overberg.

Table 4.2: Access to credit identified by smallholder respondents in the West Coast and Overberg districts

Access to credit	West Coast District (n=50)	Overberg District (n=50)
	Percentage (%)	Percentage (%)
Yes	16	32
No	84	68

Table 4.3 reveals that very few smallholder respondents had access to credit from the Land Bank. Some respondents gained access to credit from commercial banks (14%) and cooperatives (16%) in the Overberg District. However, in the West Coast District, respondents had limited access to commercial banks (2%) and cooperatives (5%).

Table 4.3: Credit sources identified by smallholder respondents in the West Coast and Overberg districts

Credit sources	West Coast (n=50)	Overberg (n=50)
	Percentage (%)	Percentage (%)
Cooperatives	5	16
Commercial Banks	2	14
Land Bank	0	2
Other	2	3

4.2.3 Natural assets

Figure 4.3 shows the results of land ownership status of smallholder respondents in the West Coast and Overberg districts.

Of the respondents from the Overberg District, 41% farmed on municipal land compared to the West Coast District with 22%. The government leased land to 11% of the respondents in the West Coast and 6% in the Overberg. Some respondents indicated that they had inherited land (West Coast 16%, Overberg 13%). Other respondents indicated that they rented privately-owned land (21% in West Coast, 8% in Overberg). Some of the respondents had managed to purchase their own land (West Coast 10%, Overberg 11%).

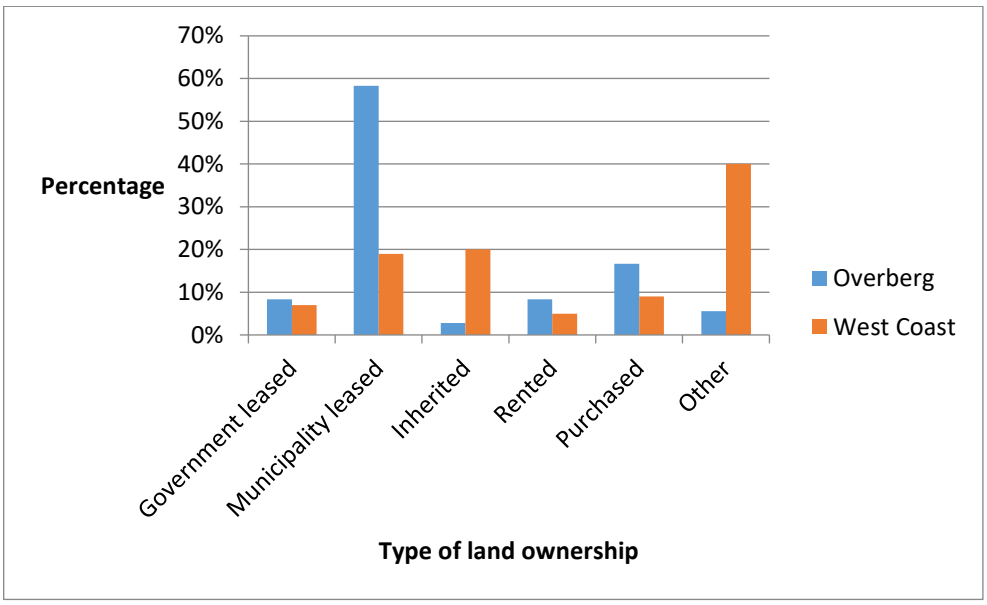

Figure 4.3: Land ownership of smallholder respondents in the West Coast and Overberg districts

Figure 4.4 illustrates that the main water sources identified by the smallholder respondents were dams (West Coast 27%, Overberg 59%). Respondents also relied on tap water sources (West Coast 25%, Overberg 22%). The respondents who accessed water from rivers comprised 13% in the West Coast and 18% in the Overberg. The results also indicate that the West Coast respondents at 19% had more access to boreholes compared to the Overberg respondents at 5%. Water wells were not promoted as popular water sources in both districts (West Coast 2%, Overberg 3%).

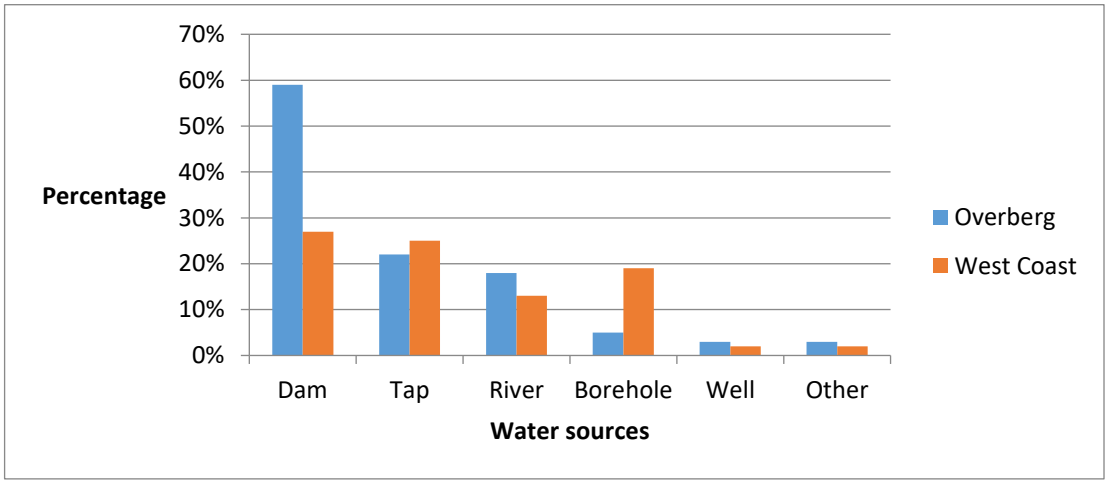

Figure 4.4: Water sources identified by smallholder respondents in the West Overberg and West Coast districts

Table 4.4 shows that numerous water authorisation authorities afforded access to agricultural water to the smallholder respondents. The municipalities and other water rights authorities

were the main water suppliers to the farmers in the study area, supplying 36% in the Overberg and 30% in the West Coast. More farmers have access to general authorisation in the Overberg at 28% compared to West Coast at 20%.

Table 4.4: Water authorization identified by the smallholder respondents in the West Coast and Overberg districts

Water authorisation	West Coast (n=50)	Overberg (n=50)
	Percentage (%)	Percentage (%)
Municipality	36	30
General	20	28
Rights	36	30
Other	8	12

4.2.4 Physical assets

Table 4.5 shows how many smallholder respondents in the study area have access to markets.

Table 4.5: Market access for smallholder respondents in the West Coast and Overberg districts

Market access	West Coast (n=50)	Overberg (n=50)
	Percentage (%)	Percentage (%)
Yes	50	92
No	50	8

Most smallholder respondents from the Overberg District (92%) had access to markets compared to 50% from the West Coast District. The severe drought in the West Coast affected the markets of the local producers because many factories closed down due to the limited supply of produce.

4.2.5 Social capital

Table 4.6 contains the results of the group membership of the smallholder respondents in the West Coast and Overberg districts. More respondents belonged to a group in the Overberg District (80%) compared to the West Coast District at 46%.

Table 4.6: Group membership of smallholder respondents in the West Coast and Overberg districts

Group membership	West Coast (n=50)	Overberg (n=50)
	Percentage (%)	Percentage (%)
Yes	46	80
No	54	20

4.3 Roles of institutions in supporting smallholder farmers during the drought

4.3.1 General roles of extension services

Table 4.7 shows the results of extension visits to farmers in the Overberg and West Coast districts. The majority of the extension officers (46%) visited the farmers every week, while 40% visited their clients every month. The total population of the respondents from the public sector falls in these two indicators. About 7% for quarterly and semester visits resides in the private sector.

Table 4.7*:* Extension officers' visits to farmers in the Overberg and West Coast districts

Visits to farmers	Responses (n=24)
	Percentage %
Once a week	46
Once a month	40
Once a quarter	7
Once a semester	7
Once a year	0

Table 4.8 depicts the frequency of extension activities by extension officers in the study area. The majority of the extension activities were implemented every quarter, which included demonstration sessions (67%), workshops (64%) and training sessions (53%). Most of the farmers' days (53%) occurred once a year and information sessions (40%) once in a semester.

Table 4.8: Frequency of extension activities implemented by public and private extension officials in the Overberg and West Coast districts

Frequency	Farmers days**(%)**	Training sessions**(%)**	Demonstration sessions**(%)**	Information days**(%)**	Workshops**(%)**	Other**(%)**
Once a month	0	24	7	7	0	33
Once a quarter	20	53	67	27	64	17
Once a semester	27	17	13	40	18	17
Once a year	53	6	13	26	18	33
Total	100	100	100	100	100	100

Figure 4.5 below illustrates the results of the general roles of public extension services in the West Coast district. One of the general roles identified by the respondents was the linking of smallholder farmers to other service providers in both the public and private sector. One of the extension officers replied:

> *Liaising farmers with other stakeholders in the agricultural industry (sector) for specialised services such as marketing, capacity building.*

Advisory services remained one of the main roles of extension services in the agricultural sector as identified by the extension officers in the study area. Extension officers provided technical advice to the smallholder farmers to transfer knowledge, build their capacity and improve farming methods. As one extension officer said:

> I support them with advice for them to be able to farm properly. I generally support vegetables and fruit farmers in this region.

The WCDoA provides financial support to the smallholder farmers with the aim of improving their livelihoods. Extension officers also disseminate information about innovations and technologies to smallholder farmers during contact sessions and farm visits.

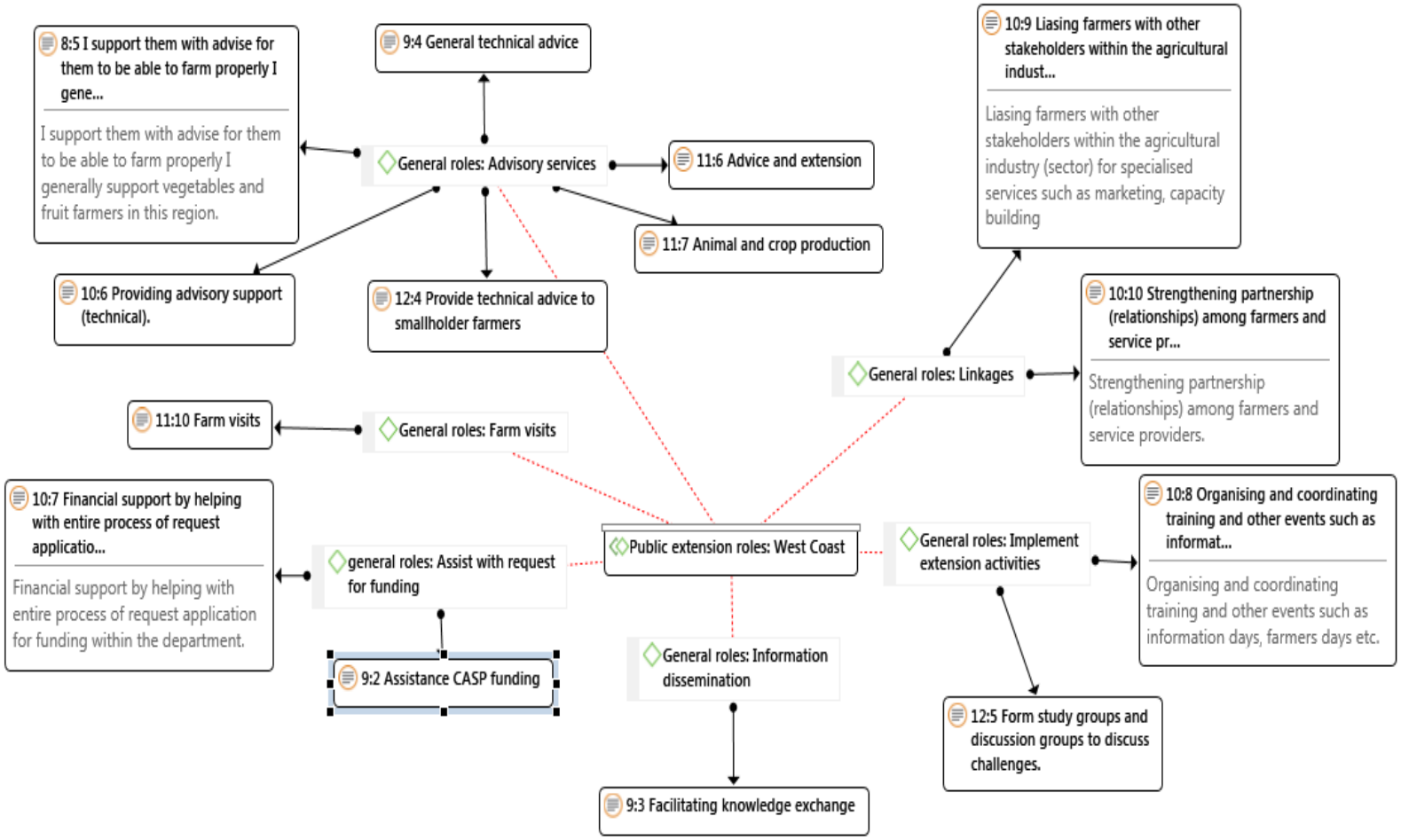

Figure 4.5: General roles of public extension services in the West Coast district

Figure 4.6 illustrates the specific roles of private extension services in the West Coast district during drought periods. The private and public sector shared some general roles (farm visits and advisory services) when delivering extension services to the smallholder farmers. Private extension agents distributed information to smallholder farmers with more focus on the services and programmes implemented by their organisations. Additionally, Figure 4.6 shows that the private sector also focused on drought mitigation and planning when engaging with smallholder farmers. One private organisation reported that their general roles included research work.

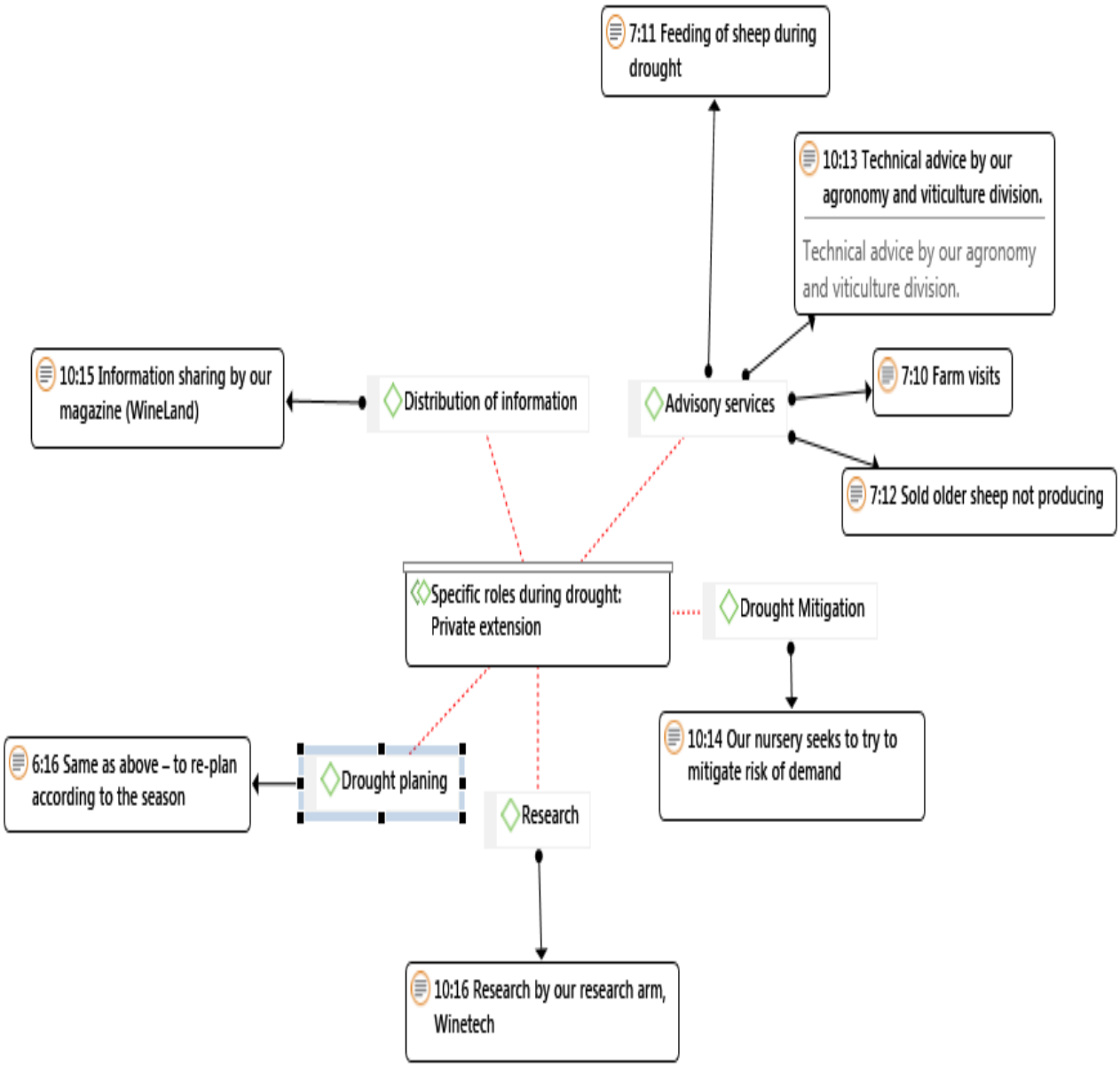

Figure 4.6: Specific roles of private extension services in the Overberg and West Coast districts during drought periods

4.3.2 Roles of public extension officers in Overberg and West Coast Districts

Figure 4.7 illustrates the specific roles of public extension officers during drought periods. The extension advice focused on drought mitigation and coping strategies. Extension officers continually investigated the degradation of the land and facilitated carrying capacity calculations to do stock adjustments. Veterinary services focused on animal legislation, animal disease control and early disease detection. Economic services assisted farmers with agribusiness skills, markets and compilation of business plans. Furthermore, extension services continue to support smallholder farmers with drought relief. Extension officers facilitate access to drought relief and farmers receive vouchers for animal feeds.

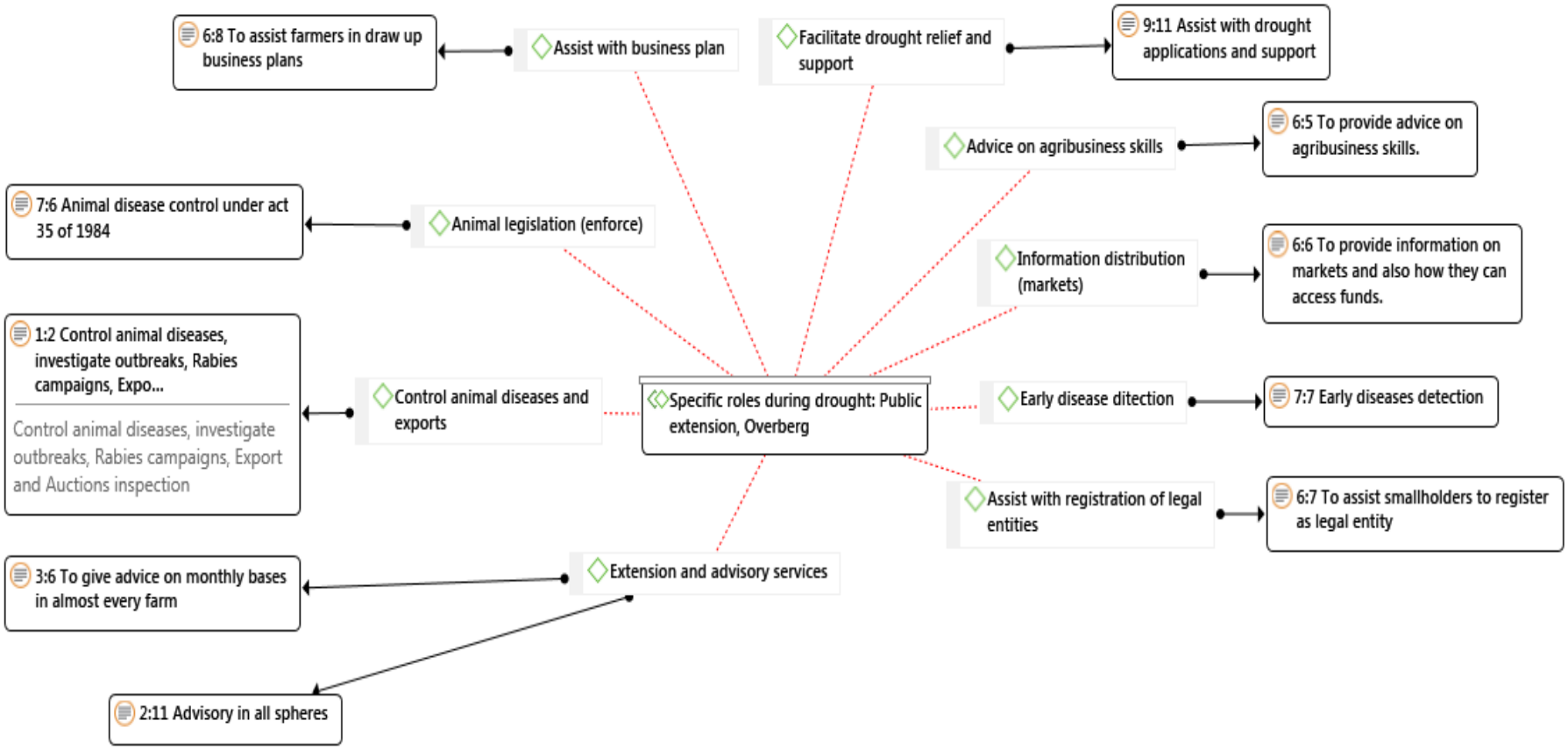

Figure 4.7: Specific roles of public extension officers during drought in the Overberg District

The results in Figure 4.8 illustrate the extension services provided to the smallholder farmers by the public extension officers during the drought. One extension officer from the West Coast district reported that he assisted two farmers with infrastructure support. The infrastructural support was in the form of access to boreholes. The WCDoA appointed drilling companies to drill boreholes for the farmers. Farmers were supported with extension-related services that included advisory services and workshops. Extension officials continued to advise farmers with drought-related activities. Workshops were organised and facilitated by extension officers. Extension officials organise experts in the field of drought to address groups of farmers and to motivate them.

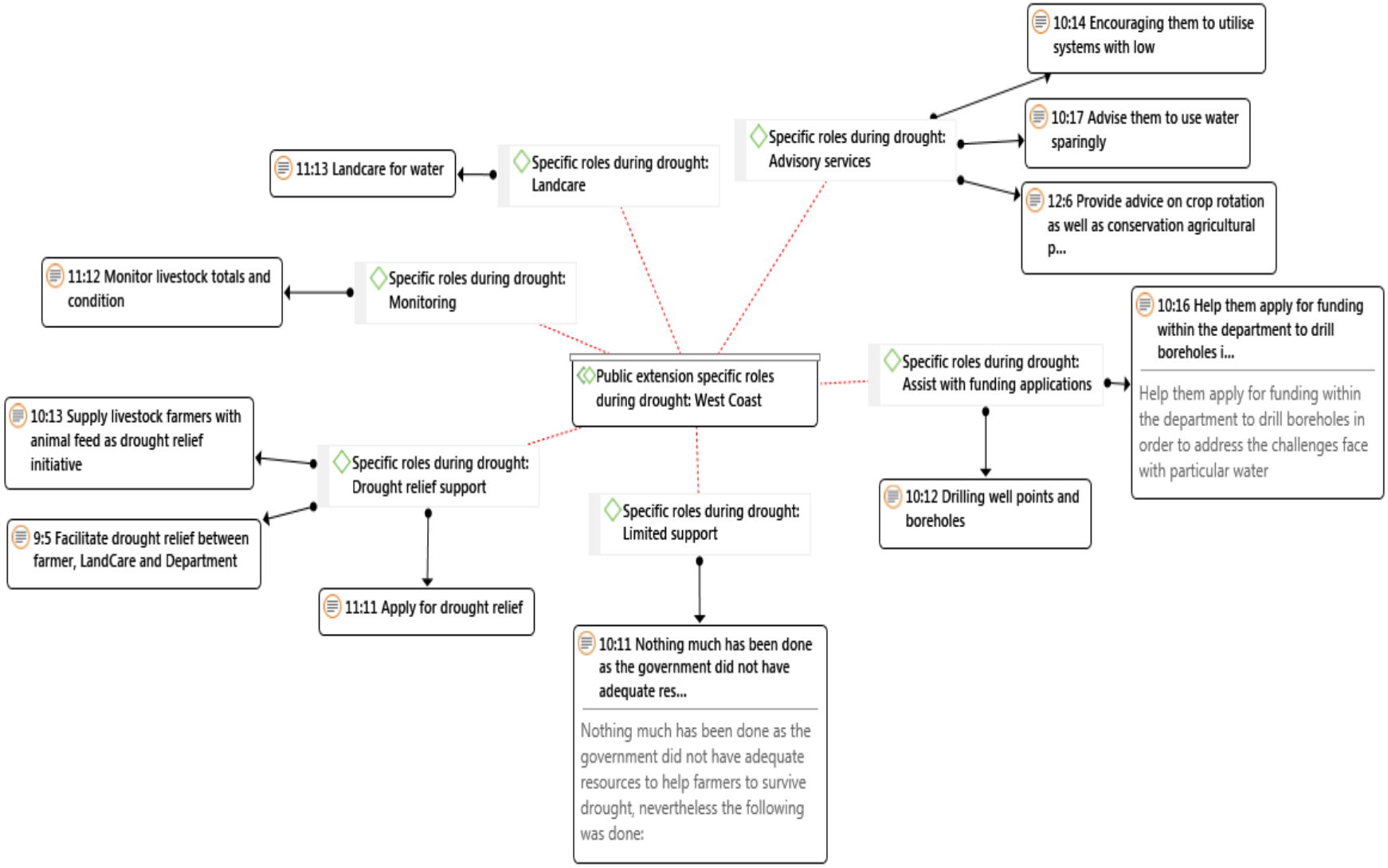

Figure 4.8: Public extension services provided during drought in the West Coast district

4.3.3 Challenges faced by public extension officers during drought periods in the Overberg

One official had not experienced any challenges because the concerned farmers had not been affected by the drought:

No challenges, as farmers were not impacted during the drought period.

The Overberg District was not declared an agricultural drought disaster area during the drought period. Another respondent reported that it was difficult to get projects approved for funding because of water shortages. The smallholder farmers' scale of production decreased and as a result, profits were marginalised, causing farmers to stress. One of the respondents reported that the drought conditions caused the farmers to stress and in this situation, it was difficult to advise the farmers. This respondent highlighted the fact that farmers were quick to report their problems but did not consider any solutions and expected the extension agents to solve their problems.

Farmers did not want to sell their livestock, although they experienced problems feeding their animals. Extension agents advised smallholder farmers to reduce their livestock numbers as a coping strategy during the drought but some farmers refused to accept this advice. Another challenge highlighted by the respondents was the tardiness and bureaucratic processes of government in responding to drought relief. The lack of necessary documentation was also highlighted as a challenge for the extension agents. Smallholder farmers did not practise sound record-keeping, which resulted in a lack of availability of the documents required by the government when emergency funding or assistance was needed.

One respondent reported challenges with communication with farmers during drought periods. Another respondent reported that not all farmers were aware of the drought relief fund and recommended that more awareness programmes needed to be implemented to inform farmers of such programmes. The respondent continued, stating that the drought relief was limited and only provided animal feed for livestock farmers but did not support water-related applications from farmers.

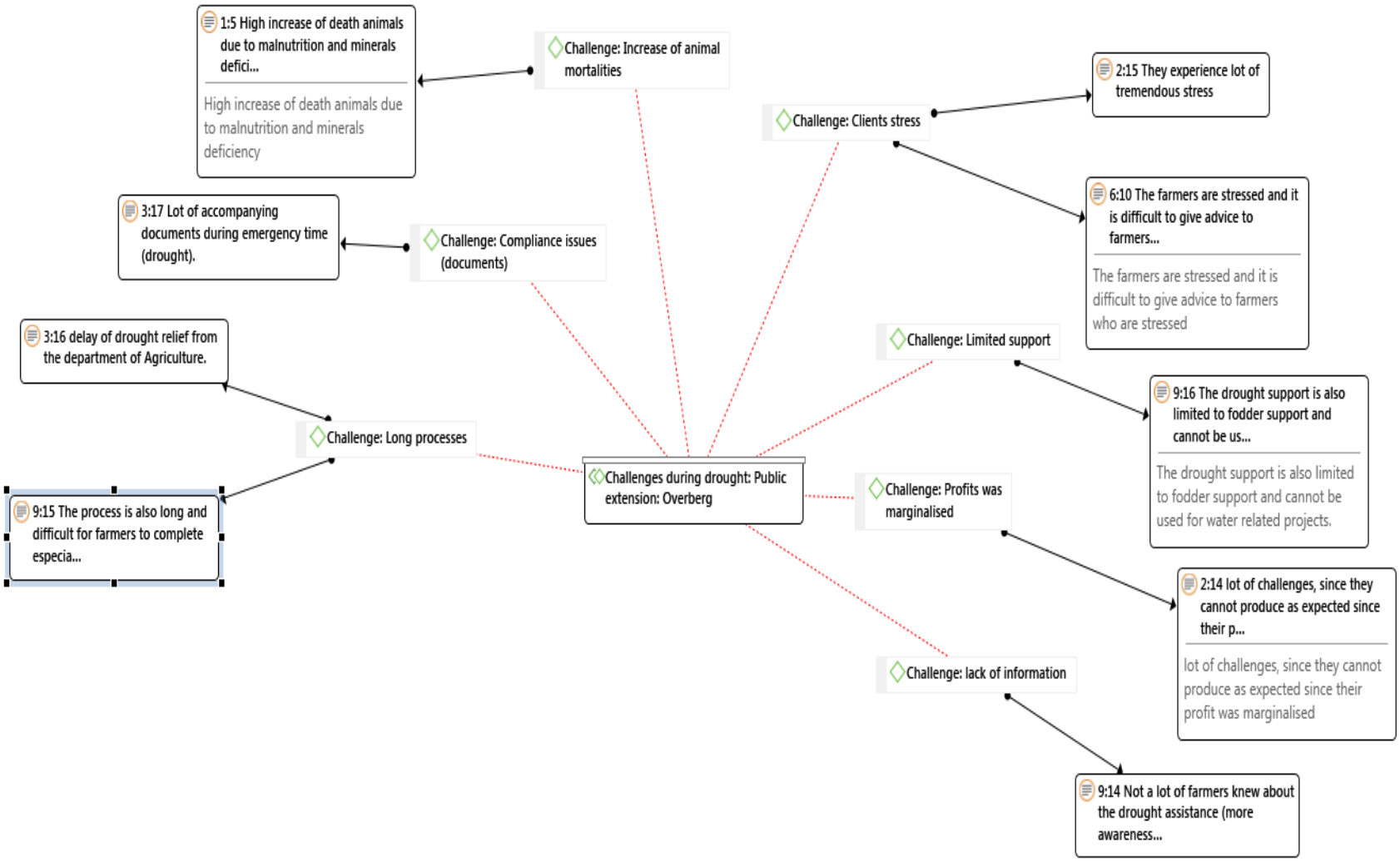

Figure 4.9: Challenges faced by public sector extension respondents in Overberg District

Low rainfall affected the soil moisture content and farmers could not plant or follow normal seasonal guidelines. Seed germination was negatively affected, with uneven seed germination causing uneven stands of crops at harvesting. Farmers lacked the financial capacity to buy animal feed and available funding resources were limited. Loss of production resulted from wrong decisions made by farmers. As one of the extension officers in the private sector said:

> *Wrong decisions are made, farmers plant late, fertiliser and top dressing is wasted.*

Farmers started to rely on outside investments and became dependent on financial grants and private investments. During drought periods, the processing of applications was slow, assistance arrived late and was insufficient and ultimately, farmers' livelihoods are compromised.

> *Red tape and slow processes hamper quick and effective decision-making which is needed in farming.*

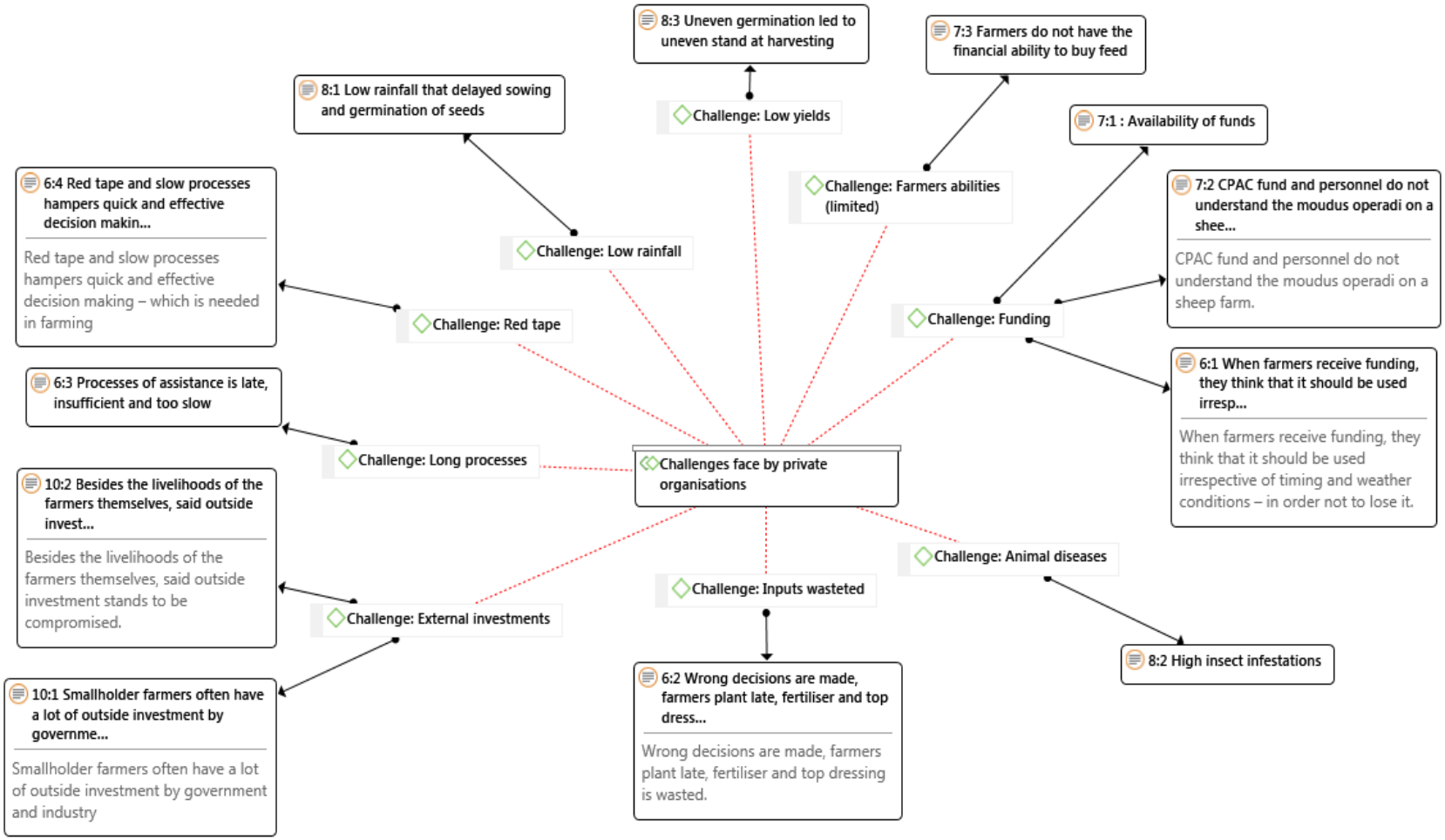

Figure 4.10: Challenges faced by private extension service respondents in Overberg and West Coast districts

4.4 Effectiveness of extension service respondents in supporting smallholder farmers

4.4.1 The effectiveness of extension service respondents in supporting smallholder farmers

There were more male extension service respondents than females. Male extension officers dominated at 75%, compared to their female counterparts at 25%.

These respondents represent broad age groups. Table 4.9 depicts the ages of the extension service respondents. The majority of them fell in the younger age groups, returning 29% for both the 20–30 year and 31–40 year age groups. The 41-50 year age group made up 25%. The group older than 50 years represented the minority (15%) of the extension service respondents.

Table 4.9: Age groups of the extension service respondents

Age group	Percentage (%) (n=24)
20–30 years	29
31–40 years	29
41–50 years	25
Older than 50 years	17

4.4.2 Qualification achievements and bursaries awarded

Table 4.10 shows the results of the level of education of the extension service respondents. NQF is the acronym for National Qualifications Framework (NQF).

Table 4.10: Level of education of the extension officer respondents

Education level	Percentage (%) (n=24)
B degree (NQF 7)	33
Honours (NQF 8)	12
Maters (NQF 9)	38
Doctorate (NQF 10)	5
Other - Diploma	12

Most of the respondents (38%) had attained an NQF 9 qualification, followed by 33% who completed the NQF 7 qualification. The number of extension service respondents that held a Honours and Diploma qualification both stood at 12%, while 5% had achieved a PhD degree.

Most extension service respondents had received study bursaries (58%) compared to the 42% who had not.

4.4.3 Sector employed

Table 4.11 shows the sector in which the extension service respondents were employed.

Table 4.11: Extension officers' sector in which employed

Sector employed	Percentage (%) (n=24)
Public sector	79
Private sector	13
NGO	8

The majority of the extension service respondents were employed in the public sector (79%). The private sector employed 13%, while 8% were employed by non-governmental organisations (NGOs). These results demonstrate that the public sector is mainly responsible for extension and advisory services in the study area.

Table 4.12 depicts the years of work experience of the extension service respondents. Most of them had 1–5 years' work experience in the extension field (46%) while 21% had 6–9 years' work experience and 21% had 10–19 years' work experience. The least number of respondents (12%) had more than 20 years' work experience in the extension environment.

Table 4.12: Years' experience of the extension officer respondents

Period of extension service	Percentage (%) (n=24)
1–5 years	46
6–9 years	21
10–19 years	21
More than 20 years	12

4.4.4 Professional body

There was an even split between extension service respondents registered with a professional body and those not registered (50%), from both the public and private sectors.

4.4.5 Tools and equipment to deliver effective extension services

Extension service respondents from the NGOs (2) and private sector (3) were amongst the respondents who did not have access to a digital pen and data phone. The remaining respondents (7) that did not have a digital pen or data phone were from the public sector. Twelve officials from the public sector had access to a digital pen and data phone. After the

successful completion of the site visits, the data becomes immediately available for managers to view. This measure also addresses the accountability of advice given to the farmers.

The results in Figure 4.11 show the access that extension officers have to IT equipment. All extension service respondents have access to laptops. Extension officials appear well equipped with Internet (94%), e-mail facilities (94%) and cell phones (94%). The digital pen (69%) and data phone (69%) are used by public extension staff during farm visits. Extension officers also have access to landlines (69%) as part of IT equipment.

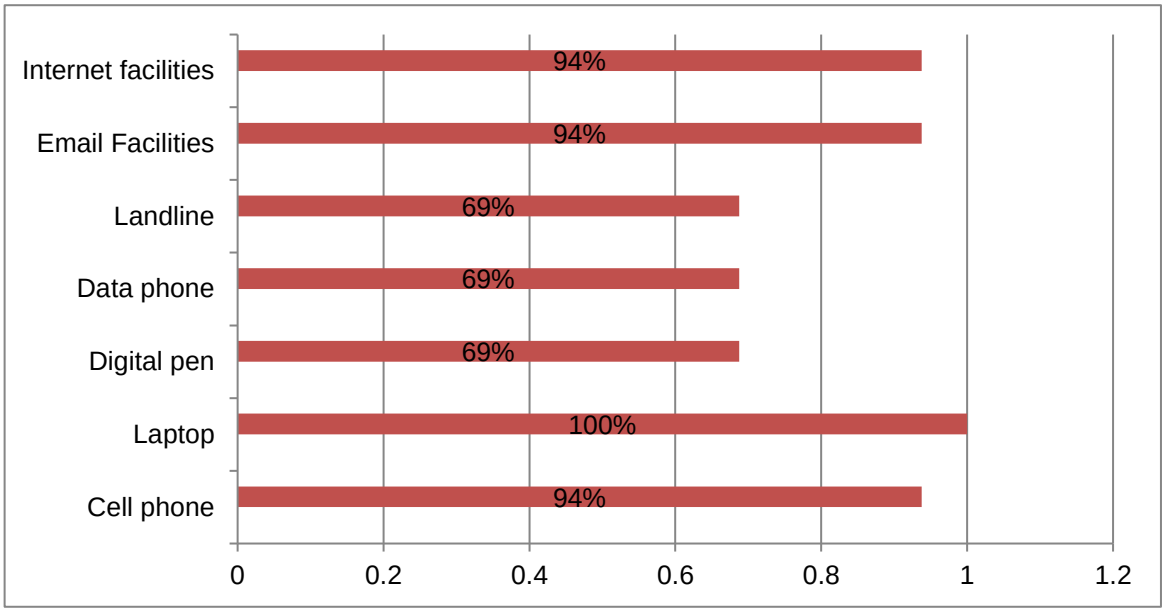

Figure 4.11: Extension service respondents' access to IT equipment

CHAPTER 5

DISCUSSION

5.1 Characteristics of smallholder farmers in the Overberg and West Coast Districts

5.1.1 Human assets

The youth comprised less than 15% in both the Overberg and West Coast Districts. This aligns with the findings of Fox et al. (2016), who noted that the youth chose to work in other industries and later tended to return to the agriculture sector. The youth continue to regard the sector as backward and opt to seek more desirable employment outside of the agricultural sector (Jepthas & Swanepoel, 2019). Zantsi (2019) reports that smallholder farmers in South Africa are ageing, as shown in this current study. Focus group discussions revealed that the youth were more successful farmers in both districts compared to the other groups of respondents because they adapted better to climate change than the older group. Kumalo (2014) argues that older farmers believe in traditional farming methods and are resistant to change. There is a need to find ways of promoting farming to the youth. During focus group discussions with farmers, it was suggested that one way of doing this would be if agriculture was taught as a subject in the curricula of schools.

The results of gender distribution in this study were contrary to findings from other parts of South Africa. Various other researchers found that that the smallholder-farming sector comprised mostly females (Aliber et al., 2009; Tshuma, 2014; Thamaga-Chitja & Morojele, 2014; Cele, 2016). The main reason why females dominate the sector is that males migrate to cities to find employment to sustain their families, while the females remain behind to care for the children, maintain the household and continue with the farming activities (Palchick, 2008; Khumalo, 2014). However, the findings of recent studies in the Western Cape Province (Bastian et al., 2019; Jepthas & Swanepoel, 2019) are similar to the findings of the current study. Bastian et al. (2019) report male respondents of 84% compared to females at 16% and households mainly comprising 4–6 individuals per household. This finding on household size is similar to that of Khumalo (2014) who reports that the average family in the southern Free State Province consists of 6 people, with a variation of 2–7 per household. The size of households has implications for family farm labour.

5.1.2 Financial assets

Respondents from Overberg District had more access to credit at 32% compared to the West Coast District at 16%. Researchers deem access to credit as one of the tools that enable smallholder farmers to become commercial farmers. Rabbi et al. (2019) aver that access to credit enhances farmers' progress to commercialization whereas lack of credit limits their ability to produce. Machete (2004) and Chauke et al. (2013) highlight that access to credit is

one of the most important factors with the potential to enhance food production amongst smallholder farmers. The finding of only 16% of farmers in the West Coast District having access to credit is a dire cause for concern. Furthermore, Kisaka-Lwayo and Obi (2012) report that the communal land tenure system and the collateral required by financial institutions limit the smallholder farmers' options to access credit.

Kuwornu et al. (2012) indicate that financial institutions consider age distribution as an important determinant when considering granting smallholder farmers access to credit. The younger generation (average age 38) are classified as economically productive and more likely to gain access to credit compared to the older generation (average age 56) who are classified as high risk (Kuwornu et al., 2012). This is supported by the results of this study's finding that younger farmers were more successful than their older counterparts because they are considered more favourably by various institutions, organisations and cooperatives that offer credit facilities. However, Chauke et al. (2013) conclude that smallholder farmers are risk-averse and tend to rely on their own resources. During the focus group discussions, the smallholder farmers indicated that they were not prepared to accept the risks associated with credit sources and chose to continue with production using their own limited resources.

Cooperatives and commercial banks in the Overberg District were more supportive of smallholder farmers (16% and 14% respectively) than cooperatives and commercial banks in the West Coast District (5% and 2% respectively). These results reflect the poor support granted by some financial institutions to the smallholder farmers in the study area. This result aligns with the findings of Chisasa and Makina (2012), who note that commercial banks in South Africa are more likely to grant credit facilities to commercial farmers and the non-farm private sector because they are viable and have access to collateral, while smallholder farmers do not meet these criteria and thus are deemed, high-risk clients. Smallholder farmers gain better access to credit through contract farming (Ortmann & King, 2006). Sugarcane smallholder farmers in South Africa benefit from contractual agreements with sugar millers who subsidise their transaction costs (Ortmann & King, 2006). In the focus group discussions, respondents highlighted the lack of collateral and tenure arrangements as the major obstacles to gaining access to credit.

Most concerning is the result that the Land Bank-supported only 2% of the farmers in the Overberg District and 0% of the farmers in the West Coast District. It is interesting to note that Machete (2004) reported that Land Bank managed to support smallholder farmers with credit facilities but later studies conducted by Chisasa and Makina (2012) found that the support of Land Bank to smallholder farmers is limited. These results are however in agreement with the findings of this study that the Land Bank support to the smallholder farmers in the study area is diminishing.

5.1.3 Natural assets

Government-leased land by the respondents was less than 12% for both districts. This is comparable to the findings of Cousins (2010; 2013a) and Manona et al. (2010), who note that the South African government has attempted to redistribute the land by designing and implementing various land reform policies over the past 25 years but with limited or insignificant success. The target of transferring 30% of the agricultural land in the country to black farmers by 2030 remains a slow process. During an attempt by the South African government to speed up land reform processes, they decided to review section 25 of the Constitution about land expropriation without compensation (Kwarteng & Botchway, 2019).

The lack of land ownership compelled farmers to rent land from different sources that included private land leases (up to 21% of the respondents) and municipal land rented (up to 41% of the respondents). The lease of land was highlighted as problematic, especially for the farmers who rented land from municipalities. Respondents noted during the focus group discussions that some municipalities issued short-term lease agreements ranging from 12 months to 5 years, while other municipalities issued more long-term leases of 9 years 11 months. This arrangement is problematic because, on the one hand, smallholder farmers with short lease agreements are denied the opportunity to apply for financial support under the CASP grant system from the WCDoA who requires a 9 year 11 months' lease agreement for farmers to qualify for support. On the other hand, smallholder farmers could not access credit facilities from local cooperatives and commercial banks due to short-term lease agreements. Financial institutions require substantial security for credit and loans to smallholder farmers. However, up to 16% of the respondents had inherited land and 11% of respondents who purchased land had access to services that included credit facilities from different institutions.

The respondents were clearly not satisfied with their current land arrangements and the land reform programme of the government is not alleviating this problem. The results of this study attest to this, with more than 66% of the farmers indicating that they do not have access to adequate land. The literature highlights that smallholder farmers are characterised by their access to small pieces of land (Tshuma, 2014).

The Western Cape Province is well-serviced with water from six major dams that fulfil the water needs of the people in the province (WCDoA, 2018). Two of these dams, Theewaterskloof Dam in the Overberg and Clanwilliam Dam in the West Coast, are located in the study area and 59% of the respondents had access to water from these dams. During drought periods, the dams reached critically low levels and the agricultural water users were the first to be limited and had to reduce water usage (WCDoA, 2018). Because of the drought, the normal water supply to the farmers from the dams was cut by up to 80% (WCDoA, 2018). It is important to note that 25% of respondents who accessed water from taps were severely impacted by the

drought because they were stopped by municipalities from using water for agricultural production. These arrangements rendered the smallholder farmers vulnerable, especially during drought periods because water sources were administered by authorities who closely monitored water usage.

Furthermore, the cost of water increased during drought periods and smallholder farmers with limited financial resources could not afford the inflated water prices. Eighteen per-cent of the respondents accessed water from rivers. The recent drought in the province has been characterised by low dam levels and rivers running dry (WCDoA, 2018). Respondents were dependent on rivers as their main water supply was severely affected and had to abandon their farming activities, especially vegetable producers, in both districts. Boreholes were promoted as alternative water sources during droughts. The West Coast District was most severely affected by the recent drought and 19% of the respondents received support through the drilling of boreholes. Notwithstanding, the fact that water supply to smallholder farmers is highlighted as a priority by the South African government as promoted in the National Water Act, 36 of 1998, it is clear that water supply to smallholders remains a challenge (Mnyaka, 2018)

Many smallholder farmers in both districts relied on municipalities for the supply of water for agricultural production. This is of concern because the recent work of Mnyaka (2018) found that the water allocated to the smallholder farmers in Barrydale for agricultural purposes by the Swellendam Municipality in the Overberg District was insufficient and as a result farmers had no option but to abandon their farming activities. After all, they could not continue without sufficient water for livestock. Secondly, during drought periods, municipalities started to cut the water supply for agricultural water usage and community gardens. Food security initiatives that depended on municipal water were also stopped. Smallholder farmers were categorised as resource-poor, with limited financial resources. Therefore, the payment of water rights was a further challenge for smallholder farmers. The general authorisation promised to support more than 20% of respondents in both districts. This came as a relief to the smallholder farmers because this arrangement allowed smallholder farmers to access water without the burden of paying for the allocated water.

5.1.4 Physical assets

Ninety-two per cent of the respondents in the Overberg District had access to markets compared to 50% in the West Coast district. The West Coast District was more severely affected by the drought than the Overberg District was. The smallholder farmers from the West Coast District lost one of their main markets when a factory that produced puree from tomatoes closed down in a West Coast town (Williams, 2018). One of the youth farmers in the West Coast District reported that he had to stop his tomato production business because of water

shortages. The findings of the current study are contrary to Wiggings and Keats (2013) and Fan et al. (2013), who found that the majority of smallholder farmers are not market-orientated for reasons such as inaccessibility, small production volumes, very low farm gate prices and absence of information.

It is fair to say that some segments of the market remain inaccessible to smallholder farmers. Okunlola et al. (2016) report that general stores have progressively entered urbanized territories in the rural areas over the past decades (with the arrangement of social grants a key factor in boosting successful interest), their scope stays constrained and local producers cannot access new marketing opportunities through the general stores. Smallholder farmers do not produce the quality or quantities required by supermarkets. Access to supermarkets is essential for smallholder farmers to maintain their livelihoods. However, due to the inability of smallholder farmers to satisfy the consumer demands that drive supermarket business agendas, they remain behind. An additional challenge to smallholder farmers is that they have to compete against commercial farmers and agriculturists from beyond the country's borders (Muchopa, 2013). Contributing factors that prevent farmers from supplying to supermarkets include limited production (because of small landholdings), transportation of produce and distance to the markets (Mutero et al., 2016). As a result, smallholder farmers opt to sell their produce at the farm gate (Mutero et al., 2016). No or very few opportunities exist for such producers to share in the value chain.

5.1.5 Social capital

Smallholder farmers from the Overberg District were more socially organised and belonged to a group (80%) than the West Coast farmers were (46%). Social capital is a phenomenon that organises smallholder farmers into groups for them to network, build trust and form relationships that mutually benefit all of them (Pretty & Smith, 2004; Reid & Vogel, 2006; Muller, 2013). Formal groups (farming cooperatives, study groups) and informal groups (stokvels) are established from time to time to collectively identify challenges and solutions; they negotiate lower transaction costs and deliver improved natural resource conservation on the one hand, while reducing practices that harm the natural environment on the other hand (Reid & Vogel, 2006). Farmers organise themselves into groups like Farmers Associations and Farmers Unions to voice their concerns, needs and aspirations at public and private sector institutions. NGOs become an effective vehicle to mobilise and organise smallholder farmers when responding to droughts. The nature of NGOs allows them to speed up service delivery because of minimal red tape and bureaucracy that hampers public service institutions.

5.1.6 Classification of smallholder farmers

The results indicate that the smallholder farmers are not a homogeneous group. Their level of education and livelihood trajectories are amongst the key variables that determine their

differentiation. Access to markets and credit seems to be enabling factors. Therefore, extension services need to package a range of support interventions for the different groups of farmers. The minimum requirements for farmers to qualify for government grant support programmes and other related services need to be re-considered. The needs of smallholder farmers must be considered when crafting support interventions, especially for periods of drought, if extension services are to support smallholder farmers adequately and effectively.

Farmers in the study area can be classified into three main groups:

a) Group 1
b) Group 2
c) Group 3

5.1.6.1 Group 1 farmers

One of the significant differentiating characteristics of Group 1 farmers (N = 12) is that they are educated. The Group 1 farmers have the highest level of education, some holding National Certificates (5; 42%) and other post-graduate qualifications (7; 58%). These farmers are empowered to negotiate for access to markets and credit.

Education is a powerful agent of change, improves livelihoods, contributes to social stability and drives long-term economic growth. Education drives people to accomplish goals and increases their awareness of possibilities (Siulemba & Moodley, 2014). Literate farmers improve the effectiveness of extension communication. The higher the educational level, the better the utilisation of extension services and the use of ICT to improve climate change awareness and market access. ICT tools enable farmers to communicate and conduct climate and market research, ultimately improving their decision-making skills (Umeh et al., 2018). The farmers in Group 1 are all males and from different age groups.

The middle-aged group (39–59) were the majority of Group 1 farmers (7; 58%) followed by the farmers (3; 25%) from the older group (60 to 75+) and youth farmers (2; 17%) in the 18–38 year age group. Nine farmers (75%) in this group had their own pick-up trucks (bakkies) to transport produce to market. Ten farmers (83%) in Group 1 had access to formal markets and offtake agreements, while two farmers (17%) did not have access to markets. Access to credit advantaged six (50%) of the farmers in Group 1 because they continued with production activities while paying for goods and services after harvesting and receiving their farming income. The remaining six farmers (50%) in the same group did not have access to any credit facilities. The main credit sources utilised by the farmers in Group 1 were cooperatives (3; 25%), commercial banks (2; 17%) and one farmer (8%) received credit from the Land Bank. The farmers from Group 1 had multiple sources of income. Some were full-time employed (2; 17%), some were part-time employed (2; 17%) and some farmers (3; 25%) farmers had their

own private businesses. Three farmers (25%) received pension grants and two (17%) farmers also received money from their sons. The farmers in Group 1 did their own record-keeping and financial management plans. All the farmers in Group 1 employed temporary farmworkers and some (5; 42%) farmers employed permanent workers as well. The diversity of the farmers is shown in the size of their land. The smallest piece land rented from the municipality by one (8%) of the farmers in Group 1 was 1 800 m², while the largest piece of land rented from the government was 6 088 ha. One (8%) farmer who had purchased his own land had access to 2 528 ha. The remaining farmers had access to pieces of land ranging from 0.7 to 257 ha.

5.1.6.2 Group 2 farmers

One of the main characteristics of the farmers (N = 48) from Group 2 was that they were fulltime farmers who resided on their farms and their main source of income was derived from farming. Group 2 farmers had achieved between Grade 9 to 12 (34; 71%) and Matric (14; 29%) They were better educated than the farmers in Group 3 and were able to benefit optimally from extension programmes from both the private and public sector.

This group of farmers was exposed to different skills training interventions and other support from extension services that included specialised training services from commodity groups. The farmers in Group 2 were land reform beneficiaries (4; 8%) and some farmed on municipal land (22; 46%). The farmers in Group 2 had access to different land sizes, the largest being 2 528 ha and the smallest being 1 800 m². Some of the farmers operated in groups and divided the different farming activities amongst themselves. This arrangement allowed them to specialise in one farming activity. For example, one member of the group was responsible for livestock and another was responsible for grain production on the farm. During drought periods, an individual focused only on his/her commodity, for example, livestock farming, doing research, attending training and information sessions based on his/her commodity. Some Group 2 farmers delivered their produce to both the formal and informal markets (43; 89%).

5.1.6.3 Group 3 farmers

Group 3 farmers (N=40) were the least educated, some having completed between Grade R and Grade 8 (37; 92%) and some who had never been to school (3; 8%). These farmers rely on extension services and social grants for their livelihoods.

Group 3 had a solitary youth farmer (1; 3%) in the 31–38-year-old age group and 12 (30%) farmers in the middle age group (39–59 years old). The majority (27; 67%) fell in the older group of 60–75+ years. The gender split of the group was 7 female farmers (17%) and 33 male farmers (83%). Some farmers hired casual labour (30; 75%) while farmers hired permanent labourers 10 (25%).

Group 3 farmers had fewer employment opportunities with 3 (8%) farmers in full-time employment and 3 (8%) farmers employed part-time. This is a clear indication that employment opportunities are increased by education. The higher the education level, the more employment opportunities (Siulemba & Moodley, 2014; Etim et al., 2019). Group 3 farmers derived most of their livelihood from farming, pension grants and remittances from family members. Other than land reform beneficiaries with access to 6 000 ha of government land, the rest of the farmers had access to smaller pieces of land, with some farmers having less than 1 ha. Group 3 farmers attended extension activities more regularly than the farmers in groups 1 and 2 did. Four (10%) farmers in group 3 had access to credit and 24 (60%) farmers had access to markets.

5.2 Roles of institutions in supporting smallholder farmers during the drought

5.2.1 Extension activities

Public extension officers visited the extension clients on a weekly (47%) and monthly (40%) basis, which is more frequently than extension officers from the private sector. This aligns with Nkosi (2017) who reports that smallholder farmers had more access to public extension services compared to private extension services. Afful et al. (2013) and Maka et al. (2019) opine that the more the extension agents visited farmers, the more their farm management practices improved. Similarly, Omoro et al. (2015) report positive correlations between frequency of extension visits and production performance of farmers. The focus group discussions revealed that farmers with access to extension services were more successful than the farmers who had limited access to extension services. This finding is corroborated by Elias et al. (2015) who indicates that extension workers are the main sources of information and training of farmers on new technologies and their frequent contact with farmers is the cornerstone for effective extension services.

Although Baloch and Thapa (2018) report that access to extension services had improved the yield and farmers' incomes in Pakistan, the availability of extension workers was limited to the majority of the farmers who only had access to extension workers once a year. In the current study, the private sector extension officers visited the farmers less frequently (7%) per semester (once in every 6 months) compared to the visits from the public sector extension officers. The private sector focuses on cost recovery during the delivery of extension and advisory services. Schwartz (1994) noted that private extension services sold agricultural inputs to farmers and advised farmers of best practices at the same time. The advice that the private sector delivers to farmers is based on the availability of products or services, how the inputs will improve the farming operations and also on the income that the farmers will generate from using their products. The focus group discussions revealed that smallholder farmers who were surrounded by private extension services were more successful, especially during drought periods, compared to smallholder farmers who did not have access to private

extension services. Arguably, this might be one of the reasons why private extension services are better rated than public extension services (Elahi et al., 2018). Elahi et al.'s (2018) study in Pakistan found that the quality of private advisory services was better than other advisory services.

The results of the current study indicate that the majority of the extension activities occurred every quarter, which included demonstration sessions (67%), workshops (64%) and training sessions (53%). Most of the farmers' days (53%) happened once a year and information sessions (40%) once in every six months. These findings are similar to those of Rajalahti and Swanson (2015) who found that extension officers use training sessions, demonstration trials and workshops, amongst others, to deliver extension services to farmers. Nakano et al. (2018) report that the training of smallholder farmers in new technologies resulted in an enormous improvement of yields over time. Similar findings are reported by Maoba (2016), that training and demonstration sessions were highly effective extension tools while farmers' days were only moderately effective.

5.2.2 General roles of extension service officers

One of the general roles identified by public extension service respondents was the linking of smallholder farmers to other service providers in both the public and private sector. The role of agricultural extension services was to link multiple segments and spheres of government and private sector actors, together to render support services simultaneously, including market access, financial services and production inputs to smallholder farmers (Anaeto et al., 2012). Extension services also fulfil the roles of advising farmers through the provision of information on sustainable agricultural production practices. Education services to the farmers are one of the core responsibilities of extension officers. Extension officers provide technical advice to the smallholder farmers to transfer knowledge, build their capacity and improve farming methods. The WCDoA provides financial support to smallholder farmers to establish and improve their livelihoods. Extension officers also disseminate information on innovative new technologies to smallholder farmers during contact sessions and farm visits (Anaeto et al., 2012).

The private sector also fulfils a role when servicing the smallholder farmers in the study area. Extension services provided by the private sector extension agents seemed to follow a more specialised approached compared to the public sector agents that followed a more general approach. Private sector agents focussed on the commodity approach and provided extension services based on a certain commodity. Extension officers that specialised in grain cultivars focussed on providing extension and advisory services on grain cultivars and would not digress to other cultivars, for example, grape cultivars. This arrangement allowed extension officers to invest more time in research, for example, on drought-tolerant grain cultivars that could be

developed and tested by farmers. The private extension services sector tended to do more research into technical agricultural issues than the public extension services did.

5.2.3 Specific roles of extension services during drought periods

The results indicate that the roles of extension service officers change during drought periods with the extension and advisory services becoming more focussed on drought-related issues. According to the results, extension officers focus more on drought-related advisory services that include mitigation and coping strategies. The extension agents became more involved in investigating the degradation of the land and calculating carrying capacity to do stock adjustments. The findings of Ngaka (2012) reveal that farmers explore the reduction of livestock as a coping strategy during drought periods. Ngaka adds that extension services aim to protect the natural resources during drought periods and thereby assist farmers to adjust the livestock numbers according to the carrying capacity of the degraded land as drought conditions continue.

Conditions during drought periods are favourable for outbreaks of pests and diseases. The results of this study indicate that veterinary services focus on animal legislation, disease control and early disease detection. The nutrients available to livestock from natural vegetation decline, together with the condition of the veld. These findings align with those of Ngaka (2012), that the farmers from the Eastern Cape and the Northern Cape provinces bought in feed for their animals and also vitamin supplements to compensate for the low nutrient content in natural grazing. Economic services assisted farmers with agribusiness skills, markets and compilation of business plans. Furthermore, extension services continued to support smallholder farmers with drought relief. Extension officers facilitated access to drought relief and farmers received vouchers for animal feeds. Ngaka (2012) reports that smallholder farmers in the Eastern Cape and Northern Cape provinces received feed for animals from the drought relief fund during the 2007/2008 drought. This method of drought relief from the South African government is highly criticised by researchers. For example, Baudoin et al. (2017) noted that the government responded reactively to droughts and only focussed on the immediate needs of relief for farmers, which in most circumstances arrived late (Agri SA, 2016) and was not sufficient (Ngaka, 2012). Proactive response to droughts, which can prepare and cushion farmers for disasters such as drought, remains a work in progress for extension services. Baudoin et al. (2017) state that the government must teach farmers “to fish” and “not fish for them” or simply “give them fish”.

The results indicate services provided to the smallholder farmers by the public extension officers during the drought period included infrastructural support in the form of access to boreholes. The WCDoA appointed drilling companies to drill boreholes for the farmers. This finding aligns with that of Baudoin et al. (2017), that the WCDoA augmented the water supply

with other water sources that included the drilling of boreholes. Extension interventions reported by the respondents included the facilitation of drought-related workshops. During the drought, especially in the West Coast District, extension officials organised and facilitated drought-related workshops. This is one intervention where public and private extension services joined forces to support smallholder farmers collectively during drought periods. The pubic extension services utilised their resources to organise workshops and other farmer group events, for example, farmers' days, while the private sector contributed through the provision of expert speakers in the drought arena that could provide valuable information to farmers, which would assist them to cope and survive the drought.

5.2.4 Challenges faced by public and private sector extension service respondents

The findings of this study indicate that some respondents, especially in the public sector, did not experience any challenges during the drought because the specific area where the agents worked was not declared a disaster area. This is similar to those of Baudoin et al. (2017) who state that government organisations do not prepare farmers for disaster periods and that the government only responds reactively to disasters. No proactive measures were communicated by extension service officers to the smallholder farmers in the study area. Extension services and other related drought support were only provided to the smallholder farmers when a disaster was declared. Bahta et al. (2016) similarly found in the OR Tambo District of the Eastern Cape that public extension services did not implement training and drought awareness campaigns as part of a drought preparedness strategy. The authors conclude by saying:

> *The lack of training in drought risk reduction and lack of timely information and resources, all reduce the farmers' capacity to prepare for drought.*

This result raised further concerns regarding the effective management and mitigating strategies that the government has in place if any when attempting to prepare farmers for disasters such as droughts.

Respondents also reported that it was difficult to get projects approved for government funding because of water shortages. It was very difficult for the government to approve projects, especially crop-related projects when the availability of water for basic production purposes is compromised because of a natural occurrence such as drought. Moreover, the disaster policy of the country only allows for livestock-related projects to be supported during droughts, ultimately rendering the crop producers with no support from the government. This finding is supported by Bahta et al. (2016) and Ngaka (2012) who report that smallholder farmers were supported with feed and fodder for animals but in most instances, the relief arrived late. The extension officer respondents also had challenges with farmers who did not want to accept the advice provided by them regarding reducing livestock numbers. The same finding was reported by Ngaka (2012), that smallholder farmers found it difficult to reduce stock numbers because

they farmed with livestock for various reasons that included social, cultural and economic reasons. Livestock is perceived as a form of wealth in rural communities.

Some respondents highlighted the challenge of the slow processes of government in responding to drought relief efforts. The extensive documentation required by the government added to the frustration of the extension agents because smallholder farmers lacked sound record-keeping, which meant that no documents were available when emergency funding or assistance needed to be requested. This finding is similar to that of Baudoin et al. (2017) who found that the bureaucratic system of the South African government prevents organisations from responding more rigorously and proactively to disasters like droughts. Officials are impeded by local, provincial and national processes that delay response time and as a result, the disaster is at a catastrophic level when relief finally arrives.

Most of the challenges reported by private extension respondents relate to low water issues. The lack of rainfall during droughts affected the soil moisture content and farmers' planting dates were compromised, with the knock-on effect of patchy seed germination and very little to harvest. The low rainfall patterns resulted in production losses and low income for farmers. Farmers become dependent on the government for relief and other support. Baudoin et al. (2017) recommended that farmers "must be taught how to fish, not be given fish", which will allow them to become more self-reliant and less dependent on government support.

5.3 Effectiveness of extension services

5.3.1 Demographic profile of extension officers

The demographic profile of extension officers is contained in Appendix B.

The female extension officers comprised less than 30% of the total population. This is comparable to the findings of various academics and scholars who note that the agricultural sector has limited opportunities for female agriculturists in the country compared to their male counterparts (Hart, 2011; Thamaga-Chitja & Morojele, 2014; Tshuma, 2014; Zikhali, 2016). Hart and Aliber (2012) report that black female farmers outnumber male farmers significantly; therefore, extension services should employ more female extension staff to service the female agriculturists in South Africa.

The agricultural sector is not attractive to the youth and they avoid choosing agriculture as a career (Leavy & Smith, 2010). This tendency is described as one of the main reasons for *de-agrarianation* in sub-Saharan Africa (Daniels et al., 2013). Limited employment opportunities in a country like South Africa, whose economy is not growing at the expected rate, has resulted in youth unemployment rates recorded at an alarming 72% during 2010 (Mayer et al., 2011). However, some of the youth in the study area, contrary to popular belief, opted to enter the agricultural sector. Both the public and private sector provide employment opportunities for the

younger generation. The reasoning of Leavy and Smith (2010) indicates that the younger generation is more exposed to educational opportunities and as a result, are rewarded with good employment opportunities in the rural areas of our country.

5.3.2 Education level

The extension service respondents had attained high levels of education, including NQF level 9 (38%) and NQF level 8 (12%). Extension officers at NQF level 7 and Diploma level are continually improving their education levels. This finding is contrary to the findings of several researchers (Greenberg, 2013; Liebenberg, 2013; David & Samuel, 2014; Xaba & Dlamini, 2015; Lukhalo, 2017; Maluka, 2017), who criticized the country's poor extension service delivery as the reason for the low level of education of extension staff. It was surprising that female extension officers held higher qualifications (NQF level 10; 5%) than their male counterparts. Zikhali (2016) records similar findings, that females held more postgraduate qualifications than their male counterparts did.

Since 2005, the South African Government has improved the extension services provided to farmers. New policies and programmes, including the Norms and Standards for Extension and Advisory Services in Agriculture, followed by the National Policy on Agricultural Extension and Advisory Services, were adopted to deliver a more effective extension service (DAFF, 2005; David & Samuel, 2014; DAFF, 2009; DAFF, 2016; Kgaphola, 2016). The Norms and Standards for Extension and Advisory Services in agriculture dictate a minimum of a 4-year NQF level 7 Bachelor's degree to practise in the field of extension and advisory services. It should be noted that although government succeeded with the upgrading of the education levels of extension staff, the current study did not measure the impact of the improved skills of extension staff on the services they rendered to their extension clients in the study area. Further research needs to investigate the impact of improved skills in the extension of crops. The results confirm that female extension officials, although in the minority, generally have higher educational qualifications than male officials have.

5.3.3 Bursaries awarded

Close to 60% of the respondents had access to study bursaries. The ERP is mandated to grant study bursaries to government extension staff to upgrade their qualifications to comply with the minimum standards as stipulated in the Norms and Standards, which extension staff have done (Xaba & Dlamini, 2015). The government avails study bursaries and resources for extension officials to perform advisory services to the greater public of South Africa as stipulated in the Norms and Standards document (DAFF, 2005). Due to the ERP, public extension officials have been able to upgrade their skills and education levels (Zikhali, 2016). Community development workers who started working for the WCDoA in early 2005 have successfully upgraded their skills and qualifications to the minimum requirements and continue

improving their qualifications beyond the minimum requirements. Although the ERP programme is a temporary intervention by government to avail budgets for various interventions, the upgrading of qualifications continued through the Western Cape Government staff support programmes and therefore extension officials are not limited by the ERP from upgrading their qualifications.

5.3.4 Sector employed

The majority of the extension service respondents (79%) are employed by the public sector. This demonstrates that the public sector is the main supplier of extension and advisory services in the study area. David and Samuel (2014) record a similar result, that extension service delivery is the responsibility of the government. Although the extension service respondents from the private sector total 13% and 8% for NGOs, their contribution to the development of smallholder farmers remains essential. The WCDoA has various interventions and partnerships with the private sector and NGOs that strengthen service delivery to the extension clients (Theron et al., 2019).

The role of extension services has been transformed to include the private sector and NGOs in the legislative documents regulating the provision of extension services (DAFF, 2016). The government acknowledges the enormous task of extension, especially in the 21st century's ever-changing environment that requires a robust, relevant and effective extension programme. Ultimately, the government employs various extension programmes such as decentralisation, pluralistic extension and commodities-based extension services to cater for the needs of all the stakeholders in the sector (DAFF, 2016). The WCDoA embraces the commodity partners in the province. Core to its development processes that aim to empower and elevate poverty in the province through food security, the WCDoA works with the commodity partners to implement the CASP funding programme. CASP aims to empower the farmers of South Africa to address food security needs and to create employment opportunities, ultimately eliminating the inequalities (Xaba & Dlamini, 2015).

5.3.5 Years of experience

The majority of the respondents (46%) had between 1–5 years' experience in the extension field. It could be that extension service providers employed from the younger generation when replacing retired, older workers. Twenty-one per cent of the respondents had between 10–19 years' work experience in the extension field, demonstrating the job security and the competitive environment created by the employer. This was contrary to the findings of Zikhali (2016) that the majority of extension workers had between 16–20 years of work experience. The older group (12%) had more than 20 years' work experience in the extension environment. Extension professionals have to possess a few core competencies (understanding and enhancing social processes and ICT) and also certain areas of expertise (demand-driven

needs) to facilitate successful extension interventions (Zwane et al., 2015; Zikhali, 2016). The length of service of respondents demonstrates competency across the extension field with extension officers understanding the local agricultural environment and also providing training for the younger generation of extension workers.

5.3.6 Professional body

The results show that 50% of the respondents were registered with a professional body. Current legislation requires that all extension staff need to be registered with a professional body (Terblanchè et al., 2012). The South African Council for Natural Scientific Professions (SACNASP) has accepted extension science practitioners into their membership, creating an opportunity for extension staff to register as professionals. Continuous professional development through participation in SACNASP, the South African Society of Agricultural Extension (SASAE) and other professional bodies' activities will cultivate professionalism in officials (Kgaphola, 2016). A new cadre of extensionists must regard serving in the profession as a calling to contribute to the development of fellow human beings, not just as a job. The extension is not always an easy job, especially in conflict-ridden or antagonistic communities or farmers that have had a nasty experience with any government official. Involvement with the professional bodies will also expose the extension officer to innovations and present networking opportunities with peers.

5.3.7 Tools and equipment to deliver effective extension services

Extension officers were well-equipped with IT equipment to perform their extension duties. All the extension staff in the study area, in both the public and private sector, had access to laptops, while 94% of the respondents had access to smartphones, Internet facilities and e-mail facilities. Deichmann et al. (2016) highlight the value of e-extension in rural areas where simple mobile phones can reach out to thousands of farmers. The use of mobile phones and Internet facilities is a great help to extension officers who are burdened with a high number of extension clients. Farmers tend to relate more to easily accessible information than to traditional extension services (Nakasone et al., 2014). Digital tools have triggered the mobilization of agricultural extension and advisory services to some extent (Deichmann et al., 2016).

5.3.8 Comparison of extension services with the National Framework

Drawing on the National Framework for ERP (DAFF, 2011), the effectiveness of extension services is assessed. Since 1994, the South African Government began implementing black empowerment programmes and rural development initiatives that sought to improve the livelihoods of rural dwellers but met with little success. The main challenge identified in an investigation as to why government programmes failed was the weak extension service system. This resulted in the government sourcing funds from the Royal Dutch Government in

pursuit of a suitable extension model (DAFF, 2011). Unfortunately, no single suitable extension model was found, however, born of this exercise was the minimum criteria for agricultural extension and advisory services, also known as the Norms and Standards for Agricultural Extension Services. These Norms and Standards form the basis of the National Framework for ERP.

The ERP has five strategic objectives, also termed pillars:

(i) Ensure visibility and accountability of extension
(ii) Promote professionalism and improve the image of extension
(iii) Recruit extension personnel
(iv) Reskill and reorientate extension workers
(v) Provide ICT infrastructure and other resources

5.3.8.1 Pillar One: Ensure visibility and accountability of extension

Pillar One seeks to narrow the gap between the extension officers and the farmers. The problem was that the farmers could not relate to extension staff and it was difficult to identify the responsible extension officer that was supposed to service the farmers in a certain area. Communication and administration measures were implemented to narrow the gap identified in Pillar One. The WCDoA implemented the agricultural information and management system that includes a digital pen, digital paper and a data phone that connects with the digital pen. It was ascertained that 12 extension staff officers did not have data phones or digital pens.

5.3.8.2 Pillar Two: Promote professionalism and improve the image of extension

The landscape of extension services is changing. The conventional extension methods of top-down technology transfer, training and visit models are becoming irrelevant. The extension client is also changing—from a few thousand white commercial farmers to masses of black and new entrant farmers, including beneficiaries of land reform projects. Social facilitation, linking clients with different service providers, marketing and market access, amongst others, become new roles for extension service officers. These new roles require actors to up their game and become specialists in one or the other disciplines. Membership of professional associations is paramount for practitioners, scientists, policymakers and managers (Bennett & Ramsden, 2007; Davis & Terblanchè, 2016). South African Society of Agricultural Extension (SASAE) and South African Council for Natural Scientific Professions (SACNASP) can serve as an example. SASAE is a voluntary association that promotes science and agricultural extension to its members. SACNASP recognises agricultural extension as a science and allows extension staff to register as practitioners (Mmbengwa et al., 2009). More male (7) than female (3) extension officers belonged to SACNASP and two females also belonged to

SASAE. Furthermore, uniforms were issued to all public extension staff to improve the image of extension.

5.3.8.3 Pillar Three: Recruit extension personnel

One of the driving factors for extension services to be effective is the ratio of extension officers to clients (Liebenberg, 2015). The ERP recommends an extension-to-farmer ratio of 1:400 for crop producers, 1:500 for livestock producers and 1:500 for mixed farming (DAFF, 2011). However, the number of extension clients are increasing, with new entrant farmers recruited from land reform beneficiaries and also food security beneficiaries that start with backyard gardens and livestock production (Lukhalo, 2017). More male extension officers (17) than females (7) were employed. The sector demonstrates a willingness to invest in young extension officers that can adapt to a changing working environment. There are youth respondents from the private sector (2), from the NGOs (1) and from the public sector (5). All of the young respondents have between one to five years' work experience in the extension field, which indicates that the agriculture sector has been recruiting extension personnel.

5.3.8.4 Pillar Four: Reskill and re-orientate extension workers

Pillar Four attempts to address the human capital status of extension workers in South Africa. Extension staff lack appropriate training and technical skills as identified by various researchers (Cousins, 2010; Fanadzo, 2012; Dube & Fanadzo, 2018). Through the implementation of Pillar Four, the human capital status of extension staff was enhanced. Study bursaries were allocated to extension staff to enrol at institutions of higher learning to improve their qualifications and international exchange programmes were organised to share experiences globally. Agricultural education and training were pinpointed as an enabling tool to grow farmers' productivity, increase their ability to acquire and adopt new technology and enter new markets (Mmbengwa et al., 2009; Landini & Davis, 2019). The solidification of human capital and the dissemination of information are essential for the development of agricultural production. Therefore, investments in human capital are important for the improvement of effective extension services (Landini & Davis, 2019).

The human capital development of the extension service providers in the study area was assessed. The results indicate that 24 extension staff members were interviewed, with 3 being from the private sector, 2 from NGOs and 19 from the public sector. A higher proportion of male extension staff had four-year degree qualifications than their female counterparts. The female extension staff was more educated than their male counterparts, with one female holding a Doctoral degree. The extension staff from the study area were characterised as well-educated and had post-graduate qualifications, with 9 Master's degrees, 11 Bachelor's degrees and 3 Diplomas. Extension staff, especially from the public sector, are continuously improving their qualifications. This phenomenon is due to the ERP initiative of DAFF. The ERP

aims to improve the image of extension through its five pillars. Education and training are one of the pillars that are funded in the public sector, where extension staff are awarded study bursaries to improve their qualifications, with 9 male and 5 female extension staff members having received study bursaries. Given these educational levels and bursary arrangements to improve the qualifications of extension staff continuously, it would be reasonable to describe the extension staff as educated and delivering an effective extension service to clients.

5.3.8.5 Pillar five: Provide ICT infrastructure and other resources

The efficiency and effectiveness of extension staff were highlighted as a concern (DAFF, 2011). The lack of necessary tools and equipment to deliver extension services to clients was identified as a limiting factor in the effectiveness of extension services. The tools and equipment required to improve the effective delivery of extension services include an information technology package (laptop, printer, cell phone, memory stick). Extension managers should create an enabling environment for extension staff to gain access to the Internet to improve technical agricultural advisory service delivery. The results indicate that 6 officials did not have access to official cell phones, while 18 had and 2 officials did not have access to laptops but 22 did. The same results apply for landline telephones. Only 1 official had no access to email facilities and the Internet, while 23 officials did have access to email facilities.

Overall, the results indicate signs of growth and improvement. Extension services have the potential to deliver an effective service to their clients. The public sector has equipped their extension staff with the required tools and equipment and has implemented extensive human development programmes that enhance extension service delivery. With specific reference to the public extension service, the Norms and Standards as well as the ERP requirements are met by the public sector. The private sector and NGOs, on the other hand, need further investment if they are to comply with the legal framework for agricultural extension workers.

CHAPTER 6
CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The findings of the study offer a framework for understanding the different roles and approaches of public, private and NGOs in providing different agricultural extension and advisory services to support the smallholder farmers of the Overberg and West Coast districts of the Western Cape during long drought periods. The study informs extension policymakers of recommendations for future policies that aim to support the smallholder farmers of the Western Cape, especially during drought periods. The key factors that underpin the characterisation and classification of smallholder farmers and determine livelihood strategies are level of education and source of income of the farmers. These were the main differentiation variables amongst the different groups of farmers as classified in this study. The higher the education levels of the farmers, the more job opportunities exist, especially in the non-agricultural sector. Some farmers derive their livelihoods from farming and are therefore full-time farmers who benefit optimally from extension services, while other farmers rely on pension grants and remittances from family members.

This study found that public extension services are the main provider of extension and advisory services in the study area. Public extension officers visited the farmers on a weekly and monthly basis, which is more frequent than the private sector officers do. Private extension services are profit-driven and promote profitable farming ventures through improved cultivars and technology that renders a competitive advantage to their clients. Therefore, farmers who have access to private extension services are more successful than farmers who do not have access to this service.

The general roles of extension services were identified as the linking of smallholder farmers to various other related services in both the public and private sector. Smallholder farmers need the support of government support programmes, for example, economic services (markets) and training services (short courses). In addition, financial services from commercial banks and Land Bank are much needed by the smallholder farmers. Extension and advisory services have the responsibility to link farmers to such services, amongst others.

The general roles of extension services change during drought periods. The conventional production advisory service changes to a service more focussed on drought, which includes coping and adaptation strategies. The degradation of the land is closely monitored and the carrying capacity and stock adjustments are part of the drought-related advisory services provided to smallholder farmers during drought periods. Additionally, farmers are advised to buy and in most instances were supported with, feed for livestock to supplement the loss of nutritional intake from the veld that was degraded by drought.

The main challenge of extension and support programmes of the government during drought periods remains the reactive approaches followed. Support services of the drought relief are in the form of feed for livestock. The lack of proactive drought management programmes renders the current support programmes as ineffective. Furthermore, the failure of the timeous declaration of disasters by authorities makes the situation more problematic. Smallholder farmers that suffer under drought conditions in areas where drought disaster was not declared do not receive any drought-related support or relief from the government. For example, elsewhere in the study area smallholder farmers were struggling to cope with extreme drought conditions but could not receive any drought relief from the government because the area was not declared as an agricultural drought disaster area. Ultimately, when the government realised otherwise, it was too late and farmers bore the brunt of the government's tardiness.

Organisations are hampered by bureaucratic procedures when attempting to respond and manage drought conditions. Affected farmers have to complete drought relief funding application forms that require supporting documentation such as tax clearance certificates, which impede them in the application process. NGOs that are linked with farmers' organisations and can organise farmers locally and respond more robustly to disasters such as droughts are undermined by the bureaucracy of the government.

The public extension service was discredited by researchers as being ineffective because the education level of extension staff was low and staff had to work with limited resources. The ERP, which was adopted by the National Government of South Africa, allows for extension staff to improve their qualifications and also addresses various empowerment interventions that aim to address poor extension service delivery. The extension staff from the public sector in the study area participated in the implementation of the ERP and improved their education levels and resources to address the quality of extension services delivered to the smallholder farmers. This study found that through exploring the five pillars of the ERP, the public sector managed to improve the effectiveness of extension services. However, this study did not investigate the impact of extension services after the improvement of actors was achieved.

6.2 Recommendations

The characterisation and classification of smallholder farmers demonstrate the diversity amongst and in the groups. Extension services need to consider the diversity of the smallholder farmers and need to design support programmes accordingly. This study proves that the blanket approach taken by extension services when supporting smallholder farmers is not effective. It is recommended that basket support packages should be available for the different farmers as classified in the three groups.

Organisations need to improve their efforts to accommodate climate change activities in their budgets and also allocate human and other resources to climate change interventions. More

importantly, the roles of municipalities in supporting smallholder farmers need special attention. Municipalities need to be empowered by the government to provide for climate change interventions to proactively prepare and cushion smallholder farmers for droughts and other climate-related events such as floods and veld fires. The South African government should offer incentive opportunities for municipalities that promote climate change activities in their domain.

The successful implementation of the ERP promises to yield a better extension service in the public extension arena. However, human capital development interventions are an ongoing activity and need to be expanded to performance appraisals and other recognition for outstanding work delivered by extension staff. This would motivate better performance and restore the dignity of public extension officers. Although the private sector contributes to the delivery of extension services in the study area, their lack of compliance with the legal framework for extension and advisory services remains a concern. It is recommended that the South African government should empower and promote rigorous public-private partnerships that aim to improve service delivery. The government should also motivate the private sector to comply with the country's legal framework for extension and advisory services. The registration with professional bodies for both public and private sector extension services needs investment interventions. It is recommended that further studies be undertaken to investigate the impact of extension services post- the up-skilling and improvements employed by the extension service providers in the study area.

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APPENDICES

APPENDIX A: Questionnaire for extension officers/managers

Roles and impacts of extension services on the livelihoods of smallholder farmers during drought periods in the Western Cape, South Africa

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Questionnaire No:	

BACKGROUND INFORMATION

The extension support services rendered to the smallholder farmers of the Western Cape are increasing on annual basis. The services are provided by several organisations including the public and private sectors. These extension services play an important role in assisting smallholder farmers. The effectiveness of these services is however under constant criticism. The perception of the understanding of the roles of extension services by farmers, extension officers and District Agricultural Managers will be investigated in different districts of the Western Cape to ascertain whether the extension services are effective. The role they played during the recent drought will also be assessed.

INSTRUCTIONS

The completion of this questionnaire will contribute to a study on the roles and effectiveness of extension services in various districts of the Western Cape. The research work forms part of a Masters in Agriculture degree at Cape Peninsula University of Technology. Please answer the questions to the best of your ability.

The information collected will be treated with the highest degree of confidentiality and no names will be mentioned in the writing.

CONSENT TO PARTICIPATE

I, _____ agree to take part in the aforementioned survey. I understand that my responses to this survey will be treated with the strictest confidence and that my anonymity is ensured. I further understand that I will not receive any compensation for taking part in this study.

SIGNATURE_____ **DATE:** _____

_____

SECTION A: BIOGRAPHIC INFORMATION

Respondent name : _____

Contact number : _____

Date : _____

Area/location : _____

Instructions: Mark the appropriate block with an X and fill the text in the provided spaces.

1. Please indicate your gender?

(a) Male	
(b) Female	

2. Please indicate your age group?

(a) 20 - 30	
(b) 31 - 40	
(c) 41 - 50	
(d) > 50	

3. Please indicate your highest educational achievements?

(a) B degree (NQF 7)	
(b) Honours (NQF 8)	
(c) Masters (NQF 9)	
(d) Doctorate (NQF 10)	
(e) Other (please specify)	

4. Did you benefit from any study bursary awarded by your employer to improve your extension skills?

Yes	
No	

5. Please indicate the sector where you are employed?

(a) Public sector	
(b) Private sector	
(c) NGO	
(d) Other (Please specify)	

6. How long have you been providing extension services to farmers in your area?

(a) 1–5 years	
(b) 6–9 years	
(c) 10–19 years	
(d) More than 20 years	

7. Which of the following commodities do you specialise in when providing extension services?

(a) Grain	
(b) Ruminants	
(c) White meat	
(d) Vegetables	
(e) Fruit	
(f) Wine	
(g) Other (please specify)	

8. Are you a registered member of any professional institution for science practitioners?

a). Yes	
b). No	

9. If yes in question 8, please mention the institutions and your level of practice?

SECTION B: TOOLS AND EQUIPMENT TO DELIVER EFFECTIVE EXTENSION SERVICES

B1. Do you have access to any information technology (IT) equipment provided by your employer?

a). Yes	
b). No	

B2. If yes in question B1, please specify the IT equipment to which you have access?

a). Cell phone	
b). Laptop	
c). Digital pen	
d). Data phone	
e). Landline	
f). Email facilities	
g). Internet facilities	
h). Other (please specify)	

B3. Do you have access to any of the following transportation services for official duties?

a). Government vehicle	
b). Subsidized vehicle	
c). Private vehicle	
d). Other (please specify)	

SECTION C: EXTENSION SERVICES

C1. Which of the following B municipalities do you serve as extension manager or extension officer in your District?

District	**B. Municipality**	
Overberg	Cape Agulhas	
	Overstrand	
	Swellendam	
	Theewaterskloof	
North West Coast	Cederberg	
	Matzikama	
South West Coast	Bergrivier	
	Saldanha Bay	
	Swartland	

C2. Do you provide extension services to the following clients in your area? (Choose the correct option). (*Extension officials only*).

a). Smallholder Farmers	
b). Commercial Farmers	
c). Both (Smallholder and Commercial farmers)	

C3. How often do you visit your extension clients? (*Extension officials only*).

a). Once a week	
b). Once a month	
c). Once a quarter	
d). Once a semester	
e). Once a year	

C4. How often do you implement the following extension activities? (*Extension officials only*).

C4.1 Famers' Days

a). Once a month	
b). Once a quarter	
c). Once a semester	
d). Once a year	

C4.2 Training sessions

a). Once a month	
b). Once a quarter	
c). Once a semester	
d). Once a year	

C4.3 Demonstration sessions

a). Once a month	
b). Once a quarter	
c). Once a semester	
d). Once a year	

C4.4 Information days

a). Once a month	
b). Once a quarter	
c). Once a semester	
d). Once a year	

C4.5 Workshops

a). Once a month	
b). Once a quarter	
c). Once a semester	
d). Once a year	

C4.6 Other (please mention any other interventions).

a). Once a month	
b). Once a quarter	
c). Once a semester	
d). Once a year	

C5. Please mention a minimum of five (5) extension messages delivered to your clients in the recent drought, focusing on preparedness for drought in your specialised field?

_____

_____

C6. What are your general roles as extension manager or extension officer in your specialised field in supporting smallholder farmers?

_____

_____

SECTION D: DROUGHT RESPONSE

D1. What are your specific roles as extension manager or extension officer in your specialised field, in supporting smallholder farmers during drought periods?

_____

_____

D2. What services did you provide to the smallholder farmers during the recent drought?

_____

_____

D3. What challenges did you face in supporting the smallholder farmers during the recent drought period?

_____

_____

APPENDIX B: Ethical clearance certificate

Cape Peninsula University of Technology

P.O. Box 1906 • Bellville 7535 South Africa •Tel: +27 21 953 8677 (Bellville), +27 21 460 4213 (Cape Town)

Reference number: 195080343

Office of the Chairperson Research Ethics Committee	Faculty of Applied Sciences

The Faculty Research Committee, in consultation with the Chair of the Faculty Ethics Committee, have determined that the research proposal of **Coleridge Paul Recardo Carelsen** for research activities related to the: **Master of Agriculture** at the Cape Peninsula University of Technology requires **does** require ethical clearance.

Proposed title of dissertation/ thesis:	Understanding the roles and effectiveness of extension services on the livelihoods of smallholder farmers during drought periods in the Western Cape

Comments (Add any further comments deemed necessary, eg permission required)

Conditional approval, I.e. approval with specified conditions

Research activities are restricted to those detailed in the research proposal.

Permission letter is required.

The communities in which the research will be conducted is vulnerable – a local community leader should be involved.

Signed: Chairperson: Research Ethics Committee	Date 28/9/2018

APPENDIX C: Demographic profile of extension officers

Table B.1: **Demographic profile of extension officers**

Education level	**Frequency (n=24)**	
	Male (17)	**Female (7)**
B degree (NQF 7)	8	3
Honours (NQF 8)	0	0
Maters (NQF 9)	7	2
Doctorate (NQF 10)	0	1
Other – Diploma	2	1
Study bursaries		
No	9	5
Yes	8	2
SACNASP membership		
Yes	7	3
No	10	4
Digital Pen and Data phone		
Yes	10	5
No	7	2
Cell phone		
Yes	13	5
No	4	2
Laptop		
Yes	17	7
No	0	0
Email access		
Yes	17	6
No	0	1
Sector employed		
Public sector	13	6
Private sector	3	0
NGO	1	1

APPENDIX D: Grammarian letter

22 Krag Street
Napier
7270
Overberg
Western Cape

31 August 2020

TECHNICAL & LANGUAGE EDITING

Cheryl M. Thomson

ROLES AND IMPACTS OF EXTENSION SERVICES ON THE LIVELIHOODS OF SMALLHOLDER FARMERS DURING DROUGHT PERIODS IN THE WESTERN CAPE, SOUTH AFRICA

Supervisor: Dr Bongani Ncube

Co-supervisor: Dr Morris Fanadzo

This is to confirm that I, Cheryl Thomson, executed the language and technical editing of the above-titled Master's dissertation of COLERIDGE PAUL RECARDO CARELSEN at the CAPE PENINSULA UNIVERSITY OF TECHNOLOGY in preparation for submission of this dissertation for assessment.

Yours faithfully

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