

The contribution of *Eucalyptus* woodlots initiative to livelihoods of small-scale timber growers in Vhembe district, Limpopo Province

By

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DECLARATION

I, Vuwani Louis Manthakha, hereby declare that this dissertation for the Master in Rural Development degree (MRDV) submitted to the Institute for Rural Development at the University of Venda has not been submitted previously for any degree at this or another University. It is original in design and execution, and all reference material contained therein has been duly acknowledged



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ABSTRACT

The *Eucalyptus* woodlots provide material benefits that could support the livelihoods of the communities. These trees are very important to the rural households; they provide an array of products, particularly timber and fuelwood. However, there is lack of information on contribution of *Eucalyptus* woodlots on the livelihoods of rural small-scale timber growers in Vhembe district, Limpopo. Establishment of *Eucalyptus* woodlots could be used as a poverty fighting tool in rural areas such as Vhembe district, the question that arises is; to what extent does these *Eucalyptus* woodlots contribute to the livelihoods of these small-scale timber growers? Therefore, the main objective of the study was to assess the contribution of *Eucalyptus* woodlots initiative to the livelihoods of small-scale timber growers. The specific objectives of the study were to evaluate economic benefits derived from the *Eucalyptus* woodlots initiative by small-scale timber growers, to determine the factors affecting the contribution of woodlots to livelihoods and exploring possible interventions to improve the contribution of *Eucalyptus* woodlots to livelihood of small-scale timber growers in Vhembe district. The focus of the study was on woodlots established by small-scale timber growers as individuals and those established under the government programmes before 1994 and after 1994 in the new democratic government.

A mixed methods approach was adopted since all methods (quantitative and qualitative) had limitations, thus this research intended to reduce the bias inherent in individual methods. The methods were based either on constructivism or positivism. A questionnaire with open ended questions was used for qualitative data collection. The qualitative data was analysed using the thematic analysis approach, through Atlas ti Version 8 software. Data collection for the quantitative phase was done through administering a questionnaire with close and open-ended questions. Collected data was analysed using IBM-SPSS version 25 and descriptive statistics tests were performed.

Major socio-economic benefits of the *Eucalyptus* woodlots were timber production, employment and different Non-Timber Forest Products. The factors affecting the contribution of *Eucalyptus* woodlots growers' livelihood and solutions thereof were resources required for production such as skills, costs, funding and support by government and other institutions. It was observed that *Eucalyptus* woodlots initiative had job creation potential. More than a quarter (37%), of the respondents survives through *Eucalyptus* woodlots production since they are unemployed. There are significant socio-economic benefits from *Eucalyptus* woodlots and the most common benefits are timber production, Non-Timber Forest Products and employment opportunities among the participants. Therefore, attention should be given

to manage the identified socio-economic benefits and factors in order to change small-scale timber growers' attitude towards *Eucalyptus* woodlot initiative.

Key words: *Eucalyptus*, Previously Disadvantaged Persons, small scale timber growers, woodlots

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Dedication

Before and first, thanks and praise be to God for giving me power to finalize this work. I would like to dedicate all my family for all things they did for me to know education besides their grateful support. A special dedication and thanks to my wife Lufuno Manthakha for her supportive idea and encouragement. Finally, a grateful thanks to my father even though he cannot see my achievement.

RESEARCH PUBLICATION AND PRESENTATIONS

Articles

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ABBREVIATIONS

CBRM	Community Based Resource Management
CPA	Communal Property Association
DAFF	Department of Agriculture, Forestry and Fisheries
DEFF	Department of Environment, Forestry and Fisheries
DLRD	Department of Land and Rural Development
DWAF	Department of Water Affairs and Forestry
EPWP	Expanded Public Works Programme
FAO	Food and Agriculture Organization on The United nations
FD	Forest Development
FED	Forest Enterprise Development
FSA	Forestry South Africa
GPS	Global Positioning System
NIPF	Non-Industrial Private Forests
NTFP	Non-Timber Forest Product
PDI	Previously Disadvantaged Individuals
SANBI	South African National Biodiversity Institute

CHAPTER 1 INTRODUCTION

1.1 Background

Forestry South Africa (2016) reported that forestry plays a major role in poverty alleviation in the rural areas, as it is an important economic activity for some rural occupants. The South African forestry industry provides a livelihood for more than 10 000 small-scale growers who supply timber to this industry (Department Agriculture, Forestry and Fisheries, 2016). In South Africa, small-scale timber growing refers to the establishment of monoculture forest plantations for timber in small portions of land less than 100 ha (Howard *et.al.*, 2005). Examples of trees grown are: *Eucalyptus* species commonly known as gum trees; *Pinus* species trees; and *Acacia* species trees. Majority of small timber growers in South Africa are growing *Eucalyptus* trees in their woodlots. A good example is of small timber growers in Vhembe district who are also growing *Eucalyptus* trees in their woodlots (DAFF, 2016). Per Grundy & Wynberg, (2001), small-scale timber growers are recognised as previously disadvantaged individuals due to the policies of the apartheid government and unfavourable socio-economic policies. *Eucalyptus* species is mostly preferred in South Africa due to its high growth rate and the general suitability of different types of products (Van den Berg *et al.*, 2016). The *Eucalyptus* species originate from the most planted tree genus called *Eucalyptus*; and it covers more than 19 million hectares worldwide. It is native in Australia and it was introduced to South Africa for timber, firewood and ornamental purposes (Garcia *et al.*, 2011). Francis (2012) reported that *Eucalyptus* is an evergreen hardwood tree native to Australia. Due to limitation of indigenous timber-producing forests, Albaugh *et al.* (2013) indicated that the first exotic trees mainly *Pinus* trees and *Eucalyptus* were established in the country in 1875 after recognizing that demand for timber had exceeded the supply available from indigenous forests. *Eucalyptus* also can coppice after harvest and has a higher growth rate compared to other timber tree species (Janine *et al.*, 2013). This notion is supported by Van den Berg *et al.* (2016) who reported that in South Africa *Eucalyptus* is an important species that grows fast and is generally suitable for timber and a range of products.

To date there has been little investigation on the impacts of woodlots on the economies of small-scale timber growers and rural communities. A related study was done by Carsan in the Eastern province of Kenya in 2007. The study was on sustainable farm timber for small cropping systems, the findings on this study indicated that woodlot timber growing has the potential to contribute to the regional wood industry and smallholders' livelihoods in the rural areas surveyed. It also shows that small-scale timber growing is indeed found to be a multi-sectoral activity with many challenges requiring pursuit through many alternative and

complementary approaches; this was done through a SWOT analysis. Hailemichael (2012) conducted a study in the Ethiopian highlands and the focus of the study was focusing on the contribution of *Eucalyptus* woodlots to the livelihoods of small-scale farmers. The author and found out that the *Eucalyptus* woodlots have a potential to take poor farmers and urban dwellers out of the poverty trap. However, the *Eucalyptus* genus is affected by many environmental challenges that hinders farmers from exploring its full socio-economic potentials. Another study was conducted by Wise *et al.* (2011) in the Vhembe district of South Africa. The study was based on woodlot development on the overview of structure, funding and contribution to rural livelihoods. Hence, the current study focused on the contribution of *Eucalyptus* woodlots initiative on the livelihoods of small-scale timber growers in Vhembe district.

Eucalyptus species is grown in different parts of the world both commercially and in subsistence woodlots. Views and conclusions made from the previous studies, results and recommendations indicated that large-scale commercialized forestry can be used as a tool to solve problems and to develop small-scale forestry in the study area. Therefore, there is a need to engage into a study that focuses specifically on the small-scale timber production and how it contributes into the day to day living of the small timber growers specifically in Vhembe district.

The establishment of *Eucalyptus* woodlots in Vhembe District was rooted on the Participatory Forest Management (PFM) approach from the previous Department of Water Affairs and Forestry (DWAF) to significantly contribute to poverty alleviation. PFM which is a co-management approach to governance in forest management comprises a major shift in government policy in terms of managing the people-forest interface in South Africa. This include decreasing poor people susceptibility by giving them access to a significant livelihood and goods, while enhancing their natural environment, creating employment opportunities, encouraging the development of skills for the underprivileged, empowering deprived individuals and creating revenue for poor households (DWAF, 2005). Currently the Department of Agriculture, Forestry and Fisheries (DAFF) has a directorate called Forestry Management. One of the responsibilities of the directorate is to provide support and extension services to the small-scale timber growers owning woodlots (including *E. grandis* woodlots) in Vhembe district (DAFF, 2012).

The Forest Enterprise Development (FED) paper defines forest enterprise development as market-driven, profitable business ventures, involving previously disadvantaged communities

and individuals, based on the sustainable use of forests and forest-based resources. This is what the current DAFF is expecting from the *Eucalyptus* woodlots established in Vhembe district. However, it is not clear whether this expectation is being met, hence the impetus to conduct the current study.

The establishment and ownership of the *Eucalyptus* woodlots in the district differs. There are woodlots which were established before 1994, most of these woodlots were established under the old Venda homeland agriculture and environmental programmes as communal woodlots controlled by the local royal leaders and elders. Most of these woodlots were mixed stands of different *Eucalyptus* species. There are also woodlots that were established after 1994 during the new government under the community forestry programmes of DWAF. Majority of these stands are under control of individuals, families and cooperatives, the dominant planted tree species in these woodlots is *Eucalyptus*. The proposed study focused on the individually owned and family owned woodlots established pre-and post-1994. These are woodlots that have been established in line with the policies of the new government following the community forestry plan of DWAF and Forestry Development (FD) programmes of DAFF.

People also managed to acquire woodlots through land claims of farms and plantations in Vhembe district (Anseeuw & Mathebula, 2008). During the new government under the administration of DAFF working together with Department of Land and Rural Development (DLRD) a large *Eucalyptus* plantation with more than 90 hectares of planted area was fully transferred to a local community next to Elim in Vhembe District as part of the land claim programme (DAFF, 2016). This is one of the ways in which local communities have ended up owning woodlots and plantations in Vhembe district.

The *Eucalyptus* woodlots do not only contribute in timber production but they are also a means of creating other types of livelihoods through Forestry Enterprise Development sub-programmes such as ecotourism, Non-Timber Forest Products, Strategy and Innovation activities and New Business Development (Koech, 2009). This makes *Eucalyptus* woodlots a vital potential tool for the development of local communities in Vhembe district.

There are certain policies that promote and control the establishment of woodlots in South Africa. Chapter 4, section 29 of the National Forest Act 84 of 1998 as amended addresses the issue on community forestry. This part of the act covers the establishment and ownership of woodlots made up of different tree species allowed for timber production, for example *Eucalyptus spp*, *Pinus*, and *Acacia*. There are some gaps that have been opened under the policy advocacy of this act which need a remedial action through a study. The act

promotes development of woodlots yet the government has developed a restriction towards further afforestation in most of the provinces around the country including Limpopo province (DAFF, 2016). Development of policies to stop afforestation can impact the efficiency of *Eucalyptus* woodlots to make a significant contribution to the livelihood of small-scale timber growers.

1.2 Statement of the research problem

Majority of small-scale timber growers in Vhembe district are growing *Eucalyptus* trees in their woodlots (DAFF, 2016). During the woodlots development programmes the government provided small-scale timber growers with *Eucalyptus* seedlings since they are fast growing, suitable for the tropical climate and able to coppice after harvest. There is a need to give attention to the contribution made by *Eucalyptus* woodlots upon the livelihoods of the small-scale timber growers in Vhembe district. The research problem of this study is therefore lack of information on contribution of gum trees (*Eucalyptus*) woodlots on the livelihoods of rural small-scale timber growers in Vhembe district, Limpopo warrants a study to fulfil the research gap.

1.3 Justification/Rationale of the study

This study will enable the small-scale timber growers to see the significance to which their woodlots have contributed to their livelihoods since their establishment. The study will also be a tool to the DAFF to monitor the progress of Forest Enterprise Development programme which was set to fulfil a number of goals especially developing rural people and combating poverty through timber production in the rural areas such as Vhembe district.

There is a gap that needs to be closed through an organised study of this nature. Therefore, this study will make a thorough discussion on the contribution of *Eucalyptus* woodlots to small-scale timber growers after the collection and analysis of data in order to add value to the body of knowledge and to assist DAFF to meet its goals for woodlots establishment in Vhembe district.

1.4 Research question and Hypothesis

1.4.1 Research question

Are the *Eucalyptus* woodlots contributing to the livelihoods of small-scale timber growers in Vhembe, Limpopo?

1.4.2 Research Hypothesis

Eucalyptus woodlots make a significant contribution to the livelihoods of small-scale timber growers.

1.5 Research objectives

1.5.1 Main objective

The main objective of the study was to assess the contribution of *Eucalyptus* woodlots to the livelihoods of small-scale timber growers.

Question: How do *Eucalyptus* woodlots contribute towards the livelihoods of small-scale timber growers in Vhembe District?

1.5.2 Specific objectives

Table 1.1 Specific objectives and associated research questions

No.	Specific objectives	Research questions
1.	To establish the economic benefits derived from the <i>Eucalyptus</i> woodlots by small-scale timber growers.	How do small-scale timber growers economically gain out of the <i>Eucalyptus</i> woodlots?
2.	To determine the factors affecting the contribution of woodlots to livelihoods of small-scale timber growers in Vhembe district	What are the factors affecting the contribution of <i>Eucalyptus</i> woodlots to livelihoods of small-scale timber growers in the Vhembe district?
3.	To explore possible intervention to improve the contribution of <i>Eucalyptus</i> woodlots to livelihood of small-scale timber growers in Vhembe district.	What are the possible solutions that can be implemented to improve the contribution of <i>Eucalyptus</i> woodlots to small-scale timber growers?

1.6 Theoretical framework of the study

Small-scale timber production is a term not clearly understood and defined but the definition of the term is usually based on the study that is being carried out. According to the common understanding small-scale timber growers are often defined by the extent of timber production and type of operations available. For example, land area is one parameter often used to distinguish between large-scale growers and small-scale growers. During this study, small-scale timber grower included Communal Property Associations (CPA) plantations having larger land areas of 100 ha and above with limited production. Most of the CPAs are still struggling with production even though having larger operational area. There are some small-scale timber growers in high potential areas characterised by a smaller land area but higher output per unit area are also clustered as small small-scale timber growers.

Different direct and indirect factors can have an impact on the production system of small-scale timber growing. Casarn (2007) reported, *“Conceived interventions should yield multiple benefits across different stakeholder. It is further conceptualised that a number and variety of environmental, economic, and social factors underlay successful small-scale timber production systems. Most of the small-scale timber growers are established in line with the government’s advocacy policies therefore during the study an analysis on the advocacy policy need to be made and how they impact the production system as part of the factors.”* According to Biruk (2007), number of studies and policy reviews now recognize the economic value of the tree resources such *Eucalyptus* on woodlots. There is also a need to strengthen the sub-sector to attain social-economic objectives such as poverty reduction and improvement of livelihoods of the small-scale timber growers.

1.7 Operational definitions of key terms and concepts.

1. *Eucalyptus* genus- A tall hardwood from warm humid climates that grows extremely fast when conditions are suited. It prefers deep, fertile, moist, well drained soils, but will tolerate short-term waterlogging. It is somewhat frost sensitive but is probably the most widely planted industrial eucalypt because of its ease of care, excellent form, rapid growth and variety of end uses (McMahon, 2010).

2. *Woodlot*- a term used to refer to a section of woodland or forest capable of small-scale production of forest products such as saw logs, pulpwood, firewood, agro-forestry and other speciality products (Rochester, 2007). Some Woodlots may also have recreational uses such as bird and animal watching, hiking and hunting.

3. *Small-scale timber growers*- are an individual that has a small portion of plantation which varies in size from between 1 and 10 ha (Prowse, 2017). The plantation should be owned/managed by the growers and is a “previously disadvantaged individual” (PDI), that is someone who was disadvantaged by the policies of the previous South African apartheid government in terms of access to land, education, business opportunities and economic benefits.

4. *Livelihood*- A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living (Scoones, 2009).

1.8 Outline of the Dissertation

This dissertation comprises of seven chapters. In chapter one, the background, the problem statement, and objectives of the study are articulated. The hypothesis tested in this study is stated. The theoretical framework that guided the study and key concepts are described. In chapter two, the review of literature relating to the contribution of *Eucalyptus* woodlots to the livelihoods of small-scale timber growers is presented. The main issues discussed are aligned to the study objectives. This provides theoretical perspectives and a deeper understanding of the study focus. Detailed review on existing frameworks used for measuring the contribution of *Eucalyptus* woodlots to the livelihoods of small-scale timber growers is also provided. The study methodology is explained in chapter three. The study design, study area, population, data collection processes and sampling procedures are also presented. Data integration, analysis and research ethical considerations for the study are also covered in chapter 3. In chapter 4, results relating to the economic benefits, factors affecting the woodlots contribution and solutions to improve the woodlots are presented. Discussion on the three aspects is also included in the chapter. Chapter 5 consists of strategies for enhancing the contribution of *Eucalyptus* woodlots to the livelihoods of small-scale timber growers. Chapter 6 as the last chapter comprises general conclusions and recommendations aspects.

Chapter 2 Literature review

2.1 Introduction

This chapter took a critical evaluation of existing literature on contribution of *Eucalyptus* woodlots to livelihoods of small-scale timber growers in Limpopo province with special reference to Vhembe district and globally at large. Small-scale timber plantations and woodlots provide a range of benefits to rural communities including fuel wood, fodder, building poles and everyday uses such as nectar for beekeeping and medicinal products as well as environmental and amenity benefits.

2.2 Small-scale timber growing as a livelihood

According to Krantz (2001), a livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living. As such, a livelihood is sustainable when it can cope with and recover from stress and shocks, and maintain or enhance its capabilities and assets. Further, provision of sustainable livelihood opportunities for the next generation, and contribution to net benefits of other forms of livelihood at the local and global levels and in the short and long term is expected.

Small-scale timber growing in the rural areas reflects different capabilities, assets and activities for means of living for the small-scale timber growers. Forests and woodlots can be used to effectively generate income and employment that will make poor people's lives better off. (Sunderlin *et al.*, 2004). Figure 2.1 below shows a simple frame work of *Eucalyptus* woodlots as a livelihood.

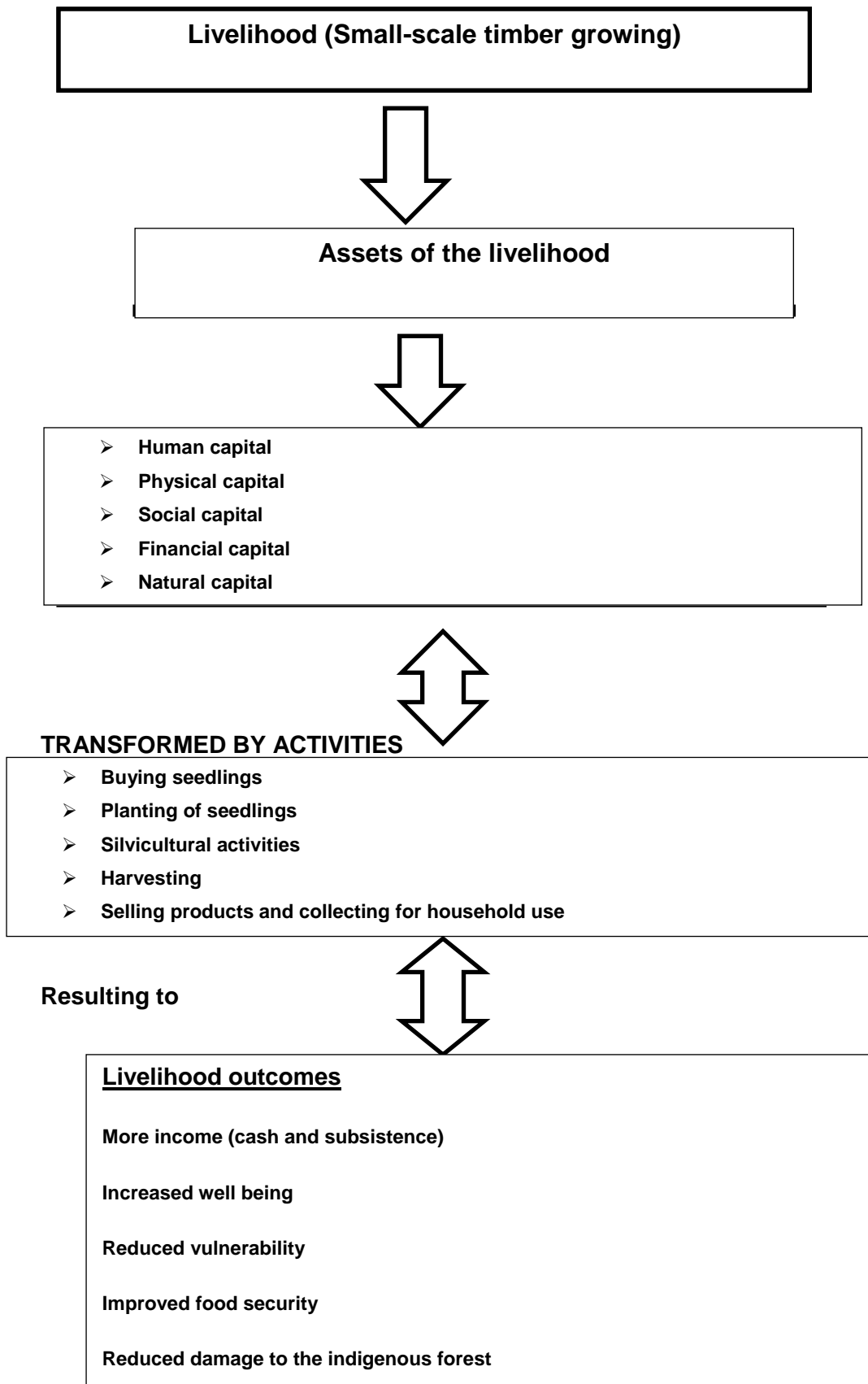


Figure 2.1 A simple *E. grandis* livelihood framework. Adapted from Landry (2009)

2.3 Worldview of *Eucalyptus* woodlots and small-scale timber growing

Eucalyptus gives superior and versatile benefits compared to many other tree species. A report by Kenya Forest Services presented by Kenya Forest Service (2009) shows that *Eucalyptus* has multiple uses and it is fast growing making it to be economically important particularly to small-scale timber growers as a means of livelihoods. Its high financial viability gives a justification to small-scale timber growers to establish more *Eucalyptus* woodlots. Due to this fact, small-scale timber growers often choose to plant *Eucalyptus* species, particularly smallholders in tropical and subtropical regions (Hailemichael, 2012). According to Oballa *et al.* (2010), in countries like Kenya, *Eucalyptus* species have been grown for more than 100 years and it is very popular with timber farmers or small-scale timber growers. The *Eucalyptus* genus trees are usually planted for fuelwood, fencing poles, construction poles and “best-bet” source for renewable energy and industrial processing of products such as tea and tobacco. Small woodlots are managed in the tea estates and tobacco farms.

Small-scale timber growing is internationally recognised as an important value asset for thousands of rural people in Africa dependent on scarce forest resource base. Carsan & Holding (2006) reported that collated evidence depicts that, trees in woodlots and farms often play an important role in the livelihoods of the population, especially of women and youth. It is well recognised that Africa, Asia, Latin-America & Oceania are some worlds regions with the greatest potential for small-scale timber growing to contribute to sustainable human development.

Eucalyptus is thus, a favourable species for small-scale timber growing. Yaojiang (2003) indicated that *Eucalyptus* species have many advantageous features such as rapid growth, high production and good economic benefits. Further analysis where made on social, economic and ecological benefits of *Eucalyptus* genus in China and the results reflected positive contribution of growing *Eucalyptus* in woodlots for rural livelihoods.

According to Turnbull (2003), *Eucalyptus* woodlots can increase farmers' income when managed in an agroforestry system. Besides, timber production in woodlots can provide more jobs than the long rotation plantations. Most of the *Eucalyptus* woodlots established by small-scale timber growers are of short period rotation, this allows one hectare of a woodlot to provide at least four job opportunities (Yaojiang, 2003). More elaborate on the potential of *Eucalyptus* woodlots has been provided below.

2.4 Potential of *Eucalyptus* woodlots to contribute into livelihoods of small-scale timber growers

Woodlots managed by small-scale timber growers have a potential to contribute to the livelihoods of rural communities. According to Forestry South Africa Report (2016), it shows that about 4% of plantation area in South Africa is under small-scale timber growers, mostly in Kwazulu-Natal. Most owners are individual women, followed by community schemes in rural areas. The report further reflects that in total there are 25 000 individual small-scale timber growers owning between 2 hectares and 100 hectares.

According to a study conducted by Tallontire *et al.* (2002) on small-scale timber growers in Kwazulu-Natal, South Africa, it shows that poverty is high in rural small-scale timber growers' communities. Most of the small-scale timber growers' lack capacity to implement certification standards. There is a lack of support such as training and funds that can help to establish small-scale timber growers' co-operatives with a potential to make a significant contribution to the livelihoods of small-scale timber growers. There is a need for more studies on factors affecting the potential of *Eucalyptus* woodlots around South Africa especially in areas with high dominance of small-scale timber growing.

Employment is one of the major economic contributions of the forest sector especially in the rural areas where majority of *Eucalyptus* woodlots are located. According to Kaboggoza (2011), a study carried out in Uganda shows that forest plantations and woodlots contribute more than 10 000 permanent jobs and 15 000 part-time jobs to local citizens. Small-scale timber growing also had a significant contribution of employment in the given report. Therefore, the potential of *Eucalyptus* woodlots can be recognised as a factor towards their ability to contribute to the livelihoods of small-scale timber growers and other poverty-stricken individuals in rural areas. Despite the importance of *Eucalyptus* to rural livelihoods, production of this plant species is hampered by several factors that include access to markets, environmental effects and socio-economic factors.

2.5 Factors affecting the contribution of *Eucalyptus* woodlots to livelihoods of small growers

There are different factors affecting *Eucalyptus* woodlots and small-scale timber growing around the world and in South Africa. According to Ngaga (2011), a report of a study carried out in Tanzania on socio-economic and environmental contributions on woodlots and forests development reflected that potential income generation ability of a woodlot is a vital factor to its success to give expected outputs. It was further reported that avoiding a woodlot from

producing only timber as a produce and adding some activities such as non-timber forest products production can maximize the income of a woodlot.

2.5.1 Availability of market for small-scale timber growers

Ability to access market and having potential customers can have an impact on the development of *Eucalyptus* woodlots and their ability to make contribution in the livelihoods of small-scale timber growers. A study conducted in South Africa by Mthengu & Green (2016) revealed that, in South Africa market access for small-scale timber growers has been a major constraint since the early 2000. Most of the small-scale timber growers wait until the timber is matured to get a proper market in some instances they wait until after harvesting to sell their timber. Major market constraints in small-scale timber growing is due to failure to comply with the certification policies and market control regulations, lack of knowledge and update of market information.

Lack of market for small-scale timber growers is also due to the flooding of local markets with low standard products. According to a study conducted by Sam (2011), domestic markets for timber and non-timber forest products (NTFPs) are often flooded with cheaper, illegal products, and small-scale timber growing cannot compete due to the economies of scale. This lead to small-scale timber growing having less chance to graduate into another business level but remain as a livelihood asset to the woodlots owners. A research by Bynes *et al.* (2014) shows that creating sustainable livelihoods is a common goal of plantation-based small-scale forestry. This shows that the growing of *Eucalyptus* woodlots in local communities is more focused on contributing to livelihoods of local people. By looking at these results, a vital market becomes a second option for small-scale timber growers and woodlots owners.

Market for small-scale timber growers can be limited by poor stands maintenance of their woodlots. According to Herbohn *et al.* (2014), the economic consequences of a lack of post establishment silviculture in timber plantations and woodlots can be severe. In the Philippines, small-scale timber growers produce low volumes less than 44% of their site potential due to a lack of appropriate silviculture and as a result, financial returns are often low for small-scale timber growers (Bertomeu, 2006).

2.5.2 Environmental effects

Different environmental effects can have an impact towards the production of *Eucalyptus* woodlot. *Eucalyptus* species have a high growth rate in the highlands, where altitude ranges from 1 400 to 2 200 metres above sea level and mean annual rainfall above 900 mm. The

species prefers moist well-drained soils, but grows in a wide range of soil types. It has few noted diseases and pests. However, it is sensitive to frost and drought (Oballa *et al.*, 2010).

Water use of *Eucalyptus* genus is a controversial issue, and many studies have been directed towards water use at the individual tree and stand levels with fewer studies at the landscape (catchment or watershed) level (Githiomi & Kariuki, 2010). In this special issue, Albaugh *et al.* (2013) reviewed the techniques used to quantify water use of *Eucalyptus* species plantations and woodlots, provided an overview of studies in water-limited South Africa, and recommended where to concentrate future research efforts.

There is a need to develop management prescriptions for common environmental effects in a woodlot. The prescription may vary from area to area therefore a small-scale timber grower needs to understand and identify the most common environmental effects in his/her woodlot. Below is an example (Table 2.1) of prescription management list adopted from Gessesse & Teklu (2011).

2.5.3 Biophysical and silvicultural factors

According to Biruk (2012), *Eucalyptus* can grow: in degraded land, swampy area, unfertile and exhausted soil, and in dry areas. *Eucalyptus* can substitute many indigenous species that have diverse environmental and biodiversity functions for the surrounding area to specific and regional benefits to a large extent. According to Jagger and Pender (2003), *Eucalyptus* also grows well in dry areas where there is a minimum amount of rainfall such as in northern part of Ethiopia with similar; most of the areas in this region get in average less than 800 mm rainfall per annum, most of the *Eucalyptus* woodlots in South Africa are also situated in dry areas.

According to Kenya Forest Service (2009), under the supervision of Professor Koech, *Eucalyptus* woodlots performance can be affected by different silvicultural practices. The following silvicultural practices must be taken into consideration during the development of woodlots to maximise the outputs; site preparation, planting, tending, pruning, thinning, harvesting, timber seasoning (drying), coppice management, pests and diseases.

**Table 2.1 Simplified recommended guidelines for management prescriptions to address major biophysical and environmental factors
Adopted from Gessesse & Teklu (2011)**

Management Prescription	Major concerns regarding <i>Eucalyptus</i> plantation			
	Water depletion	Soil degradation	Biodiversity loss	Undergrowth Inhibition
Species election	Choose appropriate Species.	Plant appropriate species on gullies	Select nursing Species.	Choose appropriate species
Planting density	Determine optimal spacing density	Promote wide Spacing	Create several canopy levels	Avoid high plantation density
Planting diversity	Promote mixed Plantation	Limit monocrop Plantation	Avoid monocrop Plantation	Promote mixed Planting
Site selection	Avoid planting near water sources	Avoid vulnerable Sites	Avoid planting on Farmlands	Limit <i>Eucalyptus</i> in biodiversity area
Rotation period	Carefully determine rotation periods	Increase rotation Period	Increase rotation Period	Increase rotation Period

2.5.4 Socio-economic factors in small-scale timber growing

Little is known about the specific socio-economic factors that are important in the small-scale timber growing and in the design of mixed-species systems under community forestry (Nguyen *et al.*, 2015). Though literature shows that the ability of timber woodlots to effectively contribute to the livelihoods of small-scale timber growers can be affected by different socio-economic factors such as household security, accessibility to the markets, accessibility to information, security of land and tree tenure, labour, farm size, gender, knowledge for management, incentives and government policy (Glover *et al.*, 2013), forest goods and services from plantations and woodlots play an extremely important economic role in local economies of different countries, and are often worth far more than any other component of forest value. According to Ototo and Vlosky (2018), private forest plantations are estimated to cover about 100,000 hectares spread across the country. They are predominately fast-growing *Eucalyptus* species grown to provide posts, transmission and building poles, sawn timber, fuelwood and charcoal this includes the woodlots belonging to the small-scale timber growers in the rural areas. Small-scale forestry enterprises are more isolated from markets and key services such as financial support and are operated by socio-economically weaker sections of society, often indigenous people. Due to limited opportunities, these groups reap less income from such enterprises and, therefore, less able to invest to improve product quality, scale up production and improve enterprise management (Nawir, 2005).

Matata *et al.* (2008) reported that one of the reasons why some of the small-scale timber growing projects managing woodlots fail is due to lack of attention to socio-economic issues in the development system as well as in the extension of technologies. Figure 2.2 below gives an illustration of different components involved in the building of the impact of socio-economic factors towards small-scale timber growing and development of *Eucalyptus* woodlots.

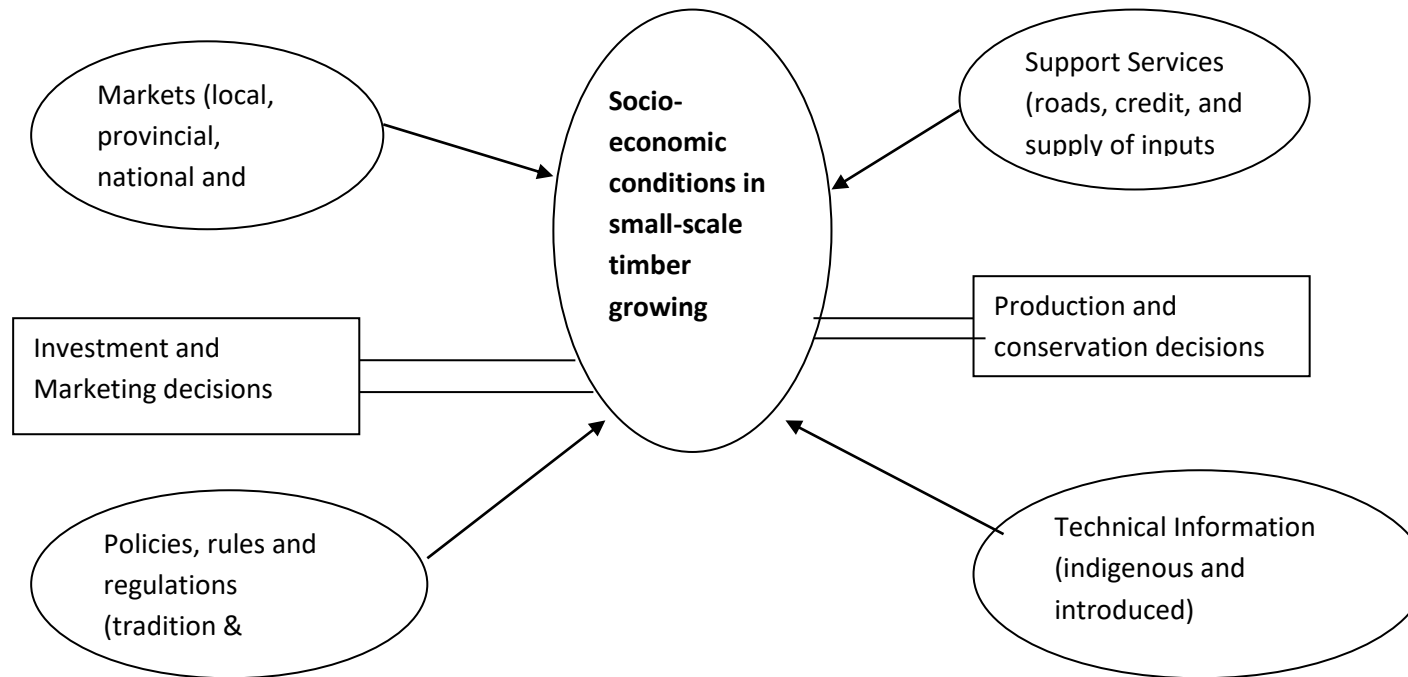


Figure 2.2 Summary of socio-economic effects on small-scale timber growing and timber woodlots: Adopted from French (2007)

2.6 Small-scale timber growing and *Eucalyptus* woodlots in different countries

2.6.1 Philippines

For more than three decades, tree planting has been promoted as the solution to the negative effects of widespread forest destruction. However, reforestation efforts have had limited success (Bertomeu, 2008). Following extensive deforestation in the Philippines, and concern over environmental impacts, the Forest Management Bureau of the Department of Environment and Natural Resources has actively promoted reforestation. The initial emphasis was on industrial forestry, but in recent years the focus has switched to farm and community forestry. Of significance is the Community Based Forest Management (CBFM) program, which subsumes a variety of earlier government initiatives, and the more recent and smaller Community Based Resource Management (CBRM) program, of which forestry is one element (Harrison, 2002).

The collapse of natural forest logging in the 1980's in the Philippines resulted in a huge shortage of timber. Fast growing trees and shrub species are currently being grown as part of a wide variety of land use systems including tree fallows, woodlots, tree plantations, agroforestry systems, isolated/scattered tree plantings and shrub secondary forest areas (Carsan, 2007).

2.6.2 Rwanda

The forestry sector is playing key roles in supporting the livelihood of all Rwandans especially by providing most of the energy consumed by the bulk population, controlling soil erosion and protecting water catchments and supplying other goods and ecological services (Bizimana, 2017). *Eucalyptus* species were introduced in Rwanda in the early 1900s and by 1911/12 harvesting of poles from the first plantations was reported making up more than 60% of all plantations in the country (Gessesse & Teklu, 2011). *Eucalyptus* species has continued to dominate the landscape in plantations and woodlots and it is estimated that in 1989 there were more than 150,000 ha of eucalypt plantations and woodlots in Rwanda. The major species encountered in woodlots and plantations include *E. grandis*, *E. saligna*, *E. globulus*, *E. camadulensis*, *E. tereticornis*, *E. microcorys*, *E. maculata*, and *E. maidenii* (Gessesse & Teklu, 2011).

2.6.3 Kenya

In the highland regions of East Africa, cultivated and managed trees have assumed an important place as one of the many land use options available to small landholders. Most of the seedlings planted by farmers are produced in local small-scale tree nurseries, which have an important role in the sustainable development of the local communities (Holding *et al.*, 2002). Since the introduction of *Eucalyptus species* in Kenya in 1902, they remain superior in terms of fast growth, multiple uses, and suitability to small-scale farmers and overall support to key sectors of the economy such as manufacturing, construction and energy in Kenya. The contribution of *Eucalyptus spp.* to the national economy is estimated at a value of Ksh 2 billion excluding non-traded domestic and small-scale enterprises (Kluthe and Chem, 2017). Due to this, the Government has moved a step further to support the introduction of high-yielding, shorter-rotation varieties through biotechnology. There is a number of notable *Eucalyptus spp.* distributed in different climatic conditions all over Kenya. They include; *E. grandis*, *E. saligna*, *E. globulus*, *E. regnans*, *E. paniculata*, *E. maculata*, *E. camaldulensis*, *E. citriodora*, *E. tereticornis*, *E. urophylla* and *E. hybrids*. Latest statistics records indicate that area under *Eucalyptus species* in the country is about 100,000 hectares (Ototo and Vlosky, 2018).

Studies have revealed that three *Eucalyptus* enterprises involving production of construction poles, transmission poles and firewood are financially viable in Western Kenya. Further studies show that a hectare of firewood and poles could generate a net surplus of Ksh 540,000 and Ksh1, 000,000 respectively over a period of 8 years (Langat *et al.*, 2015). This is a high return compared with Ksh 88 000 for low to medium production maize, Ksh 96,000 for medium production maize and Kshs 376,000.00 for high production maize (Kenya Forest service, 2009).

2.6.4 Tanzania

According to Ngaga (2011), growing demand for timber products and income earned by those with trees has stimulated a lot of people to plant trees in Tanzania. A study by Singunda (2009) showed that 35% of family tree growers in Mufindi district are new (less than 8 years of engagement in tree planting), most of whom have been attracted by the growing demand for wood raw materials. Tree farming is reportedly ranked as a 2nd or 3rd economic activity by most of the participant farmers in Iringa region. Individual private plantations/woodlots, also known as non-industrial private forests (NIPF), are currently supplying an estimated 200 000 - 250 000 m³ of roundwood (Ngaga, 2011). Woodlots are a worthwhile investment in Tanzania for small-scale rural farmers. Once the farmers receive

proper education dealing with woodlot management this may enable them to fully capitalize on their woodlot investment (Francis, 2012).

2.6.5 Zimbabwe

According to a study by Ham & Theron (2000), since the 1970s, numerous rural afforestation schemes were introduced in Zimbabwe by both government and NGOs, the main tree species being *Eucalyptus camadulensis* and *Eucalyptus grandis* chosen for their high growth rates and ability to produce straight poles suitable for construction purposes. In rural communities, eucalyptus tree species including *Eucalyptus* plantations increase the local fuelwood supply, thus mitigating the pressure on natural forests (Tynela, 2001). The impetus for exotic plantation forestry in Zimbabwe was the need to increase the commercial timber resource base. As the demand for timber increased in the 1930s, considerable pressure was placed on the slow growing indigenous tree species resulting in the need for research on fast growing exotic tree species for plantation development. This led to the establishment, in the 1960s and 1970s, of a series of forest research stations in the eastern part of the country and the sourcing, evaluation and subsequent improvement of pine and eucalypt germplasm for production under Zimbabwean climatic and edaphic conditions (Shumba, 2001).

Eucalypts were introduced into the country to meet the demand for hardwood timber, poles and firewood. The major species are *E. grandis*, *E. camaldulensis* and *E. tereticornis*. *Eucalyptus grandis*, which originally came from eastern Australia, has proved to be a versatile species in eastern Zimbabwe and the Highveld (Jagger & Luckert, 2008).

2.7 Small-scale timber growing and *Eucalyptus* woodlots in South Africa

The planting of exotic trees is encouraged because many households live in poverty while yet there are favourable growing conditions for monoculture planting, cheap land and reduced costs for the work force (FAO, 2011). This has led to the establishment of timber woodlots in different rural areas around the country managed by individuals, communities, families and small cooperatives. The establishment of woodlots was facilitated by the former Republic of Venda prior 1994. Establishment of *Eucalyptus* woodlots also continued after the new dispensation in 1994 (Khorombi, 2000). Post 1994, the woodlots were under the Department of Agriculture, Forestry and Fisheries (Buys, 2012).

Establishment of *Eucalyptus* woodlots has well-recognised benefits in South African forestry industry. It provides pragmatic options for the development of rural production systems and enables sustainable land use for land users (Alao & Shubaibu, 2013). There is high potential for *Eucalyptus* woodlots to be used for agroforestry development in the rural areas.

Participation of small-scale timber growers allows them to have income through cash crops having shorter rotation as they are waiting for the *Eucalyptus* to mature.

Nawir *et al.* (2005) reported that, more than 10 000 small-scale timber growers of whom 80% are women grow different *Eucalyptus* species on a contract basis with large timber growers such as Mondi and Sappi. Small-scale timber grower schemes make a substantial contribution to the income of rural communities. The small-scale timber growers' schemes are established in rural areas with a view of increasing and spreading livelihoods to households who are unemployed and staying in high poverty levels (Chamberlain *et al.*, 2005). Forestry South Africa (2016) reported that their business development committee engaged with non-traditional forestry partners for the benefit of small-scale timber growers during 2016. The focus of the year was enterprise development support and transformation. This helped most of the small-scale timber growers to end up being registered as secondary cooperatives that will link all the primary cooperatives allowing them to be engaged into mainstream economy. Most of the small-scale timber growers receiving support from FSA are managing *Eucalyptus* species woodlots.

2.8 *Eucalyptus* woodlots and small-scale timber growing in Vhembe district

There is inadequate literature and studies made on the contribution of *Eucalyptus* woodlots to the livelihoods of small-scale timber growers in Vhembe district. Since the establishment of the communal woodlots during the Venda homeland government and individually owned woodlots during the 1990s, few scientific studies have been conducted. Most of the information about the *Eucalyptus* woodlots in Vhembe district and the small-scale timber growers is found in the Department of Agriculture, Forestry and Fisheries, Department of Water and Sanitation, Department of Environment, and little information is found in the local municipalities. At the end of this study the results shall be presented to the related government departments, stakeholders and beneficiaries of small-scale timber growing communities, as a means of expanding information capacity.

According to DAFF (2016), most of the small-scale timber growers managing *Eucalyptus* woodlots in Vhembe district are managing them as individuals or as family businesses, most of them are registered as primary cooperatives. The DAFF further reported that there is a secondary cooperative called Vhembe Small-scale timber growers Cooperative made up of different owners of *Eucalyptus* woodlots in Vhembe district; this cooperative is also represented in the Forestry South Africa (FSA) section for small-scale timber growers by its executive members.

The *Eucalyptus* woodlots in Vhembe district have a high potential of developing agroforestry projects in the district. According to Maponya et al. (2017), by Dr Maponya, P from the Agriculture Research Council and Professor Nesamvuni from the University of Venda during their presentation in 2017 to the small-scale timber growers. The presentation was on evaluation of agroforestry farms in Limpopo province. The images below (Figures 2.3 to 2.5) show some examples of the woodlots in Vhembe district.



Figure 2.3 A *Eucalyptus* woodlot in Tshixwadza, Vhembe district



Figure 2.4 *Eucalyptus* Timber harvested from a woodlot harvested from Matombotsuka woodlot in Vhembe district



Figure 2.5 *Eucalyptus* seedlings propagated in a home yard for planting in a woodlot

2.9 Contextualizing *Eucalyptus* woodlots initiative small-scale timber growing in South Africa

The forest sector offers significant business opportunities for small-scale entrepreneurs, particularly for small-scale timber growers, contractors and saw millers in South Africa. This includes more than 20 000 small growers, 240 small saw millers and 300 independent contractors, of which half are black emerging contractors (Forestry South Africa, 2020). In addition to this, the pulp and paper industry has created more than 10 000 income opportunities for waste paper vendors³¹ (Robertson, 2018). The *Eucalyptus* woodlots in Vhembe District are part of the government Forestry Enterprise and Development plan which was established by the Department Agriculture, Forestry and Fisheries (South African National Biodiversity Institute, 2017). The aim of Forestry Enterprise Development (FED) is to create opportunities for people to utilize forests (indigenous forests, woodlands and plantations/woodlots) and forest-based resources for economic growth, income generation and job creation in a manner that will take people from a subsistence livelihood system into the market economy and from the “second economy” into the “first economy” (DAFF, 2012). The FED is a necessary initiative to ensure that forestry development relates directly with the larger agenda of government on poverty alleviation and Broad Based Black Economic Empowerment. FED has the following programmes: Afforestation which focuses on the afforestation activities particularly in provinces of KwaZulu Natal, Eastern Cape, Mpumalanga and Limpopo. Non-timber Forest Products (NTFPs) that focuses on championing all activities where timber is not an output or product but otherwise act as a support or supplementary input, and lastly, Timber Production and Processing (TPP) which focuses on timber business development.

According to CAP & Indufor (2017), local communities are important *defacto* users of forests and woodlots, but have typically been excluded from the actual ownership. Their status as owners of the lands on which plantations have been established is now being addressed through land claims and small cooperatives. Participative forestry was piloted in the first decade after the democratic transition, in order to establish *Eucalyptus* woodlots ownership in rural area such as Vhembe District (Wise *et al.*, 2011). Majority of *Eucalyptus* woodlots in Vhembe District range from 0-10 ha in area only the CPAs range above 100 ha in area. Land is one of the resources that affect the contribution of the woodlots initiative towards the livelihoods of the small-scale timber growers. According to a study by Hingi (2018), the size of a woodlot can affect the socio-economic benefits of the initiative, the larger the woodlot area the higher the number of trees leading to increased income.

2.10 Summary of literature review

Different literature has shown that in most of the countries in Africa and abroad *Eucalyptus* woodlots significantly contribute to the livelihoods of small-scale timber growers. Furthermore, in most of the countries *Eucalyptus* is most preferred for woodlots. The livelihood and economic contribution of *Eucalyptus* woodlots in other areas seem to be efficiently significant. However, this shows that in the rural areas of Vhembe district there is a need to identify solutions on improving the performance of *Eucalyptus* woodlots in this district. According to literature and studies conducted in other countries and different areas in South Africa there is a need for more studies on small-scale timber growing and *Eucalyptus* woodlots which is specific to Vhembe district.

The literature reviewed also outlined the challenges experienced by small-scale timber growers in the timber market around the world, in African and in particularly South Africa. A significant impact by lack of market towards small-scale timber growing was reflected. Information on small-scale timber growing and *Eucalyptus* woodlots in different countries such as Zimbabwe, Philippines, Tanzania, Rwanda, and Kenya were provided in the literature review and this was to develop a proper comparison between South Africa and other countries facing similar challenges in the small-scale timber growing enterprise. The countries which the literature review focused upon are Zimbabwe, Philippines, Tanzania, Rwanda and Kenya. Challenges in timber woodlots lead to development of scientific studies focusing on means and recommendations and solutions on management of woodlots and plantations. Therefore, a thorough study into the contribution of *Eucalyptus* woodlots to the livelihoods of small-scale timber growers can increase the productivity of these woodlots and reveal other hidden opportunities such as agroforestry and non-timber forest products activities as a means of improving livelihoods and job creation.

CHAPTER 3 RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the process followed when conducting the study is outlined. First, the description of the study area is presented. Ontological considerations, research design, population and sampling procedures are explained in detail. Data collection methods, analysis, expected outcomes and ethical considerations are elaborated. The research methodology is covered in two phases.

3.2 Description of the study area

The study was conducted in Vhembe District Municipality (DC43). It is a category C municipality located in the Northern part of Limpopo Province and shares borders with Capricorn and Mopani District municipalities in the eastern and western directions, respectively. The sharing of borders extends to Zimbabwe and Botswana in the north-west and Mozambique in the south-east through the Kruger National Park respectively (Vhembe IDP, 2016; Figure 3.1). Vhembe district covers 27 969 148 km² area with a population of 1 393 949 and it is predominantly rural (Stats SA, 2016). Vhembe district geographical coordinates are 22°S to 24°S and 29°E to 31.5°E (Nenwini & Kabanda, 2013). The district is currently made up of four major local municipalities which are as follows; Thulamela, Makhado, Musina and Collins Chabane local municipality. A local municipality called Mutale was disestablished as a resolution by the Executive Council of Limpopo in November 2017, and its areas were divided among Musina and Thulamela local municipality. The disestablishment was also due to identified gaps in the audit process and the Municipal Demarcation Board. Approximately 47% of the population of Vhembe District stays in Thulamela Local Municipality.

Poor transport for agricultural products, shortage of necessary skills and few processing factories are the main challenges facing forestry sector in the Vhembe district. The district has 23 commercial forestry companies with a total of 23 203 planted hectares which consist of 7 173 ha of gum and 15 066 ha of pine species (Vhembe IDP Review, 2019). There are 40 to 50 small timber growers with the average land under plantation of 259 ha from the total land size of 372 ha (Vhembe District Municipality). Yet there is no proper documentation of small-scale timber growers in the district leading to some difficulties during the sampling process. Majority of small-scale timber growers specialize in *Eucalyptus spp.* The estimated yield of commercial plantations is 238 9909 tons per year while for small timber growers are 26 780 tons per year.

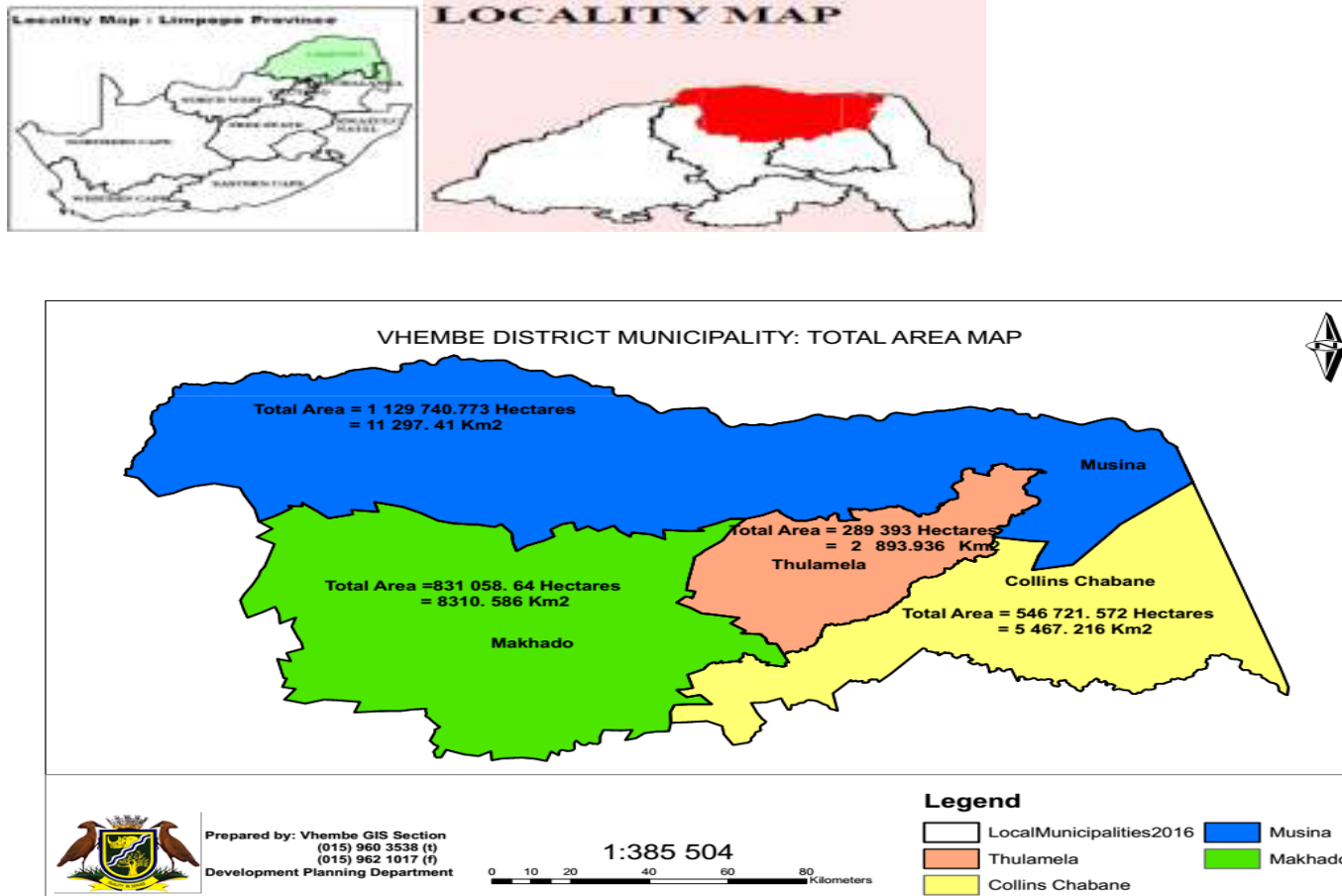


Figure 3.1 Map of the study area (Vhembe District Municipality), (Vhembe IDP, 2019)

3.3 Ontological considerations

An objective ontological was applied in the current study. Ontology considers social constructs and how they may influence the perceptions of the researcher. Objectivism and constructivism are the two common ontological positions in social sciences. Objectivism is an ontological position whereby the researcher is minimally influenced by the subject phenomena.

3.4 Research approaches

The research design adopted in this study provided the totality of the methods and procedures that were followed to ensure a consistent and systematic collection and analysis of data, as well as the interpretation and presentation of the research findings. The ultimate decision involves the type of research design that was adopted to fulfil the research questions and such a decision was based on the assumptions that the researcher considered during the study; and methods used for data collection, analysis, and interpretation (Creswell, 2009). Since there was need to assess the contribution of *Eucalyptus* woodlots to the livelihood of small-scale timber growers, as reflected in Figure 3.2 a mixed method research design was adopted. The mixed methods approach was implemented because all methods (quantitative and qualitative) had limitations, thus this research intended to reduce the bias inherent in individual methods. The methods that were adopted were based either on constructivism or positivism. Since the study was engaged in assessing the contribution of *Eucalyptus* woodlots to the livelihoods of small-scale timber growers in Vhembe District, it had to be guided by the social constructivism paradigm. The socio-economic concepts focused on in the study are multi-dimensional concepts which are difficult to measure. To assess whether the *Eucalyptus* woodlots contribute towards in the livelihoods of small-scale timber growers, the researcher adopted the social constructivism philosophy was adopted whereby knowledge is constructed through interaction. The source and focus of information shifted from the researcher to the participant. The social constructivism paradigm is generally used in qualitative research (Mertens, 1998; della Porta & Keating, 2008).

In this study, this approach was chosen because there was considerable reliance on participants' views on the income and production trends, benefits and challenges and factors affecting woodlots contribution in their livelihoods that are faced by the small-scale timber growers in Vhembe District. In this case the views of the participants about the contribution of *Eucalyptus* woodlots in the livelihoods of small-scale timber growers and the challenges that the small-scale timber growers face in their environment were identified. Thus, since this

Research paradigm is mainly qualitative in nature; questions about these phenomena were directed to the small-scale timber growers during interviews using questionnaires with open-ended questions. There are three commonly used mixed research approaches which are as follows: sequential explanatory, sequential exploratory and convergent methods. For this study, exploratory mixed approach (sequential exploratory) was preferred. Applying qualitative method in the first phase was ideal for in-depth exploration on unknown factors and challenges affecting the contribution of the *Eucalyptus* woodlots to the livelihoods of small-scale timber growers

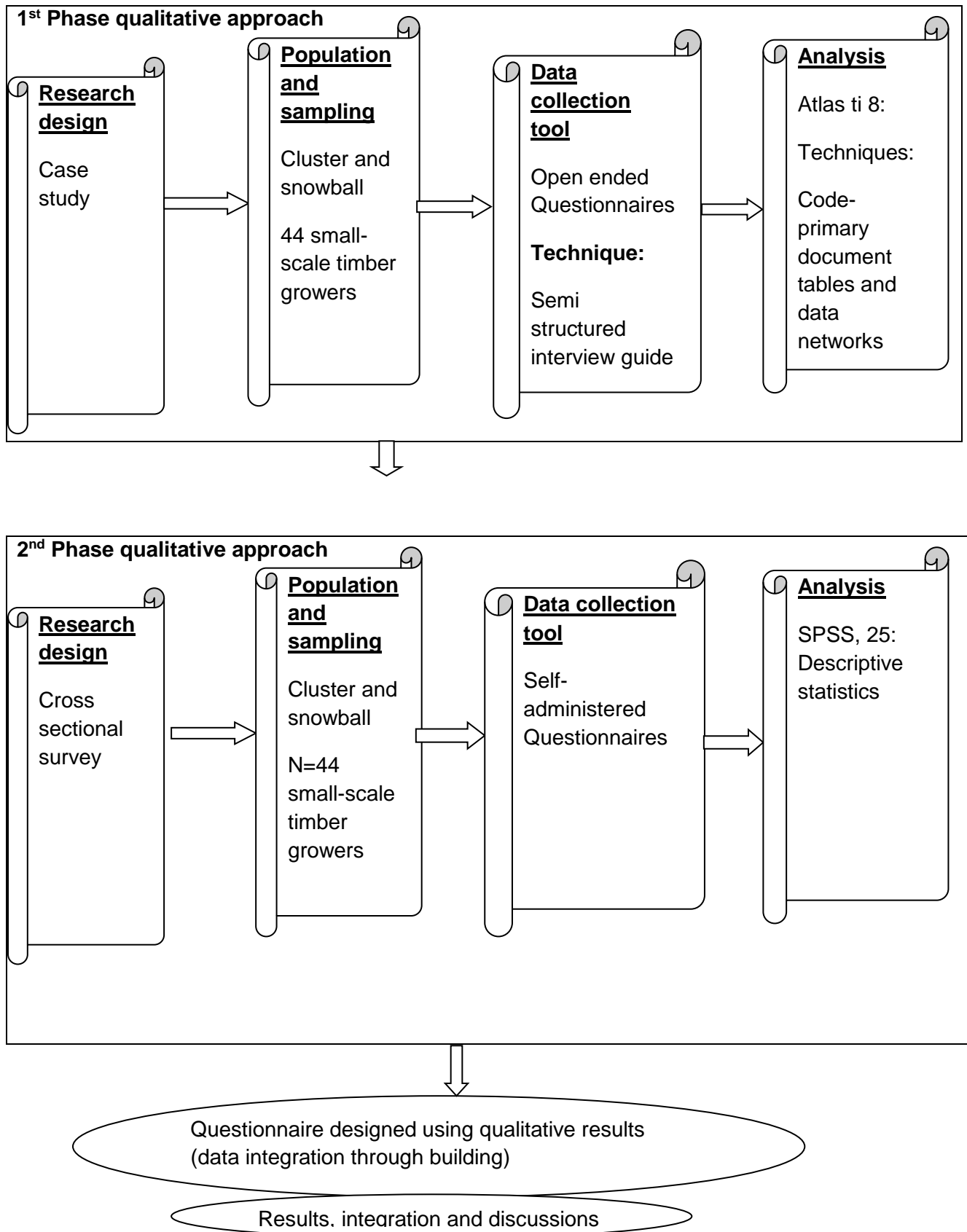


Figure 3.2 Schematic diagram of the exploratory mixed research approach

3.4 1 Phase 1: Qualitative and Quantitative research

Case study designing

A case study is a type of a qualitative research that targets to give a detailed description of a study. The case study allows a detailed comparison of different subjects in a study (Starman, 2013). An advantage of qualitative methods in exploratory research is the use of open-ended questions and probing gives participants the opportunity to respond in their own words, rather than forcing them to choose from fixed responses, as quantitative methods do (Permani, 2014). Open-ended questions can evoke responses that are: meaningful and culturally salient to the participant, unanticipated by the researcher and rich and explanatory in nature.

Another advantage of qualitative methods is that they allow the researcher the flexibility to probe initial participant responses that is, to ask why or how. The researcher must listen carefully to what participants say, engage with them according to their individual personalities and styles, and use “probes” to encourage them to elaborate on their answers.

3.4.2 Community entry procedure

Ethical clearance certificate was requested from the University of Venda higher Degrees Committee prior to community entry. Since the participants were from different areas meetings with small-scale timber growers had to be made to inform them about the study and its purpose, this also included an official from DAFF Forestry Development Limpopo since they are the main custodians of small-scale timber growing. Thereafter visit to the woodlots had to be made for individual interviews. A visit to the DAFF Forestry Development was also made in order to have more understanding about the small-scale timber growers’ operations and programmes. Thereafter data collection commenced. A verbal consultation with the local DAFF office was made to elaborate the procedures to be followed and the safety of the respondents.

A presentation was issued to the participants to inform them about their rights and also distributing letters confirming informed consent to each participant. The names of the participants were not used in the questionnaire and other response sheets; this was done to maintain confidentiality. All the data collected on day to day basis was kept safely and far from public. The use of electronic devices, such as cameras and audio recorder, was also abandoned on the request of respondents to avoid harm. The researcher complied with the requests of the participants in order to adhere to ethical considerations.

3.4.3 Population and sampling procedures

The population was comprised of small-scale timber growers owning *Eucalyptus* woodlots in the Local municipalities of Vhembe District. Both male and female small-scale timber growers participated in the study. The target population to all members who meet the particular criterion specified for a research investigation. Snowball sampling technique was used to select the 44 small-scale timber growers. Snowball technique was also made use of because of chain of referral system wherein one element of the population is approached at a time and then is asked to refer the investigator to the other elements of the population. The snowball technique is also useful in working with populations that are not readily available or not known; in the case of the small-scale timber growers there was no clear data base from different stakeholders to guide the identification of the participants. In this method, participants or informants with who contact has already been made to use their social networks to refer the researcher to other people who could potentially participate in or contribute to the study. Snowball sampling is often used to find and recruit “hidden populations,” that is, groups not easily accessible to researchers through other sampling strategies (Naderif *et.al.* 2017).

Vhembe district has less than 50 small-scale timber growers running *Eucalyptus* woodlots as a means of livelihood. It was, therefore, noble to include all the available participants available in order to come up with reasonable analysis at the end of the study. Consequently, 44 recruited participants were participated in the study.

3.4.4 Pre-testing data collection instrument

A questionnaire was prepared to run a pre-test on respondents. The purpose of the exercises was to pre-test the tool. In simple terms pre-testing is a method of checking that questions work as intended and are understood by those individuals who are likely to respond to them (Casper *et.al.*, 2016). One of the most important targets of the pre-test was to discover the means to simplify the questionnaire since the education level of the small-scale timber growers was not known. The pre-test helped to minimize time which was required to respond since the questions were restructured and it also ensured the validity and reliability of the tool. During an executive committee meeting of the small growers' cooperative the questionnaire was tested among 4 small scale timber growers who volunteered for the process.

3.4.5 Data collection methods and techniques

Individual interviews

A semi-structured interview guide was used during data collection. A semi-structured interview is open, allowing new ideas to be brought up during the interview because of what the interviewee says. According to Cohen & Crabtree (2006), the interviewer develops and uses an 'interview guide', a list of questions and topics that need to be covered during the conversation usually in a particular order. Face-to-face semi-structured interviews were useful for this study to receive understanding and perspectives about contribution of *Eucalyptus* woodlots to the livelihoods of the small-scale timber growers. It gave the researcher an opportunity to clarify doubt and ensure that responses were clearly understood. For the study as indicated in the list of appendices, interview questions were developed for the different participants. There were interview questions for the small-timber growers, traditional leaders and the forestry officials.

3.4.6 Limitations

Various challenges were encountered during the data collection process. Most of the small-scale timber growers could not allow the use of audio recording devices and any device that specifically points out their geographical position such as GPS. This is due to the threats from local people that their information can be used against them or be passed to other stakeholders. The privacy ethical consideration was respected and none of the tools mentioned above were used.

3.4.7 Data analysis

Qualitative was analysed using the thematic analysis approach. The Atlas ti Version 8 software was utilised to apply the thematic approach. Atlas ti is a very useful tool to analyse qualitative data, mainly for large sections of text, visual and audio data. The software is ideal for text analysis and interpretation using coding and annotation techniques. To conduct the analysis the collected data was uploaded into the excel spreadsheets. Data formatting was performed prior to importation into the software. Symbols were inserted for the software to correctly separate data variables. Variables included gender, location of the woodlots, employment status, and income. Different concepts were made through coding to categorise the imported data. The codes were created using main themes related to the study objectives. Codes were further classified into code families using the code manager tool; this allows categorisation of codes in relation to objectives/interview questions. The codes-primary document table and network diagram tools were used to analyse data. The network

diagram tool assisted in creating networks to show linkages in the outcomes. The codes primary document table was ideal for linking codes to respondent's biographical information.

3.5 Phase 2: Quantitative Research

3.5.1 Study area

The study was conducted in the same area described in the first phase in section 3.2

3.5.2 Research design

The purpose of the research design is to provide a plan of study that permits accurate assessment of cause and effect relationships between independent and dependent relationships (Chitongo, 2017). A cross-sectional survey was applied. This was done in line with the interviews of the first phase as a follow-up. In the first phase in depth data was collected regarding the contribution of the woodlots, challenges and factors affecting the contribution of the woodlots. Secondary data search was conducted to add to the variables that were obtained from qualitative results. The survey allowed triangulation of data and application of statistical analysis tools; this also leads to increased reliability and validity of results (Chitongo, 2017).

3.5.3 Data collection techniques

Data collection was done through a formal questionnaire that was administered in phase 1. The questionnaire had closed and open-ended questions that were posed to collect information on various socio-economic characteristics such as farm size, soil fertility, family size, market access, transport, labour, skills, knowledge, regulations, technical support and funds. Obtaining the variable items in the questionnaire from both qualitative results and secondary data was ideal for increasing the diversity of questions, hence attaining objectivity and thoroughness (Matata *et.al.* 2008; Table 3.1).

3.5.4 Data analysis

Collected data was analysed using IBM-SPSS version 25, descriptive statistics tests were performed. Descriptive tests were mainly performed for demographic variables such as age, municipality, number of employees, products, etc. Frequency distributions and percentages were used to summarize the information. Descriptive statistics are used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures (Samuels, 2020).

3.5.5 Data integration

Data integration is the process of combining data residing at different sources, and providing the user with a unified view of these data (Lenzerini, 2014). According to Eltabakh, (2012), data integration is the process of integrating data from multiple sources and probably has a single view over all these sources and answering queries using the combined information. The items derived from qualitative results were used to design a questionnaire. In this regard, qualitative results were presented first followed by quantitative outcomes. While the qualitative analysis gave detailed explanations, the survey results quantified the variables. Data from both methods was integrated during results interpretation and discussion.

3.6 Objectives and methods applied in the study

Table 3.2 Objectives and methods applied in the study

	Objective	Research methods
1.	To establish the economic benefits derived from the <i>Eucalyptus</i> woodlots by small-scale timber growers	Sequential Explorative mixed approach (qualitative and quantitative)
2.	To determine the factors affecting the contribution of woodlots to livelihoods of small-scale timber growers in Vhembe district	Sequential Explorative mixed approach (qualitative and quantitative)
3.	To explore possible intervention to improve the contribution of <i>Eucalyptus</i> woodlots to livelihood of small-scale timber growers in Vhembe district	Qualitative approach

CHAPTER 4

Economic benefits of *Eucalyptus* species woodlots to small-scale timber growers

Abstract

Small-scale timber growers in developing countries plant *Eucalyptus* widely compared to other tree species. Advantages of growing *Eucalyptus* include easy establishing even on harsh environments, easy to manage, thrive on wide ecological range and high growth rate. However, there is lack of information on contribution of *Eucalyptus* woodlots on the livelihoods of rural small-scale timber growers in Vhembe district, Limpopo province. The main objective of this chapter was to establish the economic benefits made from the *Eucalyptus* woodlots by small-scale timber growers. A sequential explorative mixed study approach involving qualitative and quantitative methods was followed. The participants were selected using snowball sampling procedures. Semi-structured interview guides were utilised to collect qualitative data and a structured questionnaire for collecting quantitative data. Code-primary document tables and network diagram techniques of the Atlas ti version 8 software were utilised to generate themes and relationships for qualitative data. Quantitative data were analysed using the Statistical Package for the Social Science (IBM SPSS) version 25 tools by ranking of components.

Qualitative results revealed major socio-economic benefits of the *Eucalyptus* woodlots such as timber production, employment and different Non-Timber Forest Products produced by small-scale timber growers in the woodlots. The factors affecting the contribution of *Eucalyptus* woodlots growers' livelihood and solutions to improve the contribution of *Eucalyptus* woodlots to livelihood of small-scale timber growers were also identified. The factors include resources required for production, skills, costs and funding and support by government and other institutions. Results by ranking of components show that through *Eucalyptus* woodlots there is job creation potential. More than quarters (37%), of the respondents survive through *Eucalyptus* woodlots production since they are unemployed. There are significant socio-economic benefits from *Eucalyptus* woodlots and the most common benefits are timber production, Non-Timber Forest Products and employment opportunities among the participants.

Key words: Economic benefits, *Eucalyptus*, small-scale timber threats

4.1 Introduction

Small-scale timber growing of *Eucalyptus* in the rural areas has a potential to contribute to the livelihoods of small-scale timber growers. Forestry (indigenous, plantation, and woodlots) is frequently an important economic activity in rural areas, and is therefore posited as a potential key player in rural poverty alleviation, or at the very least, poverty reduction (Shackleton, 2004). However, there is limited formal description of socio-economic benefits, factors and challenges affecting the contribution of *Eucalyptus* woodlots to small-scale timber in Vhembe district. Small-scale timber growing of *Eucalyptus* has created entrepreneurial opportunities for different *Saharan African*, which has contributed to growth and diversification of economic opportunities of the broader community (Howard *et al.*, 2005). In Asian and African countries, studies have been conducted to analyse and reveal the socio-economic benefits of the *Eucalyptus* woodlots by the small-scale timber growers. According to Maningo (2014), an analysis of the fast-growing species such as *Eucalyptus* was conducted in Cambodia to determine the profitability of the woodlots and it was observed that the income and other socio-economic benefits reported by the small-scale timber growers from *Eucalyptus* woodlots is greater than the annual value of income and benefits from woodlots of other tree species.

The multiple uses and fast-growth of *Eucalyptus* spp. have made them economically important particularly to the rural communities as a means of livelihood. The financial viability of *Eucalyptus* is not only an incentive but also justification for small-scale timber growers to plant more trees (Koech, 2009). Socio-economic benefits in small-scale forestry are part of the main drivers in the practice and production. According to Dessie & Erkossa (2011), the *Eucalypts* have been planted for various socio-economic purposes in African countries, Asia, South American countries and Australia. *Eucalyptus* woodlots have a means of contributing to the livelihoods of small-scale timber growers; it is expected to be an affordable practice to manage. Dessie *et al.* (2019) revealed that *Eucalyptus* can be cultivated with minimum management activities for different products and services and this become a socio-economic benefit towards small-scale timber growers cultivating the *Eucalyptus* in their woodlots.

However, it is still a known fact that besides the mistakes made in the past, community forestry has great potential to rehabilitate and protect the environment, provide resources, create employment opportunities and generate income to the rural households (Mugunga *et al.*, 2015). *Eucalyptus* woodlot development should receive such attention and objectives set from a broad perspective so that product base is widened for the benefit of the user groups rather than merely dictated by what the government want and perceive to be important to the rural folk. The major factors driving small-scale timber growers to plant *Eucalyptus* in

Vhembe district and other areas in South Africa are; increasing demand for wood products in the market, the unavailability of wood on farm, high rate of biomass production, easy to cultivate, and wider adaptability, no palatability to live stock. The species of *Eucalyptus* provides multiple environmental and socio-economic benefits such as utilized for fuel wood production (for fire), pole production, house building, medicine (e.g. blue gum used to treat flue, common cold), and timber production (Birhanu & Kumsa, 2018). Despite the known socio-economic contributions of woodlots in Vhembe district they are not well understood. Therefore, the objective of the current study was to establish the economic benefits made from the *Eucalyptus* woodlots by small-scale timber growers in Vhembe district.

4.2 Methodology

A cross-sectional survey was applied. This was done in line with the interviews of the first phase as a follow-up. In the first phase in depth data was collected regarding the contribution of the woodlots, challenges and factors affecting the contribution of the woodlots to small-scale timber growers in Vhembe district. Secondary data search was conducted to add to the variables that were obtained from qualitative results. The survey allowed triangulation of data and application of statistical analysis tools; this also led to increased reliability and validity of results (Chitongo, 2017). Desktop study was used for the characterisation of the woodlots in Vhembe District. More details on the methodology with respect to description of the study site, community entry procedure and ethical consideration, and population and sampling procedure are provided in chapter 3 sections 3.2, 3.4.2 and 3.4.3, respectively.

4.2.1 Data collection methods

The research design adopted for the study is exploratory mixed approach and was guided by the social constructivism paradigm which mainly focused on qualitative research. A semi-structured interview guide was used during data collection. A semi-structured interview is open, allowing new ideas to be brought up during the interview as a result of what the interviewee says. Face-to-face semi-structured interviews were useful for this study to receive understanding and perspectives about contribution of *Eucalyptus* woodlots to the livelihoods of the small-scale timber growers. It gave the researcher an opportunity to clarify doubt and ensure that responses were clearly understood. Further details are presented in chapter 3 section 3.4. For quantitative data, data collection was done through a formal questionnaire. The questionnaire had closed and open-ended questions that were posed to collect information on various socio-economic benefits and factors affecting the contribution

of woodlots to the small-scale timber growers. More details are presented in chapter 3 section 3.5.

4.2.2 Data analysis

Qualitative data was analysed using the thematic analysis approach. The Atlas ti Version 8 software was utilised to apply the thematic approach. Atlas ti is a very useful tool to analyse qualitative data, mainly for large sections of text, visual and audio data (Friese, 2014). The software is ideal for text analysis and interpretation using coding and annotation techniques. As such, themes and network diagrams were computed to show relationships emanating from the study variables. Quantitative data collected was analysed using IBM-SPSS version 25. Ranking of components and descriptive statistics tests were performed. Descriptive tests were mainly performed for demographic variables such as age, municipality, number of employees and timber products. Frequency distributions and percentages were used to summarize the information. Ranking of components was implemented to reduce a large set of variables to a small set that still contains most of the information in large set in lieu of determining the main economic factors of *Eucalyptus* woodlot contribution.

4.3 Results

4.3.1 Characterisation of the woodlots studied in Vhembe District

The objectives of woodlot development have been to provide poles and fuelwood to rescue indigenous vegetation especially during the homelands periods such as the Venda government whereby most of the woodlots were communally owned (Forestry Road Map, 2009). *Eucalyptus* woodlots form an integral part of rural development programmes and contribute to the RDP in the South African government. Furthermore, small scale timber-growers' schemes can be economically beneficial for the growers and create work opportunities for others in Vhembe District (Birhanu & Kumsa, 2018). Fuelwood deficits are especially severe in the former homelands, where most households also do not have access to electricity. Fortunately, community forestry which includes the growing of *Eucalyptus* woodlots is becoming increasingly people-centred in rural areas such as Vhembe District.

According to The South African Government Forestry vision it states that forests are managed for people and that there is a need to create an enabling environment for economic and social development through sustainable forestry, especially at local level. Strategies were established in the rural areas such as Vhembe district in Limpopo, this included establishment of *Eucalyptus* woodlots through the Forest Enterprise Development (FED) initiated by the former Department of Water Affairs and Forestry (DWAF) (Strategy

Execution Adviser, 2020). The woodlots established before the democratic government were also included in the strategies and initiatives in order to achieve the vision and also to promote key component of Broad-Based Black Economic Empowerment (BBBEE) in the forestry sector (Ham and Theron, 2010). Hence, most of the small-holder famers in Vhembe district and in other rural areas started to turn their land into *Eucalyptus woodlots*.

4.3.2 Participants' biographical Information

As highlighted on Table 4.1 and Figure 4.1, 44 respondents participated in the study. In terms of employment status only 5 were employed, 2 were pensioners, 3 were self-employed and 10 did not have any other form of employment except for farming. Majority (31) of the respondents were male. Thulamela municipality contributed most of the respondents (33), only 1 respondent came from Musina and the remaining ten came from Makhado local Municipality (Table 4.1). Majority of the respondents (39) were married, 2 were divorced, 2 were single parents and only 1 was a widower. The participant biographical information can also be a reflection on how the woodlots give a socio-economic benefit to the respondents and their families. Hence, the biographical information values, personal experience of the participants and individual voices and insightful ways of understanding the reality of the problem behind the study were crucial. This allows the researcher to have a full consideration of the participants' social, economic, cultural and historical context in a study. Using different variables as reflected on Table 4.1 the following findings were made in terms of benefits.

Table 4.1 Participant biographical information

Variable		Frequency	Percentage (%)
Employment status	Pensioners	2	4.6
	Employed	5	11.4
	Social-Grant bearer	10	22.7
	Unemployed	10	22.7
	Self-Employed	17	38.6
Gender	Female	13	29.6
	Male	31	70.5
Municipality	Musina	1	2.3
	Makhado	10	22.7
	Thulamela	33	75
Marital status	Widower	1	2.3
	Divorced	2	4.6
	Single-parent	2	4.6
	Married	39	88.7
Total		44	

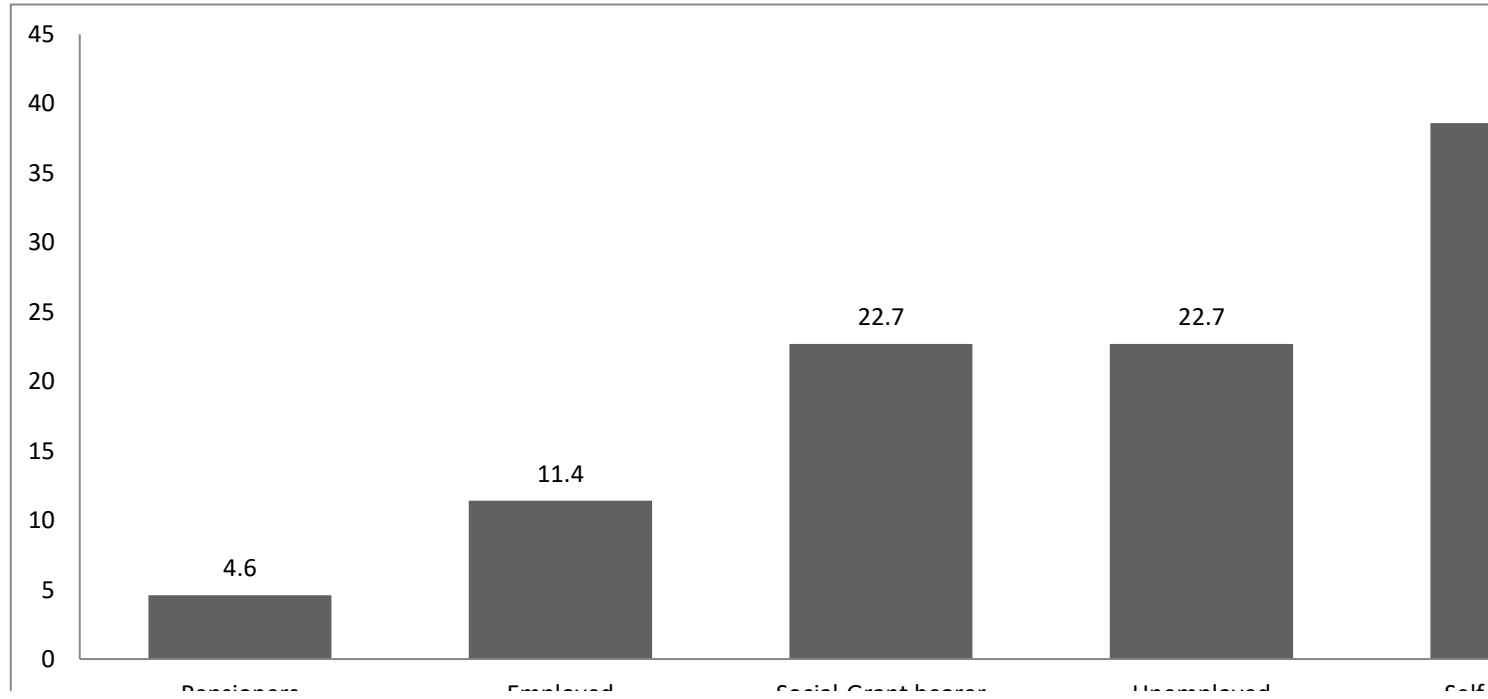


Figure 4.1 Employment statuses of the study participants

4.3.3 The Benefits of *Eucalyptus* woodlots initiative in Vhembe District

Eucalyptus woodlots are beneficial to the different social groups and maintaining their livelihoods. There is a high number of respondents managing *Eucalyptus* woodlots that are self-employed and doing business through selling timber products. We have majority of male respondents running the *Eucalyptus* woodlots. The woodlots are based in the Thulamela Local Municipality and it is like the commercial centre of the study area. So, timber is in high demand due to new constructions and developments in Thulamela Local Municipality. According to the response from other respondents there are small-scale timber growers who are single parents and they are also unemployed, the woodlots they manage are the means of feeding their families and generating income. The results of the study in Vhembe district shows that the woodlots have created business opportunities for the small-scale timber growers. Through the government programmes some of the small-scale timber growers could register their *Eucalyptus* woodlots as formal businesses as cooperatives.

There is a significant economic benefit from *Eucalyptus* woodlots and the most common benefit is employment among the participants. By ranking of components, it was revealed that through *Eucalyptus* woodlots there is job creation. More than a quarter (37%), of the respondents in the study have no jobs they are self-employed through the woodlots they own and have other sources of income such as South African Social Security Agency (SASSA) government grants and small family business. About 11% of the respondents are employed therefore they must employ people to assist in managing and maintaining the woodlots.

Whereas 23% is totally unemployed and have no any income from other sources but only from the *Eucalyptus* woodlots they are managing. It was also revealed that there are people employed by the respondents whereby 98% are part-time field workers and only 2% are permanently employed by the woodlots owners. One of the socio-economic benefits is the management of the woodlots that is less demanding in terms of finance and management skills. The participants also indicated that in some of their woodlots they also grow crops and trees such as macadamia nuts trees for extra income since *Eucalyptus* takes about 3-4 years to reach the first harvest. Two of the participants from Makhado Local Municipality also have beekeeping boxes in their woodlots, out of the beekeeping they produce honey and sell it to the local market. The *Eucalyptus* woodlots provide important source of fuelwood to the households. The wood could come from the *Eucalyptus* planted in the woodlot or from the naturally growing

trees in the woodlot. Fuel woods are also derived from the pruning, selective cutting or thinning, and even the waste materials from the harvested saw logs.

4.3.4 Employment potential of the *Eucalyptus* woodlots

Table 4.2 reflects the number of employees each participant has managed to employ in his or her woodlot and this include members of their household. The results reflect that 93.2% of the participants employ about 1-10 employees in their Eucalyptus woodlots whereas 4.5% of the participants have about 11-20 employees in the woodlot and 2.3% have more than 21 employees in the woodlot. 97.7% of the employees are not permanently employed in the woodlots but do the work on part-time basis. Figure 4.2 reflects the type of woodlot ownerships in the study area. According to the study results, 29 small-scale timber growers out of 44 manage their woodlots as individuals without any organised structure such as cooperative.

Table 4.2 Employment potential from the *Eucalyptus* woodlots

Number of employees	Frequency	Percent
1 – 10	41	93.2
11 – 20	2	4.5
21 and above	1	2.3
Total	44	100.0

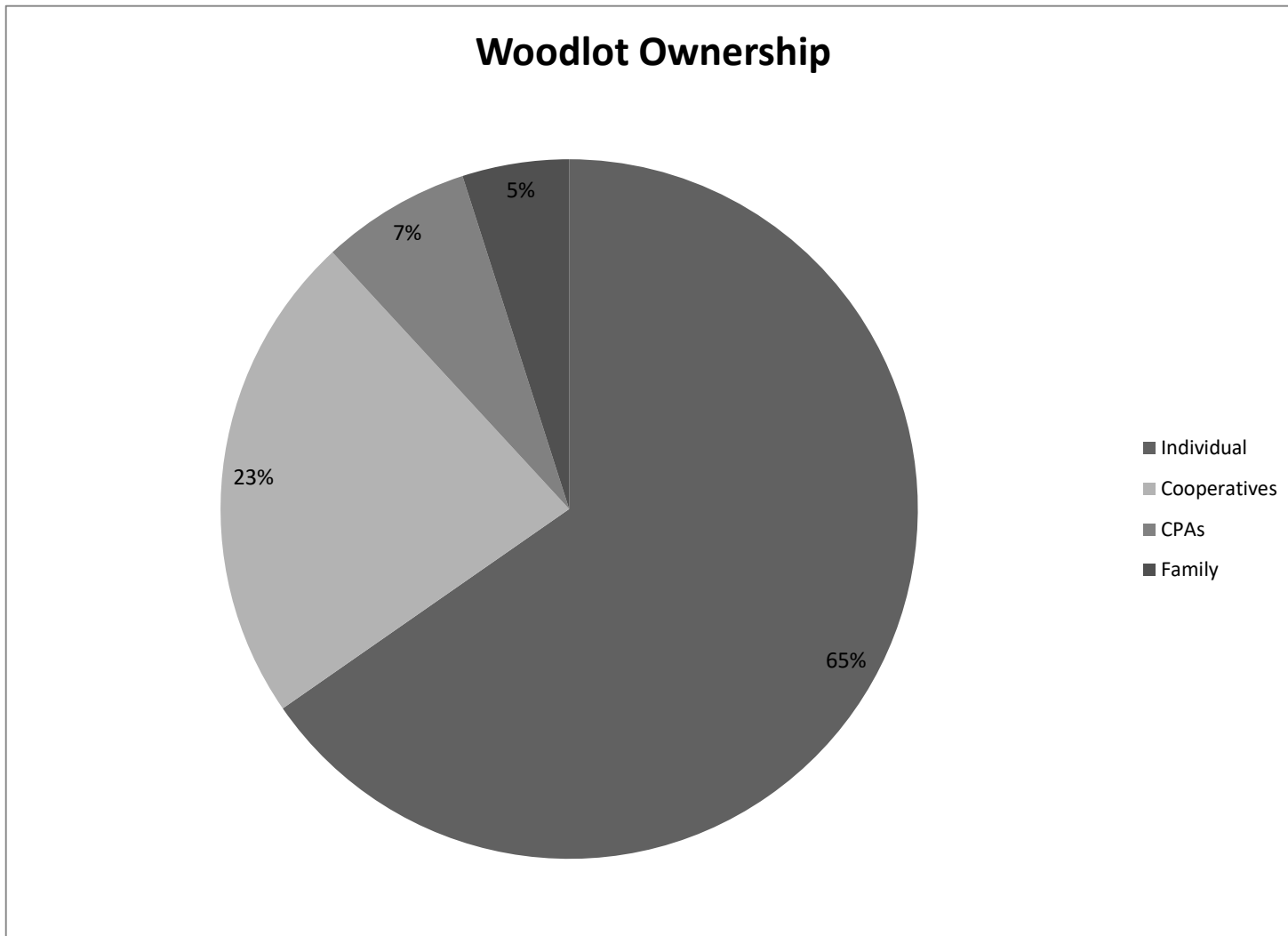


Figure 4.2 *Eucalyptus* woodlots ownership and management

About 97.7% of the participants have part-time employees working on part-time basis in their *Eucalyptus* woodlots. This is due to lack of funds and other resources needed for job creation in the woodlots. Hence, these workers work only when there is a heavy load of work for example during planting and harvesting periods. It is also revealed that 2.3% of the participants have a permanent workforce. These, are the employees who are responsible for day to day maintenance and silviculture of the woodlots.

4.3.5 Products from the *Eucalyptus* woodlots

The results of the study in Vhembe district revealed that the small-scale timber growers produce the following timber products; droppers, building poles, fencing poles, telephone poles, fuel wood, tomato poles, banana poles and timber for carpentry. Timber produced by the small-scale timber growers in Vhembe district does not go through the value adding processes such as treatment by chemicals before selling. The products produced in the woodlots have no standard price rate but they are sold according to negotiated price with the customer. For example, in areas where the timber grower must fell, debark and deliver the timber the price is higher unlike where the customer is given a plot to fell the trees by himself. With the latter, the price of timber should be negotiated since it will be costly for the customer. Table 4.3 reflects common price rates used by the *Eucalyptus* small-scale timber growers to trade their products in Vhembe district.

Table 4.3 Common prices for the Eucalyptus products in Vhembe District

Timber products	Description	Prices	Customers	Market strength
Droppers	6m length	R10 per pole	Local hardware, community members, farmers, etc.	Strong and more available
Building and construction poles	6m length	R30 per pole	Local hardware, community members, farmers, etc.	Strong and more available
Fencing poles	2m-2,4m length	R30 per pole	Local hardware, community members, farmers, etc.	Strong and more available
Furniture and pallets timber	1,5m poles per cube pack	R8000	Hardware traders and furniture making businesses	Weak with few customers
Mining poles	13m poles X 306 poles pack	R52000	Local timber traders and mining companies	Weak with few customers

4.3.6 Factors affecting the contribution of *Eucalyptus* woodlots growers' livelihood

Figure 4.3 reflects the factors determining the contribution of woodlots to small-scale timber growers' livelihoods in Vhembe District. These capitals have been arranged into four major groups which are social capital, human capital, physical capital and financial capital. The identified factors are essential determinants on performance of the *Eucalyptus* woodlots initiative. The result of the study indicates that the small-scale timber growers in Vhembe District are limited to reach maximum production due to the identified factors and a proper intervention through strategies and supporting initiatives such as agro-forestry can maximize contribution to the livelihood of small-scale timber growers. Figure 4.4 reflects how the area can influence the production of a small-scale timber grower. The *Eucalyptus* woodlots owners in the study area indicated challenge of lacking enough of land space and proper ownership. More than (68%) of the *Eucalyptus* woodlots owners own 0-5ha of land space area. The income generation potential of *Eucalyptus* woodlot production is by far the main motivating factor indicated by large proportion of the producer households. They have planted *Eucalyptus* woodlot due to the increasing demand of *Eucalyptus* products and the income generation potential of the activity. Figure 4.5 gives a reflection of monthly income made by the small-scale timber growers owning the woodlots. Concerning financial capital in the study, the results indicated that the lending institutions including those that receive government support, are reluctant to lend small-scale timber growers money. Application procedures and the surety or collateral required by the banks to underwrite the loans are outside the reach of 44 participants in Vhembe district.

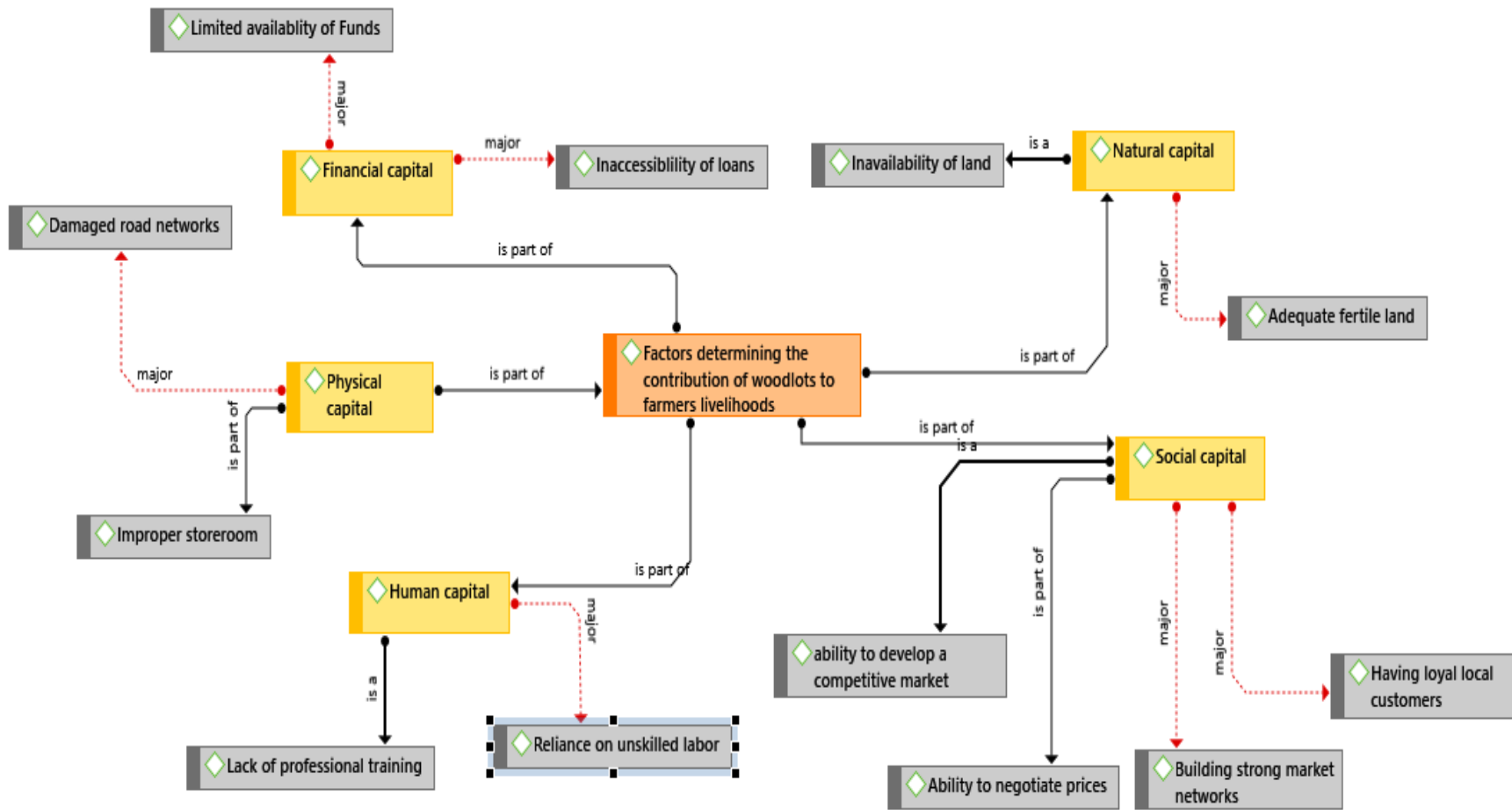


Figure 4.3 Factors determining the contribution of woodlots to farmer’s livelihoods in Vhembe District

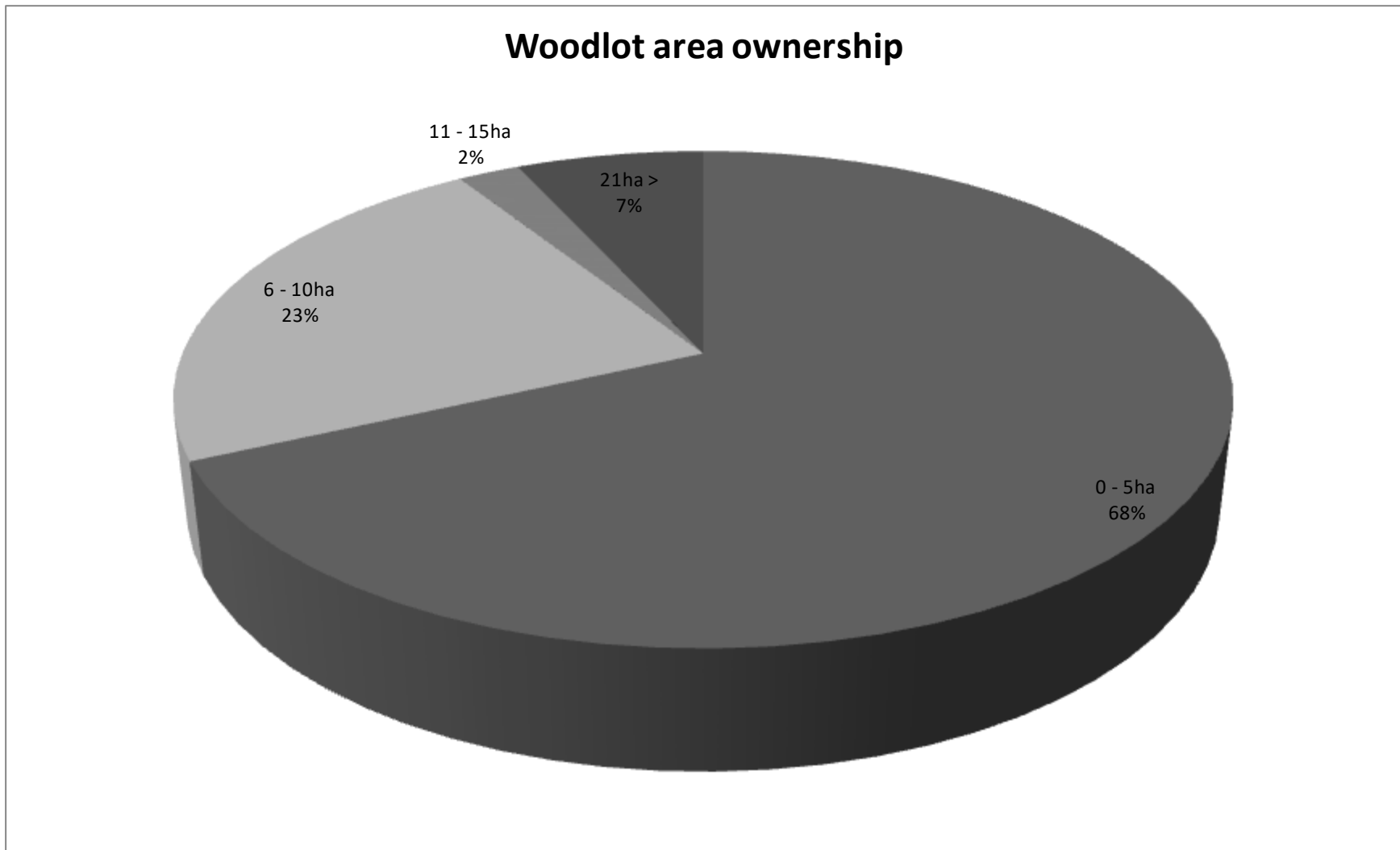


Figure 4.4 *Eucalyptus* woodlots areas per small-scale timber grower

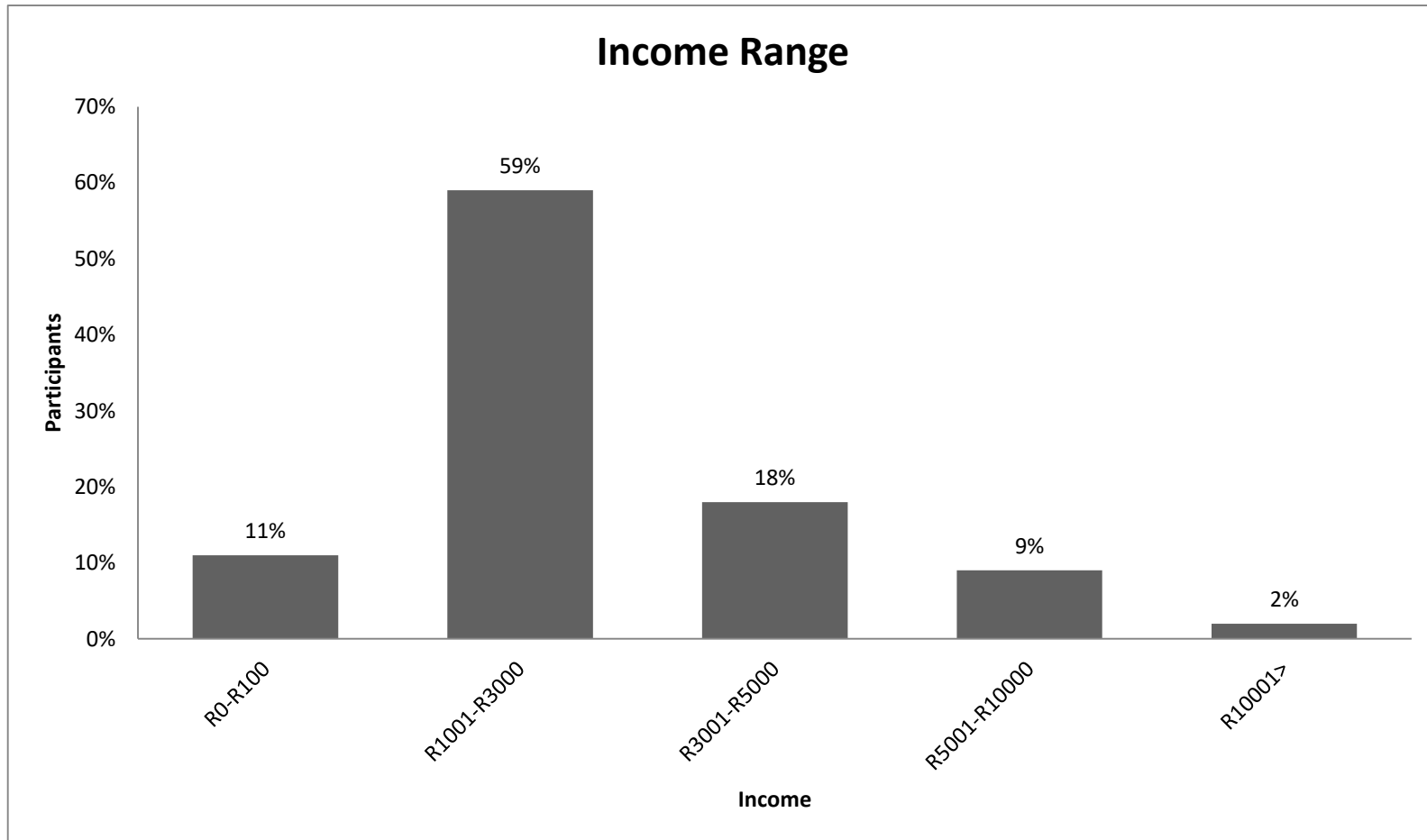


Figure 4.5 Monthly income generated by the small-scale timber growers in the study area

4.4 Discussion

The main aim of this study was to assess the contribution of *Eucalyptus* woodlots to the livelihoods of small-scale timber growers in Vhembe district. The results in the study were achieved through three different specific objectives; establishing the socio-economic benefits derived from the *Eucalyptus* woodlots, to determine the factors affecting the contribution of woodlots to livelihoods of small-scale timber growers and suggesting possible solutions to improve the contribution of *Eucalyptus* woodlots to livelihood of small-scale timber growers. Small-scale timber growers harvest the yield of eucalyptus at the age of four years after planting. Moreover, *Eucalyptus* supports the livelihoods of rural and urban dwellers at different site conditions (Hailemicael, 2012). The study result, presented in Table 4.1, summarizes the general characteristics of the participants through the biographical information. *Eucalyptus* woodlot producers and owners in Vhembe District are more male, this is because the respondents noted that land for agriculture and forestry activities is allocated to individual households through a male figure from the local chiefs. In Vhembe District the communal land is still in the hands of royal families and higher priority is given to male figures (Mahlangu, 2015). Yet according to Dessie *et al.* (2019) gender does not give a full picture because the gender distribution can be an indication that male headed households tend to engage in *Eucalyptus* woodlot production than the female headed households.

The livelihood of low-income people can be improved by small-scale timber growing such as establishment of *Eucalyptus* woodlots (Jele, 2012). The results of the study show that in terms of employment point of view, the most participating group in the heading individuals in *Eucalyptus* woodlots are self-employed group and the least participants were from the employed group and pensioners. This is because the last two categories have their own source of income through employment in other sectors or pensioners who receive government grant and retirement benefits after working in different sectors. Therefore, majority of them are not interested in generating extra income compared to the self-employed within the *Eucalyptus* woodlots. This is clear evidence that, in Vhembe District, few farmers benefit from the woodlots. This contrasts with Ham & Theron (2010) who reported that, small-grower schemes and *Eucalyptus* woodlots can be economically beneficial for the growers and create work opportunities for others. The study area Vhembe District has four local municipalities known as Musina, Makhado, Thulamela, and Collins Chabane Local Municipality. According to the results it was revealed that active heading members of *Eucalyptus* woodlots are dominant in three local municipalities which are Thulamela (75%), Makhado (22.7%) and Musina (2.3%). The fourth municipality Collins

Chabane has been eliminated due to lack of small-scale timber growers who owns *Eucalyptus* woodlots to participate in the study. The Vhembe District Municipality IDP Review (2019/20) Thulamela, Makhado and Musina are recognised as the centre of development and business in the study area, this create opportunity for agricultural production for food production by small-holder farmers and timber production by small-scale timber growers. The result on employment has revealed that the *Eucalyptus* woodlots in Vhembe district have the potential for job creation. Employment is one of the major economic contributions of the forest sector of different Eastern and Southern African countries (Nguyen *et al.*, 2015). This is achieved through both commercial forestry and small-scale timber growing in the rural areas (AFF, 2011).

Small-scale forestry through *Eucalyptus* cultivation has proved to be an important enterprise for small-sale and large timber growers worldwide. Different products such as timber, fuel wood and charcoal are produced (Andika *et al.*, 2014). According to Francis (2012), well supported timber production from the *Eucalyptus* woodlots would be able to improve small-scale timber growers living conditions through increased household income and improved environmental conditions. As reflected on Table 4.3 timber produced by the small-scale timber growers in Vhembe district does not go through the value adding processes such as treatment by chemicals before selling. Hence, the growers sell timber in its raw form to the customers. It is, therefore, unfortunate that the small-scale timber growers in Vhembe district sell their timber at minimum prices (Birhanu & Kumsa, 2018). Majority of the customers are the local community members and then followed by the value adding customers such as sawmills and hardware's. The trading prices are determined based on the size of the timber; the quality and age also have an impact on the selling prices of timber. It is unfortunate that the small-scale timber growers in Vhembe district sell their timber at minimum prices since they only fell and sell timber as it is without any value adding process. According to Andika *et al.* (2014), in value chains timber flow up the value chain and money flows down the chain where each of the direct actors performs one or more specific functions, thereby incurring some expenses and gaining some income, and thus adding value to the product.

In the current study the small-scale timber growers also produce Non-Timber Forest Products (NTFPs) as means to have income during the waiting period of timber to mature which usually take a minimum period of 3 to 4 years. The NTFPs that are produced by the small-scale timber growers are honey through beekeeping, macadamia nuts and cash crops. This is in line with Mugunga (2016)'s assertion that, besides the ability of *Eucalyptus* woodlots to generate income through the production of timber, small-scale timber growers also produce non-timber forest products. *Eucalyptus* tree species widely grown in the tropics

and subtropics therefore primarily serve to supply the firewood and charcoal and other non-timber forest products that are in high demand. According to the study result less than 50% of the participants produce NTFPs in their *Eucalyptus* woodlots: this is due to lack of land space since majority of the growers' own woodlots that are less than 10 hectares.

Eucalyptus woodlots have several desirable socio-economic benefits including financial, employment and security as indicated above. The spread of *Eucalyptus* throughout extensive areas and cultivation by many small-scale timber growers has opened many business opportunities (FAO, 2009). The result of the study in Vhembe district shows that the woodlots have managed to create business opportunities for the small-scale timber growers, through the government programmes some of the small-scale timber growers could register their *Eucalyptus* woodlots as formal businesses such as cooperatives. Hence this has allowed the small-scale timber growers to come together and create secondary cooperative of all the small-scale timber growers in the Vhembe district (Ofoegbu *et al.*, 2016). Small-scale timber growers closer to business centres such as Thohoyandou and Makhado have become regular suppliers of timber to the hardware and sawmills around. According to Lemenih (2010), an important reason why small-scale timber growers see *Eucalyptus* as safe investment is its continued demand and good survival therefore this can be a huge potential towards sustained and improved livelihood and growth for small-scale timber grower to higher levels of timber growing.

Factors affecting the contribution of *Eucalyptus* woodlots growers' livelihood are one of the specific objectives of this study and a driving force towards the sustainability of the *Eucalyptus* woodlots in Vhembe District. In terms of natural capitals, having adequate fertile land largely influences productivity. The unavailability of land for expansion also limits growth and the contribution of woodlots to growers' income (Ham *et al.*, 2016). The availability of loyal customers and building strong market networks with both local and external markets are major social capital determinants towards the contribution of woodlots to the livelihoods of small-scale timber growers. In line with Ahimbisibwe *et al.* (2019), having the ability to negotiate prices as well as having a competitive market is also necessary to make woodlots productive in remote areas where most of the woodlots are situated. In terms of human capital, reliance on unskilled labour appeared to derail full capacity production. Furthermore, the unavailability of professional training and skills is a drawback to small-scale timber growers' development. Damaged road networks were the major physical capital reportedly influencing the contribution of woodlots to the growers' livelihoods. According to Gizchew (2017), the model result of his study indicated that households that are located far away from accessible road and having poor accessibility were less likely to establish and allocate land

for *Eucalypts* woodlot. According to Howard *et al.* (2005), the emergent forestry-based enterprises have some difficulty interacting with the formal banking sector for funding and loans due mainly to the vast difference in perspectives between the small-scale timber growers and the bank managers or other customer liaison staff. This is due to the banks operating systems and the requests such as title deeds for the land which the small-scale timber growers own. The *Eucalyptus* woodlots are located in the communal lands which are under the control of the royal authority and the individual cannot recognise as landowners but operate using the Permission To Operate (PTO) document which the commercial banks do not recognise for financial support.

4.5 Conclusion

The aim of this chapter was to identify the economic benefits of *Eucalyptus* woodlots to the small-scale timber growers and contribution to the livelihood. There is a significant economic benefit from *Eucalyptus* woodlots and the most common benefit is employment among the respondents. *Eucalyptus* woodlots have a potential to take poor small-scale timber growers out of the poverty trap. It is not a few strong qualities of *Eucalyptus* that contributes to its popularity among small-scale timber growers but the fact that it possesses many important and/or strong qualities that the smallholders appreciate.

Majority of the respondents were unemployed; the woodlots were identified as an active means of job creation. The *Eucalyptus* woodlots also contribute into the local Vhembe District economy. The economic benefits need to be well balanced especially in gender variable; more than 50% of the respondents were male small-scale timber growers. The imbalanced economic benefiting might be a threat to the progress of small-scale timber initiative.

Chapter 5: Factors affecting the contribution of *Eucalyptus* woodlots to growers' livelihoods

Abstract

Eucalyptus woodlots have a potential to take poor farmers and urban dwellers out of the poverty trap. In tropical and subtropical countries, many small-scale timber growers prefer to plant *Eucalyptus* compared to other tree species and even to other cash crops. Hence, the aim of this study was to identify the factors affecting the contribution of *Eucalyptus* woodlots to the small-scale timber growers' livelihood. A sequential explorative mixed study approach involving qualitative and quantitative methods was followed. The participants were selected using snowball sampling procedures. Semi-structured interview guides were utilised to collect qualitative data followed by structured questionnaires for collecting quantitative data. Tables and network diagram techniques of the Atlas ti version 8 software was utilised to analyse qualitative data. Quantitative data were analysed using the Statistical Package for the Social Science (IBM SPSS) version 25 tools by ranking of components.

The study qualitative results revealed that *Eucalyptus* have several important qualities for the smallholders; they are easy to establish even on degraded land and easy to manage, and have few natural enemies, a wide ecological range, good survival, high growth rate and a reliable source of cash income. The factors identified in the study were silvicultural factors involving the growing of the seedlings and maintenance of trees. Policy and regulations were also mentioned by the participants in Vhembe District as a factor that affects their rate of production in the woodlots, for example water licencing and land ownership policies. The other factors reflected in this study were challenges during harvesting, labour and employment factors, lack of proper equipment, inadequate capital, poor environmental conditions, timber theft and veld fires and pest attack.

Key words: challenges, *Eucalyptus*, factors, small-scale timber growing

5.1 Introduction

This chapter presents the findings of the research conducted in Vhembe District Municipality on small-scale timber growers. It focuses on factors that affect the contribution of *Eucalyptus* woodlots to the small-scale timber growers' livelihood. To present a clear view, these findings are presented in frequency tables and graphical format. This chapter firstly explains the statistical tests conducted on the findings. This is followed by a discussion of the way the different sections of the questionnaire have been clustered in line with the objectives.

The properties of fast growth and easy establishment in South Africa have made the *Eucalyptus* a popular tree crop for over many years to meet demand for many timber products and services, and have created a strong local knowledge of the various species (Jele, 2012). Studies show that attention should be given to manage the identified factors and change small-scale timber growers' attitude to optimize the positive value of *Eucalyptus* and reduce its negative effects, contribute for enhancement of growers' income (Gizachew, 2017). According to Langat et al. (2015), the volume of wood produced from 1 ha of a woodlot or plantation in a given period depends on many factors including: environmental quality, quality of seedlings, silvicultural operations, competition, veld fires, and pest attack and timber theft rate.

A study by Derbe et al. (2018), the adoption of *Eucalyptus* in the form of woodlot by small-scale timber growers has been increasing even by replacing their fertile lands to the tree production. The result confirmed that farm size, access to market and perception of farmers towards *Eucalyptus* woodlot production were positively and significantly affected the adoption of *Eucalyptus* woodlot by small-scale timber growers. Poor management of the *Eucalyptus* woodlots lead to high risk of natural resources depletion, as a results livelihood of the people will be affected as the quality and quantity of wood and other products declines (Das, 2011). The objective of this chapter is to determine the factors affecting the contribution of *Eucalyptus* woodlots to livelihoods of small-scale timber growers in Vhembe district.

5.2 Methodology

A cross-sectional survey was applied. This was done in line with the interviews of the first phase as a follow-up. In the first phase in depth data was collected regarding the contribution of the woodlots, challenges and factors affecting the contribution of the woodlots to small-scale timber growers in Vhembe district. Secondary data search was conducted to add to the variables that were obtained from qualitative results. The survey allowed triangulation of data and application of statistical analysis tools; this also led to increased

reliability and validity of results. Desktop study was used for the characterisation of the woodlots in Vhembe District. More details on the methodology with respect to description of the study site, community entry procedure and ethical consideration, population and sampling procedure are provided in chapter 3 sections 3.2, 3.4.2 and 3.4.3, respectively.

5.2.1 Data collection methods

A semi-structured interview guide was used during data collection. A semi-structured interview is open, allowing new ideas to be brought up during the interview as a result of what the interviewee says. Face-to-face semi-structured interviews were useful for this study to receive understanding and perspectives about factors affecting contribution of *Eucalyptus* woodlots to the livelihoods of the small-scale timber growers. It gave the researcher an opportunity to clarify doubt and ensure that responses were clearly understood. Further details are presented in chapter 3 section 3.4. For quantitative data, data collection was done through a formal questionnaire. The questionnaire had closed and open-ended questions that were posed to collect information on various factors affecting the contribution of woodlots to the small-scale timber growers. More details are presented in chapter 3 section 3.5.

5.2.2 Data analysis

Qualitative data was analysed using the thematic analysis approach. The Atlas ti Version 8 software was utilised to apply the thematic approach. Atlas ti is a very useful tool to analyse qualitative data, mainly for large sections of text, visual and audio data (Friese, 2014). The software is ideal for text analysis and interpretation using coding and annotation techniques. As such, themes and network diagrams were computed to show relationships emanating from the study variables. Quantitative data collected was analysed using IBM-SPSS version 25 by ranking of components.

5.3 Results

5.3.1 Water availability

According to the response from the small-scale timber growers there is over reliance on rainwater. As illustrated on Figure 5.1, water regulations such as the water licensing policy and limited farmers' access to water reservoirs such as rivers and dams in the area leads to over reliance to rainwater. Lack of water supply during planting season leads to low planting rate and high mortality rate of planted seedlings.

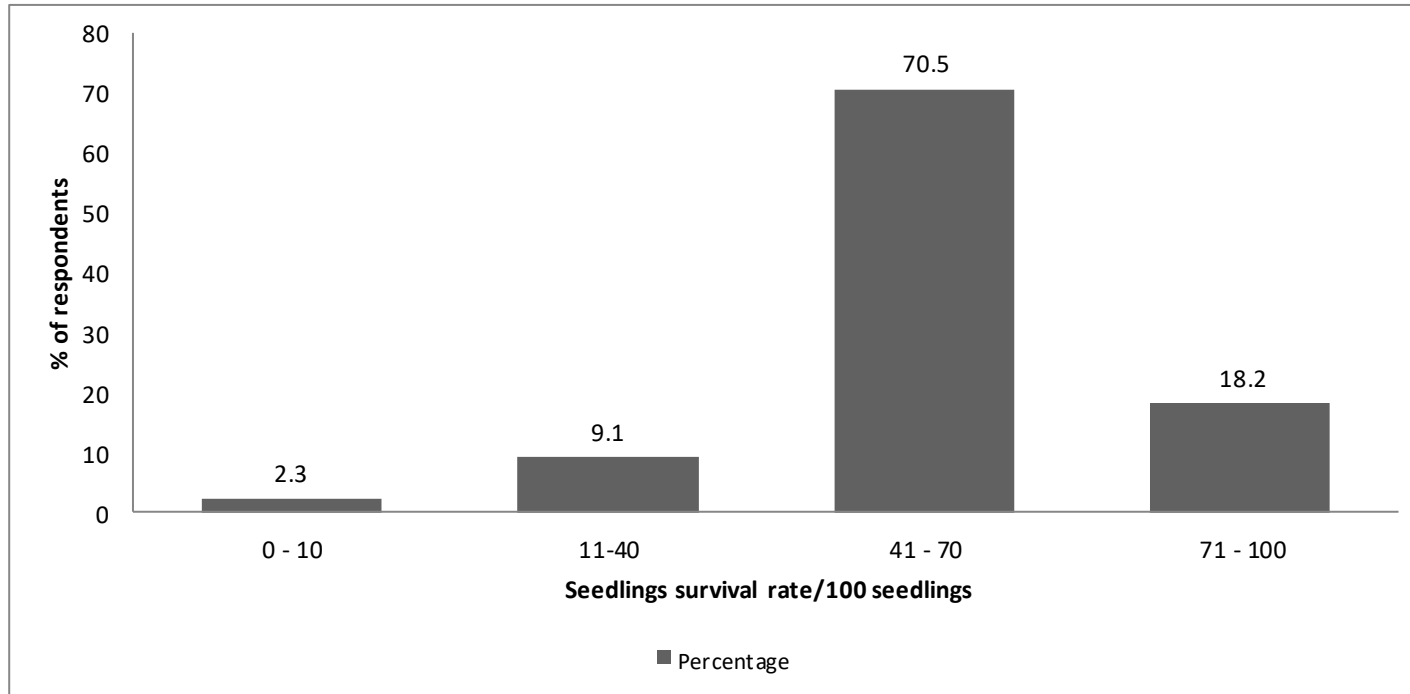


Figure 5.1 Tree survival rate post planting

5.3.2 Survival rate of the trees after planting

According to the findings *Eucalyptus* seedlings are very rare in the local nurseries and must be purchased some miles away from the study area and this increases the cost of establishing a *Eucalyptus* woodlot. Most the respondents indicated that they buy their seedlings from Tzaneen in specific nurseries that deals with timber seedlings. Government provides very little seedlings for the growers as a means of support under its DAFF responsibility. The survival rate of the planted seedling gives a clear reflection of the first rotation and the quantity of timber to be harvested. As reflected on Figure 5.1 poor survival rate indicates a financial loss to the *Eucalyptus* small-scale timber growers. Most respondents achieve only 41-70% survival rates out of the total planted seedlings. The respondents stated that poor survival rate is due to the environmental conditions and lack of silvicultural skills.

5.3.3 Policy challenges influencing the contribution of woodlots to livelihoods

The application process of the license also takes long and crowded with terms and conditions. The dissemination of information is being done regularly by the extension officers from the government departments such as Department of Environment, Forestry and Fisheries, Department of Water Affairs and Local governments. The small-scale timber growers also indicated that some of the rules and regulations are a stumbling block to funds and loans to manage their woodlots. This is well demonstrated on Table 5.1 below through ranking of factors.

5.3.4 Challenges faced during harvesting

The respondents indicated different challenges that affect them during harvesting. The challenges are as follows from the challenge with the highest impact to the lowest; expensive transportation, limited labour, lack of proper mechanical equipment, inadequate capital and limited accessibility such as lack of roads. These results are shown on Figure 5.3 below.

Table 5.1 Ranking of factors on policy challenges

Policy problems	Tallies	Total (Ranking)	Tallies	Proportion (%)
Very few empowerment programmes from the government, water bills are a problem for small grower		6		13.6
Extension officers' advice on policies and acts, trainings and workshops also help		5		11.3
DAFF always give advice on Policies and regulations leading to avoid challenges		10		22.7
Some policies limit partnering with large growers & water use licenses also create negative impact on the progress		12		27.2
The woodlot is small but water use bills are always sent		11		25.0
Total		44		

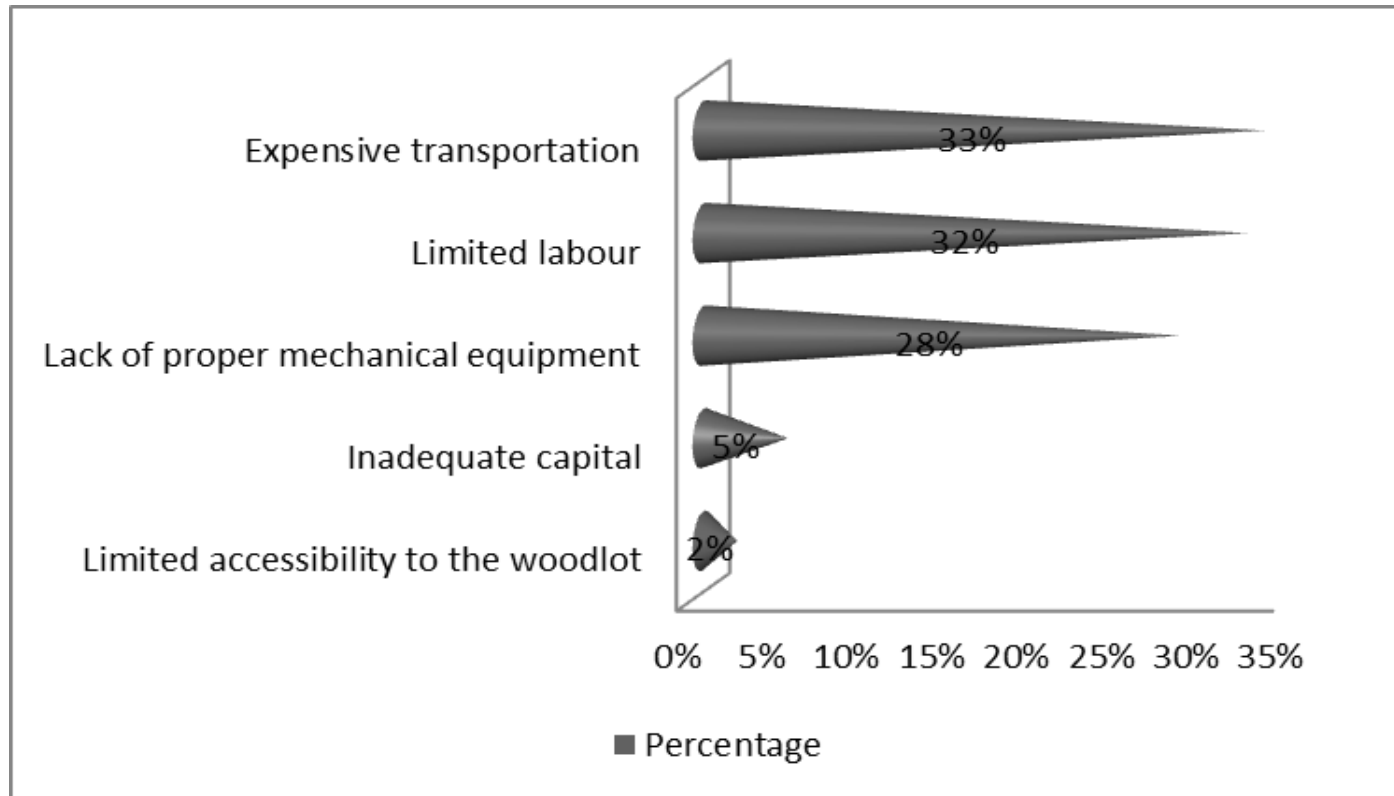


Figure 5.2 Challenges faced during harvesting in the *Eucalyptus* wood

- **Expensive transportation**

According to the results of the study as reflected on Figure 5.2 above, 33% of the participants have indicated that transport expense has a very high impact on the contribution of the *Eucalyptus* woodlots to their livelihood. The participants reflected that most of the times after harvesting of timber harvested timber remain in the woodlots due to lack of transport to the market, this gives advantage to the manipulative buyers who refuse to pay normal price but negotiate for less prices since they are using their own transport.

- **Limited labour**

The small-scale timber growers in the study area of Vhembe District face limited labour as a challenge, 32% of the growers in the study area have limited labour leading to poor production in their *Eucalyptus* woodlots, and this is also reflected on Figure 5.2. The respondents also indicated that much of labour they have is foreign and unskilled leading to limited performance due to fear of enforcement agencies such as South African Police Services (SAPS). As part of results it is reflected that in the study area most of the small-scale timber growers should operate on their own with their family members due to limited labour. This is also reflected on the ranking of factors below in Table 5.2




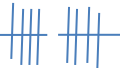
- **Lack of proper mechanical equipment**

The unavailability of harvesting infrastructure such as chainsaws and other felling equipment was found to limit the farmers' productivity. The results on Figure 5.2 indicate that 28% of the respondents claimed to be using the little money they have to hire these implements when needed. The implements of those who had them were old and poor in quality. Most of the respondents indicated that they own only one chainsaw in their woodlots.

- **Inadequate capital**

The results in Table 5.2 to 5.5 and Figure 5.3 indicate that Small-scale timber growers have significantly built on the asset base that is natural, social human, financial and physical capital of rural livelihoods but many challenges remain. Under social capital some capacity in growers' cooperatives has been built, cooperatives are used mainly for administration purposes and cannot generally negotiate for better terms of contracts and market. Most of the growers are complaining about the shortage of land space especially due to policies and local land laws that limit the expansion of plantation areas. There is lack of funds and loans for the small-scale timber growers from different institutions due to lack of security such as title deeds for the land ownership. The influence of inadequate capitals is well illustrated through the ranking of factors below.

Table 5.2 Ranking of factors on limited labour and human capital

Human capital	Tallies (Ranking)	Total Tallies (Ranking)	Proportion (%)
Unskilled part time workers		12	27.2
Part-time workers are hired during busy periods and experience of the owner help to train the workers		6	13.6
Usually employ people from the local village, the owner helps to train his own workers		16	36.4
Part-time workers are hired during busy periods		10	22.7
Total		44	

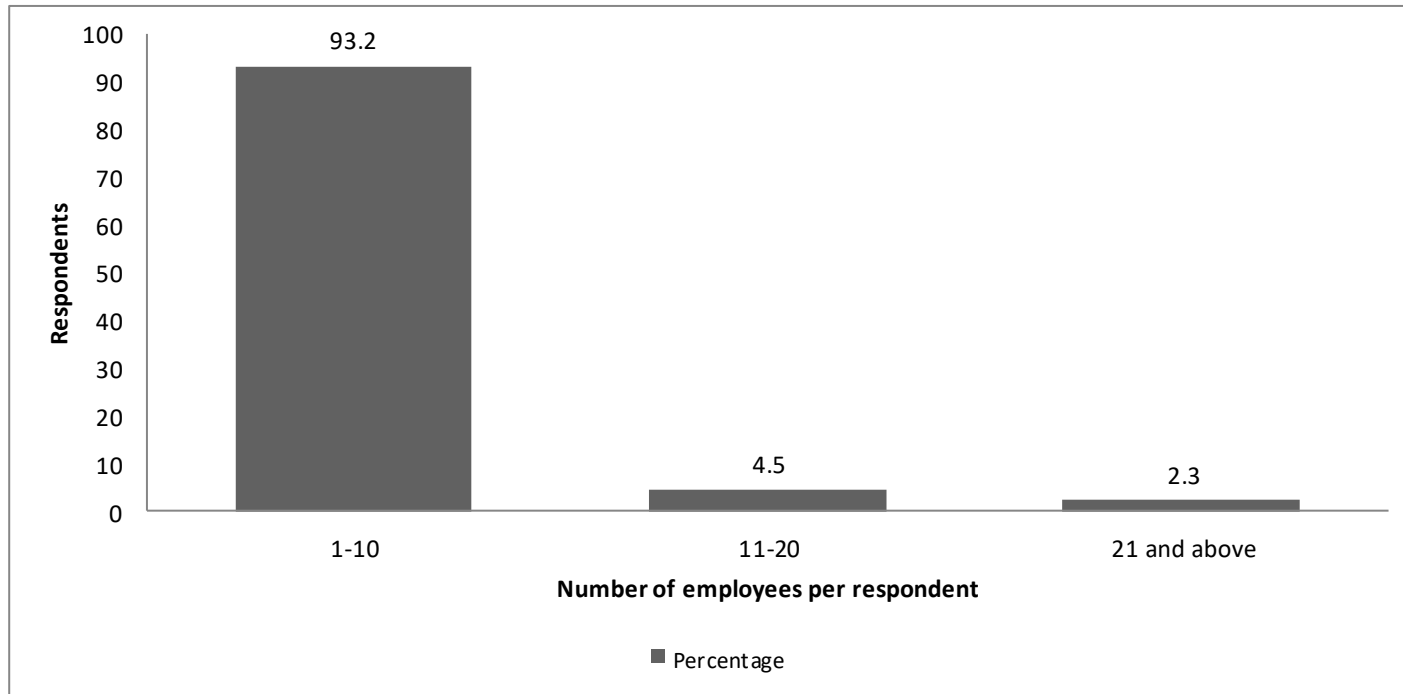


Figure 5.3 Employment pattern in the *Eucalyptus* woodlots





Table 5.3 Ranking of factors on natural capital

Natural capital	Tallies (Rankings)	Total Tallies (Ranking)	Proportion (%)
The land available is currently enough		16	36.4
Demand has increased and more land is needed		23	52.3
Less than half of the area has been planted		4	9.1
Still using the area given by the chief yet more land needed		1	2.3
Total		44	

Table 5.4 Ranking of factors on social capital

Social capital	Tallies	Total Tallies (Ranking)	Proportion (%)
Most of the customers are from the local area, there are customers from the hardware also		17	38.6
Sometimes timber is sold to sawmills but prices should be negotiated, local customers are the most preferable		16	36.4
The timber is sold to different customers at different prices and to sawmills on T&Cs	 —	9	20.5
Total		44	

Table 5.5 Ranking of factors on financial capital

Financial capital	Tallies	Total Tallies (Ranking)	Proportion (%)
Need for funds, No loans from banks, No funds from government		19	43.2
Funding is the biggest challenge and loans are always rejected		19	43.2
A R100 000 loan application was rejected due to lack of title deed		1	2.3
The first waiting period is hectic since there is nothing to sell. Loan applications always end fruitless		5	11.4
Total		44	

- **Limited accessibility to *Eucalyptus* woodlots**

Eucalyptus woodlots in the study are situated in the rural areas of Vhembe where accessibility is a problem. The roads to the woodlots are not accessible and some of the woodlots are in the mountainous areas. The respondents indicated that limited accessibility reduces their participation in the larger timber market. Harvesting in the area with limited accessibility is costly, increasing the expenses of harvesting operations.

5.3.5 Environmental conditions in the area

The following are the environmental conditions in the area. As indicated on Table 5.1, 41% of the respondents indicated that they experience dry winters and fluctuating climatic conditions. Some of the areas have fertile lands for woodlot production. Some highlighted that strong winds normally break the trees. Table 5.6 and 5.7 below also show more details through ranking of factors.

5.3.6 The effects of forest and veld fires

Regarding fire, every participant indicated that they experience constant threat from fire and timber theft is very low in the study area. According to the response from the participants it is impossible to calculate the value of timber stolen by criminals because so many incidents are unreported, and in many cases the losses are not accurately quantified. Table 5.8 below gives more review through ranking of factors on forest and veld fires in the study area.

5.3.7 Effects of pests on timber production in the *Eucalyptus* woodlots

According to information from the small-scale timber growers there are various diseases and pests damaging early plantations. According to the respondents there are no cases of pests' outbreaks that are uncontrollable. But the respondents experience different kinds of effects from the pests in the study area. Per the results 62% of the small-scale timber growers indicated that they have never witnessed any effect from the pests that they can outline as a problem since the establishment of their woodlots. 33% of the respondents indicated that they experience effect of pests during the seedling stages especially during the harsh climatic conditions when there is no rainfall. Only 5% of respondents indicated an effect of pests at harvest stage when timber has been kept for long; termites and bugs start to feed and create habitat on the untreated timber. This is reflected on figure 5.4 and Table 5.9 below also give more analysis by ranking of factors on effects of pests and diseases.

Table 5.6 Ranking of factors on environmental conditions in the study area

Environmental condition	Tallies (Rankings)	Total Tallies (Ranking)	Proportion (%)
The area can be very dry and the seasons can be unstable		1	2.3
Unstable climatic conditions, winter can sometimes be very dry and increasing the risk of fire		40	90.9
Summer is hot and with rain, strong winds that break some trees		1	2.3
the area has fertile soil with abundance of moisture during summer		1	2.3
Water availability: Planting is done during rainy season since the sources are protected by the law		1	2.3
Total		44	

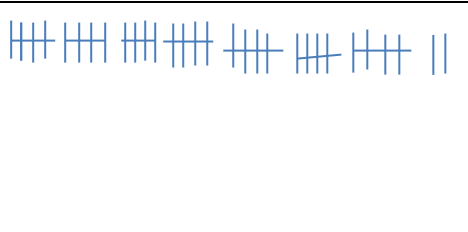



Table 5.7 Environmental conditions and their impact on the *Eucalyptus* woodlots

	Environmental conditions	No. of respondents	Impact on woodlots
1.	Dry winters	18	Majority of the growers indicated that dry winters have a negative effect on tender seedlings and also increase the chances of veld fires in the woodlots areas.
2.	Fluctuating Climatic conditions	18	Fluctuating climatic conditions reduce a stable development of <i>Eucalyptus</i> leading to retarded growth of trees and reduced timber quality.
3.	Fertile soils	16	Fertile soils were mentioned to be very influential during the establishment stages of the seedlings. Woodlots in the fertile soil areas have an earlier harvest rotation than woodlots in the rocky mountainous areas.
4.	Strong winds break trees	1	Depending on the position towards the wind direction the trees can be vulnerable to damage by wind. Taller thin trees usually break leading to poor timber quality for the market.

Table 5.8 Ranking of factors on Forest and veld fires in the study area

Forest and veld fires	Tallies	Total Tallies (Ranking)	Proportion (%)
Every year fire incidences take place		9	20.5
Fire is a biggest threat since the woodlot is surrounded by natural forest, the forest has been burnt more than 3 times since establishment		17	38.6
The woodlot was burnt to ground and it had to be replanted		2	4.5
More than half of the woodlot was once burnt since establishment		5	11.4
The woodlot is in a high fire risk area		7	15.9
Total		44	

Table 5.9 Ranking of factors on effects of pests and diseases

Effects of pests and diseases	Tallies	Total Tallies (Ranking)	Proportion (%)
No effect of pests and no diseases has been recognized yet due to lack of specific monitoring		37	84.1
7 years ago, seedlings were attacked by pests before they can be planted, sometimes felled timber gets attacked by termites		1	2.3
Harvested timber is mostly attacked by pests		4	9.1
If the timber is kept for too long it gets attacked by insects as feed and habitat		2	4.5
Total		44	

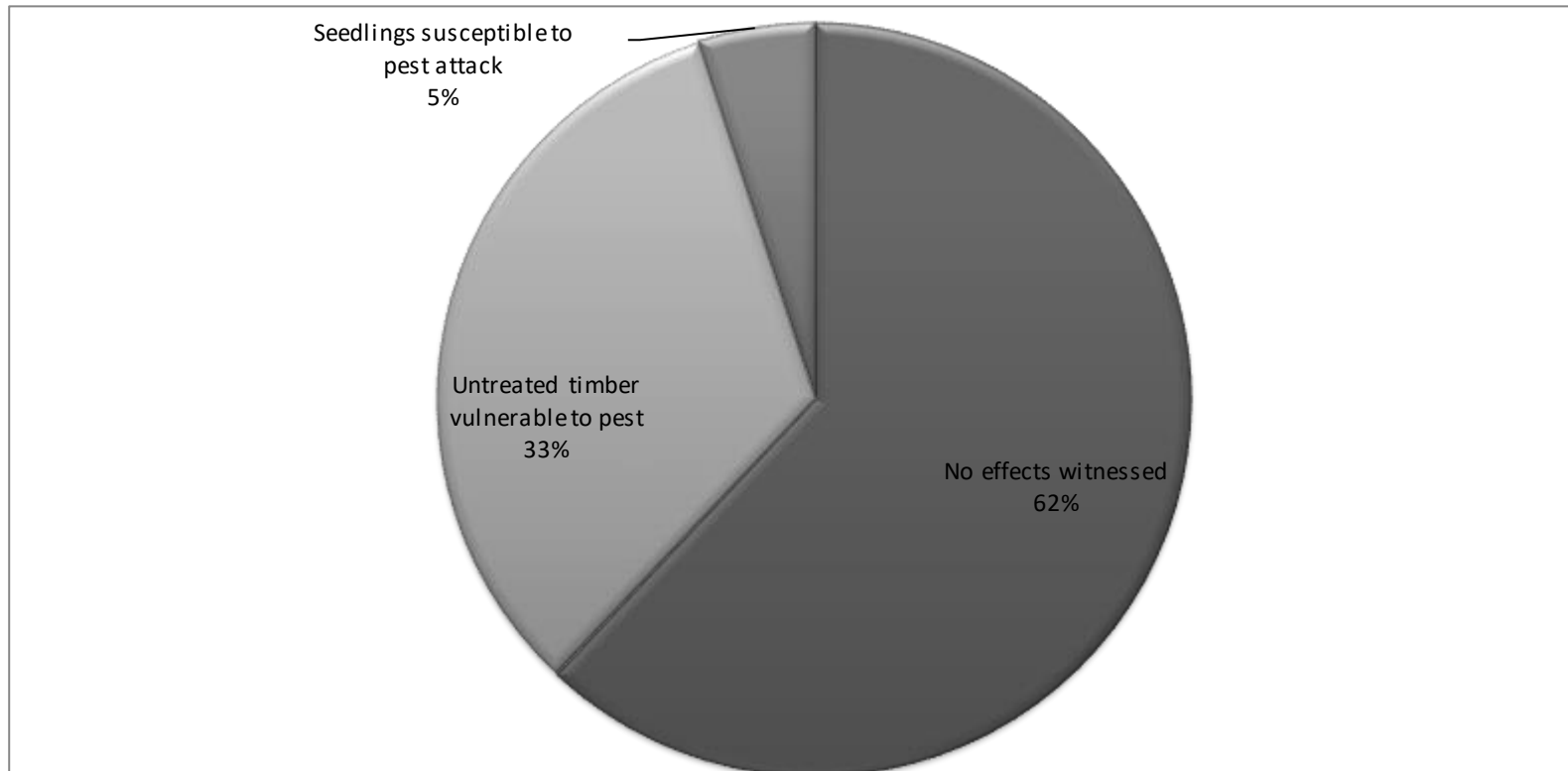


Figure 5.4: Effects of pests on production in the *Eucalyptus* woodlots

5.4 Discussion

The aim of this study was to identify the factors affecting the contribution of *Eucalyptus* woodlots to the small-scale timber growers' livelihood. Through the response from the small-scale timber growers the following factors were identified as the main factors establishing, managing and harvesting the *Eucalyptus* woodlots. Unavailability of certain capitals and assets such as land, finance, equipment, human capital etc. might lead to poor performance of the woodlot hence reducing its contribution to the livelihood of the small-scale timber grower (Ledger, 2017). Majority of the respondents lack the needed capitals and assets for the proper running of the woodlot. Silvicultural factors involve the science of managing a plantation or a woodlot from the stage of establishment to maturity, this require skills and knowledge to properly manage the plantation or a woodlot based on certain forestry principles (Birhanu & Kumsa, 2018). Per the respondents the woodlots are not managed according to principles. Respondents are dependent on rain for planting and some even plant during dry season hence this is the cause of poor survival rate of the planted trees. The lower the survival rate the lower the timber to be harvested hence the lower the contribution to the livelihood of the small-scale timber growers.

Policies and regulations are like the co-drivers of the forestry industry; the respondents usually get trapped and delayed from progress due to some policies and regulations. The respondents identified the Water Use License act as the most progress delaying policy especially to the small-scale timber growers. There are different policies that are made to regulate the use of water by different industries and enterprises such as mining, farming, forestry, energy suppliers and others. The planting of *Eucalyptus* has also been regulated under the implementation of acts (SANBI, 2017). Most of the small timber growers own small area of land yet they are requested to pay the water use rates bills. At some point a proposal was made that woodlots owners of area 10 hectares and below shall not pay the bill, currently the small-scale timber growers continue to receive the bills requesting them to pay for the water use license. Challenges during harvesting can reduce the income to be made and the quantity of timber to be produced. The respondents indicated different challenges that affect them during harvesting. The challenges are as follows from the challenge with the highest impact to the lowest; expensive transportation, limited labour, lack of proper mechanical equipment, inadequate capital and limited accessibility such as lack of roads. Environmental conditions are a major factor on the quality and ability of *Eucalyptus* woodlots to produce maximum timber load as planned. This is because it involves the growing medium and effects from the atmosphere. According to Keenan *et al.* (2015), most of the environmental conditions are out of their control and means of involvement for correction are

costly. For example, some woodlots are situated in rocky areas where the soil is not fertile and lack necessary nutrients to produce strong timber and leads to retarded tree growth hence unlike in crop farming, improving soil fertility might be costly since large quantities of fertilizers will be needed (Appiah & Pappinen, 2010). Respondents therefore depend on the organic matter in the area and the ability of *Eucalyptus* to adapt to the soil content. The small-scale timber growers also mentioned the following environmental conditions as having negative impact on their woodlots; dry winters, fluctuating climatic conditions and strong winds breaking trees. According to a study by Osawaru *et al.* (2015), environmental conditions with negative impact leads to poor production in the *Eucalyptus* woodlots, with an unstable fluctuation of income generation. Other years are noted to be dry and having low rainfall; growing *Eucalyptus* in low rainfall areas may cause adverse environmental impacts due to competition for water with other plant species and an increased incidence of allelopathy (Githiomi & Kariuki, 2009). This limits the *Eucalyptus* woodlots from performing at their best rate and leading to low production. Fire is a natural control tool when properly used and well administered, the constant threat to the woodlots can be controlled through creation of fire breaks around the *Eucalyptus* woodlots, avoiding unnecessary use of fire and making awareness to the local communities about the negative impact of fire to farms and woodlots (Capone *et al.*, 2016). Timber theft in the *Eucalyptus* woodlots in Vhembe area is very low, yet to the few affected small-scale timber growers it causes unexpected loss in terms of timber production in the woodlots. In terms of pests' effect, the overall conclusion is that there are no pest outbreaks that affect woodlots especially at the tree stage. This is due to the adaptability of the tree species to the study area, most of the *Eucalyptus* species grown in the area have developed the ability to withstand attack by the pests and diseases in the area and there is a low population of native pests since the *Eucalyptus* species grown are exotic to the study area (Ambele *et al.*, 2018)

5.5 Conclusion

The aim of this chapter was to identify the factors affecting the contribution of *Eucalyptus* woodlots to the small-scale timber growers' livelihood. Different factors were revealed during the study and their effects were identified. Hence, attention should be given to manage the identified factors and change small-scale timber growers' attitude to optimize the ability of *Eucalyptus* woodlots to improve livelihoods. Majority of the respondents identified silvicultural factors and environmental factors to have much effect on the progress of the *Eucalyptus* woodlots leading to low production and causing negative effect on small-scale timber growers' livelihood. Variables with positive and negative effects on *Eucalyptus* woodlots were identified. Factors had significant effect on the contribution of the woodlots to

the growers' livelihood are; water availability, survival rate of the trees after planting, policy and regulations challenges, challenges during the harvesting periods and environmental conditions. Per the respondents, timber theft and fire are not a challenge since most of the incidences were not reported as cases. The pest attacks in Vhembe District on the *Eucalyptus* woodlots were not recognized as a significant factor since most of the products were traded for the local markets which do not check the quality of the products.

Chapter 6: General Discussion, Conclusion and Recommendations integrated with solutions to improve the contribution of *Eucalyptus* woodlots to livelihood of small-scale timber growers in Vhembe district

Abstract

Cultivation of *Eucalyptus grandis* trees at a farm level in the form of woodlot has become a common practice among rural households in Vhembe district. Currently, small-scale timber growers mainly establish *Eucalyptus* woodlot as a part of livelihood portfolio for meeting both household wood consumption and generating cash income. However, empirical evidence is lacking on the extent of small-scale timber growers' motivation in *E. grandis* woodlot production and means of improving contribution towards the growers' livelihoods. Consequently, this study developed the solutions and marketing strategies to improve the contribution of *Eucalyptus* woodlot towards the livelihood of small-scale timber growers in Vhembe district. A sequential explorative mixed study approach involving qualitative and quantitative methods was followed. The participants were selected using snowball sampling procedure. Semi-structured interview guides were utilised to collect qualitative data and a structured questionnaire for collecting quantitative data. Code-primary document tables and network diagram techniques of the Atlas ti version 8 software were utilised to generate themes and relationships for qualitative data. Quantitative data were analysed using the Statistical Package for the Social Science (IBM SPSS) version 25 tools and by ranking of components and computing descriptive statistics.

Key words: Livelihood, marketing strategies, small-scale timber growers, solutions, woodlots

6.1 Introduction

Eucalyptus grandis can start providing output from third or fourth year depending on the intention of the grower and type of the product to be extracted, if the planting sites have a good condition of nutrient and water (Dessie *et al.*, 2019). Generally, production and planting of *E. grandis* tree in the form of woodlot have a significant poverty alleviation role as a source of regular income, and improving most household's livelihood. Most of the small-scale timber growers lack the ability to increase the performance of their woodlots and solutions to encounter the negative effects over the *E. grandis* woodlots. The aim of the study was to assess the contribution of gum trees (*Eucalyptus*) woodlots to the livelihoods of small-scale timber growers. Specific objectives of the study were to establish the economic benefits made from the *Eucalyptus* woodlots by small-scale timber growers, to determine the factors affecting the contribution of woodlots to livelihoods of small-scale timber growers and developing solutions to improve the contribution of *Eucalyptus* woodlots to livelihood of small-scale timber growers in Vhembe district.

Management practices (site preparation, weeding, fire and stock protection, felling at the correct time) have been shown to vary considerably among small-scale timber growers in Vhembe district, significantly affecting yields and net profits from the woodlots (Forestry South Africa. 2010). Small-scale timber growers fell too early in order to obtain cash when needed for urgent situations (Getahun A. 2010). Through this study it was reflected that poor management practices are one of the challenges leading to low woodlots output and less contribution to farmers' livelihoods.

Limited capital (financial, natural, physical, human and social) among the small-scale timber growers were also identified as a stumbling block towards expected output Chapter 5. The numbers of *Eucalyptus* small-scale timber growers that have emerged are relatively smaller compared with the number of overall growers (Mwase *et.al.* 2015). Small-scale timber growers' projects have less potential than other tree production projects to support linked income generating activities in the forestry industry (Kelemu and Tadesse, 2010). By ranking of components that hinder productivity of *E. grandis* woodlots, limited capitals among small-scale timber growers in Vhembe district were identified and reviewed to produce possible solutions (Chapter 5). There were also other few attributes that showed significant contribution towards the livelihoods of the *Eucalyptus* small-scale timber growers in Vhembe district (Chapter 4 and 5). These include area, employment income, and income generating activity, forestry skills and market availability. In this Chapter the key findings of the study, their discussion and possible solutions to challenges faced by the timber growers and hence recommendations are presented.

6.2 Methodology

The study was conducted in Vhembe District Municipality (DC43). It is a category C municipality located in the Northern part of Limpopo Province and shares borders with Capricorn and Mopani District municipalities in the eastern and western directions, respectively. The sharing of borders extends to Zimbabwe and Botswana in the north-west and Mozambique in the south-east through the Kruger National Park respectively (Vhembe IDP, 2016; Figure 3.1). Vhembe district covers 27 969 148 km² area with a population of 1 393 949 and it is predominantly rural (Stats SA, 2016). Vhembe district geographical coordinates are 22°S to 24°S and 29°E to 31.5°E (Nenwini & Kabanda, 2013).

The mixed methods approach was implemented since all methods (quantitative and qualitative) had limitations, thus this research intended to reduce the bias inherent in individual methods. The methods that were adopted were based either on constructivism or positivism. Qualitative methods in exploratory research was used through open-ended questions and probing to give participants the opportunity to respond in their own words, rather than forcing them to choose from fixed responses, as quantitative methods do (Permani, 2014). Open-ended questions were used to evoke responses that are: meaningful and culturally salient to the participant, unanticipated by the researcher and rich and explanatory in nature.

Ethical clearance certificate was requested from the University of Venda higher Degrees Committee prior to community entry. Since the participants were from different areas meetings with small-scale timber growers had to be made to inform them about the study and its purpose, this also included an official from DAFF Forestry Development Limpopo since they are the main custodians of small-scale timber growing. A presentation was issued to the participants to inform them about their rights and distributing letters confirming informed consent to each participant. The names of the participants were not used in the questionnaire and other response sheets; this was done to maintain confidentiality. The population was comprised of small-scale timber growers owning *Eucalyptus* woodlots in the Local municipalities of Vhembe District. Both male and female small-scale timber growers participated in the study. The target population to all members who meet the particular criterion specified for a research investigation. Snowball sampling technique was used to select the 44 small-scale timber growers. Snowball technique was also made use of because of chain of referral system wherein one element of the population is approached at a time and then is asked to refer the investigator to the other elements of the population.

A semi-structured interview guide was used during data collection. Since semi-structured interview is open, it allowed new ideas to be brought up during the interview because of what the interviewee says.

6.3 Realisation of study objective

6.3.1 Establishing the economic benefits made from the *Eucalyptus* woodlots by small-scale timber growers.

The results of the study in Vhembe district revealed that the small-scale timber growers produce the following timber products; droppers, building poles, fencing poles, telephone poles, fuel wood, tomato poles, banana poles and timber for carpentry. The result of the study indicates that the small-scale timber growers in Vhembe District are limited to reach maximum production due to the identified factors and a proper intervention through strategies and supporting initiatives such as agro-forestry can maximize contribution to the livelihood of small-scale timber growers. The result on employment has revealed that the *Eucalyptus* woodlots in Vhembe district have the potential for job creation. Employment is one of the major economic contributions of the forest sector of different Eastern and Southern African countries (Nguyen *et al.*, 2015). This is achieved through both commercial forestry and small-scale timber growing in the rural areas (AFF, 2011). According to Ham & Theron (2010) reported that, small-grower schemes and *Eucalyptus* woodlots can be economically beneficial for the growers and create work opportunities for others. As reflected in chapter 4 the *Eucalyptus* woodlots have the potential to give out economic benefits.

6.3.2 Factors affecting the contribution of woodlots to livelihoods of small-scale timber growers

One of the specific objectives of the study is to identify the factors affecting the contribution of *Eucalyptus* woodlots to livelihoods of small-scale timber growers in Vhembe district. Unavailability of certain capitals and assets such as land, finance, equipment, human capital etc. might lead to poor performance of the woodlot hence reducing its contribution to the livelihood of the small-scale timber grower. More than (68%) of the *Eucalyptus* woodlots owners own 0-5ha of land space area. The income generation potential of *Eucalyptus* woodlot production is by far the main motivating factor indicated by large proportion of the producer households (chapter 4).

Policies and regulations are also the co-drivers of the forestry industry; the respondents usually get trapped and delayed from progress due to some policies and regulations. The planting of *Eucalyptus* has also been regulated under the implementation of acts (SANBI,

2017). Most of the small timber growers own small area of land yet they are requested to pay the water use rates bills. Therefore, forestry policies and regulations are influential in the productivity of the woodlots and its contribution to the small-scale timber growers' livelihoods.

Environmental conditions are also a major factor on the quality and ability of *Eucalyptus* woodlots to produce maximum timber load as planned. This is because it involves the growing medium and effects from the atmosphere. silvicultural factors and environmental factors have much effect on the progress of the *Eucalyptus* woodlots leading to low production and causing negative effect on small-scale timber growers' livelihood. As indicated in chapter 5 through the ranking of factors different factors were identified and represented on figures and tables.

6.4 Results of the Study

As mentioned the specific objectives of the study were to, establish the economic benefits derived from the *Eucalyptus* woodlots by small-scale timber growers, to determine the factors affecting the contribution of woodlots to livelihoods of small-scale timber growers and developing solutions to improve the contribution of *Eucalyptus* woodlots to livelihood of small-scale timber growers in Vhembe district. Qualitative results revealed major socio-economic benefits of the *Eucalyptus* woodlots such as timber production, employment and different Non-Timber Forest Products produced by small-scale timber growers in the woodlots. Results by ranking of components show that through *Eucalyptus* woodlots there is job creation potential. More than quarter (37%), of the respondents survives through *Eucalyptus* woodlots production since they are unemployed.

Per the study results, *Eucalyptus* have several important qualities for the smallholders; they are easy to establish even on degraded land and easy to manage, and have few natural enemies, a wide ecological range, good survival, high growth rate and a reliable source of cash income. The factors identified in the study were silvicultural factors involving the growing of the seedlings and maintenance of trees. The other factors reflected in this study were challenges during harvesting, labour and employment factors, lack of proper equipment, inadequate capital, poor environmental conditions, timber theft and veld fires and pest attack.

6.4.1 Marketing strategies utilized by the growers

Marketing strategies can be an effective means of improving the economic output of the woodlots. The respondents outlined different strategies they use to market their products in (Figure 6.1).

Majority of the respondents use the common marketing methods of posters and telephone communication to promote their timber. The methods are effective and less costly. Per the respondents marketing can be done from everywhere and at any time. The study shows that 16% of the respondents indicated that they engage in regular visits to different customers in the local area. Promotion through visitation is much costly due to transport costs but it is more effective in terms of price negotiations and creating business deals. Majority of the respondents are old and have little awareness about the use of social media as a marketing strategy. Only 9% of the respondents indicated that they use social media to market their timber, the growers using social media indicated that it is a less costly and faster means of communication. As a solution, the evolution of society and business requires that small-scale timber growers in Vhembe district become more sophisticated in their marketing efforts. A production-oriented approach to operations requires few “real” marketing efforts, but a focus on customer needs and satisfying those needs requires additional investments in planning and delivering products and/or services to the customer.

6.4.2 Support required by *E. grandis* woodlot small-scale timber growers

Most of the small-scale timber growers operate as individuals and lack support to stand against different challenges they come across. Some of the respondents indicated that their woodlots are failing to break into the commercial level because of lack of proper support from the government and other responsible structures such as development agencies. Table 6.1 below illustrates the importance of support needed by the small-scale timber growers. During the outlining of the local district municipality Integrated Development Plan small-holder forestry is given less consideration. Respondents outlined their needs and support that they consider to be a solution towards improving the contribution of woodlots to their livelihood. The supports suggested were outlined in an order of most needed to least needed based on majority of response on the support. These are presented in Figure 6.2.

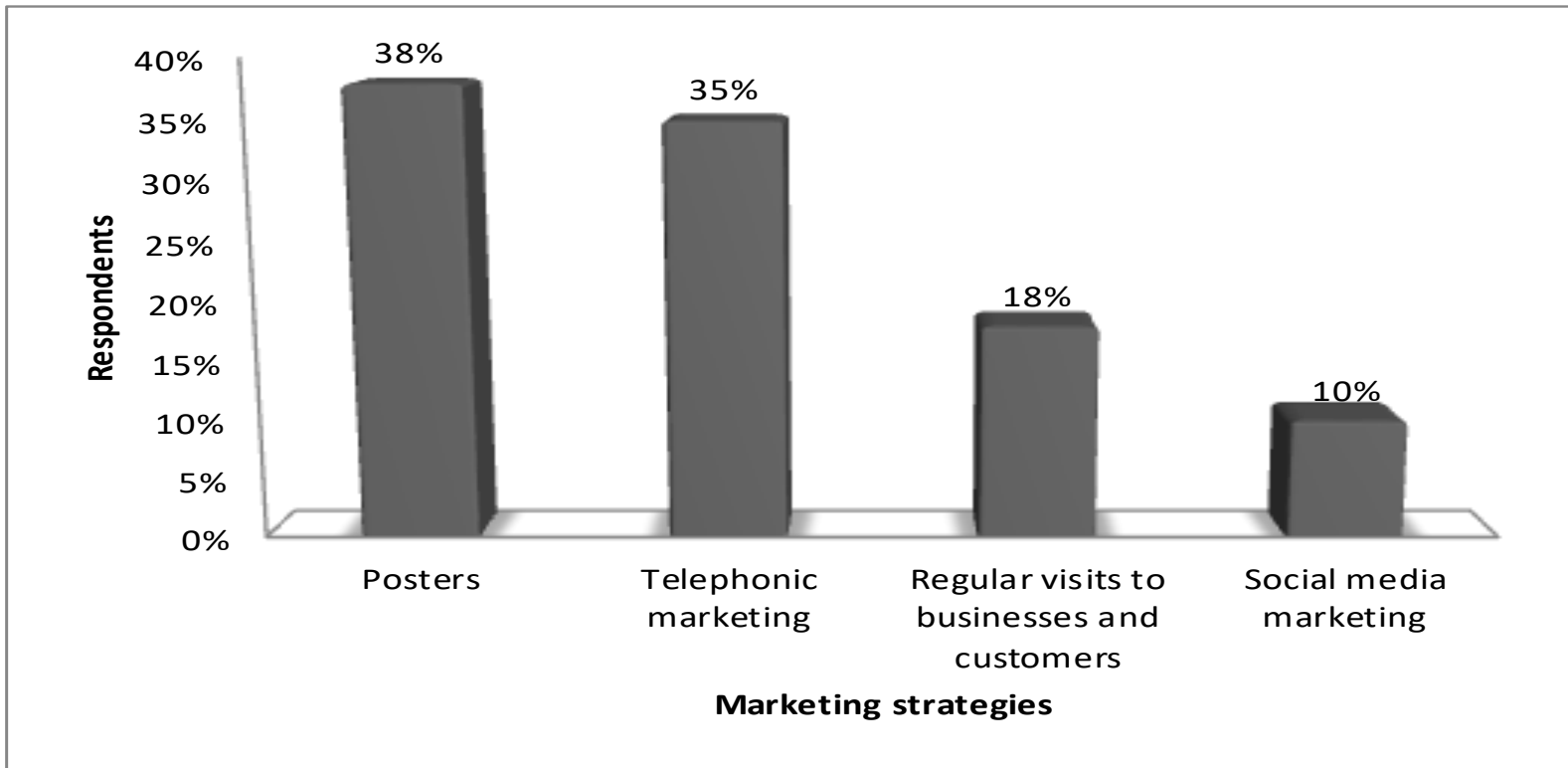


Figure 6.1 Small-scale timber growers marketing strategies

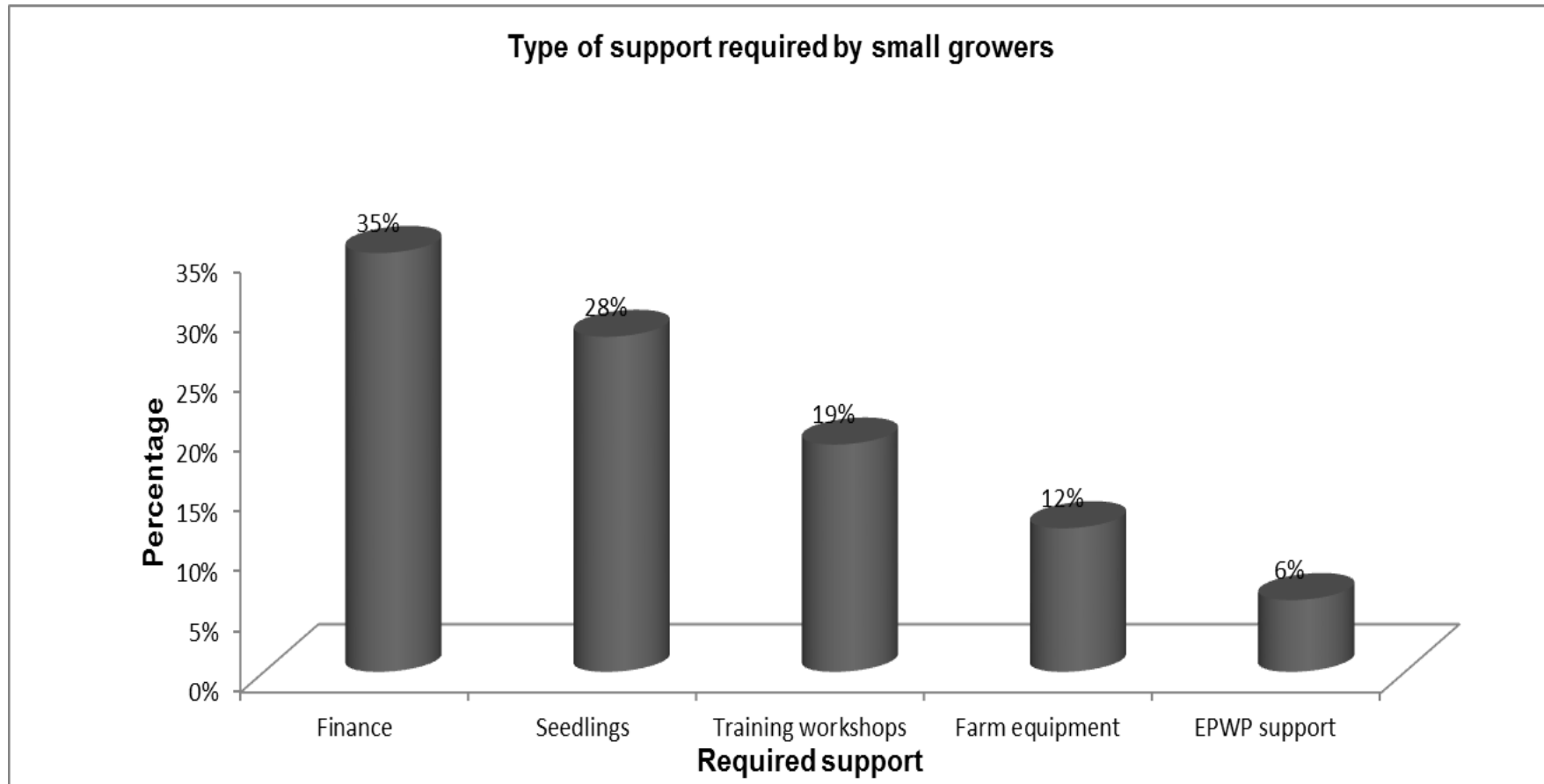


Figure 6.2 Support for small-scale timber growers

6.4.3 The importance of outlined support in the woodlot environment

The lack of capital for investment contributes significantly to the lowering of small-scale timber growers' productivity levels. The challenge to access agricultural credit from different financial institutions is longstanding. The study results show that about 35% of the participants need financial support to manage their *Eucalyptus* woodlots. Lack of seedlings in the local area leads to poor production and inability to expand the woodlots. As illustrated below in Table 6.1, seedlings support will allow the small-scale timber growers in Vhembe district to plant the total provided planting area and strengthen the livelihood. 28% of the respondents indicated that seedlings support is one of their vital needs as small-scale timber growers towards maximised timber production.

Training and education plays an important role in small-scale timber growers' development. Per the study 19% of the respondents indicated that there is a need for training and skills development support. Forestry is an equipment intensive practise and its performance and output is influenced by availability of equipment. The respondents indicated the high cost of equipment as a limitation towards their progress and ability to have maximum harvest. Expanded Public Works Programme (EPWP) as a government financed job creation programme in South Africa, it can work through different departments and municipalities to achieve its goals of creating jobs in different industries including forestry. Working together with DAFF responsible for small-scale timber growers' support provision jobs can be created as part of the programme for skilled workers to work in the *Eucalyptus* woodlots in Vhembe district.

6.4.4 Availability of the timber market

The respondents' rate of production and courage to continue with timber growing is based upon the availability of market in the area. The respondents mostly sell their timber without being processed and very few also sell non-timber products such as honey, poultry and macadamia nuts. The non-timber products help with income generation for the families as they are waiting for the harvesting period which takes a minimum of 3 to 4 years. As illustrated in chapter 4, 89% of respondents agreed that there is market for their timber products and only 11% of respondents indicated that there is difficulty in reaching the timber market.

Table 6.1 The importance of outlined support in the woodlot environment

	Support	Percentage	Description and importance
1.	Financial	35%	The respondents indicated that lack of capital for investment contributes significantly to the lowering of small-scale timber growers' productivity levels. The challenge to access agricultural credit from different financial institutions is longstanding. They indicated that availability of financial support will move their woodlots to an improved production level with a higher income generation ability and job creation mechanism.
2.	Seedlings	28%	Seedlings are the back bone of <i>E. grandis</i> woodlots. Most of the respondents buy seedlings for planting and from nurseries far away. As indicated in Figure 5.3 most of the respondents achieve less than 70% seedlings survival rate. Lack of seedlings leads to wasted land space without being planted. Small-scale timber growers in the study area plant $\pm 1\ 700$ trees per ha, yet due to lack of seedling they are failing to achieve the expected planting rate leading to low output. Seedlings support will allow the small-scale timber growers in Vhembe district to plant the total provided planting area and strengthen the livelihood.
3.	Trainings and workshops	19%	Training and education plays an important role in small-scale timber growers' development. Per the respondents', majority of them were crop farmers and fruit orchards owners hence they converted to timber growing without acquiring any skills or knowledge. Training workshops can be used to educate small-scale timber growers on technical skills that can improve the quality of produce from small-scale timber growers.

	Support	Percentage	Description and importance
4.	Equipment	12%	Forestry is an equipment intensive practise and its performance and output is influenced by availability of equipment. The respondents indicated the high cost of equipment as a limitation towards their progress and ability to have maximum harvest. One of the challenges for the future is to exploit technologies (communications and logistical) which will enable owners of <i>Eucalyptus</i> woodlots in Vhembe district to participate fully in commercial wood markets.
5.	Expanded Public Works Programme (EPWP) Support	6%	Expanded Public Works Programme (EPWP) is a government's flagship job creation programme. It is also used as a support mechanism by different departments. The DAFF implemented the programme to assist the small-holder farmers in the study area and few small-scale timber growers also benefited. The respondents have indicated lack of human capital and in some instances growers work as a family leading to poor performance. EPWP as a government financed job creation programme in South Africa, it can work through different departments and municipalities to achieve its goals of creating jobs in different industries including forestry. Working together with DAFF responsible for small-scale timber growers' support provision jobs can be created as part of the programme for skilled workers to work in the <i>Eucalyptus</i> woodlots in Vhembe district.

6.5 Discussion

Eucalyptus woodlots hold an obvious potential to contribute to improve the livelihood of the poor small-scale timber growers in Vhembe district. The genus is afflicted with many controversies that reduce the options to explore its full socioeconomic potentials (Indufor, 2011). The results of the study in chapter 4 show that in terms of employment point of view, the most participating group in the heading individuals in *Eucalyptus* woodlots are self-employed group and the least participants were from the employed group and pensioners. This is because the last two categories have their own source of income through employment in other sectors or pensioners who receive government grant and retirement benefits after working in different sectors. The results also indicated that the small-scale timber growers also produce Non-Timber Forest Products (NTFPs) as means to have income during the waiting period of timber to mature which usually take a minimum period of 3 to 4 years. In chapter 5 the key findings confirmed that farm size, access to market and perception of farmers towards *Eucalyptus* woodlot production were positively and significantly affected the adoption of *Eucalyptus* woodlot by small-scale timber growers. Poor management of the *Eucalyptus* woodlots lead to high risk of natural resources depletion, as a results livelihood of the people will be affected as the quality and quantity of wood and other products declines.

The respondents in the study indicated that the marketing strategies also affect the performance of the *Eucalyptus* woodlots. As figure 6.1 shows, majority of the small-scale timber growers utilize posters as the most affordable means of marketing their business yet this does not mean it is the most effective method of marketing. As a recommendation, the Department of Agriculture, Forestry and Fisheries (2012), recognises the important role that marketing cooperatives play as they allow producers to accomplish collectively what they cannot achieve individually. Most small-scale timber growers have relatively little or no bargaining power or influence with large buyers, hardware, agribusinesses, processors or food companies that purchase their products (Kebebew and Ayele, 2010). Therefore, joining other producers in a cooperative and pooling their products together can give them greater bargaining power in the marketplace, be it in the agricultural, forestry or fisheries subsectors (DAFF, 2016). Andika *et.al.* (2014) indicated that in countries like Kenya and South Africa it may be possible to fast-track the development of organisational structures by capitalising on the widespread availability of web-based technologies and utilising current logistical technologies, and available sophisticated

timber harvesting equipment, to facilitate a working together management of the fragmented small-scale timber resource.

Eucalyptus can start to provide income from age 3-4 in the study area excluding in-between benefits. Earlier thinning (two to four years and even less if the site is good) of dense *Eucalyptus* plantations can provide stakes for the construction of walls of traditional houses (Mtengu & green, 2016). Lack of proper support of resources leads to low contribution of the woodlots to the livelihoods of the small-scale timber growers. This is well illustrated on Table 6.1; the participants showed that the following are the most required support; financial support, *Eucalyptus* seedlings, training and workshops, equipment and EPWP support for jobs creation. Evidently, *Eucalyptus* small-scale timber growing contributes to social cohesion and has helped to foster rural development (Robertson, 2018). Furthermore, small-scale timber growing has a potential to contribute to developing rural communities by providing employment in the form of low and semi-skilled employment, after which the workers can improve and add to their skills. All these can be made possible through the support listed in Table 6.1

The income found from *Eucalyptus* woodlots satisfies the daily expenses and needs of small-scale timber growers and their families as indicated by the respondents. *Eucalyptus* generates income to the owners from its early ages and this makes the cash-flow more consistent compared to other tree species. Every part of *Eucalyptus* (leaves, barks, stems and roots) have value at the local market and/or in the household of the small-scale timber growers (Agasha, 2015). Yet the evolution in the market has led to limited market accessibility, small-scale timber growers in the study area are stuck to outdated market approaches leading to low output of their products.

Out of the results of the study several solutions can be derived and also based on different literature. Through comparison with similar small-scale timber growing initiatives following possible solutions were derived. According to Glover *et.al.* (2013), improving the return on forestry investments through the increased scale of small-scale forestry and participation in downstream processing can increase and accelerate access to State land. Different stakeholders in the industry can derive access to funding through the establishment of facilitation agencies, offering collateral certificates and subsidies and/incentives. Under poor economic situations there is need to improve access to financial services such as commercial banks and agricultural banks (Ardolf & Jeckoniah, 2018). Responsible government departments and related stakeholders should improve provision of extension and support services.

6.6 Conclusion

There is a significant economic benefit from *Eucalyptus* woodlots and the most common benefit is employment among the respondents. *Eucalyptus* woodlots have a potential to take poor small-scale timber growers out of the poverty trap. Majority of the respondents were unemployed; the woodlots were identified as an active means of job creation. The *Eucalyptus* woodlots also contribute into the local Vhembe District economy. Different factors were revealed during the study and their effects were identified. Hence, attention should be given to manage the identified factors and change small-scale timber growers' attitude to optimize the ability of *Eucalyptus* woodlots to improve livelihoods.

As the government lacks capacity in terms of manpower and finances to support adequate development initiatives, facilitating partnerships through policy and other avenues within their jurisdiction helps create enabling environments for investment, poverty reduction and ensuring that communities gain social and economic empowerment. Implementation of modern marketing strategies can be a solution towards expanding the small-scale timber growers market outside the local area. When the market is more expanded growers also get better selling prices. There is a need to improve the ownership and management of the woodlots, most woodlots fail to perform due to management strategies implemented. Most of the woodlots managed as cooperatives are performing poorly which is due to lack of skills and knowledge to run a business structure. Trainings and workshops can be a solution towards improved woodlot management and ownership. Promoting business partnership can be a solution towards creating market for the small-scale timber growers. In South Africa's forestry sector, various factors continue to motivate community-company partnerships. Apart from existing relationships between forest companies and communities, there's still potential for partnerships on existing commercial plantations, community woodlots, and indigenous forests and on newly afforested communal land.

6.7 Recommendations

6.7.1 Recommendation for Practice

This study supports the literature indicating that small-scale timber growing of *Eucalyptus* has the potential to improve the livelihoods of small-scale timber growers in Vhembe district. Small

growers in the study area belong to the Previously Disadvantaged Individuals (PDI) group leading to a significant lack of resources and capital to invest into the *Eucalyptus* woodlots to turn them into a business entity that can contribute to their livelihood. Different factors identified such as poor silviculture practices, lack of needed capital, unfavourable policies and regulations, lack of suitable market and environmental factors needs to be addressed to increase the potential of *Eucalyptus* small scale timber growing to eradicate poverty in the lives of small growers.

The key findings can also be an important contributor in the local government Integrated Development Plan (IDP) on the Agriculture and Forestry section (Agro-Forestry). The main custodians in the forestry sector such as Forestry South Africa and Department of Environment, Forestry and Fisheries need to create programmes and integrated support plans for the *Eucalyptus* small-scale timber growers in the study area and in South Africa.

6.7.2 Recommendation for Policy

The forestry sector toolkit cannot be complete without financial support; most small-scale timber growers lack financial support from both the government and financial institutes due to lack of different requirements such as title deeds and prove of land ownership. Therefore, the government should intervene to open the financial doors for the small-scale timber growers. Water use licences also hinders the effective production of the *Eucalyptus* small-scale timber growers due long waiting periods and water bills for small woodlots. Policy makers need to create favourable operating environment for the small-scale timber growers concerning water use licence applications, title deeds and land opportunity ownerships.

Some of the woodlots are not registered as business entities because of paper work and the process to be gone through during registration. Majority of the *Eucalyptus* woodlots owners are illiterate or having low level education and this makes it difficult to register their woodlots as legal business entities such as cooperative or companies. More support from the main custodians of forestry such as DAFF and Forestry South Africa is needed to assist the woodlot owners to register their woodlots as legal business entities. Registration of the woodlots will allow more opportunities and open doors towards financial support.

6.7.3 Future Research Area

Per the current study it is recommended that further study should be conducted comparing the livelihood of timber suppliers and *Eucalyptus* small-scale timber growers selling to timber

suppliers with households that do not practise timber growing. By applying the Sustainable Livelihood Framework to a particular study area, the actual contribution that timber growing makes to the community as a whole can be determined.

There is also a need for an enquiry into the role that local institutions such as large forestry companies and timber distribution businesses can play to create more co-ordination in the area. Further investigation is needed to determine if small growers that waited for optimal tree maturity and engaged in other forms of income, such as the selling of forestry by products, produced significantly better yields from timber growing than those who participated in the felling of immature trees. Finally, a need exists to investigate the potential of introducing other income-earning activities which *Eucalyptus* small-scale timber growers could embark on while waiting for their timber to mature. It is also recommendable to develop a productivity studies to provide empirical data on performance of the woodlots.

References

- African Forest Forum, 2011. Forest Plantations and woodlots in Tanzania. A platform for stakeholders in African Forestry, 1(16):35-39
- Agasha A. 2015. FSC Visit to KwaZibi Area: FSC Smallholder Support Manager. Manguzi, KwaZulu-Natal, 7 September
- Ahimbisiwe, V. Auch, E. Groeneveld, J. Tumwebaze, S and Berger, U. 2019. Drivers of household decision-making on land-use transformation: An example of woodlot establishment in Masindi District, Uganda. MDPI. <http://www.mdpi.com/journals/forests>
- Alao, J. & Shubaibu, R. 2013. Agroforestry practices and concepts in sustainable land use systems in Nigeria. *Journal of Horticultural and Forestry*, **5**: 156-159.
- Albaugh, J. Dye, P. and King, J. 2013. Eucalyptus and water use in South Africa. *International Journal of forestry research*, 11(1): 1-2
- Ambele, F. Bisseleua, D. Babalola, O. and Ekesi, S. 2018. Soil-dwelling insect pests of tree crops in Sub-Saharan Africa, problems and management strategies—A review. *Journal of Applied Entomology*, 142(6), 539– 552.
- Andika, O. Gori, C and Ogola, O. 2014. The potential of farm level forestry enterprises by small-scale farmers in selected Arid and Semi-Arid (ASALs) in Kenya). *Journal of Agricultural and Ecology Research International*. 1(1):51-56
- Anseeuw, W. and Mathebula, F. 2008. Evaluating land reforms contribution to South Africa's pro-poor growth pattern. TIPS annual forum. CIRDA and University of Pretoria
- Appiah M and Pappinen A. 2010. Farm forestry prospects among some local communities in Rachuonyo District, Kenya. *Small-scale Forestry* 9(3):297–316
- Ardolf, T and Jeckoniah, J. 2018. Gendered livelihood outcomes among woodlot farmers in Mufindi District, Tanzania. *Journal of Co-operative and Business Studies (JCBS)*. Vol 1(1). ISSN 0856-9037
- Bamberg, M. 2010. Narrative analysis. *APA handbook of research methods in Psychology*. Clark University. Volume 3. APA Press. Washington DC.

Bertomeu, M. 2006. Financial evaluation of small-holder timber based agroforestry systems in Claveria, Northern Mindunao, and The Philippines. *Small-scale Forestry Management and Policy*. 5(1):57-82

Bertomeu, M. 2008. Can smallholder tree farmers help revive the timber industry in deforested tropical countries? A case study from Southern Phillipines. *Smallholder tree growing for rural development and environment services*. Pp.177-191

Birhanu, S and Kumsa, F. 2018. Review on expansion of *Eucalyptus*, its economic value and environmental issues in Ethiopia. *International Journal of Research in Environmental Science*. College of Natural and Computational Science, Ethiopia. 4(3):41-46

Bizimana, I. 2017. Forestry policies and communications: case of Rwanda. Presentation to the Bagamoya convention. Africa Forest Communicators Networks. Food and Agriculture Organization of the United Nations

Buys, M. 2012. An analysis of the impact of land redistribution project in Modimolle municipality, Limpopo province. Mini dissertation- submitted in partial fulfilment of the requirement for the degree in of Master of development. Faculty of Management and law. University of Limpopo

Bynes, J. Herbohn, J. Gregario, J. and Fernandez, J. 2014. How useful are small stands of low-quality timber? *Small-scale forestry journal*. 14:193-204

Capone, R, El-Bilali, H, Debs, P and Bottalico, F. 2016. Relations between food and nutrition security, diets and food systems. *Agriculture and Forestry* 62 (1): 49-58.

Carney, D. Drinkwater, M. Rusinow, T. Neefjes, K. Wanmali, S. and Sighn, N. 1999. Livelihoods approaches compared. A brief comparison of the UK department for International Development, CARE, Oxfam and the United Nations Development programme (UNDP). Department for International Development, DFID.

Carsan, S. 2007. Sustainable farm timber for small holder cropping systems. A thesis submitted in partial fulfilment of the requirements of master degree in sustainable agriculture of the faculty of Natural and agricultural sciences. University of Free State

Carsan, S. and Holding, C. 2006. Growing farm timber: Practices, Markets and policies. The Meru timber marketing pilot programmes case studies and reviews. Published by World Agroforestry Centre. ISBN 92 9059 208 7

Chamberlain, D. Essop, H. Hougaard, C. Malherbe, S. and Walker, R. 2005. Part 1: The contributions, costs and development opportunities of the forestry, timber, pulp and paper industries in South Africa, Johannesburg. Genetics Analytics

Community woodlots in the Phillipines: Methods, Initial findings and insights. Small-scale forestry journal. 13(1): 79-100

Criterion African Partners and Indufor-forest intelligence. 2017. Allocating capital for maximum impact in Africa's plantation Forestry sector.

DAFF. 2012. Integrated Growth and Development. Department of Agriculture, Forestry and Fisheries. <http://forestry.DAFF.gov.za/webapp/Linksforests.aspx>

Das, N. 2011. Women's dependence on forest and participation in forestry: A case study of joint forest management programme in West Bengal. Journal of Forest Economics. (17):67-89

Department of Agriculture, Forestry and Fisheries, (DAFF). 2016. Report on the review of the agricultural marketing environment in South Africa, Directorate Marketing. Pretoria.

Department of Agriculture, Forestry and Fisheries, 2012. Integrated Growth and Development Plan. Government publishing: Pretoria

Department of Agriculture, Forestry and Fisheries. 2012. A profile of the South African forestry and wood products market value chain. Directorate marketing. Government publishers. Pretoria.

Department of Agriculture, Forestry and Fisheries. 2012. Agricultural Marketing Policy for the Republic of South Africa, Pretoria, South Africa.

Department of Agriculture, Forestry and Fisheries. 2016. Economic Commentary: Issue No. 2. Directorate: Statistics and economic analysis, Pretoria

Department of Agriculture, Forestry and Fisheries. 2016. Forestry Development, Limpopo Province. Makhado office

Department of Water Affairs and Forestry, 2008: Abstract of South African Forestry Facts for the year 2006/2007 Leaflet, Department of Water Affairs and Forestry, Pretoria, South Africa

Derbe, T. Agitew, G. and Yehuala, S. 2018. Factors influencing small-holder farmers' adoption of Eucalyptus woodlot in Wogera District, North Gondar zone, Amhara Regional state of Ethiopia. *International Journal of Scientific Research and Management (IJSRM)*.6(7):566-574

Derbe, T. Yehuala, S. and Agitew, G. 2018. Factors influence small-holder farmers' adoption of *Eucalyptus* woodlot in Wogera District. North Gondar Zone, Amhar Regional state of Ethiopia. *International Journal of Scientific Research and Management*. 6(7): (566-574)

Dessie, A. Abate, T and Mekie, T. 2019. Eucalyptus: the popular exotic tree crop in Ethiopia. *Acta Scientific Agriculture*. Review Article. 3(9):50-56

Dessie, A. Abtey, A and Koye, A. 2019. Determinants of the production and commercial values of Eucalyptus woodlot products in Wogera District, Northern Ethiopia. *Environmental System*. Vol 8(4)

Dessie, A. Abtey, A and Koye, A. 2019. Determinants of the production and commercial values of Eucalyptus woodlot products in Wogera District, Northern Ethiopia. *Environmental System*. Vol 8(4)

Erkossa, T and Dessie, G. 2011. Eucalyptus in East Africa socio-economic and environmental issues. *Planted Forests and Trees Working Papers*. Forestry Department and Agriculture Organization of the United Nations. Working Paper. <http://www.fao.org/forestry>

FAO (2011). Eucalyptus in East Africa, Socio-economic and environmental issues, by Gessesse, D. and Erkossa, T. *Planted forests and trees working paper 46/E*, Forest Management Team, Forest Management Division. FAO, Rome

FAO. 2009. Eucalyptus in East Africa. The Socio-economic and Environmental issues. FAO Sub-Regional Office Eastern Africa, Addis Ababa.

Forestry 2030 Road map. 2009. DAFF Forestry Strategy 2009-2030. FAO

Forestry South Africa. 2010. Abstract of South Africa Forestry Facts for the year 2008/2009. South Africa: Forestry South Africa.

Francis, P. 2012. Small-scale timbers stand management techniques. A case study of woodlots in Isongati, Tanzania. Michigan Technological University. School of Forest Resources and Environmental Science

Francis, P.D. 2012. Small-scale timber stands management techniques: A case study of woodlots in Isangati, Tanzania. School of Forest resources and Environmental Science, Michigan Technology University

Friese, S. 2014. Implementing different analysis approaches with ATLAS-ti. Max Planck Institute

FSA. 2020. Forestry South Africa. <http://forestryexplained.co.za>

Garcia, M. Villalba, P. Acun, C. Oberschelp, J. Harrand, L. Surenciski, M. Martinez, M. Petroli, C. Sansaloni, C. Faria, D. Grattapaglia, D. and Poltri, S. 2011. A genetic linkage map for full sib population of *E. grandis* using SSR, DArT, CG-SSR and EST-SSR markers. Bio-med central. 5(17): pp26

Getahun A. 2010. Eucalyptus species management, history, status, and trends in Ethiopia. In: Gil L, Tadesse W, Tolosana E, Lopez R, editors. Proceedings from the Congress Held in Addis Ababa; 2010 Sep 15-17; Addis Ababa, Ethiopia. Addis Ababa (Ethiopia): Ethiopian Institute of Agricultural Research

Githiomi, K & Kariuki, J. 2009. Wood basic density of *Eucalyptus grandis* from plantations in central rift valley, Kenya: variation with age, height level and between sap wood and heartwood. Kenya Forestry Research Institute. Journal of Tropical Forest Science 22(3): 281–286

Gizachew, K. 2017. Expansion of Eucalyptus woodlots and its factors in Cheha District, Southern Ethiopia. World Social News. [http://: www.worldscientificnews.com](http://www.worldscientificnews.com)

Glover, E. Ahmed, H. and Glover, M. 2013. Analysis of Socio-Economic Conditions Influencing Adoption of Agroforestry Practices. International Journal of Agriculture and Forestry 2013, Vol 3(4): pp178-184

Grundy, I and Waynberg, R. 2001. Integration of Biodiversity into national forest planning programmes the case study of South Africa. Edited by Centre for International Forest Research, UNEP, GEF

Hailemicael, B. 2012. The contribution of Eucalyptus woodlots to the livelihoods of small-scale farmers in Tropical and sub-tropical countries with special reference to the Ethiopian Highlands. Swedish University of Agricultural Sciences.

Ham, C and Theron, J. 2010. Community Forestry and development in South Africa. The past, present and future. *Southern African Forestry Journal*. 184: 71-79

Ham, C., Ackerman, S., Rietz, D., and Meyer, W. 2016. Forest Enterprise Simulator. Institute for Commercial Forestry Research. Annual Research Review. <http://www.icfr.ukzn.ac.za>

Harrison, S. 2001. Research approaches to environmental-economic issues in small-scale forestry. Economic sustainability of small-scale forestry. EFI Proceedings No. 36. The University of Queensland, Australia

Hingi, O. 2018. Organization of Smallholder Tree Growers, Support Organizations, Linkages and Implications for Woodlots Performance. The Case of Mufindi District, Tanzania. Master Thesis. Technische Universität Dresden. Faculty of Environmental Sciences. Institute of International Forestry and Forest Products

Howard, M., Matikinca, P., Mitchell, D., Brown, F., Lewis, F., Mahlangu, I., Msimang, A., Nixon P. and Radebe, T. 2005. Small-scale timber production in South Africa: what role in reducing poverty? Fractal Forest Africa, Fakisandla Consulting, Institute of Natural Resources, Rural Forest Management cc, South Africa, and International Institute for Environment and Development, London, UK.

Indufor, 2011. Timber market dynamics in Tanzania and in key export markets. Private forestry and carbon trade project. 193pp

Jele, Z. 2012. The contribution of small-scale timber farming in enhancing sustainable livelihood at Sokhulu. Submitted in accordance with the requirements for degree of master in Human ecology. University of South Africa

Kebebew Z. and Ayele G. 2010. Profitability and household income contribution of growing *Eucalyptus globules* (Labill.) to smallholder farmers: the case of central Highland of Oromia, Ethiopia. *European Journal of Applied science* 2(1): 25-29.

Keenan, R. Reams, G. Achard, F. De Freitas, J. Grainger, A. Lindquist, E. 2015. Dynamics of global forest area: Results from the FAO Global Forest Resources Assessment. *For. Ecol. Manag.* 352, 9–20

Kelemu K. and Tadesse W. 2010. Analysis of Eucalyptus role in the Livelihoods of rural Household KFS .2009. A Guide to On-Farm Eucalyptus Growing in Kenya.

Khorombi, M. 2000. Towards a sustainable land use plan for the lake Fundudzi catchment area. Partial fulfilment of the requirement for the M. Inst. Agra. Department of Zoology and entomology. University of Pretoria

Koech, E. 2009. A guide to on-farm Eucalyptus growing in Kenya. Kenya Forest Service

Krantz, L. 2001. The sustainable livelihood approach to poverty reduction. An introduction. Division for policy and socio-economic analysis. Swedish International development cooperation agency.

Langellier, K. 1999. Personal narrative performance. Performativity, "Two or three things that I know for sure". Text and performance quarterly (19), 125-144

Ledger, T. 2017. Case study on the forestry regional value chain in southern Africa: South Africa, Mozambique and Tanzania. Trade and Industrial policy strategies. Department of Trade and Industry. <http://www.tips.org.za>

Lemenih, M and Teketay, D. 2004. Effect of prior land use on the recolonization of native woody species under plantation forests in the highlands of Ethiopia. Forest Ecology and Management. 218: 60-73

Mahlangu, I. 2015. Small-scale timber farming in Entembeni Community-exploring sustainability and possibilities for leisure and tourism. African Journal of Hospitality, Tourism and Leisure Vol.4(1). <http://WWW.ajhtl.com>

Maningo, E. 2014. Contribution of family woodlots on livelihood of rural communities' consultancy report

Masutha, T. 2002. Community forestry and rural livelihoods. A case study of the contribution of natural resources to livelihoods of rural communities in the Northern Province South Africa. Thesis for the Partial fulfilment of the requirements of the degree in the Master of Science in Forestry science. Faculty of Agricultural and Forestry sciences. University of Stellenbosch

McMahon, L. 2010. Eucalyptus grandis, Prime facts for profitable, adaptive and sustainable primary industries

- Mtengu, S. and Green, P. 2016. Forestry Stewardship Council in Relation to Market Accessibility by Small Scale Timber Growers: A Case in KwaZulu-Natal. Durban University of Technology, South Africa. *J Hum Ecol*, 56(3): 283-294
- Mugunga, C. 2016. The use of Eucalyptus in Agro-forestry systems of Southern Rwanda: to integrate or segregate? Wageningen University
- Mugunga, C. Kool, D. Van Wijk, M. Mohren, G and Giller, K. 2015. Water use by short rotation Eucalyptus woodlots in Southern Rwanda. *Agro-forestry Systems*. 89: 1119-1139
- Mwase, W. Sefasi, A. Njoloma, J. Betserai, I. Manduwa, N & Nyaik, J. 2015. Factors Affecting Adoption of Agroforestry and Evergreen Agriculture in Southern Africa. *Environment and Natural Resources Research*, 5(2): pp148
- Nenwini, S. and Kabanda, T. 2013. Trends and variability assessment of rainfall in Vhembe South Africa. *Journal Of human ecology*, 42(2): 171-176
- Ngaga, Y. 2011. Forest plantations and woodlots in Tanzania. *African Forest Forum Working Paper series*. 1(16):44-72
- Nguyen, H. Herbohn, J. Clendenning, J. Lamb, D. Dressler, W. Vanclay, J. and Firn, J. 2015. What is the available evidence concerning relative performance of different designs of mixed species plantings for small-holder and community forestry in the tropics? A systematic map control. *Environmental Evidence Systematic Review Protocol*. 4(15): 2-7
- Nieuwenhuis, M. and O'connor, N. 2000. Challenges and opportunities for small-scale tree nurseries in the East African highlands. University College Dublin. *Unsylva*.
- Ofoegbu, C. Chirwa, P. Francis, J. and Babalola, F. 2016. Assessing forest-based rural communities' adaptive capacity and coping strategies for climate variability and change: The case of Vhembe District in South Africa. *Environmental Development*
- Osawaru, M. Ogwu, M. and Imarhiagbe. 2015. Principal Component Analysis (CPA) as an ideal tool for analysing on-form research data. *Biological and environmental Sciences Journal for the tropics* .12(1):514-522

Otuba, M. 2012. Alternative management regimes of Eucalyptus: Policy and sustainability issues of small-holder Eucalyptus woodlots in the tropics and sub-tropics. Swedish University of Agricultural Sciences. Department of Forest Products, Uppsala

Riessman, C.K. 2000. Analysis of personal narratives. Boston University. Riessman@bu.edu

Robertson, S. 2018. The role of plantation forestry for promoting sustainability in South Africa. Trade and Industrial Policy Strategies. Green Economy Coalition. <http://www.greeneconomycoalition.org>

SANBI. 2017. South African Forestry Certification Standard Achieves PEFC endorsement. South African National Biodiversity Institute. <https://www.pefc.org/projects/forests/south-african-smallholders>

Samuels, P. 2020. A really simple guide to quantitative data analysis. Birmingham City University. Statistics teaching resources. Research Gate. DO-10.13140/RG.2.2.25915.36645

Seale, C. 2012. Researching Society and Culture (3rd Ed). Sage, Los Angeles, USA.

Shackleton, M. 2004. Assessment of the livelihoods importance of forestry, forests and forest products in South Africa. Rhodes University

Singunda, W.T. 2009. Economic Contribution of Private Woodlots to the Economy of Mufindi District, Tanzania. MSc Dissertation, Faculty of Forestry and Nature Conservation, Sokoine University of Agriculture. 142 pp.

Strategy Execution Advisers. 2020. Forestry Sector Master Plan. Department Forestry, Fisheries and Environment. Project No.: IGP 02 RFP Application - Masterplan Forestry

Sunderlin, W. Angelsen, A. Belcher, B. Burgers, P. Nasi, R. Santoso, L and Wunder, S. 2004. Livelihoods, forests and conservation in developing countries: An overview. Elsevier world, 33(9): 1383-1402

Van den Berg, G. Vrryn, S. Chirwa, P and Van Deventer, F 2016. Genetic parameters and genotype by environment interaction of Eucalyptus grandis populations used in intraspecific hybrid production in South Africa. Southern forests: A journal of forest science, 1(9): 1-2

Vhembe Biosphere Reserve, 2016. United Nations Educational, Scientific and Cultural Organization. Ecological Sciences for Sustainable Development. UNESCO

Vhembe District Municipality. 2015. Limpopo Vhembe district profile. Limpopo Provincial government

Vhembe District Municipality. 2016. Integrated Development Plan 2012/13-2016/17. Limpopo government

Vhembe District Municipality. 2019/20. IDP Review Final Draft. Limpopo provincial government

Vhembe District Municipality. The local government handbook. 2016. Government printing. Pretoria, SA

Wise, R. Dye, P and Gush, M. 2011. Comparison of the biophysical and economic water-use efficiencies of indigenous and introduced forests in South Africa. *Forest Ecology Management* (262): 906-915

7. Appendix

Appendix 1 Sample Interview Questions

Questionnaire No. 1

SECTION 1

Small-scale timber growers interview questions

1. Name of the small timber grower _____

2. Village _____

Ward _____

Local Municipality _____

3. Age _____

4. Gender. 1. Male 2. Female

5. Marital status: 1. Married 2. Not Married 3. Divorced Single parent

6. Employment status: 1. Employed Unemployed

3. Self-Employed Social-grant Others

If other specify: _____

7. Income range: 1. 0-R1000 2. R1000 -R3000 3. R3000-R5000
4. R5000-R10000 5. R10000 and above

8. Type of woodlot ownership: _____ (1. Individual, 2. Cooperative,
3. Communal, 4. Other (Specify.) _____

9. Area of the woodlot: 1. 0-5ha 2. 6-10 ha 3. 11-15 ha 4. 16-20ha
5. 21ha and above

10. Planted area: 1. 0-20% 2. 20%-50% 3. 50%-70% 4. 70%-90%
5. 90%-100%

SECTION 2

Specific objective 1

1. What was your main objective behind establishing a gum tree woodlot?

2. What are the raw materials that you produce in your woodlot?

	Timber products		Non-timber products	
	Products	Price	Products	Price
1.				

2.				
3.				
4.				
5.				
6.				

3. Do you have a market for your products? 1. YES NO

If yes, list:

If NO give reason why

4. What is your estimated net income per month for the past 3 years from this woodlot?

1. R1-R99 2. R100-R500 3. R600-R1000 4. R2000 and Above

5. Estimate the average expenses of running the woodlot per month?

Specify the products

Type of products (Droppers, fencing poles, building poles, tomato poles, others)

1. Expenses in SA Rand	
1.	Labour
2.	Purchasing Seedlings
3.	Silvicultural operations (Slashing, pruning, etc.)
4.	Harvesting operations
5.	Delivering products to customers
6.	Others

6. Out of a hectare area (soccer field area) during harvesting how much estimated net income do you make?

1. 0-R500 2. R500-R2000 3. R2000-R5000
 4. R5000-R10000 5. R10000 and above

7. How many people have you employed in your woodlot?

1. 1-10 2. 11-20 3. 21 and above

8. Are the employees permanent or part-time?

1. Part-Time 2. Full-Time

Specific objective 2

1. Briefly explain the impact of the following factors in your woodlot and how it is affecting your expected production.

1.1 Capital

(a) Natural capital (e.g. Availability of land for woodlots)

(b) Social capital (e.g. Ability to negotiate for better selling prices, land space, etc.)

(c) Human capital (e.g. lack of skills and training for owners and employees)

(d) Financial capital (e.g. Availability of funds, qualifying for loans, interested investors, etc.)

1.2 Infrastructure (e.g. condition of access roads, input supply depots and storerooms, admin offices etc.)

1.3 Policy problems and empowerment opportunities (e.g. availability of partnerships with large growers, availability of policies information from DAFF and other related government departments)

1.4 Timber theft

(a) What is the level of timber theft in this area and how does it affect your woodlot?

1. LOW 2. HIGH

Briefly explain

1.5 Silvicultural Factors

(a) Forest and veld fires

(b) Cost and availability of seedlings

(c) Effects of pest and diseases

(d) Water availability during planting

(e) Describe the environmental condition of this area and how it affects your gum trees?

(f) Out of a set of 100 gum trees planted how many survive for growth?

1. 0-10 2. 10-40 3. 40-70 4. 70-100

1.7 Harvesting

(a) Challenges during harvesting (e.g. Availability of equipment, transport, labour, etc.)

(b) How long does it take to make a first harvest after planting your gum trees?

1. 3 – 4 Years rotation 2. 5-8 Years rotation 3. 9 Years and above

2. Outline the processes you went through during the establishment of your woodlot.

3. What kind of support did you receive during the establishment process?

Explain: _____

4. Do you receive any technical support from the government and other stakeholders?

1. YES 2. NO

If YES, briefly explain the nature of support

5. Do you use gum trees for in your own household?

1. YES 2. NO

If YES briefly outline the

uses: _____

Specific objective 3

1. Outline the type of support that you want the government to provide for your woodlot to progress.

2. How is your relationship with the extension officers from DAFF as the main custodians?

1. Good 2. Bad

If _____ bad _____ briefly
explain: _____

3. How much knowledge do you have about the success of gum trees (*Eucalyptus grandis*) as a suitable species for your woodlot?

1. Little 2. Limited Enough 4. More than enough

4. What promotion strategies do you involve to sell the products from your woodlot?

5. Are you affiliated to any forestry or agricultural cooperative in Vhembe district?

1. YES 2. NO

If YES give name: _____

Appendix 2 Traditional leaders interview questions

SECTION 1

1. Traditional leader _____
2. Area of authority _____
3. Local Municipality _____
4. Other responsibilities _____

SECTION 2

Specific objective 1

1. How do citizens under your area benefit from the *E. grandis* woodlots they own?

2. Do the owners of the *E. grandis* woodlots employ other citizens from your area of authority?

1. YES 2. NO

3. Since the establishment of the *E. grandis* woodlots in your area is there any provision of raw materials and energy supply such as woods and charcoal for the local citizens?

1. YES 2. NO

Specific objective 2

1. What is your contribution towards land space provision for an individual who wants to establish an *E. grandis* woodlot?

2. What are the procedures to be followed to access a land to establish a woodlot?

3. How do the Forestry acts, environmental policies and municipal regulations affect the expansion woodlots of *E. grandis* small-scale timber growers?

4. How do the *E. grandis* woodlots affect other natural resources and how does it help in the protection of other resources?

	Positive effects of gum woodlots on natural resources	negative effects of gum woodlots on natural resources
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Appendix 3 Officials interview questions

SECTION 1

1. Official _____
2. Position _____
3. Office _____
4. Responsibility _____

SECTION 2

Specific objective 1

1. What was the purpose of encouraging small-scale timber growers to establish *E. grandis* woodlots in Vhembe district?

2. What type of raw materials and other products do small-scale timber growers harvest from the woodlots?

3. Do DAFF/ District municipality provide any financial support to the small-scale timber growers?

1. YES 2. NO

4. Is there any other support they provide?

1. YES 2. NO

If YES which ones briefly

explain: _____

If NO give reasons why not

4.2 Are small scale-timber growers able to make any income from *E. grandis* woodlots?

1. YES 2. NO

4.3 In the past three years, what is an estimated financial return per month for small-scale timber growers regarding the sizes of their woodlots?

	Woodlot size	Number of woodlots	Comments on benefits (Select how the benefit of the woodlot with an X)			
			1.FINANCIAL BENEFIT	2.HOUSEHOLD USE	3.COMMUNITY USE	3.BOTH
1.	0-5ha					
2.	6-10ha					
3.	11-15ha					
4.	16-20ha					
5.	21-25ha					
6.	26-30ha					
7.	31-40ha					
8.	41-50ha					
9.	51-99ha					
10.	100ha and above					

4.4 In the past 3-5 years how is the market for the small-scale timber growers' products?

Specific objective 2

1. Briefly describe the Infrastructure of the woodlots that you provide support to and its impact on the production. (e.g. condition of access roads, input supply depots and storerooms, admin offices etc.)

2. From your section, what are the regulatory policies and acts responsible for the managing of small-scale timber growers? Briefly explain how each affect the small-scale timber growers.

	Regulatory policy/act	Effect on the Small-scale timber growers

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3. Briefly explain the types of support offered by the responsible extension officers?

4. How do the environmental conditions affect the establishment, development and success of the *E. grandis* woodlots?

5. Are there any other stakeholders involved in the support provision of small-scale timber growers? If yes, mention them and briefly explain their responsibilities.

1. YES 2. NO

Specific objective 3

1. Are there any support plans available for improving the performance of *E. grandis* small-scale timber growers in Vhembe district?

1. YES 2. NO

If Yes outline the plans:

2. How often do extension officers visit *E. grandis* woodlots for support and advice to small-scale timber growers?

	Periods of visitation	Minimum number of visitations	Maximum number of visitations
1.	Monthly		

2.	Quarterly		
3.	Annually		

Appendix 4 RANKING OF FACTORS

Natural capital	Ranking (Tallies)	Total Tallies (Ranking)
The land available is currently enough		
Demand has increased and more land is needed		
Less than half of the area has been planted		
Still using the area given by the chief yet more land needed		
Total		

Social capital	Total Tallies (Ranking)
Most of the customers are from the local area, there are customers from the hardware also	
Sometimes timber is	

sold to sawmills but prices have to be negotiated, local customers are the most preferable		
The timber is sold to different customers at different prices and to sawmills on T&Cs		
Total		

Human capital	Tallies	Total Tallies (Ranking)
Unskilled part time workers		
Part-time workers are hired during busy periods and experience of the owner help to train the workers		
Usually employ people from the local village, the owner helps to train his own workers		
Part-time workers are hired during busy periods		
Total		

Financial capital	Tallies	Total Tallies (Ranking)
Need for funds, No loans from banks, No funds from government		
Funding is the biggest challenge and loans are always rejected		
A R100 000 loan application was rejected due to lack of title deed		
The first waiting period is hectic since there is nothing to sell. Loan applications always end fruitless		
Total		

Infrastructure conditions	Tallies	Total Tallies (Ranking)
Poor access roads and lack of storerooms		
The roads are badly damaged, the government indicated lack of equipment to assist		
The main road is damaged and there is a shed that is used as a		

store room in the woodlot		
The main road is damaged and increase difficulty to access the area		
Total		

Policy problems		Total Tallies (Ranking)
Very few empowerment programmes from the government, water bills are a problem for small grower		
Extension officers' advice on policies and acts, trainings and workshops also help		
DAFF always give advice on Policies and regulations leading to avoid challenges		
Some policies limit partnering with large growers & water use licenses also create negative impact on the progress		

The woodlot is small but water use bills are always sent		
Total		

Timber theft(low/high)	Rankings(tallies)	Total
HIGH		
LOW		

Other Challenges

Forest and veld fires	Ranking (Tallies)	Total Tallies (Ranking)
Every year fire incidences take place		
Fire is a biggest threat since the woodlot is surrounded by natural forest, the forest has been burnt more than 3 times since establishment		
The woodlot was burnt to ground and it had to be replanted		
More than half of the woodlot was once		

burnt since establishment		
The woodlot is in a high fire risk area		
Total		

Costs and availability of seedlings	Ranking (Tallies)	Total Tallies (Ranking)
The cost is high and no nurseries available in the local area		
Some seedlings are produced at home and some are bought from Tzaneen and transport cost is high		
Transport increases the cost of seedlings; the seedlings have to be collected from Tzaneen		
Total		

Effects of pests and diseases	Tallies	Total Tallies (Ranking)
No effect of pests and no diseases has been		

recognized yet due to lack of specific monitoring		
7 years ago, seedlings were attacked by pests before they can be planted, sometimes felled timber gets attacked by termites		
Harvested timber is mostly attacked by pests		
If the timber is kept for too long it gets attacked by insects as feed and habitat		
Total		

Environmental condition	Ranking (Tallies)	Total Tallies (Ranking)
The area can be very dry and the seasons can be unstable		
Unstable climatic conditions, winter can sometimes be very dry and increasing the risk of fire		
Summer is hot and with rain, strong winds that break some		

trees		
the area has fertile soil with abundance of moisture during summer		
Water availability: Planting is done during rainy season since the sources are protected by the law		
Total		

Survival rate (out 100 trees)	Rankings(tallies)	
40-70		
70-100		
10-40		

Challenges	Ranking (Tallies)	Total Tallies (Ranking)
Lack of labour, Lack of proper mechanical equipment & high cost of transporting timber		
No permanent workers, Lack of equipment & lack of transport		
Lack of money to pay		

for extra workers, Transport must be hired, old chainsaws		
There is no transport therefore it has to be hired, few workers, poor accessibility to the area		
Total		

First harvest	Rankings(tallies)	
3-4-year rotation		
9 years and above rotation		
5-8-year rotation		

Do you receive Technical support(Yes/No)	Rankings(tallies)	
YES		
NO		

Do you use Eucalyptus at home(yes/NO)	Rankings(tallies)	
YES		

NO		
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Appendix 5 Review Paper Submission Confirmation e-mail

Circular Economy and Sustainability - Editorial Office <em@editorialmanager.com>

(20 hours ago)

to me

Dear Mr. Manthakha,

Thank you for submitting your manuscript,

"Topic: Systematic review on the contribution of Eucalyptus grandis woodlots to the livelihoods of small-scale timber growers in South Africa", to Circular Economy and Sustainability

The submission id is: CIES-D-21-00073

Please refer to this number in any future correspondence.

During the review process, you can keep track of the status of your manuscript by accessing the journal's web site.

Your username is: Vuwani Manthakha

If you forgot your password, you can click the 'Send Login Details' link on the EM Login page at <https://www.editorialmanager.com/cies/>.

With kind regards,

Journals Editorial Office CIES

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****Our flexible approach during the COVID-19 pandemic****

If you need more time at any stage of the peer-review process, please do let us know. While our systems will continue to remind you of the original timelines, we aim to be as flexible as possible during the current pandemic.

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