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The socio-economic impacts of *Eucalyptus* spp. on smallholder farmers in Chiweshe communal lands, Mazowe district, Zimbabwe.

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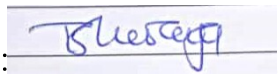
DECLARATION

I Tafadzwa Loreta Sharaunga with registration number B200863B do hereby affirm that this work is entirely the product of my findings and has never existed or been presented to any academic institution. Any reference to previously published work has been indicated. This dissertation is suitable for submission to the faculty and has been checked for conformity with faculty guidelines.

Student's signature:  Date: **11/10/2024**

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DEDICATION

This dissertation is dedicated to my family.

AKNOWLEDGMENT

I would like to express my heartfelt gratitude to my project supervisor Dr L. Mujuru

who guided and supported me throughout the project writing. I would also want to appreciate the guidance given by my family and friends throughout the research.

Above all, I thank the almighty God for giving me the courage and strength to conduct this research.

ABSTRACT

Eucalyptus species have garnered significant attention in recent years due to their rapid growth and versatility in various agricultural applications. However, their introduction and expansion in smallholder farming systems raise critical questions regarding their socio- economic impacts. A study was done to assess the socio-

economic impacts of *Eucalyptus* spp. on smallholder farmers in Chiweshe Communal Land, focusing mainly on employment and income generation for smallholder farmers. Data was collected using questionnaires and interviews and analysed using descriptive statistics. Results showed that cultivation of *Eucalyptus* spp. had both positive and negative socio-economic impacts on smallholder farmers. The positive economic impacts were income generation (66%) through the sale of various *Eucalyptus* products and market access (34%). The sale of the products allowed farmers to earn substantial incomes that varied with the size of the farm area. The major social impacts were employment creation (30%), building materials (25%), improved living standards (10%), and poverty reduction (4%). The notable employment opportunities created were for harvesting (51%), planting (25%), weeding (13%), transportation (8%) and security (3%). However, despite all the positive economic and social impacts, *Eucalyptus* spp. planting had various challenges. The negative socio-economic impacts were land use changes (56%), lack of technical funds (28%) and theft (16%). Therefore, the government through the Forestry Commission and NGOs, should develop programs that help smallholder farmers with technical funds such as access to technology, training, capacity building and infrastructure developments and security measures to reduce theft. There is a need to promote sustainable *Eucalyptus* management practices among smallholder farmers to maximize economic benefits while minimizing the negative social impacts.

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CHAPTER ONE

INTRODUCATION

1.1 BACKGROUND OF STUDY

People have obtained livelihoods from the growing and use of planted forests, mainly the *Pinus* and *Eucalyptus* plantations worldwide. There are over 800 species of *eucalyptus*, an evergreen blooming tree of the Myrtaceac family (Bayle, 2019). *Eucalyptus* species are grown commercially, dominated by *E. globulus*, *E. urophylla,* and *E. grandis* (Costa 2020; Gouvea 2020; Navarro 2019). *Eucalyptus* covers 25 million planted ha of which 2.2 million hectares are in Africa. *Eucalyptus* is the most widely planted forest genus worldwide, with 25 million hectares planted (Martins, 2022). Brazil has the world's largest area with around 7.6 million hectares planted, constituting about 7% Brazil's Gross Domestic Product (IBA, 2019).

Eucalyptus trees are frequently planted by farmers, especially smallholders, because they offer a multitude of advantages over many other tree types. They provide timber and wood products, raw materials for pulp and paper production, energy production, and essential oils for medicinal purposes (Costa, 2020). The world's *Eucalyptus* plantation rapid expansion demonstrates the importance of the socio-economic lives of communities engaged in the plantation and use of *Eucalyptus* trees (Melka, 2022).

In Africa, countries such as Ethiopia, Kenya, South Africa, and Rwanda, *Eucalyptus* has been grown for several socio-economic purposes. *Eucalyptus* is one of the most important tree species in East Africa that is used in the pulp and paper industry (Sembiring, 2021). In Ethiopia, the species was introduced during the time of Emperor Menilik to be used for many purposes and to alleviate the shortage of fuel wood and construction wood in the capital of Addis Ababa (Bayle, 2019). The most economically significant and widely grown exotic tree species in Ethiopia, based on the economic contribution is *Eucalyptus globulus* (Edesa., 2021).

In Zimbabwe, *Eucalyptus* trees were first planted in 1981 under the Rural Afforestation Programme (Mandondo et al., 1995). The government adopted this program in response to the worsening woodland resource deficit in communal areas (Furness, 1981). According to the Whitsan Foundation, 1981, policymakers

recommended the establishment of *Eucalypt* nurseries and block plantations mainly for fuel wood as a way to speed up solutions to rural deforestation. *Eucalyptus* was chosen because of two major reasons: high productivity and adaptability to a wide range of environmental conditions (Furness, 1981). In Chiweshe, Mazowe district, establishment of *Eucalyptus* plantations started in 1942 with about 2.22 ha planted through the Native Commissioner and by the end of 1947, there were 28 established gum plantations covering 50.99 hectares as a result of the Rural Afforestation Programme. The two programs both aimed to increase forest cover, however the differences were based on approaches, objectives and outcomes.

1.2 PROBLEM STATEMENT

Eucalyptus important for the provision of fuel wood and poles can be used as an income-generating commodity (Alemayehu et al., 2022). In Zimbabwe, there is little or no information on how *Eucalyptus* projects impact the livelihoods of smallholder farmers. Barret (1968) and Mullin, (1978) concentrated on *Eucalyptus* sustainability and improvement of forest genetic resources using seeds sourced from South Africa in the Eastern Highlands of Zimbabwe, but all socio-economic impacts were left out. A study by Mandondo et al., (1995) in Mashonaland East (Murewa and Mutoko) only focused on the management and performance of *Eucalyptus* plantations but neglected the impacts of growing *Eucalypts* on small-holder farmers. Tyynela (2000) also focused on the social benefits of *Eucalyptus* natural woodlots in Mukarakate, North Eastern Zimbabwe but specialised on the benefits of wood to the livelihood of people. These studies did not explore the socio-economic impacts of *Eucalyptus* spp. Including income and employment. Therefore, this study identified and explored the socio-economic impacts of *Eucalyptus* spp. in Chiweshe communal lands of Zimbabwe.

1.3 AIM/GOAL

The study aims to assess the socio-economic impacts of growing *Eucalyptus* spp. on smallholder farmers in Chiweshe communal lands of Zimbabwe.

1.4 OBJECTIVES

To determine the economic impacts influencing smallholder farmers' decision to cultivate Eucalyptus in Chiweshe, Zimbabwe.

To determine the social impacts of cultivating *Eucalyptus* in Chiweshe, Zimbabwe.

1.5 RESEARCH QUESTIONS

1. What are the main economic impacts influencing smallholder farmers' decision to cultivate *Eucalyptus* in Chiweshe, Zimbabwe?
2. What are the key social impacts influencing smallholder farmers' decision to cultivate *Eucalyptus* in Chiweshe, Zimbabwe?

1.6 JUSTIFICATION

The results of this study are crucial for policymakers and agricultural development organizations for use in designing policies and interventions that support sustainable agricultural practices. Assessing the socioeconomic impacts of *Eucalyptus* cultivation sheds light on how diversification fits within livelihood strategies including income generation, resilience to economic shocks, and employment opportunities. Also, results may be used as a source of information by students and other researchers.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Eucalyptus is an evergreen blooming tree species consisting of over 800 species in the Myrtaceae family and is of immense socio-economic significance with a wide range of benefits (Bayle, 2019). *Eucalyptus* covers 25 million planted hectares of which 2.2 million hectares are in Africa (Martins, 2022). *Eucalyptus* species are grown commercially dominated by *E. globulus*, *E. urophylla,* and *E. grandis* (Navarro 2019; Costa 2020; Gouvea 2020).

The establishment of *Eucalyptus* plantations provides multiple benefits of generating income, creating employment opportunities, and as well as enhancing the food security for the smallholder farmers (Bekele, 2015). The socio-economic impacts of *Eucalyptus* are complex and differ depending on the local context, policy structure, and management practices. Socio- economic impacts of *Eucalyptus* are both positive and negative however, the positive impacts outweigh the negative ones (Bayle, 2019).

2.2 ECONOMIC IMPACTS OF GROWING *EUCALYPTUS* SPECIES

Income generation from *Eucalyptus* spp. is either direct or indirect. Globally, *Eucalyptus* spp. provides income to smallholder farmers. The pulp and paper industry uses more than 60% of the *Eucalyptus* wood supply, making the species a significant input in the industry (Bond et al., 2021). For example, *Eucalyptus* species play a vital role in the Australian economy generating roughly to $23, 5 billion contributing to the country's economy in 2018-19 (ABARES, 2019). In Brazil *Eucalyptus* spp. contributed to a 20% more to the income of smallholder farmers (Santos, 2017). A study in India also highlighted that planting *Eucalyptus* spp. resulted in a 15% increase to the income of smallholder farmers who earned $1500 per annum (Kumar et al., 2017). In this regard, farmers engaged in different *Eucalyptus* cultivation activities generated more income than those not planting. *Eucalyptus* species also improved market access for smallholder farmers by supplying raw materials needed by the industries. In China Zhang et al., (2018) showed how the cultivation of various *Eucalyptus* species enabled market access for smallholder farmers who sold timber to local markets resulting in increased income. Similarly, Wekesa et al. (2010) identified market access improvements directly contributing to income growth for farmers by facilitating the sale of produce at competitive prices in Kenya. Furthermore, smallholder farmers received about $2000 more per annum than income generated from traditional agricultural practices. The global review also examined that *Eucalyptus* species are usually planted for their valuable products and resources such as paper production, lumber, and timber. Thereby stimulating the income growth of the country.

In Africa, *Eucalyptus* spp. increase household incomes of smallholder farmers. For example, planting *Eucalyptus* species resulted in an increase in regular income when compared to other crops in Ethiopia (Dese, 2021). Similarly, a study by Tadesse (2016) identified that 92% of the respondents benefited from *Eucalyptus* ssp. plantations generating income from selling wood products. Bayle, (2019) also stated that farmers use income generated from *Eucalyptus spp. cultivation* sale to buy food and construction materials. In Kenya, *Eucalyptus* plantations increased smallholder household income and sent their children to school from the income obtained (Mwangi et al., 2013). However, the study recommended consideration of negative impacts such as loss of grazing land and competition for water resources

with the *Eucalyptus* spp.

In Zimbabwe, *Eucalyptus* species cultivation benefits the smallholder farmers through income generation. The study by Mudhara et al., (2015) revealed that *Eucalyptus* spp. provided smallholder farmers with fodder, timber, and fuel wood. E*ucalyptus* species provide smallholder farmers with revenue from selling firewood, poles and timber. These findings suggest that *Eucalyptus* species impact the overall economic wellbeing of smallholder farmers. Also the growing and processing of *Eucalyptus* species are essential for pulp and paper industry (Mhaka et al., 2018). A report from the (Forestry Commission of Zimbabwe, 2020) highlighted that the country's forest products contributed around $413 million in 2020, with *Eucalyptus* species making substantial contributions of the economy.

Moreover, non-timber forest products also supplement smallholder's income for instance medicinal plants and paper (Abebe, 2019). For example, through establishing partnership with local markets, herbalist and paper manufacturers farmers can create supply chains that facilitate the sale of these products, thereby increasing their profitability. *Eucalyptus* is an important raw material in paper making industries and hence becomes an important source of income (Bekele, 2015). *Eucalyptus* is also a source of nectar and honey production that contains medicinal properties (Abebe, 2019) evidencing that these non-timber forest products aid in income generation.

2.3 SOCIAL IMPACTS OF *EUCALYPTUS* SPECIES

Eucalyptus cultivation is extremely valued and favoured by smallholder farmers for their rapid growth rate depending with their genetic makeup and high biomass production (Alemu, 2010). They provide fuel wood and poles for market and home consumption facilitating provision of food, education and health (Alemayehu et al., 2018). *Eucalyptus* also contributes to household livelihoods and food security as they are widely used for the construction of houses, cooking and heating as the major benefits (Bekele, 2015).

2.3.1 Employment opportunities

Employment opportunity is the main and vital social impact of *Eucalyptus* that can

improve smallholder farmers' livelihoods (Dese, 2021). In Brazil, Eucalyptus species generated over 1.5 million jobs with a 20% poverty reduction (FAO, 2018). *Eucalyptus* plantations in China cover about an area of 4- 5 ha, creating employment opportunities to over 1.5 million people (FAO, 2018). Moreover, *Eucalyptus* plantations in Indonesian communities are around 2, 5 million ha, generating employment to over 500 000 people (FAO, 2018). Hence, the creation of these jobs impacted both the smallholder farmers and their children's lives by providing income and education. In South Africa *Eucalyptus* spp. generated 1.5 times more employment compared to other land uses (Masuku et al., 2018). Therefore, the growing of Eucalyptus species resulted to the increment of employment opportunities to the study area. In Zimbabwe *Eucalyptus* spp. cultivation resulted in job creation with activities such as pruning, planting and harvesting and most of these jobs are mainly in rural areas (Chikanda et al., 2020). However, from the local information provided one can argue that it lacks adequate information on the actual number of people saved and jobs created. Employment opportunities can either be direct or indirect and also can be seasonal as explained below.

Eucalyptus cultivation creates direct employment opportunities in nurseries, plantations, and harvesting operations. In rural areas smallholder farmers' activities like raising seedling, weeding, planting, pruning and watering are done (Munda, 2004; Alemayehu et al., 2018). Direct employment such as weeding and planting created for about 150-225 labor days per hectare per year to the smallholder farmers (Munda, 2004; Alemayehu et al., 2018). Thus, *Eucalyptus* plantation generate employment for the rural people. However most of the employment opportunities created are seasonal or temporary. Chikoko (2016) also revealed that whilst *Eucalyptus* cultivation creates employment, these jobs are often temporary and do not provide a stable income throughout the year.

Eucalyptus plantations also arouse indirect employment for related industries, such as transportation, processing, and furniture manufacturing*. Eucalypt* cultivation provides employment for urban dwellers such as timber processing, charcoal making and pulp and paper making (Alemayehu et al., 2018). Abebe (2019) discovered that the growth of urban employment in Ethiopia was significant with a 4,5% increase per year. Similarly, Sibanda et al., (2019) stated that the planting of *Eucalyptus* results in the development of small-scale industries that provide valuable

products from species, thereby indirectly creating employment.

2.4 NEGATIVE SOCIO-ECONOMIC IMPACTS

Eucalyptus species have impacts on the environment, society and economy (Alfred et al., 2020). Also, *Eucalyptus* is known for its high water consumption more than any other tree species Abebe (2019). *Eucalyptus* spp. plantations compete with smallholder farmers' agricultural products for sunlight, water and other nutrients (Mudimu et al., 2017). For instance, *Eucalyptus* trees have a tendency to overshadow smaller crops, effectively limiting their access to sunlight. This competition further exacerbate the challenges faced by smallholder farmers who often really on sunlight to grow variety of vegetables fruits and grains. Thereby, negatively impacting the smallholder farmers by diminishing crop yields and alter traditional planting. *Eucalyptus* spp. can also negatively affect the food security of smallholder farmers as revealed by a study in Ethiopia which showed that *Eucalyptus* spp. cultivation resulted in a deterioration in food production thereby impacting the food security of smallholder farmers (Tadesse, 2016). The study showed that smallholder farmers were unable to cultivate staple crops such as maize and beans due to the encroaching plantations. Hence, the transformation of agricultural land led to a diminished variety of crops which was detrimental not only to food but also to dietary diversity.

Furthermore, farmers are shifting their agricultural land to *Eucalyptus* plantations thereby resulting in competition for land and land use changes. The change of agricultural land to *Eucalypt* plantations results in reduced yield of local crops due to pests and diseases (Alemayehu et al., 2015). The transition from diverse agricultural landscape to *Eucalypt* plantations often leads to increased population of certain pests, as the *Eucalyptus* plantations often create a perfect breeding ground for pests such as leaf miners and bark beetles (Alemayehu et al.,2018). Land grabbing of smallholder farmers by large-scale farmers that results in displacement and loss of cultural rights is also inevitable and this has been supported by several studies in Brazil, South Africa, and India which indicated that *Eucalyptus* spp. cultivation resulted in the loss of customary land rights and land grabbing (Souza et al., 2018; Martinez-Alier,2014; Nel et al.,2018).

CHAPTER THREE

METHODOLOGY

3.1 DESCRIPTION OF STUDY AREA

The study was conducted in the Chiweshe Communal Lands of Mashonaland Central Province. The district, Chiweshe is located at a distance of approximately 105km from Zimbabwe's capital Harare. The district has a total of 13 wards but only four of them namely, Chitsungo, Nyambiriri, Mukumbura, and Forester A are going to be used for this study. Chiweshe district is located between latitudes 16°53'00.1''S and longitudes 31°07'21.0''E (Latitude: -16.88337, Longitude -31.12249) at an average elevation of 1245 meters above the sea level.

The soils in Chiweshe are mainly composed of clay, sandy loam, and loam and are rich in minerals hence making them very fertile and productive (International Journal of Environmental Research and Public Health (2021). Sandy loam soil is appropriate for the cultivation of crops such as tobacco, cotton, and maize. Loam soils are suited for *eucalyptus* cultivation and about 2500 ha of *Eucalyptus* have been planted between 2019 and 2022 according to Forestry Commission Annual Report (Forestry Commission of Zimbabwe 2020).

The climate in Chiweshe is subtropical with mild winters and hot summers. The rainy season stretches from November to March and an annual average rainfall of 800-900 mm is received (Climate-Data.org, 2021). Temperatures range from 12ºC to 30ºC which makes the area conducive for agricultural production. The population is estimated to be approximately 100,000 people using the current census data (ZIMSTAT, 2022). The majority of the people reside in rural areas with a small percentage that lives in the urban area.

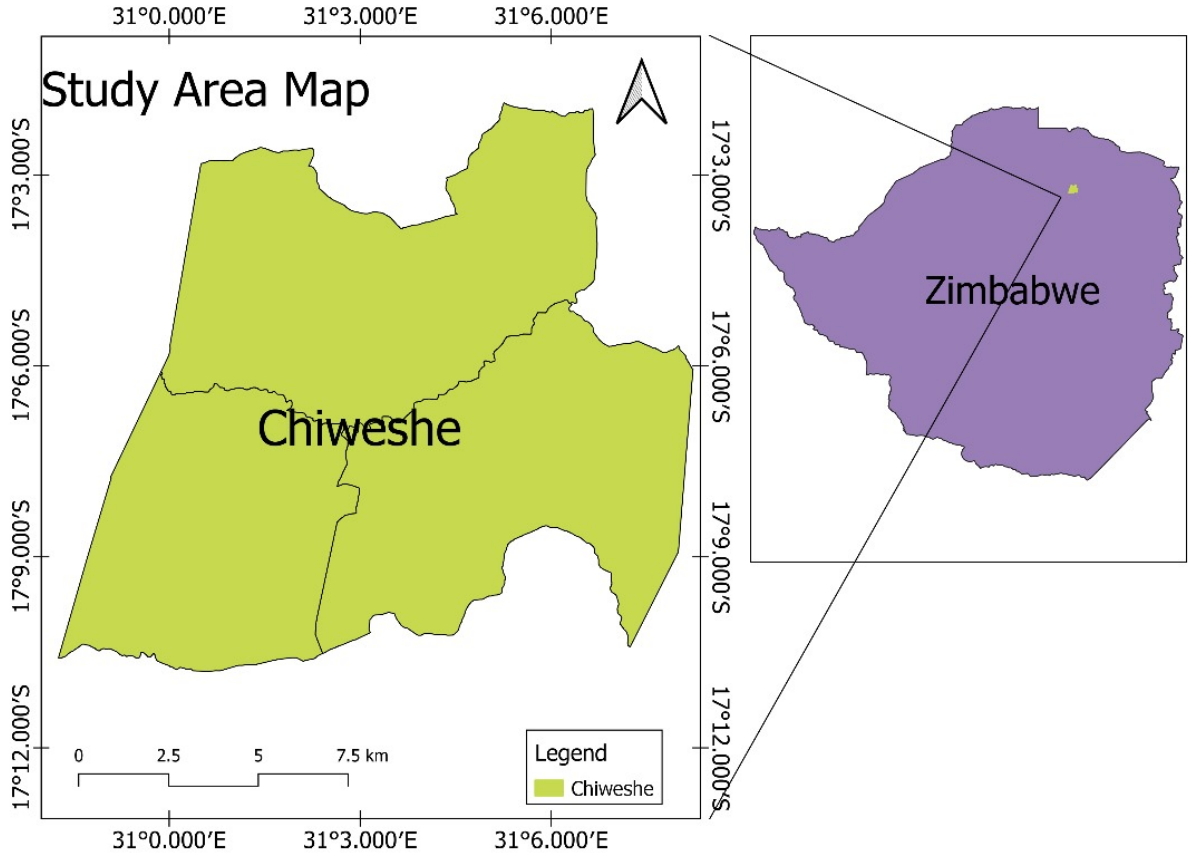

Figure 3.1: Map showing location of Chiweshe, Mazowe District

3.2 RESEARCH DESIGN

Both qualitative and quantitative research methods were used in this study as they show a broader understanding of the social and economic impacts and analyze non-numerical and numerical data. Quantitative research involves data collection that is typically numeric and hence the data collected aid insights on smallholder farmers' perceptions and experiences with *Eucalypt* cultivation. Qualitative data helped with statistical evidence of income generation and employment effects of *Eucalyptus* spp. In-depth interviews with key informants which include agricultural extension officers and forestry department officials were interviewed. The interviews conducted helped in collecting data related to *Eucalyptus* production and social and economic impacts on a broader perspective in the study area. Also, quantitative data was obtained through the use of quantitative surveys where questionnaires were administered to the farmers.

3.3 SAMPLING TECHNIQUE

A multi-stage sampling technique was employed in this study. Firstly, Chiweshe district was purposely chosen for its plantations and then 4 wards were randomly selected from the 13 wards which are Mukumbura Ward 2, Nyambiriri Ward 5 and Chitsungo in Nzvimbo Ward 8 and Foresters A Ward 25 in the community. A list of smallholder farmers in each ward was obtained from the agricultural extension office and then a simple random sampling technique was used to select 60 farmers. The total population size was 600 and the sample was determined by calculating 10% of the population size which is 60.

3.4 PROCEDURES FOR COLLECTING DATA

Two methods of data collection which include survey questionnaires and key informant interviews were used for the study.

3.4.1 Surveys

Surveys to the farmers were done using questionnaires (Appendix 1) to obtain quantitative data that will be used to assess the social and economic impacts of *eucalyptus* and farmer's perception of livelihood. Questionnaires were administered to the sampled farmers and would consist of both close-ended and open-ended questions. The contents of the questionnaire included personal demographic characteristics such as age, education and marital status, household livelihood activities, and sources of income. Close-ended questions were used to collect data on social and economic variables such as income, education, and land use practices while open-ended questions, on the other hand, would help in collecting data on the farmers' perceptions and experiences with *eucalyptus*. A total of 60 questionnaires were administered with 15 questionnaires administered per ward.

3.4.2 In-depth interviews

The researcher identified key informants, purposively, for interviews (Appendix 2) that were conducted, useful for the study and these included officials from government departments namely the Forestry Commission, agricultural extension officers, local community leaders, and smallholder farmers. Questions about informants' experiences with *Eucalypt* cultivation in the study area were asked. About 20 smallholder farmers were selected using the farmers' household list from

the sample to be collected and then interviewed to know their perspectives and experiences on the impacts of *Eucalyptus* on their livelihood and income.

3.5 DATA ANALYSIS

Descriptive statistics that include frequencies and percentages were analysed using quantitative data obtained from survey questionnaires. The data was coded into SPSS, processed, and finally represented as graphs, charts, and tables.

CHAPTER FOUR

RESULTS

4.1 ECONOMIC IMPACTS OF *EUCALYPTUS* SPECIES

There are two main economic impacts of *Eucalyptus* species which are income generation and market access which long back had hinderance, as there were poor infrastructure developments such as poor roads that were making it difficult for the farmers to transport their produce. Henceforth, the development of infrastructures such as the Nzvimbo growth point and roads such as Muswenerd and Nzvimbo to Svoto roads resulted in increased attraction of buyers paving the way for market access. Income generation was the most common economic impact of *eucalyptus* species (66%) and *eucalyptus* species cultivation in Chiweshe also facilitated market access (34%) for the smallholder farmers (Figure 4.1).

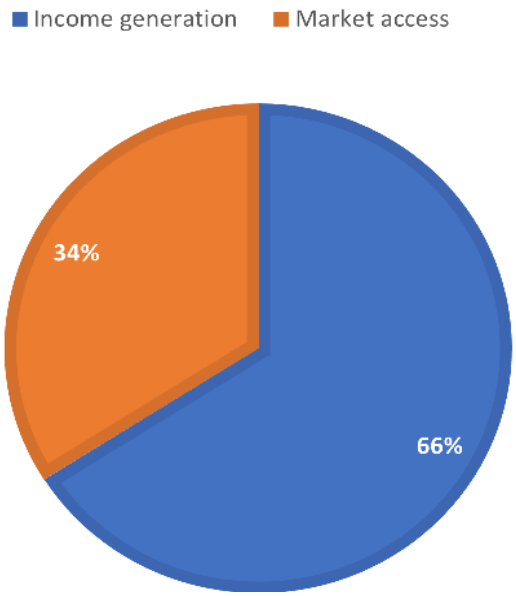

Figure 4.1: Economic impacts of *Eucalyptus spp.* on smallholder farmers in Chiweshe

Income was generated through the selling of various products of *Eucalyptus*. The most commonly sold *Eucalyptus* products were fuel wood (56.6%), honey (22.2),

medicine (18.5), and timber (3.7%) done at Forester I or Fog more farm (2%). Products such as fuel wood and poles are often sold for tobacco curing and brick molding, whereas honey production is seasonal. E*ucalyptus* sap used for traditional medicine practices for its healing process, *Eucalyptus* twigs used to make infusions for respiratory issues and *Eucalyptus* bark which is used for traditional remedies for its anti-inflammatory and analgesic effects. Moreover, *Eucalyptus* leaf powders are mixed with honey for Asthma treatments traditionally. Products such as poles are often sold to High Glen, Glenview, and also locally to those who do fencing whilst fuel wood, honey, and *Eucalyptus* medicine such as twigs, leaves and barks are sold at the local market (Figure 4.2).

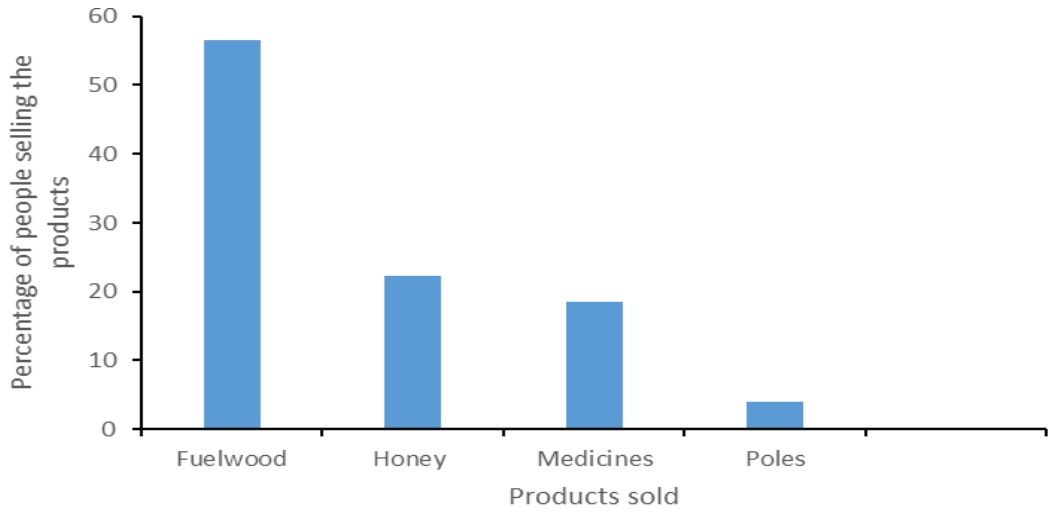

Figure 4.2 Products sold by the smallholder farmers

4.1.1 Income of smallholder farmers after harvesting in the 7th year

Table 4.1 shows the income of smallholder farmers after harvesting in year seven. Farmers with 0.3 hectares (3.7%) earned up to about $900 while those with 1ha (54%) earned from $1500 where the majority of the respondents lie and those with more than 4 ha of farm area earned approximately $10000 depending on the market price.

Table 4.1: Income of smallholder farmers after harvesting in the seventh year

	US$	Responses	Farm Hectare	Percentage
Annual income	500-900	2	0.3	3.7
	900-1500	29	1	54
	2000-5000	7	2	13
	1500-3800	8	4	15
	3800-4000	7	4.8	13
	10000-12000	1	6	2

4.2 SOCIAL IMPACTS OF *EUCALYPTUS* SPECIES

There are various types of social impacts associated with *Eucalyptus* cultivation. These include employment (30%), provision of building materials (25%), improved living standards (10%), and poverty reduction (4%) (Figure 4.3).

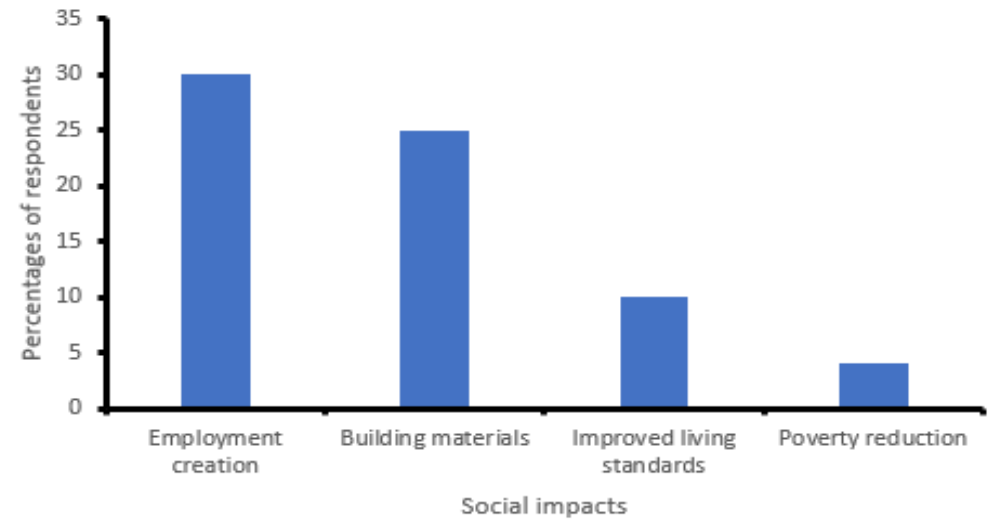

Figure 4.3 The social impacts of *Eucalyptus* spp. on smallholder farmers

4.2.1 Types of employment associated with Eucalyptus spp

The main types of employment associated with *Eucalyptus* spp. are harvesting (51%), planting (25%), weeding (13%), transportation (8%) and security (3%). Employment types identified are part and parcel of their daily lives. (Figure 4.4).

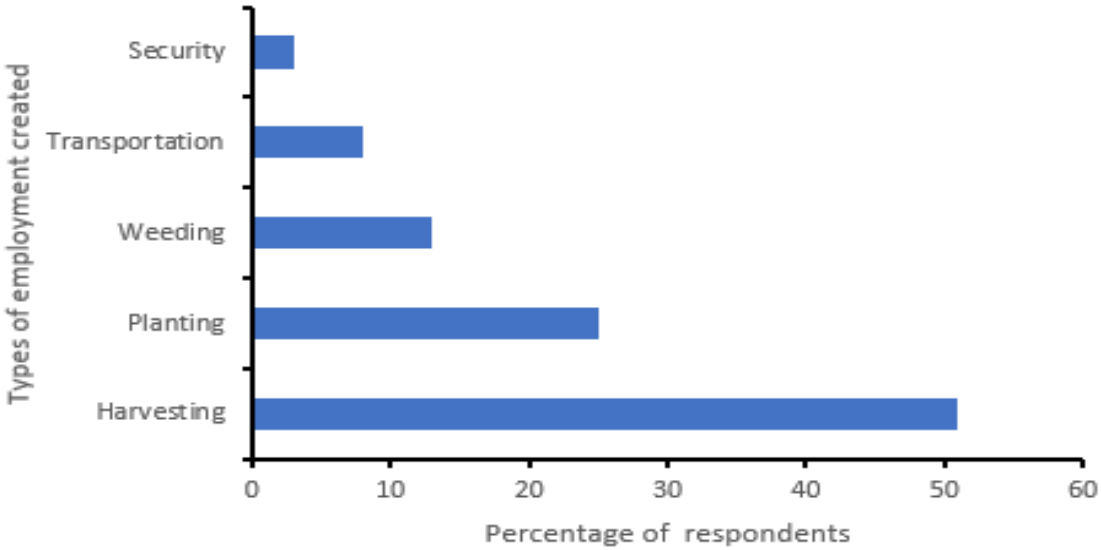

Figure 4.4 Types of employment opportunities associated with *Eucalyptus*

4.2.2 Changes of employment from 2020-2023

Table 4.2 shows that a majority of respondents (53.8%) reported an increase in employment opportunities due to Eucalyptus cultivation from 2020-2023. While a smaller percentage (20.4%) saw no change, (12.2%) experienced increased income. However, (6.8%) noted a decrease in employment opportunities, and (6.8%) did not provide an answer.

Table 4.2: Changes in employment from 2020-2023

Changes of employment from 2020-23	% of Respondents
Increased employment	53.8
Constant employment	20.4
Income increased	12.2
Decreased employment	6.8
Did not answer	6.8
Total	100

4.3 SOCIO-ECONOMIC IMPACTS OF EUCALYPTUS SPECIES

The establishment of *Eucalyptus* plantations has negative impacts such as land use changes, theft manifest when the saplings are young and escalate when plantations reach maturity which is the most common, and lack of technical funds which refers to the insufficient financial resources and investment in the necessary technologies, technical trainings and infrastructure development such as irrigation systems for smallholder farmers in Chiweshe. Land use changes was the dominant challenge (56%), lack of technical funds (28%) was second, and lastly theft (16%) (Figure 4.5).

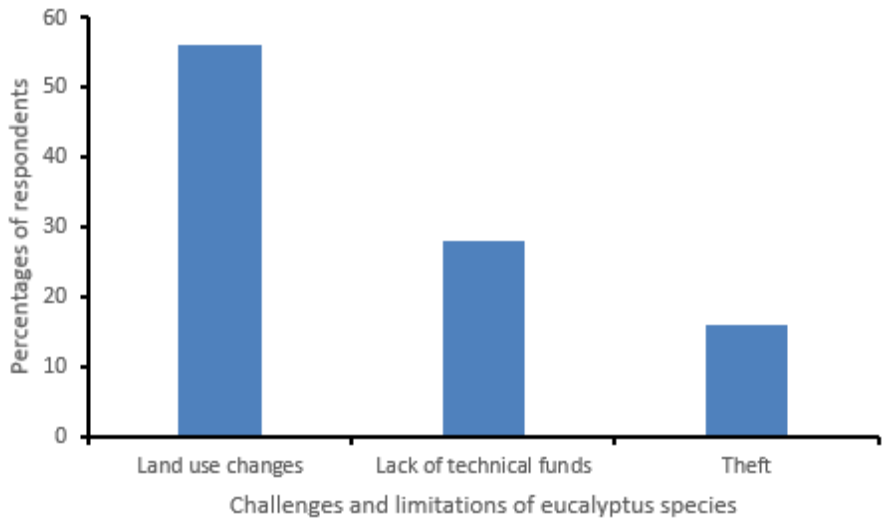

Figure 4.5 Perceived challenges and limitations of *Eucalyptus* species

CHAPTER FIVE

DISCUSSION OF RESULTS

5.1 ECONOMIC IMPACTS OF *EUCALYPTUS* SPECIES

Results showed that the major economic impacts of *Eucalyptus* species are income generation and market access (figure 4.1). The cultivation of *Eucalyptus* species in Chiweshe has provided significant economic benefits for smallholder farmers, primarily through income generation. The increased income of smallholder farmers in Chiweshe was through the selling of *Eucalyptus* products. *Eucalyptus* spp. provided the highest form of income when compared with other crops, Similarly, *Eucalyptus* increased smallholder farmers' income in Ethiopia (Bayle, 2020). The results also agree with the findings of Mudhara (2015) who stated that *Eucalyptus*

spp. increased smallholder farmers' income through revenue from *Eucalyptus* products such as fuel wood and timber. More so, the results also suggest that *Eucalyptus* species increase market access for smallholder farmers in Chiweshe through development of infrastructures at the growth point to support the growing market including roads that increased market access. This enabled the smallholder farmers to supply and sell their raw materials thereby generating income. The results are supported by Zhang et al., (2018) who indicated that the cultivation of *Eucalyptus* species paved the way for market access resulting in the increased smallholder farmers' income. Similarly, Wekesa et al. (2010) in Kenya stated that market access improvements directly contributed to income growth for farmers by facilitating the sale of produce at competitive prices.

5.1.1 Products sold by the smallholder farmers

Smallholder farmers in Chiweshe mainly sold, fuel wood, honey, poles, and medicines (figure 4.2). The main source of income came from selling fuel wood and honey as they had a higher market share compared to other products such as poles and medicines as they are produced in smaller quantities. Fuel wood was the most common product being sold probably because it is the main source of energy for tobacco farmers and domestic use. Furthermore, the area also faces massive deforestation. This concurs with the study by Dese (2021), who showed that most of the respondents who benefited from *Eucalypt* spp. plantations got income from the sale of wood products. Similarly, a study by Tadesse (2016) identified 92% of the respondents benefiting from *Eucalyptus* plantations generating income from sale of wood products. Honey was the second commonly sold product because of the belief that honey produced from *Eucalyptus* has medicinal value. This aligns with the findings of Abebe (2019) who confirmed that *Eucalyptus* spp. is a good source of nectar and the honey has medicinal properties. The smallholder farmers also used the income generated from selling *Eucalyptus* products to buy food for home consumption and send their children to school. This is supported by Bayle (2019) who indicated that farmers relied on income earned from *Eucalyptus* spp. cultivation to buy food and construction materials. Moreover, traditional medicines made from *Eucalyptus* twigs, leaves, and bark are sold to people locally as they are used in making infusions and remedies for healing processes such as muscle strains and coughs. Lastly, poles are sold to small-scale markets in Harare’s High Glen and

Glenview areas and also locally to the people for making fences. Hence, it can be argued that *Eucalyptus* spp. increase the income of smallholder farmers in Chiweshe from selling these poles. This concurs with the study of Mudhara (2015) who revealed that *Eucalyptus* species provide smallholder farmers with revenue from selling products such as poles and fuel wood.

Table 4.1 suggests that the annual income of smallholder farmers depends on the farm area. The sale of these products has enabled farmers to earn significant incomes, with those managing 1 hectare of *Eucalyptus* earning less than those with bigger areas after harvesting in year seven. The results agree with the findings of Zhang et al., (2018) who showed a strong positive correlation between the size of *Eucalyptus* plantations and the annual income of smallholder farmers, with larger plantations consistently generating higher income. This also concurs with the study of Mwangi et al., (2013) in Kenya who showed that there is a linkage between the size of Eucalyptus plantations and farmers' annual income. Therefore, the annual income of smallholder farmers depends on the size of the plantation.

5.2 SOCIAL IMPACTS OF *EUCALYPTUS* SPECIES

Several social impacts were shown, including employment creation, building materials, improved state of living, and poverty reduction (figure 4.3). The results agree with the findings of Dese (2021) who suggested that employment opportunities were the core and vital social impact of *Eucalyptus* species that enhanced the livelihoods of the smallholder farmers. Building materials were the second social impact identified which is crucial for local construction projects. Establishing of plantations and marketing of the products resulted in improved standards of living and poverty reduction for smallholder farmers through the provision of good health and education. This aligns with the findings of Alemayehu and Desalegn (2015) who showed that *Eucalyptus* species provided building materials, and other infrastructure contributing to improved living conditions. Although there was high employment creation, poverty reduction remained low because most of the employment created was seasonal. Chikoko (2016) also revealed that whilst *Eucalyptus* cultivation creates employment, these jobs are often temporary and do not provide a stable income throughout the year. Therefore, this limits the potential of *Eucalyptus* to significantly reduce poverty levels.

Eucalyptus species provide direct and indirect employment to smallholder farmers (Figure 4.4). The notable types of employment created are during harvesting, planting, weeding, transportation, and security. The results agree with the findings of Chikanda et al., (2020) who stated that *Eucalyptus* plantations increased jobs from activities such as pruning, planting, and harvesting in Zimbabwe. This is supported by Munda (2004) and Alemayehu et al., (2018) who showed that direct employment activities including raising seedlings, weeding, and planting were done by smallholder farmers.

Furthermore, the results show that employment opportunities changed from 2020-23, which had a positive effect on livelihoods reducing poverty (table 4.2). This might be due to various activities created during the establishment of the plantations. Similarly, the results agree with the report by FAO (2018) who showed that *Eucalyptus* species generated over 1.5 million jobs also with a 20% poverty reduction in Brazil. Also, employment might have decreased because the demand for labor decreased with maturity of plantation stands.

5.3 PERCEIVED NEGATIVE SOCIO-ECONOMIC IMPACTS OF *EUCALYPTUS* SPECIES

Despite the positive economic and social impacts, *Eucalyptus* cultivation also presents several challenges. Land use changes were the dominant negative impact on the respondents, as traditional lands are being shifted from agricultural land to *Eucalyptus* plantations. The changes in land use have impacts on the food security of smallholder farmers, as there will be a reduction in crop yields due to pests and diseases and local ecosystems. This aligns with the study of Alemayehu et al., (2018) who indicated that the change of agricultural land to *Eucalyptus* plantations resulted in reduced yield of crops due to pests and diseases in Ethiopia. Similarly, the study of Tadesse et al (2016) also indicated that the cultivation of *Eucalyptus* spp. in Ethiopia resulted in a deterioration in food production thereby impacting the food security of smallholder farmers. Additionally, the lack of technical funds to purchase inputs, hire labor, and transport cost, the dangers of theft pose significant challenges for smallholder farmers restricting their ability to maximise the benefits of *Eucalyptus* cultivation, which requires attention from the government.

CHAPTER SIX

CONCLUSION

6.1 CONCLUSION

The results suggest that the major economic and social impacts of *Eucalyptus* species on smallholder farmers in Chiweshe Communal lands. *Eucalyptus* species had both positive and negative socio-economic impacts. The positive impacts resulted in income generation, market access, employment creation, and improved living standards among others. Despite the positive economic and social impacts, *Eucalyptus* cultivation also presents several challenges. The negative socio-economic impacts resulted in changes in land uses, lack of technical funds, and theft. According to the findings, *Eucalyptus* species impacted smallholder farmers in different ways.

6.2 RECOMMENDATIONS

The following are the recommendations based on the research findings:

- The government, through the Forestry Commission and NGOs, should develop programs that help smallholder farmers with technical funds such as access to technology, training, capacity building and infrastructure developments and security measures to reduce theft.
- Community engagement and participation in decision-making of policies that directly impact their livelihoods.
- There is a need to promote sustainable *Eucalyptus* management practices among smallholder farmers to maximize economic benefits while minimizing the negative social impacts.
- There is need to advocate for policies that support smallholder farmers engaging in *Eucalyptus* cultivation, surrounding land use, agricultural practices and access to resources.

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LIST OF APPENDICES

APPENDIX 1: QUESTIONNAIRE

Good day. My name is Tafadzwa Loreta Sharaunga, and I am doing my final year at Bindura University of Science Education. I am undertaking a research entitled *"The socioeconomic impacts of Eucalyptus spp. on smallholder farmers in Chiweshe Communal lands in Zimbabwe.* You are therefore, requested to assist in the research by completing the questionnaire fully and as truthfully as you can. All the information you provide will be used solely for this study and will be treated with the utmost confidentiality.

Date: …… **Questionnaire ID:** ……

INSTRUCTIONS:

- *Please tick on the appropriate answer and fill in where ever possible.*

SECTION A: Respondent's demographic

1. Gender: Male ☐ Female ☐

2. Age class: <20 years ☐ 21-40 years ☐ 41-60 years ☐ >60 years ☐
3. Marital status: Married ☐ Divorced ☐ Single ☐ Widowed ☐

4. Highest educational level attained: None ☐ Ordinary ☐ Advanced ☐ Tertiary ☐

5. How long have you been farming in Chiweshe: <5 years ☐ 6-10 years ☐ >10 year ☐

Section B: *Eucalyptus* practices/ experiences

6. Do you cultivate *eucalyptus* trees on your farm? ----------

7. If yes, for what purpose do you cultivate *eucalyptus* on your farm?----------
---
---

8. How many hectares of your farm are dedicated to *eucalyptus* cultivation? ----------
---

9.What are the main factors that influenced your decision to cultivate *eucalyptus* trees?----------
---

Section C: Socio-economic impacts

10. In your opinion, what are the main impacts of *eucalyptus* cultivation on your livelihood?----------
---
---

11. Describe changes in your income since you started *eucalypt* cultivation. ----------
---
---

12. If yes, how has it affected your household's overall life?----------
---
---

13. If yes, what is the annual income from *Eucalyptus*?----------
---
---

14. What products are sold? ----------
---

15. Which products are used by the household? ----------
---

16. What are the other uses of *Eucalyptus*? ----------

17. What are the challenges or limitations?----------

18.Do you have any further comments or suggestions on the socioeconomic impacts of *eucalyptus* on Smallholder farmers in Chiweshe?----------
---

Section D: *Eucalyptus* farming and employment opportunities

19. Have you ever worked in the *eucalyptus* industry in Chiweshe? ----------
---

20. If yes, what kind of work did you do? ----------
---

21 a).How has *eucalyptus* cultivation affected the employment opportunities among you or your household members? ----------
---

b)Can you describe the changes observed over time?----------

22.What are the different types of employment opportunities associated with *eucalyptus* cultivation?----------
---
---

23. Do you hire external labor for *eucalyptus* related tasks? ----------

24. If yes, how has the employment of external labor changed from 2020-23?----------
---
---

25. Are there any seasonal variations in employment opportunities related to *eucalyptus* cultivation? ----------
---

Thank you for taking the time to complete this questionnaire. Your responses are valuable and will contribute to the success of this study.

APPENDIX 2: INTERVIEW GUIDE

Interview guide for the Forestry Commission and Agricultural extension officers on the socio-economic impacts of Eucalyptus spp. on smallholder farmers in Chiweshe Communal lands in Zimbabwe.

QUESTIONS

1. What is the primary purpose for which smallholder farmers plant *Eucalyptus* spp.?
2. What are the demographic and socio-economic characteristics of smallholder farmers in Chiweshe who have planted *Eucalyptus* spp.?
3. What is the average size of land holdings for smallholder farmers with *Eucalyptus* spp. plantations?
4. What are the economic benefits of *Eucalyptus* spp. plantations for smallholder farmers?
5. What are the perceived social benefits and challenges associated with

Eucalyptus spp. plantations?

6. How has the introduction of *Eucalyptus* spp. affected the social life of the community?

Thank you for taking your time

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