

**VALUE CHAIN AND RURAL LIVELIHOODS: ANALYSIS OF *Acacia mearnsii*
(BLACK WATTLE) ACTIVITIES IN NJOMBE AND LUSHOTO DISTRICTS**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
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ABSTRACT

Despite the positive impact of *Acacia mearnsii* (Black Wattle) production presented in literature as an alternative source of energy and income for rural poor, the value chain for black wattle in terms of who are the actors along the chain, what value addition activities are performed and economic performance at the main node have received low research attention. This study analysed the value chain of, and its contribution to the rural livelihoods in Njombe and Lushoto Districts. Data were collected from a random sample of 178 black wattle chain actors using structured questionnaire supplemented by the secondary data. Price, profit and gross margins were determined to examine efficiency at different nodes along the value chain. Descriptive statistics were obtained using SPSS software. Results revealed that black wattle activities are important source of income and fuel energy in the sample villages. Various value addition activities were done though they use local methods which led to low return. In general, both horizontal and vertical coordination along the value chain actors were weak. All actors including producers, processors and traders in the black wattle value chain were not organized to safeguard their interests. Factors that influenced ($p < 0.05$) return were cost of labour and area under black wattle production. The results also show that black wattle contributes to improved livelihood of producers. Results of profitability analysis indicated variations in the gross margin with the higher margin (TZS 2 975 million) obtained by barks processors and TZS 2 536 580 by traders followed by TZS 717 111 of charcoal processors while producers had the lowest gross margin (TZS 567 632.50). Based on findings of this study, it is recommended that actors use improved value addition methods, farmers organise themselves into groups to enjoy economies of scale, improve infrastructure, market information and extension services.

DECLARATION

I, Dafroza Aloyce Sanga, do hereby declare to the Senate of Sokoine University of Agriculture that this research dissertation is the result of my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

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Date

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Date

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DEDICATION

The work is dedicated to my beloved late parents, Mr. Aloyce Sanga and Mrs. Stephania Aloyce Sanga who laid the foundation for my education. May God rest their souls in eternal peace, Amen!

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LIST OF ABBREVIATIONS AND SYMBOLS

BW	Black Wattle
Co.	Company
DED	District Executive Director
DFID	Department for International Development
FAO	Food and Agriculture Organization of the United Nations
GM	Gross Margin
IIRR	International Institute of Rural Reconstruction
IITA	International Institute of Tropical Agriculture
Kg	Kilogramme
KWH	Kilo Watt Hour
MDGs	Millennium Development Goals
MKUKUTA	National Strategy for Growth and Poverty Reduction
MNRT	Ministry of Natural Resource and Tourism
N	Number of individual in a sample
NDC	Njombe District Council
NTFPs	Non Timber Forest Products
OLS	Ordinary Least Square
SACCOS	Savings and Credit Cooperative Society
SLA	Sustainable Livelihood Analysis
SNAL	Sokoine National Agriculture Library
SPSS	Statistical Package for Social Science
TAFORI	Tanzania Forest Research Institute
TANESCO	Tanzania Electricity Supply Company

TANWATT	Tanganyika Wattle Company Limited
USD	United State Dollar
VC	Value Chain
VCA	Value Chain Analysis
VEO	Village Executive Officer
VICOBA	Village Community Bank

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Acacia species is a fast growing leguminous (nitrogen fixing) trees originated from Australia. It is grown commercially in many areas of the world including Africa, South America and Europe (Adair *et al.*, 2000; Chilima, 2007). Many of the Acacia species have evolved into various ways to survive including; ability to grow in different environmental conditions and habitats, reduced loss of moisture through transpiration, developed deep root systems (Dharani, 2006). There are more than 1 342 Acacia species worldwide of which about 132 are found in Africa, of these 62 are found in East Africa. Most of Acacia species grow under various environmental conditions contribute to flora and fauna diversity in Africa (Mbuya *et al.*,1994 and Dharani, 2006).

Black wattles are examples of exotic species considered to be highly invasive, yet profitable (Aitken *et al.*, 2009). Some development interventions in Tanzania promote planting and management of wattle in small plantations as a means for increasing livelihood sustainability for poor rural households. Tanzania is among countries that grow black wattle commercially under small and large plantations, and has Lion Wattle and TANWATT Factories in Lushoto and Njombe Districts for processing barks into solid and powder extract respectively.

Black wattle and products have various socio-economic importance from its use as; ornamental, fuel wood, pole for building, fencing shade, tool handles, medicine, adhesive material, bee forage and tannin (Dharani, 2006; Chilima, 2007; Dharani *et al.*, 2009; and Seigler, 2002). During dry season, Velvet monkey and baboons feed on stem sap while

bees and butterflies use nectar. Seed are also consumed by birds for example Ostrich and rodents and its barks produce tannin, fiber – cellulose (Or and Ward, 2003). Furthermore, black wattle is excellent fuelwood, which is used for curing tea and tobacco (TAN WATT, 2014). The trees are also used as a soil stabilizer to decrease erosion. Agro-forestry promotes use of black wattle among others, as a potential "soil improver" (Wit *et al.*, 2001; Seigler, 2002; Gujrathi and Babu, 2007).

As a rule of thumb, black wattle trees are stripped of bark when they have achieved a diameter of 5-7 inches and are about 5-9 years old. This is when the bark has the highest tannin (wattle extract) content of 42-47%. The tannin content of the bark fluctuates according to the age and size of the tree, season, soil type, amount of ferrous iron in the soil, soil drainage, and handling of the bark before extraction of the tannin. The tannin content is also highest in trees grown in deep, well-drained volcanic soils that have low ferrous iron content. Timing of harvesting determines the quality and quantity of tannin. During the dry season, tannin acts as a source of food for the plant, therefore tanning content is higher in leaves than during the wet season. During the wet season, tannin reaches the highest concentration in the bark (Onchere, 2001).

Barks of black wattle contain high quantities of tannin which is categorized as one of non-timber forest products (NTFPs) and represents a sustainable source of important raw material for leather industries. While black wattles are environmental friendly, there is also an increase in its market share and prices. This is reported to result into high multiplier effects from input supply to the final product to the end users (Bellù, 2013). The primary focus in value chains was on the value addition activities, benefits that accrue to customers, the interdependent processes of various actors for value generation and the resulting demand and money flows that are created (Feller *et al.*, 2006).

Successful chains depend on integration, coordination, communication and cooperation between nodes with the traditional measure of success being the return on investment. Black wattle production activities can be regarded as sustainable livelihoods gateway, diversify sources of incomes and may be regarded as a springboard for rural households' development.

1.2 Problem Statement and Justification

Black wattle production has been considered as one of the main alternatives to agriculture in Lushoto and Njombe Districts (NDC, 2010). The trees are grown on 10-year harvesting cycles and managed in such a manner to ensure that farmers/growers receive a regular income and a continuous and sustainable supply of high quality wattle bark is available for processing. Black wattle has multiple uses for its nature including sustaining livelihood and for biodiversity conservation (Gujrathi and Babu, 2007). Black wattles play a greater role in balancing ecosystem and biodiversity as it provides environmental services, climate regulation, cycling of carbon soil fixation and cultural services (Agustino *et al.*, 2011).

Without much empirical analysis, NDC (2010) reported that wattle plantations in Lushoto and Njombe districts are one of the economic activities that contributed to the council's revenues in terms of CESS¹ and enhanced household livelihoods. The plantations create employment opportunities across various age groups and as a result minimizes unemployment problem. Despite the positive impact of black wattle production presented in literature as an alternative source of energy and income generation for rural poor, the value chain for black wattle in terms of who the actors are along the chain, what value addition activities are performed and economic performance at each node have received low research attention in black wattle.

¹ CESS is an alternative term for tax

Various studies have been conducted on some of Acacia species in East Africa (Kirinya, 1983; Malyosi, 1990; Leonidas, 2003; Dharani *et al.*, 2009 and Qolli, 2011) on *A. Albida*, *A. Xanophloea*, *A. Tortilis*, and *A. Kirkii* respectively. However, research on value chain analysis of black wattle has received little attention in Tanzania. None has provided adequate information on the existing black wattle value chain and its contribution to rural livelihoods. It is hypothesized that there are unutilized potentials and unexplored available on black wattle along the chain and its contribution to rural livelihood.

Thus, this study was conducted to identify key actors along the value chain and analyse value addition activities performed by the actors. Also, identified main nodes and determined productivity at the main nodes, and analysed factors influencing the chain and identified the opportunities for promoting black wattle production.

The results from this study will help policy makers to design appropriate policies and strategies for efficient and sustainable development of the black wattle industry. This in turn it will improve wattle value chain with the aim to effectively contribute to poverty reduction and establishment of sustainable livelihoods for smallholder farmers. Also, the study will provide useful information that will serve as a reference to subsequent research on the issue in the context of Tanzania.

1.3 Objectives

1.3.1 Overall Objective

The overall objective of this study was to analyse the value chain of black wattle and its contribution to the rural livelihoods in Njombe and Lushoto Districts.

1.3.2 Specific objectives

- i. To identify and examine how the chain is organized, coordinated and function between the key actors in the study areas,
- ii. To evaluate contribution of black wattle activities to actors' livelihood in the study areas,
- iii. To determine factors influencing the value chain of the black wattle in the study areas,
- iv. To determine economic efficiency of the main nodes of the value chain in the study areas,

1.3.3 Research questions

- i. Who are the key actors and how are the actors organized and coordinated in black wattle activities?
- ii. What are the impacts of Black Wattle production on rural livelihood in the study area?
- iii. How efficiently are the different operations along the chain performed?
- iv. How are the profits distributed to the actors along the chain?
- v. What are the major constraints facing the value chain actors?
- vi. What are factors influencing the black wattle value chain?
- vii. What are the prevailing prices, profitability of different actors along the chain?

1.4 Organisation of the Report

This report is organized into five chapters. Chapter one is an Introduction covering background to the study, problem statement, objectives, and research questions. Chapter Two provides a review of literature and Chapter Three covers methodology used in the

study. Chapter Four presents results and discussion of findings and the last chapter, Chapter Five gives conclusions and policy implications.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 The Structure of Value Chain

The structure of value chain includes all firms in a chain based on their organization and linkages (horizontal or vertical), the conduciveness of the environment and market opportunities. Market is a starting point of value chain analysis and its end markets is customers. In a chain consumers have a powerful voice which influences changes. Chains also operate in a business enabling environment that can be all at once local, national or global which includes norms, international trade agreements, and public infrastructure (Teischinger, 2009; Sewando, 2012).

Horizontal linkages (formal and informal) between firms at all levels in a value chain can reduce transaction cost and create economies of scale which contribute to increased efficiency and competitiveness of an industry. Also it facilitates collective learning and risk sharing while increases the potential for upgrading.

Coordination of value chain is the act of making all stakeholders involved in the organized value chain; more emphasis is on vertical coordination supply chain. Coordination implies a set of two or more actors who performs tasks in order to achieve stated goal (Nang'ole *et al.*, 2011 and Sewando, 2012). In order to have a better understanding of where the small produce of black wattle stand in the value chain, it is important to analyze who are the actors and what interaction are like.

2.2 Value Chain Analysis

Lusby and Panlibuton, (2004) state that, value chain analysis (VCA) can help to i) reveal links between producers, exporters and global market ii) identify constraints along the chain to competing in the market place iii) clarify the relationships in the chain from buyer

to producer and iv) highlight the distribution of benefit among buyers, exporters and producers in the chain.

Sarris and Hallam (2006) stated that VCA seeks to explain who undertake what activities in the production and transformation of a product and why and how the income generated and distributed between participants in the process. Value chain of black wattle can be broken into several subsets of activities including production, collection, storage, transportation, marketing and sale. The intensity, frequency and sequence of these activities may differ from product to product (Mhapa, 2011 and Nang'ole *et al.*, 2011).

Elepu (2014) conducted a study on agricultural value chain analysis in two sub-regions (Acholi and Lango) in northern Uganda. A value chain analysis was done for each of the following five crop commodities: maize, rice, groundnuts, sunflower and sesame. The study included mapping of the value chains, detailed descriptions of the main actors involved in the value chains (from farmers to end consumers) and lastly, analysis of how the value is distributed across the different actors. The methodology involved collection of data and documentary review of secondary literature, collection of primary information from the field through focus group discussions and semi-structured interviews using purposive sampling. Lastly, data was compiled and analysed to generate gross margins obtained by different actors along the value chains. All value chains were similar particularly at the upstream stages of the chain, right after harvest. Once farmers harvested their crops, they either sold production directly at the farm gate level or stored and bulked. Selling at farm gate level was not preferred by farmers but was often done out of necessity or simply due to very limited access to markets. Farmer bargaining power was low and the selling prices of their crops were often very low. Another marketing strategy was often to

bulk up the crop commodity either in the granary on the farm or in local stores in order to seek better prices (sold at the right time and in larger quantities).

Hulusjo (2013) studied a value chain analysis for timber in four East African countries (Kenya, Uganda, Tanzania and Rwanda). The purpose of the study was to identify and describe common value chains for timber in the countries where Vi Agro-forestry operated. The study was conducted as an exploratory case study focusing on gaining broad initial insights. Data collection was done mainly through semi-structured interviews with actors engaged in activities throughout the chains. The observed chains consisted of farmers engaged in silviculture, independent contractors providing processing of timber into boards, other independents providing transporting services from interior sites to markets, timber dealers coordinating between different stages plus handling retailing and finally contractors or carpenters engaged in construction or furniture making. Businesses were very small-scale, sole proprietorships with mainly one or two employees and markets were local. The findings point out the opportunities to increase the overall surplus to the benefit of all value chain participants by increasing cooperation and coordination, both horizontal and vertical. This could increase scale and reduce costs but from the farmers' perspective, for more vertical integration to make sense, there had to be a firm horizontal cooperation between actors in the first stage. Average farm size was a seriously limiting factor to creating economies of scale and considering the cost of required inputs for processing this would need to be in place. However, most of these studies have been focused on invasiveness of Black wattle and little attention has been put on value chain study.

The study conducted by Bhatta (2009), on unlocking Eucalyptus for poor communities in central Terai- Nepal. Value chain map of Eucalyptus which was derived from field studies

and focus group discussion. Four different value chain maps (based on different end products) were obtainable including; a value chain of plywood, power transmission poles, firewood and eucalyptus oil in relation to the different stakeholders and facilitating institutions based on the different end product uses.

2.3 Value Chain Actors

According to the International Institute of Rural Reconstruction (IIRR, 2006) in terms of chain actors, a value chain may be explained as a specific type of supply chain, where by actors actively seek to support each other so that they can increase their efficiency and competitiveness. They invest time, effort and money and build relationships with each other to reach a common goal of satisfying consumer needs so that they can increase their profit. In this study the sampled actors include, producer, processors, traders and consumers will be assessed.

Moreover, Kaplinsky and Morris (2000); Bellù (2013) explained chain actors are those involved in producing, processing, trading or consuming a particular agricultural product. The actors include direct actors who are commercially involved in the chain (producers, processors, traders, consumers) and indirect actors who provide financial or non financial support services such as banks, credits agencies, business services provider, government, researchers, and extension's.

2.4 Value Chain Coordination and Organization

According to Kabuje (2008), value chain organization describes the institutional set up of the marketing agents in the value chain. It examines the relationship between actors along the value chain and how the trade is conducted. The value chain organization also describes the marketing channels together with the flow of goods and services in the chain.

Coordination is considered to be one of the crucial components in an organization's effort to achieve efficient and effective value chain management practices. Little is known in term of black wattle value chain and its contribution to rural livelihood. Thus critical examination of the current black wattle value chain was important aspect of this study.

2.5 Livelihood Concept in view of Black Wattle Production

A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (DFID, 1999; Bennett, 2010).

A livelihood comprises ability of an individual or household to transform natural, physical, human, financial a social assets to attain a decent living (Ashley and Hussein, 2000; Ellis, 2000; Vedeld *et al.*, 2012). The fundamental characteristics of livelihood in developing countries are the ability to adapt in order to survive. The construction of livelihood has to be seen as an ongoing process in the elements that remain the same from one season or year to the next (Ellis, 2000).

Access to and effective utilization of livelihood assets/capitals have direct influence on production, processing, storage, marketing and utilization of black wattle products which in turn determine the livelihood outcome such as increase well being of the rural households, increase income and reduce vulnerability comes from seasonality, shocks and trends.

The Sustainable Livelihoods Analysis (SLA), is drawn on a framework developed in the 1990s (Chambers and Conway, 1992; Bennett, 2010). The livelihood is defined as combination of the resources used and the activities undertaken in order to live. Chambers and Conway point out that: “A livelihood is sustainable when it can cope with, and recover from, shocks and stresses and maintain or enhance capabilities and assets both now and into the future, while not undermining the natural resource base”.

Sustainable Livelihood Analysis describes a vulnerability context containing the relevant temporal variations responsible for sudden changes (shocks), trends and seasonality, the relevant policies, institutions and processes that determine how people can turn assets (social, human, physical, financial and natural resources) into a set of desired livelihood outcomes (DFID, 1999).

In this study the livelihood analysis focused on households, the purpose was to gain an understanding on how households make effort to utilize the potentials of the black wattle to convert capitals/assets into livelihood outcomes. The conceptual framework (Figure 1) illustrates how the black wattle production as a natural capital is transformed and contributes to total household income. Black wattle production which is a natural capital and other socio-economic variables including household size, farm size, education status, experience, occupation, age, gender, price and household income. Household categories are combined and transformed through activities into outcome which is rural livelihood.

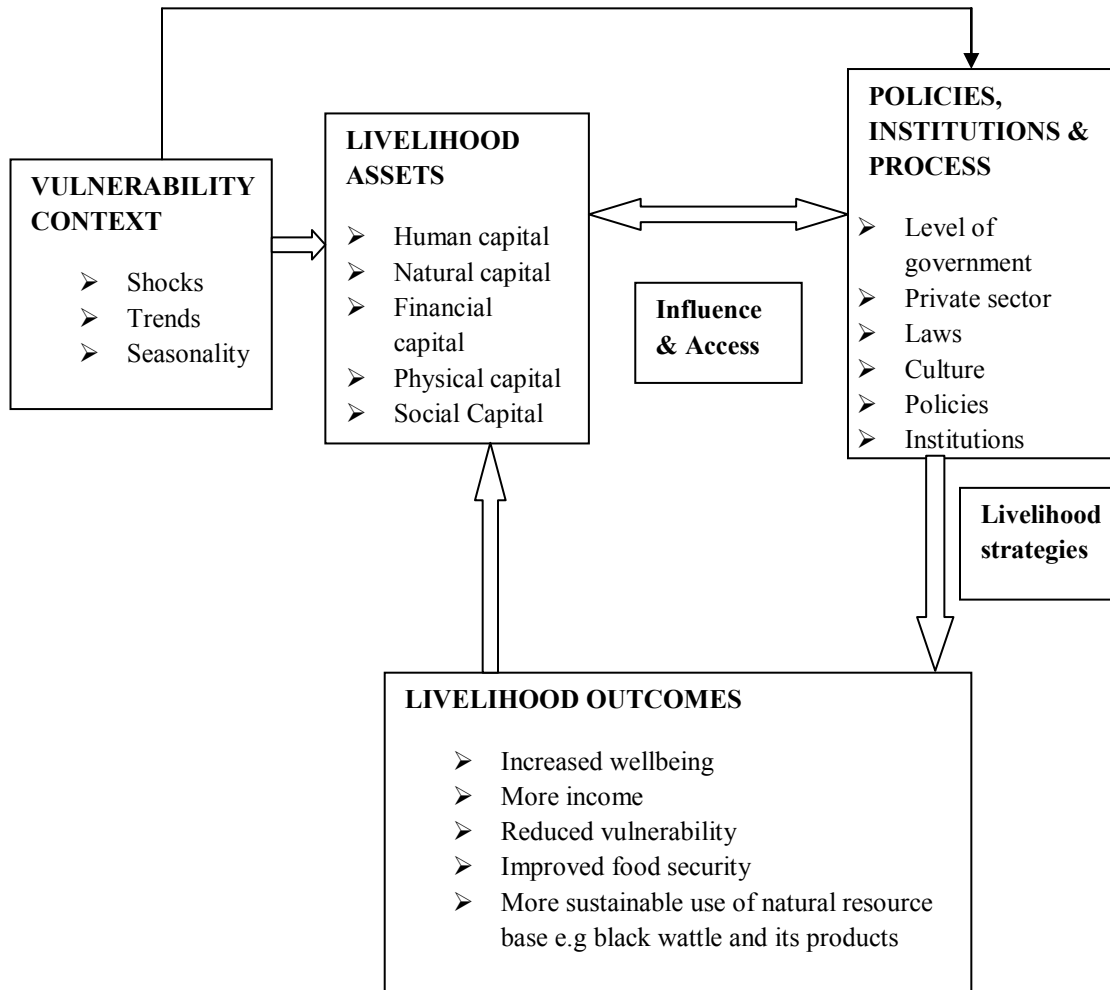


Figure 1: The sustainable Livelihood framework adopted from (DFID, 1999)

A study by ICRISTAT conducted a research on livelihood analysis in micro- watersheds in southern India for the purpose of taking up livelihood analysis in two villages Powerguda and Kistapur five capital assets (physical, human, financial, social and natural) were assessed using primary and secondary data. Primary data collected by adopting rapid and the participatory methods using appropriate analysis tools (DFID, 2000). During data collection all capital assets were assessed at village level with the participation of the community and weighted on fixed marked methods according to their importance. The methods referring to primary data were rapid case studies, key informants interviews and focused group discussion. The livelihoods opportunities in these two micro watersheds in the same agro-eco region are different because of variability in livelihoods assets, different

levels of interventions and institutional development, access of different capitals in the villages. In the livelihoods frameworks capital assets are strongly inter linked and any change in one capital asset directly influence the magnitude of change in other capitals therefore the variability in different capitals governed the livelihoods options for the farmers in remote area. The findings of the study show that the sustainable management of natural resources especially bringing in diversified livelihood options such as environmental service and biodiesel production chain.

Mhapa (2011), conducted a study to assess the trade of NTFPs and its contributions to livelihood in Njombe District. Data were collected using Participatory Rural Appraisal techniques, questionnaire and market survey. Eleven economically valuable NTFPs and products were identified to be traded in the study area. Market chain analysis of four NTFPs (firewood, honey, wild fruits and medicinal plants) showed that each product was channeled differently. The main actors in NTFPs trade were producers, processors, wholesalers and customers. Traded NTFPs were found to subsistence in terms of income contribution to the households.

2.6 Gross and Profit Margins Analysis

Gross Margin (GM) is used to assess the economic profitability of a venture. GM is obtained by finding the difference between the gross income accrued and the variable costs incurred. The analysis is therefore a simplified tool, but in many cases, a sufficiently powerful tool for economic analysis exists (Makeham and Malcolm, 1986). The GM enables one to directly compare the relative profitability of similar enterprises and consequently provides a starting point to deciding or altering the farms overall enterprise mix. Most often, new technologies in smallholder farmers are aiming at increasing the farm productivity by the fact that increasing income is one of the immediate objectives of

the individual farmer or group of farmers (Mutayoba, 2005). There is a need to distinguish between variable costs and fixed costs when explaining the concept of gross margin. Variable costs are those cost that increase or decrease as output change: Examples of variable costs in production include seeds, fertilizers, labour and pesticides. The most important fixed costs in agro-forestry production are: owned land, farm buildings, machinery and implements.

According to Mutabazi (2007), gross margin analysis is static as it does not take into consideration the time value of money compared to discounted measures of project worthness. The advantages of gross margin analysis as an economic analytical tool include its easiness to be understood, its ability to draw logical interrelation of economic and technological parameters and its ability of rational variants for the operational structure of an enterprise or individual farmers (Johnsen, 2003) concluded that although gross margin is not a good measure of profitability, it remains the most satisfactory measure of profitability in small enterprise.

A number of studies in Tanzania have employed the GM model. For example, the study by Mahoo (2011) who assessed the market efficiency analysis of *Jatropha* value chain in Monduli and Arumeru districts and Juntwa (2010) who studied the value chain assessment for ripe banana in Morogoro urban. The Model was also employed by Kadigi (2013) who evaluated the factors influencing choice of milk outlets among smallholder dairy farmers in Iringa municipality and Tanga city.

Therefore, Gross Margin analysis was used to estimate profit/return earned from black wattle activities. GM was calculated using the formula specified in equation 1.

$$GM_i = (ATR_i - ATC_i) \dots \dots \dots (1)$$

Whereby;

G_{Mi} – Gross Margin of each chain actor

A_{TRi} = Average total revenue of each chain actor

A_{TCi} = Average Total cost (Total variable cost) of each actor

i = Black wattle chain actors (Producers, processors, traders)

Profit margin also called return on sales ratio or gross profit ratio is a profitability ratio that measures the amount of net income earned with each dollar/shilling of sales generated by comparing the net income and net sales of company. Profit margin can be calculated by dividing net income by net sales. Profit margin is very useful in comparing companies in similar industries. A higher profit margin indicates a more profitable company. It is expressed by percentage for example, 30% of profit margin means that the company has a net income of 0.30 for each shilling of sales. It shows what percentages of sales are left over after all expenses are paid by the business. Profit margin method takes care of all direct and indirect costs. Profit margin was calculated using the formula specified in equation 2.

Profit margin for actors i at node j= Net income / Net sales.....(2)

Where: Net income or net profit equals to total revenue minus total expenses.

Some of the studies used profit margin model is Hussein (2010), examined actors benefits accrued in the value chain of grapes and Kabuje (2008), use profit margin to determine the efficiency in performing different operations in the value chain for hides and skins.

2.7 Gini Coefficient Analysis

Gini coefficient is an index that estimates the extent of inequality in income or wealth. (Li *et al.*, 2011). According to Balde *et al.*, (2014), other measures of income inequality

include; Lorenz curve, Theil measure, relative mean deviation, Dalton measure, atkinson index and coefficient of variation. Gini coefficient is considered to be the most used measure of inequality in empirical research compared to others because of its statistical properties and interpretation in terms of social welfare (Li *et al.*, 2011; Abdallah *et al.*, 2012; Balde *et al.*, 2014). Gini coefficient is a number or index varying between zero and one; zero signifies perfect (United Nations, 2007). In this study Gini coefficient was used to measure inequalities in household incomes with and without wattle production in order to examine the extent to which wattle production has either reduced or increased income inequalities between households in the study villages. Gini coefficient was calculated following the formula as applied by Abdallah *et al.*, (2012)

$$\text{Coefficient} = \frac{1}{n^2 \times \mu} \sum (2i - n - 1)x_i$$

where i is the individual's rank order number, n is the number of total individuals, x'_i is the individual's variable value, and μ is the mean income.

2.8 Past Studies on Black Wattle

Aitken (2009) conducted a study on living with alien invasive in South Africa. Black wattles are examples of exotic species considered to be highly invasive, yet profitable. Working for Water (WfW) Program targets the black wattle as among the most invasive species in South Africa, and employs poor marginalised people to clear these trees from waterways. Although both these programs have been criticised in literature and in the media, many still hold them up as good examples of how development and environmental management can and should be tied together. The Aitken (2009) paper argues that, the complex relationships between households, community systems of resource use, wattles, and landscapes at the local level are poorly addressed by policy interventions and programs focused on controlling exotic species. It shows how local modes of accessing

and using wattle are both disrupted and augmented by these programs, leading to substantial confusion and anxiety amongst poor rural households regarding the future local availability of a crucial resource for subsistence and livelihood needs.

A study by Dye *et al.* (2004) on water use by black wattle conducted in South Africa. The species commonly invades many forms of indigenous vegetation, developing into dense, evergreen thickets, particularly along riparian zones. It is widely accepted that removal of such stands of trees in these circumstances leads to improved catchment water yields. The assumption was made that over the long term, reductions in total evaporation equate to water yield increases. Soil water storage and leakage from catchments are therefore considered to be small and constant under the different vegetation covers. The review shows that very high rates of total evaporation are possible from dense infestations of black wattle occurring in riparian zones, where there are no soil water deficits through the year. Annual total evaporation from such sites may exceed 1500 mm, a figure that is comparable to many evergreen tropical lowland forests. Annual total evaporation from dense stands of black wattle established over entire catchments is likely to be lower than that from trees in riparian zones, since some degree of dry season drought stress was common on non riparian sites. Annual total evaporation at such sites may exceed the current year's rainfall for a time, if prior accumulation of soil water has occurred.

Seburanga (2015) investigated the role of black wattle in Rwanda's colonial and postcolonial forestry and the species' threat to biodiversity conservation. Herbarium data and desk-based was use in data collection. Study interview-based data were gathered from a sample of informants, who was selected from the people present on site during the vegetation survey. A two-sample t test was used to evaluate the age difference between trees plantation types the group of *Eucalyptus* spp. and black wattle. The results suggest

that black wattle demonstrates a comparatively higher occurrence and potential of regeneration within the understory of Eucalyptus plantations within the Congo-Nile ridge buttress; Bufundu and Bushiru; and Budaha, Ndiza, and Buberuka agro-bioclimatic zones. More recently, black wattle has invaded national parks and forest reserves above 1600 m of altitude. The most significant case was recorded at Nyungwe National Park (NNP), East Africa's largest montane rainforest. A study of biomass and spatial patterns of this species in specific ecosystems, such as NNP, is strongly recommended in order to uphold effective conservation practices.

Dahl *et al.* (2001) conducted a study on wattle eradication compared with wattle utilisation and management for Makomereng, South Africa. An interdisciplinary investigation including social and environmental elements was conducted regarding the relative costs and benefits of invasion by alien black wattle and silver wattle (*Acacia dealbata*) as well as the implementation of eradication efforts. Open-ended interviews were carried out to assess social impacts of invasion, and attitudes towards eradication, key-informant interviews were conducted to assess implementation of eradication efforts, identification of invertebrates was used to assess herbicide leaching from eradication, and soil samples and species lists were utilized to determine environmental effects of invasion. From result, wattle was found to offer significant social services and an uncertain, possibly positive, balance of environmental costs/services, eradication was critiqued according to principles of disturbance, and suggestions for further research were offered.

Shackleton *et al.* (2006) conducted a study to assess the effects of Invasive Alien Species - IAS (*Opuntia ficus-indica* and *Acacia mearnsii*) on rural livelihoods in South Africa. The objective of the study was to determine the effects of IAS infestation on human well-being, with a focus on the effects on rural livelihoods, within a general livelihoods

analysis approach. Pointed out, black wattle used for construction allowed development of physical capital as well as firewood and some supplementary income. Fuel wood collection occurred more regularly than the collection of building and fencing poles (which were collected when people felt they needed to repair a house, or re-fence their garden). All the people interviewed claimed they were using black wattle because it was located close by and that there are government restrictions on using indigenous species. Hence, livelihoods will be affected if the IAS were to be removed. There did not appear to be too many explicit trade-offs as reported by the rural people themselves.

Based on the studies above little has been explained on the value chain of black wattle and its contribution to the actors livelihood. Therefore, this study accessed the value chain of black wattle and its contribution to rural livelihood in Tanzania.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of the Study Areas

The study was conducted in Njombe and Lushoto districts. The area was chosen because they are main producers of black wattle and they have multiple use of Black wattle.

3.1.1 Njombe District

Njombe District is located on the Southern Highlands and lies between attitudes 8.8° and 9.8° south of the Equator, and 34.5° – 35.8° Longitudes East of Greenwich. The area borders Ruvuma region to the South; Morogoro and Iringa Region in the East; Mbeya region and Makete District to the South and Mufindi district in the North. The variation of topography contributes to diversity of climate in Njombe ranging from mild-hot lower zone and humid in upland zones. The districts has only one rainfall season between November and March it range from 950 – 1200mm (NDC, 2010).

The uplands vegetation is characterized by soft wood (pines and cypress), eucalyptus and wattle plantations, extensive grasslands and miombo woodlands; medium altitudes are covered by woodlands, apple-ring, *Acacia*, winter thorn, *Parianari species*, snot apple, *uapaca kirkiana* and extensive grassland; lowlands constitute bush trees, shrubs and grass (Mhapa, 2011). The major socio-economic activities includes agriculture, livestock keeping, beekeeping, tourism, forest products business and processing industries for tea and wattle barks.

3.1.2 Lushoto District

Lushoto District situated in the northern part of Tanga Region and lies within 4° 25' – 4° 55' Latitude south of Equator and 30° 10' – 38° 35' Longitude East of Greenwich. The District covers 3500 km² which is 12.8% of Tanga region land area. The population of

Lushoto is 492 441 according to the 2012 Population and Housing Census. The selection of the study areas were based on the rich and commercial engagement of black wattle activities of the households.

3.2 Economic Activities

The main economic activities of the people of Njombe District include cultivation of food and cash crops, timber and electric poles are produced at large amounts. The main food crops grown include; maize, beans, sweet potatoes, vegetable crops, the major cash crops are sunflowers. Agricultural activities are carried out and generally dominated by smallholders (NDC, 2010).

According to the 2002 National Population and Housing census, the main activities in the Lushoto District are clustered into several groups such as agriculture, industry and manufacturing, tourism, transportation and communication, livestock, and forestry. Other activities are community services provision (electricity, gas and water); construction; trade and commerce. The reports added that agriculture is the main industry in the District as it employs the majority of the labour force. Other industries that employ a significant number of the labour force include forestry, trade and commerce, public administration, education and manufacturing.

3.3 Research Design

A cross sectional design was used in this study based on its advantage of minimizing time and resources (Adam and Kamuzora, 2008; Kothari, 2004). The design is suitable in descriptive study and for determination of the relationship between and among variables. The study was conducted between November, 2014 and January, 2015.

3.4 Sampling Procedures and Sample Size

The population of the black wattle value chain actors was stratified and in each strata main group were farmers/producers, traders, processors and consumers. This was necessary

because stratification reduces variation within the community subdivisions (strata) and increases the precision of the population (community) estimate (Kowero, 1980; Kothari, 2004). Both purposive and simple random sampling techniques were adopted in this study. Purposive sampling technique was used to select district producing highly black wattle trees and random sampling technique was performed in selecting villages within the districts. A sampling unit for the farmers'/producers strata was households.

The study was conducted in two villages of Kidegembye and Nyombo in Njombe District. A total of 120 households from two villages in each district (30 household in each village) were selected. In addition, 25 traders; 9 charcoal processors and 2 bark processing factories and 20 customers of (firewood, pole and charcoal) in line with two customers of solid and powered extracts were selected and interviewed.

Table 1: Breakdown of districts, villages and respondents selected in the study areas

District and Villages	Producers	Processors	Traders	Customers
Lushoto District				
Mlalo village	30	3	9	6
Mgwashi village	30	1	4	2
Njombe District				
Kidegembye village	30	3	6	8
Nyombo village	30	2	6	4
Total	120	9**	25	20*

* There are other **two customers** from Kilimanjaro namely Moshi Leather and Himo Tanneries and planters who buy tannin from TAN WATT and Lion Wattle factory

** It excludes two processing factories TAN WATT and Lion Wattle.

3.5 Data Sources

This study dealt with value chain and rural livelihoods on black wattle activities. Main focus was on black wattle producers, traders, processors and customers of black wattle products and its contribution in their livelihood. Both primary and secondary data were collected. Primary data were collected through formal survey, focus group discussion and

key informant interview while, secondary data which included journals and other unpublished documents relevant for the study were extracted from SNAL and various web resources.

3.6 Data Collection Techniques

Structured and semi structured questionnaires (Appendix 1 - 4) were used to collect data on black wattle production, processing and marketing information. The collected information included input cost used, output obtained in quantity, and sales prices for farmers, traders, processors and exporters whereby different questionnaires were used for different key actors. A preliminary survey was conducted prior the survey so as to get used of the study area and questionnaires were tested in order to see the validity of the questions. Also, interview with key informants including village leaders, extension officers, forestry officers were conducted in order to supplement field data. Apart from that, focus group discussion was conducted as to get general information on the contributions of black wattle products to their livelihood (Appendix 5 and 6).

3.7 Data Analysis Techniques

To achieve the objectives of the study, several statistical techniques and methodologies were employed. Data from the primary source were verified, coded and analysed using Statistical Package for Social Sciences (SPSS) computer software. Both qualitative and quantitative descriptive statistics were employed. The methodologies used in each objective are described in the sections below.

3.7.1 Identification and examination of black wattle value chain organization, coordination and function between key actors

Products that are being obtained from wattle were identified by applying ranking matrix in a participatory manner using focus group discussion in each village. Based on Potential species and various products that are, can be extracted for market were identified.

The next major step was to apply the value chain approach focusing on the development of win-win strategies in potential value chains. The approach starts with understanding and developing actors maps for key product lines and by identifying supply channels with potential to be developed into fully fledged value chains. Based on these identified supply channels an End-market review was done to understand market requirements (supply quantities) and critical success factors and by using it as a departure point all the functions, actors and their interrelationships downstream the chain was mapped. Apart from understanding the primary private actors, also the secondary actors to the chain who are the support institutions (public, donor, projects) that are or may work together in supporting the chain were analyzed. In this juncture, among others, the critical services to be delivered by them were analysed, its relevancy and its sustainability. The main data collection analysis tools were: Actors and value chain mapping conventions and overlays tools, constraints and opportunities checklist, Market segmentation and critical success factors matrix, organizational analysis model, Institutional analysis / coverage matrix and Guided focused group discussions using checklist (Appendix 6). It should be understood that much of the essential data for the analysis was collected directly from the primary and secondary actors.

A household questionnaire (Appendix 1) was implemented to the stratified heads of households, and checklists for key informants (Appendix 5) to secondary actors which were collectors, public officers, donor, institutions and projects involved in black wattle activities. The term End-market as used in this study means where the final transaction takes place in the value chain. Typically, it is where the end user of the product is located, meaning the individual or organization for whom the product is created. The analysis of the End-market in this objective identified the key trends that affect the various products, and articulate the view points of the buyers and experts with regard to the strengths,

weaknesses, opportunities and threats in the products; also it examined the buyer preferences and makes recommendations for improving the product competitiveness

3.7.2 Evaluation of the contribution of black wattle activities to actors' livelihood

Livelihood data was collected using household questionnaire (Appendix 1) based on the five livelihood assets (human, natural, social, physical and financial capitals). The assessment was based on how wattle production has influenced the well being of the local community i.e. income redistribution among the household; ownership of land; ability to send kids to school; access to credits and market information; training acquired; social relations, institutional and ability to convert these asserts into livelihood outcome. SPSS was deployed to analyse the relative incomes from wattle, gini coefficient with wattle and without wattle incomes and its contribution to rural livelihood income.

3.7.3 Determination of factors influencing value chain of the black wattle

Household variables collected using questionnaires (Appendix 1) were coded processed and summarized in terms of means or frequencies. The Multiple Regression using Ordinary Least Square (OLS) was used to determine quantitatively some socio-economic factors that influence the black wattle activities of the producers. The variables for regression analysis are as shown in Table 2.

Table 2: Description of the variables

Variable	Description
Sex	Gender of respondent (1 if male, 0 otherwise) (binary)
Edulevel	Education level of respondents (1 if the respondent have attained at least primary education, 0 otherwise)
Maritalst	Marital status of respondent (1 if respondent is married, 0 otherwise)
Age	Age of respondent (continuous)
Hhsize	Number of people in the household (continuous)
Landsize	Area under black wattle production (continuous)
IncoffBW	income from other activities other than black wattle
Bicycle	Own bicycle (1 if household own bicycle, 0 otherwise)
Mobile	Own Mobile (1 if household own mobile, 0 otherwise)
Croad	Condition of road (1 if the condition is poor, 0 otherwise)
costLabour	Cost of Labour (continuous)

Model Specification;

The empirical model postulated is implicitly presented by equation

$$Y = f(X_1, X_2, \dots, X_n) \dots\dots\dots(3)$$

A multiple regression equation is:

$$Y_i = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots\dots\dots \beta_n X_n + \varepsilon \dots\dots\dots(4)$$

Where dependent variable is gross margin and independent variables are as detailed in Table 2 above.

Studies that employed multiple linear regression mode includes Juntwa (2010) who applied on factors affecting Gross Margin of ripe banana and Barozi (2012) used linear regression to access livelihood assets/capitals having more influence in farmers livelihood.

3.7.4 Analysis of economic efficiency of the actors

Analysis of the gross margin of main actors was based on the data of cost (variable cost), price and revenue obtained at each main node of the chain in order to get the performance of each actors along the chain. The performance was evaluated using gross margin

approach as described by Hildebrand (1998) and profit margin analysis so as to determine the benefit accrued by each actor along the chain.

Questionnaire was deployed to collect data on the socio-economic characteristics of the respondents, constraints faced and costs and returns to black wattle production in the study area. Data collected was analysed using SPSS. Descriptive statistics such as frequency distribution, means, charts and percentages were used to analyse the socio-economic characteristics of the respondents. Gross margin analysis was used to determine the returns to black wattle activities in the study areas (which is the difference between total revenue and total variable cost), return on investment (profit/total cost) and profit (total revenue minus total cost) (Owombo, Adiyeloja, Koledoye, Ijigbade, and Adeagbo, 2012).

At each stage of the black wattle value chain, gross margin and profit margins for each actor in a chain was estimated by using formula detailed in section 2.6 (equation 1 and 2 respectively).

3.8 Limitations of the Study

Some of the key actors were unwilling to answer some of the questions in the questionnaire due to their worry of the government to come and collect tax or allocate tax on their products. It was mostly when seeking information on income, cost incurred and sales. To address this challenge, the researcher explained to respondent that this study was only for academic purpose and the results will not be shared to the third party. Answers were given depending on their memory recall especially for farmers, customers and few traders, because most of them were not keeping record. Thus, the researcher had to probe the respondent. In spite of the above limitations, it is expected that data collected was reliable and adequate to address the objectives set in the study.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Identification and Examination of Black Wattle Value Chain Organization, Coordination and Function between Key Actors

4.1.1 Black wattle products and its activities

Black wattle has the potential to produce a wide range of products including timber, fuel wood, pulpwood, tannin and posts. However, in many cases markets are not yet developed and there is a scope for new processing industries. Based on the Focus group discussion which was carried out in each village including Kidegembye and Nyombo in Njombe District; Mlalo and Mgwashi in Lushoto District, communities were able to rank products that are being obtained from black wattle tree. The products were ranked according to its important, frequency of use and as source of income to the household. The products were Fuelwood, poles, ropes and barks.

Fuel wood: black wattle is now recognized as a valuable fuel wood (firewood and charcoal). Wood is moderately dense with specific gravity about 0.75, splits easily and burns well with a calorific value of 3500-4600 kcal/kg. Rural communities rely on fuel wood for all their energy needs due to its accessibility and reliable also are cheap in terms of cost. Fuel wood is the most used forest product in rural and urban communities as it forms the bulk of the energy requirements of such communities (Plate 1). It finds use in cooking, heating, fish and tobacco curing (Kowero, 1980; Kevin, 2000).



Plate 1: Firewood from black wattle tree used by Kidegembye village

Makain (2007), found that charcoal production is an important occupation. In deed for many rural households, charcoal is not a major source of energy rather serves as a source of income; especially in a dry season it became an important off farm activity in study areas. Fuel woods produced from black wattle trees serves costs to the households, source of income and stakes for horticultural crops like tomatoes. The finding are in line with Onchere (2001), Dye (2004), Shackleton *et al.* (2004, 2006), and Seburanga (2015). The study observed that a household having a plot of black wattle trees act also as safety net which serve as insurance in times of family problems such as diseases and unexpected economic hardship.

Firewood from black wattle tree is used for power generation. In Tan Watt factory the firewood of black wattle tree is used to produce power and sell to TANESCO. In 2013 the factory sold about 4 924 KW'000 to TANESCO and generated a revenue of TZS 798 million.

Building materials: pole and rope that comes out of black wattle tree are one of the best building materials especially in villages. The poles from black wattle are used to support

tomato farming. Some households are using black wattle poles for building houses especially in Lushoto (Plate 2) as supported by Onchere (2001) and Shackleton *et al.* (2004, 2006).

Tannin: Wattle bark is the most widely used tannin material in the world. It contains 30-45% (dry basis) high-quality tannins that are used in tanning various classes of skins and hides to make varieties of leather. While they are environmental friendly, its value and market share are increasing worldwide hence raise price of the commodity which results to sustainable livelihood of those engaged in the chain from input supply to the final product to the end users (FAO, 2001). In Njombe and Lusoto districts households are benefited from sales of barks of black wattle at the same time obtain the source of energy (Plate 2).



Plate 2: Barks ready for processing in the Lion wattle factory-Lushoto

In Tanzania there are two processing mimosa extract factories (TANWATT in Njombe and Lion wattle in Lushoto). They market mimosa extract in two forms; solid extract (Lion wattle) and powdered extract (TANWATT). The extracts (Plate 3) are sold by the factories to local industries for leather softening. Among the local industries includes; Moshi

Leather industry; Himo Tanery and planters; and Lake trading company. Also, factories export outside the country including India, United Kingdom, Egypt, Italy, Mexico and Pakistan. Himo Tanneries Industry and Moshi Leather located in Moshi were among leather industries visited.



Plate 3: Powered and solid extract from TAN WATT and Lion wattle factories in Himo Tanneries industry - Moshi

The leather are used to produce various products. Leather products produced by Himo Tanneries including bags, sandals, house furniture (coaches and tables), belts, balls, key holders, wallets and shoes (Plate 4). The study revealed that, there is price differences between the price of wattle barks fetched from processing factory and that of tannin sold locally or internationally. This was supported by Onchere (2001).



Plate 4: Different leathers products from Himmo Tanneries industry in Moshi

Other uses

Among of the uses of black wattle products raised by focus group discussion was black wattle tree also used as soil improver, fencing; pole to support tomato; bee forage and shelter for small animals as also supported by Car (2000), Onchere (2001) and Dharani (2006).

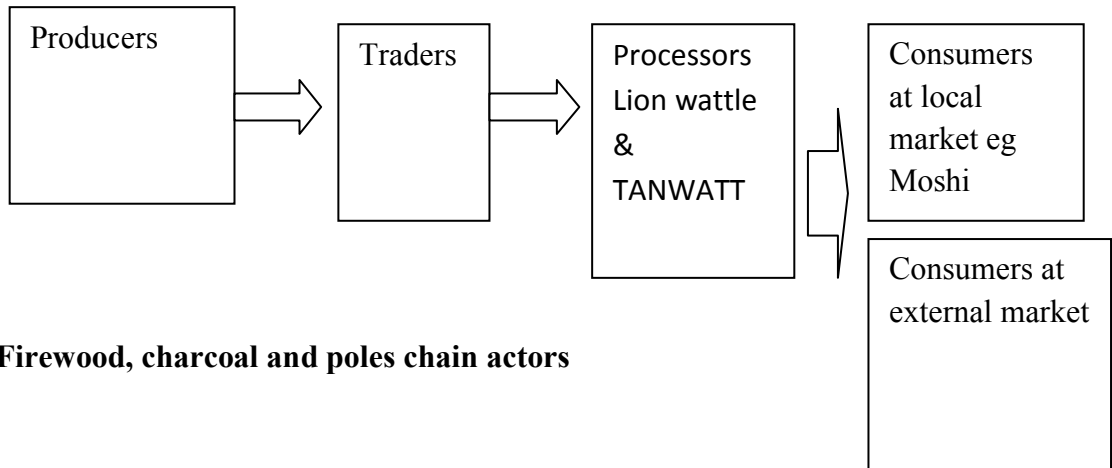
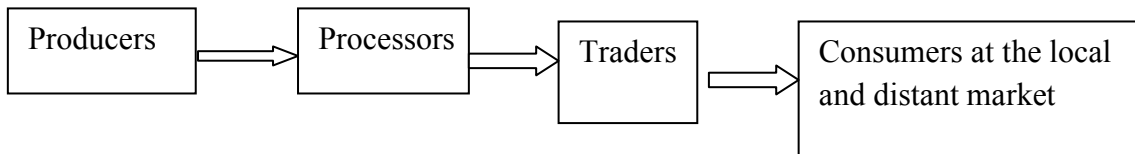
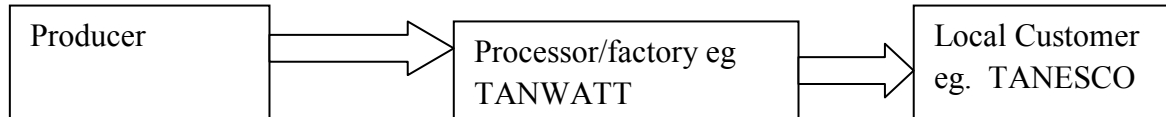
4.1.2 Organization and coordination along the value chain

During the survey, two types of coordination were observed namely vertical and horizontal coordination. The vertical coordination linked producers with traders, charcoal processors along the black wattle value chain. Moreover, horizontal coordination among actors in each stage of the value chain was generally weak. The black wattle actors were not organised into any associations. The need of association was emphasized by the respondents as it could be used to increase their bargaining power. They had no influence on market prices of black wattle produce and are not informed about prices in local and foreign market.

On the other hand coordination between different actors was limited. Only 64% of barks traders (64%) had formal contracts with factory. However, the contracts were documented without lawyers been involved which leads to breach of contracts by factory. This might have reduced the motivation of farmers to take good care of wattle trees. The weak coordination between actors along the value chain has probably been responsible for low production of black wattle trees (Section 2.5). Effort should be made to promote their establishment and strengthen them through training on group, marketing and leadership skills.

4.1.3 Value chain actors

Value chain actors are those who are directly involved in delivery of a product or service from conception and production to final consumer as (Fig. 2). In Black wattle activities there are five products (firewood, charcoal, poles, tannin and electricity) and two value chain actors based of their products. Products of tannin from barks and electricity from black wattle firewood's have specific chain and the rest have the same chain actors.

(a) Barks chain actors**(b) Firewood, charcoal and poles chain actors****(c) Electricity production from BW firewood****Figure 2: Black wattle products and its value chain actors****4.1.3.1 Characteristics of producers**

Black wattle production activities are dominated by men (Table 3). Out of 120 producers, 75% were men and 25% were female and large number of black wattle producers fall under the age between 20 and 45 years (50%). The average age was 48 years. About 97.5% of black wattle producers had primary education and the remaining 2.5% had no formal education.

Table 3: Socio - economic characteristic of producers in Lushoto and Njombe

Districts → Characteristics	Lushoto		Njombe		Total	
	Frequency (n=60)	Percentage	Frequency (n=60)	Percentage	Frequency (n=120)	Percentage
Age						
Distribution:						
20 -45 years	27	45	33	55	60	50
46 – 60 years	15	25	18	30	33	27.5
Above 60 years	18	30	09	15	27	22.5
Gender						
Distribution:						
Male	41	68.3	49	81.7	90	75
Female	19	31.7	11	18.3	30	25
Marital status:						
Married	55	91.7	54	90	109	90.8
Single	1	1.7	4	6.7	5	4.2
Divorce	3	5	0	0	3	2.5
Widow	1	1.7	1	1.7	2	1.7
Separated	0	0	1	1.7	1	0.8
Level of Education:						
Illiterate	2	3.3	1	1.7	3	2.5
Primary	57	95	52	86.7	109	90.8
Secondary	1	1.7	7	11.7	8	6.7
Source of Labour:						
Family labour	50	83.3	26	43.3	76	63.3
Hired labour	2	3.3	26	43.3	28	23.3
Both Family and hired labour	8	13.3	8	13.4	16	13.3

Further, the average household size in the study area was four and family members were the main source of labour. From the study, out of 120 respondents, 63.3% use family

labour, 23.3% use hired labour and remaining 13.3% use both family and hired labour. The average area under black wattle production was 1.88 acres; most of it has been inherited.

All age groups participated in black wattle products trading Majority (52%) of sampled traders were aged between 20 and 45 years, 32% range 46 and 60 and the remaining 16% aged above 60 years. In order to improve the value chain the traders need to be assisted in business skills and financially so that they could expand their business which is currently done in small scale.

Table 4: Total area and household size of producers in Njombe and Lushoto Districts

Characteristic	Lushoto			Njombe			Total		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Age of respondent	25	105	50.35	27	79	46.1	25	105	48.22
Household size	2	10	5	1	12	4	1	12	4.66
Total area under BW production	0.25	6	1.33	0.25	9.5	2.46	0.25	9.50	1.8937

Main sources of the income

Respondents have multiple sources of income as (Fig. 3). The main economic activities as source of income to the households were agriculture, black wattle activities, business/petty trading, service, livestock keeping and agro-processing.

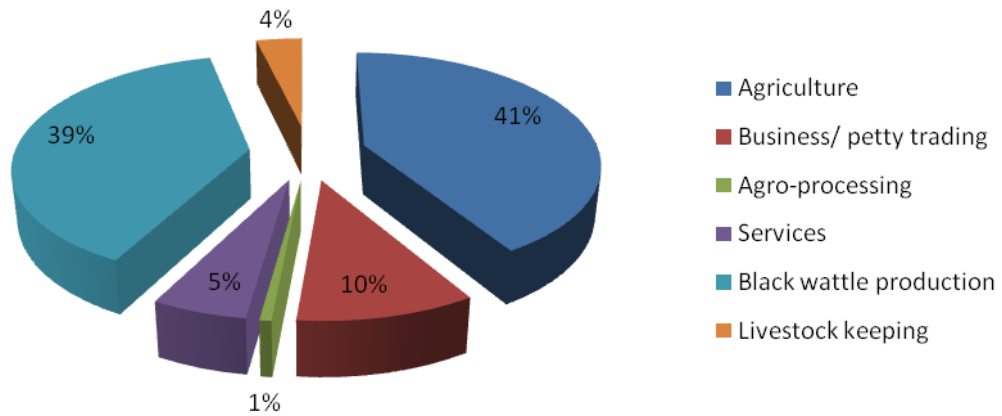


Figure 3: The main source of producer's incomes in Njombe and Lushoto Districts

4.1.3.2 Characteristics of traders

The survey findings revealed that most of traders were male compared to female (Table 5). Out of 25 traders interviewed, 76% were male and the rest 24% were females. This might be attributed by the difficult nature of the business, which involves traveling to fetch farms with black wattles, debarking, packing into bundles and travelling to the factory or selling points.

Table 5: Characteristics of traders in Njombe and Lushoto Districts

District Characteristic	Lushoto		Njombe		Total	
	Frequency (n= 16)	Percentage	Frequency (n= 9)	Percentage	Frequency (n= 25)	Percentage
Age						
Distribution						
20 – 45 years	8	50	5	55.6	13	52
46 – 60 years	4	25	4	44.4	8	32
Above 60	4	25	0	0	4	16
Gender of Respondent						
Male	11	68.8	8	88.9	19	76
Female	5	31.2	1	11.1	6	24
Marital Status						
Married	16	100	9	100	25	100
Level of Education						
Primary school	12	75	6	66.7	18	72
Secondary school	4	25	2	22.2	6	24
College	0	0	1	11.1	1	4
1 Age : Min = 31 Max =78 Mean =47.6						

Market Information

Black wattle trading was the main economic activities to most of traders as revealed 88% of traders in Table 6. However, they have not received any business or technical training apart from their local experience. Experiences of traders in Black wattle were low. The average experience in black wattle activities trading was six years. Capacity building of traders in terms of business skills would assist upgrading products to meet processors and consumers.

Table 6: Traders awareness on marketing information in Njombe and Lushoto

Districts						
District	Lushoto		Njombe		Total	
Characteristic	Frequency (n=16)	Percentage	Frequency (n=9)	Percentage	Frequency (n=25)	Percentage
BW main economic activities						
Yes	14	87.5	8	88.9	22	88
No	2	12.5	1	11.1	3	12
Market information on products						
Yes	12	75	8	88.9	20	80
No	4	25	1	11.1	5	20
Mode of trade						
Contract	9	56.2	7	77.8	16	64
First come first served	6	37.5	2	22.2	8	32
Both	1	6.2	0	0	1	4
Mode of payment						
Cash	10	62.5	6	66.7	16	64
Credit	0	0	1	11.1	1	4
Both cash and credit	6	37.5	2	22.2	8	32
Provider of market information						
Friends	0	0	1	12.5	6	24
Media	1	8.3	0	0	1	4
Processor	11	91.7	7	87.5	18	72

***experience on doing BW trade: max =21, Min = 1 and Mean = 6.12**

As regards market information, the study shows that 80% of traders get information on the products regarding the market. Providers of market information were processors (72%), friends (24%) and media (4%). This implies that, Media including news papers, radios and televisions have not been used effectively in transferring information regarding BW activities. Further, the study shows that, mode of trade was contract 64% and 32% first come first served and its mode of payment was mainly by cash. From the survey, 64% of traders receive their payment by cash.

Black wattle value addition activities performed by traders

The study revealed that few households were engaged in value addition activities from black wattle tree as Table 7. Only 12% engage in charcoal processing, 60% in barks the rest 20% storage and transportation.

Table 7: Black wattle value addition activities performed along value chain

Districts	Lushoto		Njombe		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Black wattle activities						
Firewood to charcoal	2	13.3	1	12.5	3	12
Barks bundles	8	53.3	7	87.5	15	60
Storage	4	26.7	0	0	4	16
Transportation	1	6.7	0	0	1	4

Access to credit

From Table 8, only 20% of traders have access to credit this may be due to number of factors including; few credit institutions in the study area, lack of knowledge about loans, no collateral, and high bureaucracy in getting loans. As known access to credit improve household's income and help to make business grow faster as supported by Mutatina

(2008). Microcredit provides loans to individuals or groups to help them invest in their business ventures for raising living standards at given time period and at a given interest. Microcredit was cited as key strategy to attain by then the MDGs and in building global financial systems that meet the needs of the poorest people (Hudu, 2009).

Table 8: Traders access to credit in Lushoto and Njombe Districts

Districts Characteristic	Lushoto		Njombe		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Access to credit						
Yes	0	0	5	55.6	5	20
No	16	100	4	44.4	20	80
Credit institutions						
Banks	0	0	4	80	4	80
SACCOS	0	0	1	20	1	20
Ability to save						
Yes	7	43.8	9	100	16	64
No	9	56.2	0	0	9	36

Also, about (16) 64% of traders were able to save some amount accrued from the black wattle activities. There is a need of extension officers with the help of DFO's to train traders on important of credit institution and facilitate them to be members.

4.1.3.3 The processors

The survey results show that sampled processors were 88.9% males and 11.1% female. It indicates that both genders are involved in processing activities. This was observed in Mlalo and Mgwashi villages of Lushoto District. The processing activity involved was charcoal processing. The main source of black wattle materials (firewood) was farmers

77%, barks agents 11% and from own farms 11.1%. All surveyed processors used Earth Kilns for charcoal production; thus there is a need to train them on modern efficient Kiln. The status of the processors firm was 55.6% full time; infrequent 33.3% and 11.1% was part time while the average year of being in black wattle processing activities was 7.44%.

Also, there is only two factories; Tanganyika wattle Company Limited in Njombe and Lion wattle in Lushoto which are processing barks into Tannin (solid and powder mimosa). In 2013 TAN WATT factory processed 11 634 tonnes of barks and accrued 5 818 TZS mil. The main constraints raised during the field visit was too many CESS, wild fires, bureaucracy in procedures of accessing market, delay of inspections due to few timber graders, raw supply from producers/traders. Apart from processing barks to tannin, TAN WATT process firewood of black wattle to power which are being used as source of energy throughout the year by factory and sell the remains to TANESCO. In 2013 the factory managed to produce 9 901 Kwh'000 and got revenue of TZS 775 mil.

4.1.3.4 Characteristics of customers at the local market

Survey results revealed that out of 20 customers interviewed, 65% were female and 35% were males. This indicates that black wattle products (firewood, charcoal and poles) are consumed by all gender groups except tannins extracted from barks were consumed by leather industry for softening leather. Majority, 90% of sampled consumers were married and only 10% were single. Regarding education, it was shown that 90% possessed primary and the rest 10% college education.

The products of black wattle tree used mainly by customers are firewood 90%, charcoal 55% and 6% use poles. While their main source were farm yard, market and charcoal traders and most customers buy them throughout the year. It revealed that, customers

prefer products of black wattle because of its good quality; it is so strong in burning (fuel wood) and building compared to other trees. However, customers main occupation were 65% small business (petty trading) including food vender and restaurant “mgahawa”, 25% Horticulture as it has seen mostly in villages in Lushoto District, and the rest 10% agriculture.

The study finding shows that, 80% of products were added value through transportation, storage and product added value like charcoal. There is a need of training on value added activities to processors as it has shown 100% customers were satisfied and wants products from black wattle tree.

Regarding tannin local customers, it was revealed the most of its users are leather industries where tannin is among input used to soften the leather. Field visit was on two industries, Moshi tannery and Himo Tannery which found in Kilimanjaro region. The major concern was late delivery of tannin by TAN WATT and Lion wattle factory and currency used in purchasing tannin (dollar) which fluctuates most of the time.

4.1.3.5 Characteristics of consumers at external market

Tannins extracted from barks of black wattle tree are processed by factory (TAN WATT and Lion Wattle) are sold in domestic leather industry for softening it and big portion are exported. In so doing the country through MNRT collect fees which increase foreign currency to the economy. Tanzania tannin (solid and powder mimosa extract) are currently exported to India, Italy, Egypt, Mexico and Pakistan. The data revealed that Tanzania exports Tannin which has been added value that adds more foreign currency (Table 9).

Table 9: Tannin exported outside the country and accrued values

Factory	2011/12		2012/13		2013/14	
	Bags	Value(USD)	Bags	Value(USD)	Bags	Value(USD)
Tanganyika	16 720	343 613	1 0764	213 432	69 790	1 564 978
Wattle Co. Ltd						
Lion Wattle	3 425	221 094	5 700	281 350	3 200	138 600
Extract						

Source: MNRT, Forest and beekeeping Division (Export section), 2014

4.1.4 Value chain of Tanzania's black wattle

Based on the finding of the study, the black wattle value chain consists of producers/farmers, traders, processors, exporters and customers. Producers plant black wattle trees and sell as poles, firewood, charcoal, trees for debarking, barks and trees for charcoal processing to traders and processors. Some of producers engage in processing charcoal and sell them at farm gate price and local market direct to the consumers.

Traders harvest barks and purchase barks to the farmers and sell them to the factories (Lion wattle and Tan wattle). While, processors purchase them from the traders who have contract with and some to farmers and process it to Solid or powder mimosa extract (Tannin) and sell them in local leather industries including Lake trading; Moshi Leather company, Himo Tanneries and DIT. Also, Processors of tannin they export it to India, Mexico, Pakistan, Egypt and Italy. The black wattle value chain is presented in Fig. 4.

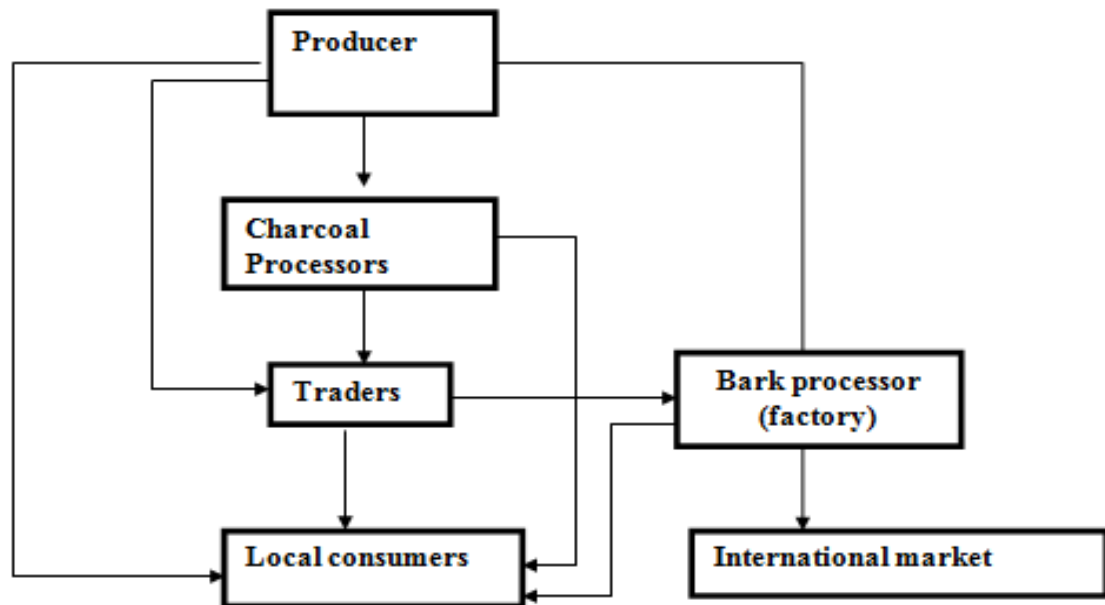


Figure 4: Value chain of Tanzania's black wattle

4.1.4.1 Value chain activities at producer's node

The main role of producers in the value chain is to produce black wattle trees. Most of surveyed producers have got/inherit farms from their parents and few have planted for firewood consumptions. Recently, black wattle production has being a popular business due to policy enforcements on natural and plantation forest were communities used to fetch firewood within the natural and plantation forest. The findings shows that majority of those planted their got seedlings from others farms especially in villages of Lushoto Districts while in villages of Njombe they got seedlings free from TAN WATT factory. There is a need to raise awareness to producers on the use of input for making black wattle being a business crop as it shows that black wattle production does not requires a lot of activities. This can be another income generating activities to the households.

It was indicated that black wattle activities is done in small scale farms, as the results revealed that the average size of farm in the study area was 1.894; minimum size being 0.25 acres and maximum size was 9.50 acres. The main source of labour was family

labour 63.3%, hired 23.3% and 13.3% were both family and hired labour. There is a need on training producers the usefulness of black wattle tree apart from fuel wood as most revealed only that. The extension officers should join together with forestry officers on advising producer's best ways which will results to high yield including proper pruning of farms.

Regarding marketing of black wattle products, the study found out that, there were no any arrangements of selling by groups or cooperatives/ associations thus more costs incurred in process. Regarding market information the survey revealed that, 40% get information from friends, direct visit market and from Medias. The study further found that, farmers have little control over the price. Out of 120 producers interviewed, 61.7% reveals that price is determined by buyers, 4.2% sellers and the remaining 34.2% through negotiation between buyer and seller. Findings ascertain the needs for selling in groups/associations in order to have power in setting price and enjoy economies of scale as supported by Hussein (2010). Also, the study revealed that only 5.8% of producers are member of social association (SACCOS and NGO) with 4.2% have access to credit.

As far as black wattle value chain is concerned, the results revealed that only 17.5% of sampled producers involved in processing activities including transportation, storage and product adding value (firewood to charcoal and barks bundles). In order to build up the value chain, Tanzania Forestry Research Institution (TAFORI) could intervene by training producers on the use of various processing technologies including modern Kiln in order to add value and benefit from the returns. Also, there was 98% very weak linkage between producer and other actors in a chain. Producers revealed that traders have great power in a value chain 86.7% followed by processors (factories) 13.3%.

4.1.4.2 Value chain activities at trader's node

The study revealed that, most of traders involved in main firewood trading 28.1%, barks selling 53.1%, charcoal trading 15.6% and 3.1% pole trading. The main source of product/raw material was from producers, charcoal processors and barks traders. None of them have received business or technical training; there is a need to train traders as seen 88% the main economic activities for their livelihood.

Prices of black wattle products are determined by traders depending on farm size, distance of the farm from the main roads, occurrence of tree in a farm and quality of product. The mode of trade to sampled traders was 64% contact (barks sending to factories) and the rest 36% first comes first saved (fuel wood). While, the mode of payment was 64% cash, 4% credit and 32% both cash and credit payment. It was revealed that, factories were the ones entertain credit payment and this makes trader's delay paying labours wages. The study shows that 80% of traders get market information from friends, media and processors (factories).

The study revealed that only 20% of traders have access to credit from Banks and SACCOS. Shortage of credit support institutions is among the factors which limit performance of this industry. The government needs to assist traders on means of getting credit for their business to continue assisting them in their livelihood.

With regards to value chain, the study shows that the sampled traders participated in value added activities including firewood to charcoal 12%, barks into bundles 60% and 20% storage and transportation. Trades revered that processors (factories) have greater power in a value chain 76% followed by 24% of traders. The linkage between key actors in a value

chain is weak 92% and the rest 8% is strong. This may be due to not knowing stakeholders and key actors with relation to the market information for the business.

4.1.4.3 Value chain activities at processor's node

The study revealed that there was small number of actors involved in processing activities of black wattle tree, 17.5% of producers involved in processing activities before selling including storage, transportation and product adding value. Similar finding were reported by Hussein (2010), who found that this small percent of producers can be attributed by lack of knowledge, a need of training on use of modern technology (the use of kiln) so as to improve their livelihood and minimize time used in processing. Black wattle barks are processed into charcoal, tannin and power. Charcoal is produced locally by farmers using local kiln while tannin and power is produced by factory. Tannin and power produced from black wattle are produced in quality standard and customers have no doubt with them. Some of customers raised concerned about charcoal products based on quality, quantity and environmental desertification due to local methods used in preparation and no new establishment.

Regarding tannin processing, there are two factories, Lion wattle factory in Lushoto districts which processing barks to solid tannin and Tanganyika Wattle Company Limited in Njombe District which process barks to powered tannin. The processing capacities for the two factories were five tonnes to 18 tonnes respectively. Both of the tannin is sold at local leather industry and big portions are exported. Lion wattle factory is not operating at its maximum capacity due to inadequate supply of raw materials (barks), for example during the study visit it was observed that the industry did not received the raw material for processing for at least two months. Lion wattle factory need to have its own black wattle plantation like TAN WATT factory in Njombe in order to solve this problem of

insufficient supply of raw materials. Also, in order to allow constant flow of raw materials, the factories could provide some incentives to farmers such as seeds, increase price of barks to about TZS 250 per kg (the price was between 90 and 100 TZS per kg in year 2014) and use contracts. The performance of TAN WATT factory is detailed in Table 10.

Table 10: TAN WATT performance in terms of raw materials consumed and products manufactured and sold during the year 2012 - 13

Description	Units	2012	2013
Production:			
Wood fuel	Tonnes	74 875	84 458
Wattle extract	Tonnes	2 178	2 357
Power	Kwh'000	10 839	9 901
Raw material used:			
Wattle bark	Tonnes	9 333	11 634
Sales volume			
Wood fuel	Tonnes	23 807	17 780
Wattle extract	Tonnes	2 062	2 231
Power	Kwh'000	4 924	5 006
Cost of sales			
Wood fuel	TZS Mil	146	212
Wattle	TZS Mil	2 747	3 172
Power	TZS Mil	521	694
Revenue (TZS):			
Wood fuel	TZS Mil	411	460
Wattle	TZS Mil	4 798	5 818
Power	TZS Mil	798	775

Source: Tanganyika Wattle Company Limited (2014)

4.1.4.4 Value chain activities at customer's node

About 95% of sampled consumers use firewood, 55% charcoal and % 6 poles. The main sources of products used by customers were farm gate, market and charcoal traders. Customers appreciated products come from black wattle tree because it was stronger

building materials and good sticks to support tomato farms. due to reasons that it is so strong in building and in supporting tomato trees; it burns well with little soots as compared with other trees.

As far as value addition is concerned, about 80% of sampled consumers use products which have added value. All sampled consumers commented that price of black wattle products are reasonable and 90% of sampled customers are using it throughout the year. Wise, customers raised concerned of long distance of the where products found (farm yard are very far); inadequate supply of charcoal in rain season and low quality due to the use of local methods in preparations.

Also, the study managed to visit local leather industries (Himo Tanneries and Moshi leather) that use powder and solid tannin from the processing factory for leather softening. There concern was they buy product in dollar while their products are sold in TZS and Late delivery of the input (tannin) from the factory.

4.1.5 Mapping actors and product flows in the value chain

Chain mapping is a rather rapid technique that helps identify the various actors in the value chain, their functions and degree of power, and the interdependencies among them. In the mapping of value chains, visual depictions of basic structures are often used. A value chain map illustrates the way the product flows from raw material to end markets and shows the type of actors involved.

Once the actors and relationships are drawn prices and margins at each level can be added to the map Fig. 5. Value chain mapping is often used to locate actors in the chain, understand interactions and identify constraints and possible solutions at its different levels. “Chain mapping” is also undertaken to gain a better overview of the value chain to

guide further full-fledged value chain analyses to be undertaken at a later stage. There is no standard approach to mapping value chains. This is in line with the findings of Elepu (2014), who included mapping of the value chains of five crop commodities: maize, rice, groundnuts, sunflower and sesame; detailed descriptions of the main actors involved in the value chains (from farmers to end consumers) and lastly, analysis of how the value is distributed across the different actors.

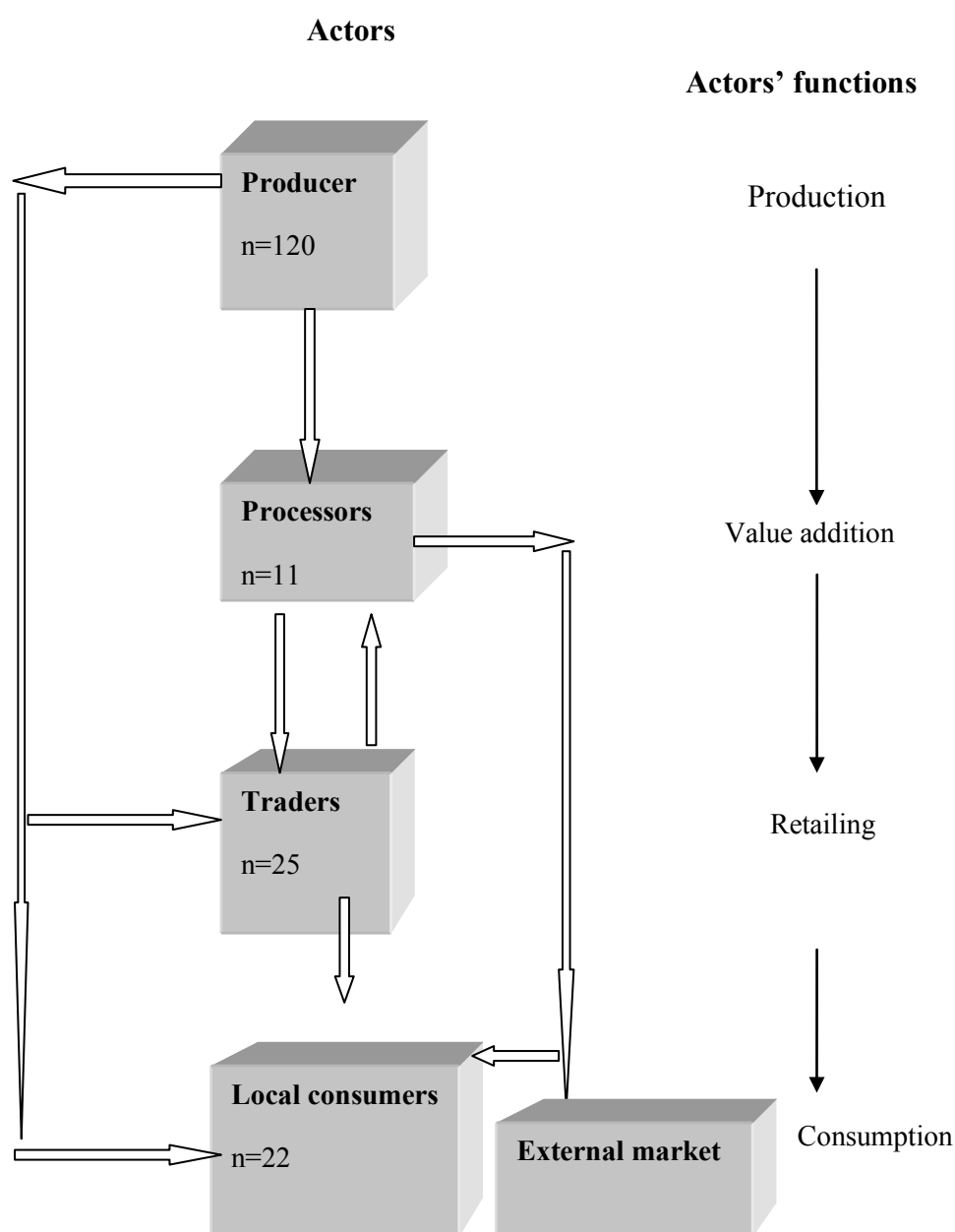


Figure 5: Black wattle Value Chain Map

4.2 Evaluation of the Contribution of Black Wattle Activities to Producers Livelihood

Livelihoods are affected by uniformity of assets and balance between assets (IFAD, 2008). It can be observed that wattle production might have contributed to the ownership of the household assets. The survey revealed that 100% their houses were roofed by corrugated iron sheets, 58.3% with mud bricks and 48.3% cement floor. However, it was observed that respondent from Njombe District have more improved houses compared to respondent in Lushoto District. This might be attributed to engagement in black wattle production.

Further, the study revealed that, spring water was the main source of drinking water for both districts (44.2%). Comparing the two districts, the sources of drinking water in Lushoto villages were spring water 58.3%, piped water 28.4%, and 13.3% of improved well while, Njombe surveyed villages were 31.7% piped water, 38.3% improved well and 30% surface water. There is a need to improve water infrastructure in surveyed villages. Regarding skill development (human capital asset) the findings show that none of producers have ever received any training. Only 40% of producers in the survey receive marketing information through friends, visiting direct the market and Medias. Also, it was revealed that the road networks are poor in all four villages this increase cost of transportation. As illustrated in the Table11, black wattle activities contribute to improving producers livelihood as source of cooking energy (fire wood) to the household 49.7% and 50.3% income accrued play a big role of sustaining basic needs and capital to other investment as supported by Shakleton *et al.* (2004).

Table 11: Contribution of black wattle activities to producers' livelihood

Description	Percent
Cover basic need (fees, food, hospital)	30.7
Source of income /capital	19.6
Main source of energy	49.7

4.2.1 Vulnerability

Vulnerability refers to the external environment in which people pursue their livelihoods and exposed to the negative effects of external environment (shocks and trends of seasonality). Vulnerability is closely linked to access to resources (capital assets) because these are a principal means by which people reduce their vulnerability as illustrated in Table 12. It is the access to resources, assets and entitlements that together give people the capabilities to pursue livelihood strategies that may have direct material as well as more individually subjective objectives.

Table 12: Events/shocks occurred for the past three years

Description	Frequency	Percent
Crop failure		
Yes	73	60.8
No	47	39.2
Drought		
Yes	1	0.8
No	119	99.2
Price fall of crops		
Yes	8	6.7
No	112	93.3
Loss of market		
Yes	31	25.8
No	89	74.1
Household Outbreak disease		
Yes	27	42.5
No	93	77.5
Crop / tree diseases		
Yes	4	3.3
No	116	96.7

4.2.2 Coping/livelihood strategy

Diversification reduces vulnerability help to increase stable income. In the study livelihood diversification was observed in non black wattle a production activity which was 58.3% of producers. Among the coping strategies found in the study areas were livestock keeping, timber production, mixed crop farming and small scale business.

4.2.3 Livelihood outcomes

Livelihood outcomes are the achievements or output of livelihood strategies. Based on the findings it revealed that black wattle activities contributed in households livelihoods in terms of incomes generated, has improved well being and reduced vulnerability and helped on sustainable use natural resources.

4.2.4 Income distributions

Gini coefficient analysis was used to measure inequalities in household incomes with and without wattle production in order to examine the extent to which wattle production has either reduced or increased income inequalities between households in the study villages.

Table 13 revealed that black wattle activities Gini coefficient was 0.59 while without black wattle the coefficient increased to be 0.64. Therefore, black wattle activities reduce income inequality by 0.05. Also, the study shows that households engaged in timber production have low income inequality of 0.24 compared to other income activities.

Theoretically Gini coefficient takes any value between zero (perfect equality i.e everybody has the same income) and one (perfect inequality i.e all incomes goes to a single person).

According to ILO, 2010 inequality is categorized into four groups: 0.20 low inequality; 0.25 moderate inequality; 0.35 high inequality and 0.50 extreme inequality.

Only few producers/households were involved in processing while the rest are selling as raw material (tree). Further, there was no specific price of selling plot of black wattle trees rather; it was based on bargaining power between producer and buyer (trader/processor). Thus, there is need for training black wattle producers on value addition for them to benefit more from their activity and reduce the inequality level.

Table 13: Gini coefficient for various households income

Economic activities	Gini coefficient
Agriculture	0.47
Black wattle production	0.59
Horticulture activities	0.47
Small business	0.48
Timber production	0.24

***without black wattle activities Gini coefficient is 0.64**

Gini indices are typically affected by quite a number of hidden factors, including household size, age distribution within a population, and discrepancies between countries on how income data are collected (Catalano *et al.*, 2009).

4.3 Factors Influencing Value Chain of the Black Wattle

Multiple linear regression analysis was used to assess the factors influencing returns of black wattle production as described in section 6.4.3 of chapter three. The dependent variable was Gross margin and the regressors were sex, education level, household size, land size, income from other activities other than black wattle, own bicycle, own mobile, condition of road and cost of labour.

Table 14: Linear regression results on factors influencing black wattle

Variable	Coefficient	Std. Error	Sig
(Constant)	161574.564	592745.714	0.786
Edulevel	17161.953	275138.759	0.950
Sex	20125.698	102815.694	0.845
Maritalst	-63213.889	160435.615	0.694
Bicycle	35017.048	96964.598	0.719
Mobile	73880.618	113841.320	0.518
Croad	-97240.898	458169.325	0.832
IncoffBW	0.044	0.037	0.242
Age	-751.480	3159.532	0.812
Hhsize	-21621.010	23968.638	0.369
Landsize	62086.802*	26109.921	0.019
costLabour	-3.841*	0.327	0.000
R ²	0.963		
Adjusted R ²	0.958		

Dependent Variable: Gross Margin; Significance at 0.05*, Number of observations = 117

From Table 14 above reveals the results of the linear regression which estimated the effects of the identified independent variable on the returns to black wattle production. The R-square and the Adjusted R-square values were 0.963 and 0.958 respectively. This implied that the 95.8 percent variations in returns to black wattle are jointly explained by the independent variables. The results further revealed that cost of labour and areas under black wattle production were statistically significant at 5 percent level. While, cost of labour influenced negatively returns to wattle production, area under wattle production positively influenced returns to wattle production. The inverse relation between the returns and cost of labour agreed with the expectation of the study. This is in line with the findings by Juntwa (2010); Barozi (2012); Owombo (2012).

4.4 Analysis of Economic Efficiency of the Actors along the Black Wattle Value

Chain

4.4.1 Gross Margin

The results in Table 15 summarize the Gross margin (GM) for producers, processors and traders. The survey findings shows that the GM for producers were TZS 567 632.50, traders was TZS 2 536 580, bark processor was TZS 2 975 million, and charcoal processors were TZS 717 111 This indicates that black wattle bark processing or factory was the most profitable (2 975 TZS mil) marketing enterprise followed by traders, charcoal processors and producers. These observations could be attributed by the fact that barks processing involved value chain addition to new products such as solid and powdered tannin and are sold in dollar both local market and distant market. Also, value addition of the products tends to allow the processors to fetch relative higher price as they export and earn foreign currency at the market compared traders and charcoal processors.

Table 15: Gross margin for black wattle producers, processors and traders

Actors	Description	Sales/cost
Producers	Average revenue(TZS)	752 758.33
	Less	
	Average variable cost (TZS)	185 125.83
	Average Gross Margin	567 632.50
Charcoal Processors	Average revenue(TZS)	1 800 000.00
	Less	
	Average Variable cost (TZS)	1 082 888.89
	Average Gross Margin	717 111.11
Bark processors/factory	Revenue(TZS Mil)	7 053
	Less	
	Variable cost (TZS Mil)	4 078
	Average Gross Margin	2 975
Traders	Average revenue(TZS)	5 819 600.00
	Less	
	Average variable cost (TZS)	3 283 020.00
	Average Gross Margin	2 536 580.00

The gross margin for producers was lowest (TZS 567 632.50) compared to other actors may be attributed as majority of producers sell their products in raw and long period of waiting to harvest and sell in low price which is not relative to period waited. A study supported by Jutwa (2010) and Mahoo (2011). However, despite of a positive margin received by producers, they still not benefiting from black wattle production. Also, Lack of marketing information to majority of producers leads traders take advantage of setting low prices of raw materials including fire wood and barks as in most cases it was revealed that producers sell black wattle tree based by traders price. There is a need of TAFORI with the help of Districts forest officers and extension agent to raise awareness of market information and facilitate them to have social organization groups. The presence of social groups will facilitate the mechanism of participating in decision making and allow access to skills and financial support from different institutions (social capital). The Lion wattle factory did not provide the financial reports for costs and revenues thus it was hard to establish the gross margin and profit margin.

4.4.2 Profit Margin analysis

4.4.2.1 Profit Margin analysis for producers

The findings of sampled producer's in Table 16 revealed that, the profit margin was TZS 0.52 which entail that producers of black wattle trees received a net income of TZS 0.52 for each shillings of product. Average returns per shilling invested were found to be TZS 2.23. The result shows producer receive more income than other actors but when we compare with the time used from planting to harvest black wattle trees which range from 8 to 20 years. Producers still receive low profit margin may be due to the small number of producers involved in processing activities and high cost of production with relative low price of selling the products. The high cost of production incurred by producers is the gestation period/long time lag between production and harvesting, pruning cost in terms of family labour. The black wattle tree takes average of 8 to 10 years to be ready for bark

harvesting. Hussein (2010) observed that producer get a lower profit margin compared to other actors.

Table 16: Profit Margin analysis for producers

SN	Description	Value
1.	Average Revenue per acre (TZS/acre)	340 945.98
2.	Average Variable Cost (TZS)	185 125.83
3.	Net Profit (1) –(2) (TZS/acre)	155 820.14
4.	Profit Margin (3) / (1)	0.52
5.	Returns per shilling invested (3) / (2)	2.23

4.4.2.2 Profit Margin analysis for traders

The profit margin for traders in Table 17 shows that, the black wattle traders received a profit margin of TZS 0.43 and returns per shilling invested was TZS 1.21. The cost incurred by traders on black wattle activities including labour, plots hiring, transportation, levy and taxes and storage. The absent of credit assistance in financial institutions a major concerned of traders which have limited traders from buying large volume. They suggested for the government to improve the road infrastructures in rural areas in order to cut down the transportation cost.

Table 17: Profit Margin analysis for traders

SN	Description	Value
1.	Average Revenue per acre (TZS/acre)	5 819 600.00
2.	Average Variable Cost (TZS)	3 283 020.00
3.	Net Profit (1) –(2) (TZS/acre)	2 536 580.00
4.	Profit Margin (3) / (1)	0.43
5.	Returns per shilling invested (3) / (2)	1.21

4.4.2.3 Profit Margin analysis for processors

The findings in Table 18 revealed that, the profit margin of charcoal processors were TZS 0.46 which means processors of black wattle received a net income of 0.46. The returns

per shilling invested was TZS 1.02 while the returns of labor used was TZS 190 028. In order to improve the value chain the TAFORI needs to work hand in hand with all key actors involved in black wattle activities by training on the modern technologies in order to meet customers' expectations.

Table 18: Profit Margin analysis for processors

SN	Description	Value
1.	Average Revenue per acre (TZS/acre)	1 800 000.00
2.	Average Variable Cost (TZS)	1 082 888.89
3.	Net Profit (1) –(2) (TZS/acre)	771 111.11
4.	Profit Margin (3) / (1)	0.46
5.	Returns per shilling invested (3) / (2)	1.02

As far as profit margin at TAN WATT factory for black wattle activities including wood fuel, tanning/wattle extract and power were 0.54, 0.45 and 0.10 respectively as shown in Table 19 below.

Table 19: TAN WATT factory profit margin on black wattle activities

Descriptions	Years and Value	
	2012	2013
Net Profit (TZS mil)		
Wood fuel	265	248
Wattle	2 051	2 646
Power	277	81
Profit Margin	2012	2013
Wood fuel	0.6448	0.5391
Wattle	0.4275	0.4548
Power	0.3471	0.1045
Returns per Shs	2012	2013
Wood fuel	1.8151	1.1698
Wattle	0.7466	0.8342
Power	0.5317	0.1167

Source: TANWATTLE performance in terms of raw materials consumed and products manufactured and sold during the year 2012 – 13

4.4.3 Threats of Black wattle production

Results revealed that the presence of different threats as shown in Fig. 6 such as low price of black wattle products where farm price range from 25 TZS of 1Kg of barks; 1 acre range from 100 000 to 200 000 TZS of tree longs for 8 to 20 years; 1 bag of charcoal range 5 000 to 9 000 TZS and 8 000 to 12 000 TSZ in Njombe and Lushoto districts respectively.

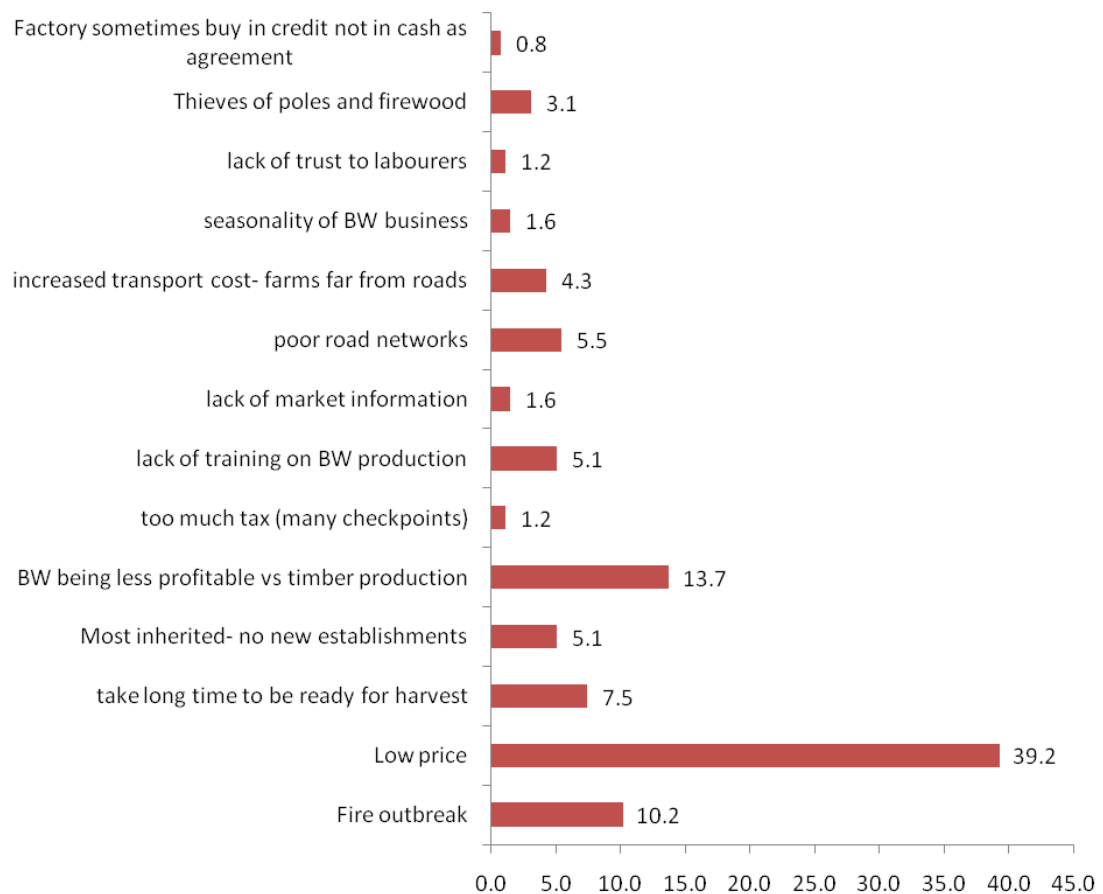


Figure 6: Challenges in black wattle production

Also, both districts are facing the problem of fire outbreak and limited expansion in acreage due to land use change from black wattle cultivation to other timber tree (eucalyptus and Pines) because of poor marketing systems. To address the named challenges the producers put forth some recommendations as detailed in Fig. 7.

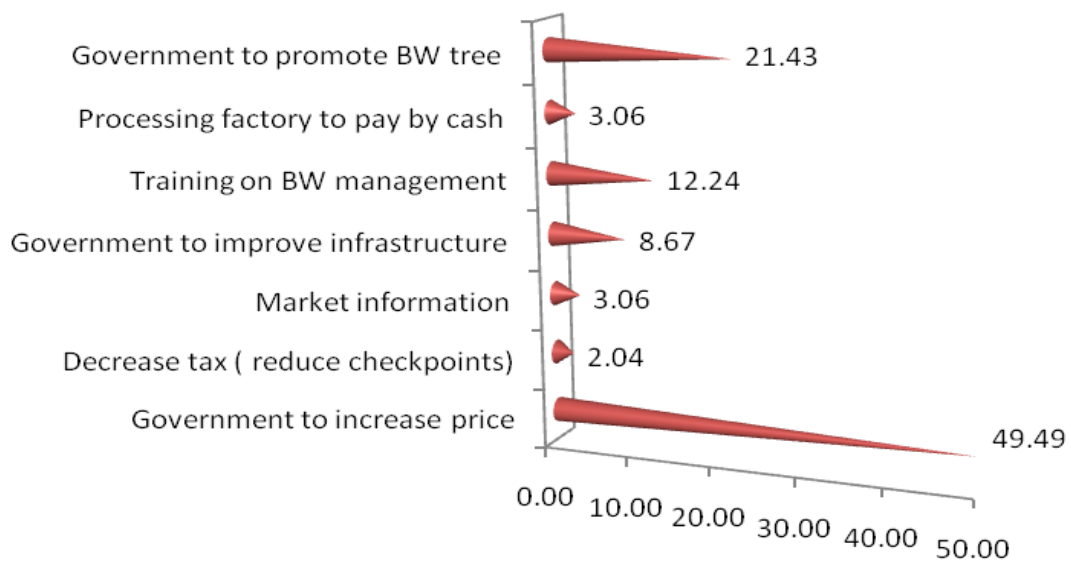


Figure 7: Solution to address the challenges in black wattle production

4.4.4 Black wattle production constraints and problems

Exploring the black wattle activities is an approach that opens opportunities to exploit them and their products for maximum profit without forgetting quality. Despite the positive impact made from the black wattle production as alternative source of energy and income to rural household the sector is being operating poorly. Among the constraints contributing to this include the productivity which is hampered by changes of land cultivated to grain crops; marketing challenges facing black wattle product due to poor infrastructure (road, transport, storage facilities); low volume of barks produce; Financial problems among small scale producer/farmers to obtain credits to facilitate marketing activities; high transaction costs would cause value chain of Black wattle to poorly operate; lack of market information; inadequate buyer; lack of harmonized places for collection; poor pricing system and dependency on brokers are persistent problem.

Furthermore, value addition technologies to black wattle products are one of the problem facing small scale producers in Njombe and Lushoto District (IITA, 2006). Due to lack of

processing technology and marketing information; the products benefit middlemen, processors and traders left behind farmers being sold at low price. This mentioned problems are likely to affect livelihood of farmers involved in the black wattle sub-sector if no action will be taken.

Improving the marketing strategies and income of rural households involved in black wattle activities is an important task in which help to achieve the Millennium Development Goals and *MKUKUTA* II through stimulating cost effective to small scale farmers.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Despite the positive impact of black wattle production presented in grey literature as an alternative source of energy and income for rural poor, the value chain for black wattle in terms of who the actors are along the chain, what value addition activities are performed and economic performance at each node have received low research attention.

The general objective of this study was to analyse the value chain of black wattle and its contribution to the rural livelihoods in Njombe and Lushoto Districts. Specifically, the study identified and examine how the black wattle chain is organized, coordinated and function between the key actors in the study areas; evaluated the contribution of black wattle activities to actors' livelihood; determined factors influencing the value chain of the black wattle in the study areas and determined economic efficiency of the main nodes of the value chain in the study areas.

The study revealed that, most black wattle produced by smallholder producers are marketed by traders who collect, pack into bundles and distribute the wattle barks to processors (factory). The economic and institutional barriers to wattle marketing (transportation costs, quality standards, inadequate and uncoordinated wattle market information systems) limit wattle-sector development. This impact negatively on the welfare of the large population of smallholder producers and others who depend on the sector for their livelihoods.

In general, the value chain of black wattle in the study area is characterized by low value addition. Value addition activities were limited to (barks in bundles; charcoal processing, storage and transportation and tannin). Also, there was generally weak coordination among actors in the black wattle value chain. All actors in a chain had no organizations to safeguard their interest. The need of association is highly required to increase bargaining power on market prices.

Further, the findings revealed that black wattle production improves the household's income. Income led by bark processors, traders, charcoal and producers were TZS 2 975 mil; TZS 2 536 580; TZS 717 111.11 and TZS 567 632 respectively. The results from multiple linear regression revealed that cost of labour and areas under black wattle production were statistically significant at 5 % level. Other variables were not significant even at 10 % level. While, cost of labour negatively influenced returns to wattle production, area under wattle production positively influenced returns to wattle production.

5.2 Recommendations

Based on the conclusions drawn from the findings, the following are some policy recommendations to improve the value chain of black wattle in the study area and Tanzania at large.

5.2.1 Policies

As the survey shows that tree of black wattle is mainly used for fuel wood (firewood and charcoal) to the households and as source of income, it would be better if the government would prepare policies that instruct each household to plant trees.

5.2.2 Best farming practices

The majority of producers do not implement best practices, including pruning of black wattle tree to allow space for a tree to grow well and establishment of new farms most of households have inherited farms from their parents. This has resulted in low yield. Although they are very skilled in terms of utilizing their limited knowledge and resources on how to process charcoal, the training on the use of modern knowledge especially on use of Kiln on charcoal processing will help them to get more and quality charcoal which will increase their income and help to sustain their livelihood.

5.2.3 Capacity building in processing (value addition) and handling

The study shows that incomes of primary producers and charcoal processor get affected not only by their limitations in negotiating with buyers but also by the inherent low value of products collected. There is a striking lack of processing and value-addition happening at source. Imparting appropriate training in cleaning the farm area, sorting tree through pruning, and packaging can address this issue.

5.2.4 Market information and market access

Market systems supported by widely available tools such as mobile phones, radios and news paper will strengthen the marketing of black wattle products. Also, the involvement of the public and the private sectors in the production activities of black wattle is highly required.

5.2.5 Sustainability and biodiversity

Black wattle activities make use of forest biodiversity. Sustainable harvesting is therefore an important skill the forest-dependent communities must possess. Such harvesting practices will ensure that these communities have sustainable livelihoods in the long run.

5.2.6 Prices

Producers have a weak bargaining power when it comes to prices, although tannin extracted from barks of black wattle trees have high demand in domestic leather industries and export market. The Government needs to come with a strategy to help producers to benefit from this business.

5.2.7 Access to finance

Although black wattle activities are labour intensive and high cost industry, households involved are substantial ones but financial institutions including Banks, SACCOS and VICCOBA do not recognize this as a business crop. So it is hard for key actors to get fund.

5.2.8 Establishing and strengthening coordination between actors

The study revealed weak coordination between actors along black wattle value chain. Contract was found to exist between barks traders and factories. The study recommends strengthening of the existing contractual arrangement between actors by facilitating formulation of formal legal contracts. Also, effort should be made to facilitate associations of actors.

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APPENDICES

Appendix 1: Questionnaire for black wattle producers

Questionnaire Number.....

Date of interview.....

District.....Village.....

Section A: Personal information of a respondent:

1. Name of the respondent

2. Age in years.....

3. Gender: 1 = male[], 2 = female[]

4. Marital status:

1= Married [], 2= Single [], 3= Divorced [], 4= Widowed [], 5= Separated []

5. Level of education:1 = No formal education[]; 2 = Primary school []; 3 = Secondary school[];

4 = College [], 5 =University [], 6 = others [] (specify)...

6. How many people in your household.....

Section B: Information on black wattle production

7. What are major economic activity do you engage in as your main source of livelihood?

1= Agriculture [], 2= Business/petty trading [], 3= Agro-processing [], 4= services [], 5= Black wattle production [], 6= others (specify)

8. Experience of working with black wattle production.....

9. If black wattle production is your main economic activities,

a. What is total area in acreages under the wattle production.....

b. What are source of labour? 1=family labour [], 2=hired [], contract [].

c. What are your earnings in the past three years (TZS)? 2012.....

2013..... 2014.....

- d. What are the products of black wattle and where do you sell them? Specify according to the product

S/N	Black wattle products	Market

- e. Do you receive any extension services? 1= Yes [], 2= No [].

If yes, what type and source.....

10. If you're engaging in bark activities, which equipments/materials do you purchase during preparation period?

S/No	Type of equipment / material	Uses	Purchasing price
1			
2			
3			
4			

- a. Please indicate the costs involved in black wattle activities before selling:

S/No	Activity/item	Time (days)	Cost (TZS)
1			
2			
3			

b. How much do you pay the following items when marketing your produce?

Cost item	Frequency	Costs (TZS)	Total cost(TZS)
Transportation cost			
Labor (loading and unloading)			
Communication			
Hidden cost (e.g. waiting time, etc.)			
Others (specify)			

Section C: Information on livelihood issues relating to black wattle production

11. Rank your livelihood activities according to its contribution to your household needs?

S/No	Livelihood activity	Income (TZS)	How long have been involved in this livelihood activity
1			
2			
3			
4			
5			

12. Do you think black wattle activities contribute to your livelihood 1 = Yes [] 2 = No

13. If yes to question 11 above, in what ways does it support you? Please

mention.....

14. How many black wattle products do you harvest?

S/No	Product(s)	Total harvest (specify unit)	Selling price (TZS)	Domestic use
1	Fire wood(s)			
2	Barks of Black wattle			
3	Pole			
4	Others (specify)			

15. Where do you normally sell your wattle products? 1 = consumers [], 2 = middlemen [], 3 = wholesalers [], 4 = retailers [], 5 = others [] (specify).....

16. How much income do you usually generate per year

17. How often do you engage in black wattle activities in a year?

1 = Dry season [], 2 = When in need of money [], 3 = All the time [].

18. Have you ever received training on how to improve black wattle production?

1=Yes [], 2= No []

19. Do you get market information? 1 = Yes [], 2 = No []

20. If yes to question 19 above, how do you obtain such pieces of information?

1 = friends [], 2 = from media [], 3 = direct visit to the markets [], 4 = others []
specify.....

21. Who sets the price for the black wattle products when selling?

1=buyer [], 2=seller (producer) [], 3=others []
(specify).....

22. What factors are considered in setting up the price of black wattle products? (Please rank) 1 = production costs [], 2= transportation costs [], 4 quality [], 5 =seasonality [], 7=others (specify).....

23. Are you satisfied with the current black wattle products prices? 1 = Yes [], 2 = No []

24. If no why?

1 = price is low [], 2 = operational costs are very high [], 3 = buyers offer price which are in their favor [], 4 = others specify).....

25. How will you describe the road network to your community? 1= Poor [], 2=Good[].

Section D: Information on black wattle value chain

26. Which specific role have you played within a value added on black wattle products in marketing system?

27. How do you assess the linkage between you and other actors in the value chain?

1 = very strong [], 2 = strong [], 3 = weak [], 4 = very weak [], 5 = none []

28. Who do you perceive as having greater power in the black wattle value chain?

1 = producers [], 2 = traders [], 3 =processors [] 4 = consumer []

29. How much do you trust other stakeholders in the black wattle value chain?

1 = very much [], 2 = much [], 3 = little [], 4 = very little []

30. How do you assess the current performance of the black wattle value chain?

1 = best [], 2 = good [], 3 = worse [], 4 = worst []

31. How do you think the performance of the value chain can be improved?

.....
.....

32. As producer, do you have any association in your area? 1 = yes [], 2 = no []

33. If yes, to question 32 above, what are the benefits of the association/organization?

.....

34. What are the values added activities do you perform in your business?

.....

35. What are the main challenges while undertaking the black wattle production?

.....
.....

36. What do you think should be done to make your work easier

.....
.....
.....

“Thank you for your cooperation”

Appendix 2: Interview guide for Black Wattle Processors

Date of interview.....

District.....Village.....

Name of Processing Firm 1= TANWATT [], 2=Lion wattle [], 3=others
(specify).....

Section A: Respondent's characteristics:

1. Name of the key informant
2. Age
3. Level of education.....
4. Title/position.....
5. Marital status

Section B: Information on wattle activities

1. For how long have you been doing this business.....
2. Form of ownership of the firm? 1=Individual [], 2=Partnership [],
3=State/cooperative [], 4= other (specify)
.....
3. Year established the firm.....
4. Reason for establishing.....
5. What is your processing capacity.....?
6. What is the status of the firm? 1= Full time [], 2=Part time [], 3=infrequent[],
4=others (specify).....
7. (a) How many employee do you have.....Female.....male.....
(b) How many employees are in management..... administration..... productions?
.....
8. What are the source(s) of black wattle (raw materials)/ villages?
.....

9. What is the volume do you receive and process in the past three years?

.....

10. What are the products do you produce from black wattle

.....

11. Do you have any contractual agreement with your suppliers of raw materials 1=Yes
 [], 2= No [].

(a)If no why

.....

(b) If Yes for how long have you operated

12. (a)What are your markets for your products and price per unit both local and international market.

Wattle Products	Unit sold	Market		Price per unit
		Domestic	International	

(b) Has the number of customers increased, decreased or remain the same for the past three years.....

(c) Explain your answer for item b above

.....

(d) What efforts have you taken to ensure your products are well known to the customer?

.....

13. (a) What are the costs involved on processing your products?

Items	Cost (TZS)

(b) How much do you incur/pay on the following when marketing your products?

Items	Cost per unit (TZS)
Transport	
Packaging	
Storage	
Loading/unloading	
Government levy and other taxes	
Miscellaneous costs	
Others specify	

14. What are other activities apart from black wattle processing

.....

15. Are you also involved in wattle production? If Yes how many acres.....

16. What are the challenges do you encounter in wattle processing activities

.....

17. What are the opportunities do you see.....
18. Do you face any competition in your business
19. How do you deal with it from qn 18
20. How can you access the intensity of linkages between you and other actors in the value chain
.....
21. How do you assess the current performance of the black wattle value chain
.....
.....
.....
22. What ways do you think government could improve its support of this type of enterprise
-
-
23. What are your contributions to improving livelihood of the local community
.....
.....
.....
24. What can be done by government and other stakeholders to improve efficiency in black wattle industry?
.....
.....
.....

Thank you for your cooperation”

Appendix 3: Questionnaire for Black Wattle Traders

Questionnaire Number.....

Date of interview.....

District.....Village

Section A: Personal information of a respondent:

25. Name of the respondent.....

26. Respondent age in years.....

27. Gender: 1 = male [], 2 = female []

28. Marital status:1= Married [], 2= Single [], 3= Divorced [], 4= Widowed [], 5=
Separated []

29. Level of education.....

Section B: Information on trader sources, costs and pricing

30. Is black wattle transportation your main economic activity? 1 = Yes [] 2 = No []

31. For how long have you been doing this business.....

32. Have you received any business or technical training?1 = Yes [], 2 = No []

33. Which black wattle product do you involve in? 1= Firewood [], 2=tannin [], 3= pole []
], 4=others specify.....

34. What are the source(s) of black wattle products

1 = producers [], 2 = transporters [], 3 = processors/industry [], 4 = others []
(specify)...

35. Do you sell outside Tanzania? 1=Yes [], 2=No [],

36. If yes which are you are customers.....

37. About how much income do you usually generate per annual.....

38. What was the mode of the trade?

1 = Contract [], 2 = first come / first served [], 3 = others [] (specify)...

39. What was the mode of payment? 1 = cash [], 2 = credit [], 3 = other [] (specify)...

40. Please provide details of your costs you have incurred in your business last year 2013

Cost item	Number	Cost/unit	Total cost
Fuels (diesel/petrol)			
Vehicle repair and maintenance			
Wages e.g. driver,			
Loading and unloading			
Communication			
Road licenses/fees			
Transit Pass fees			
Others (specify)			

41. Is there any variability in the volume of black wattle products between seasons

1 = yes [], 2 = no []

Section C: Information on livelihood activities

42. Has there been a shift in your economic/livelihood activity? Yes [1] No [2]

43. When did you change your occupation/livelihood activity

44. What used to be your occupation/livelihood activity

45. Are you satisfied with your current occupation/livelihood? Yes [], No [].

Explain.....

.....

46. Do you get information on your product required to be market? 1 = Yes [], 2 = No []

47. If yes to question 22 above, how do you get such information?

1 = friends [], 2 = through media [], 3 = processors/factory [], 4 = others (specify)...

Section D: Information on black wattle value chain

48. How do you assess the linkage between you and other actors in the value chain?

1 = very strong [], 2 = strong [], 3 = weak [], 4 = very weak [], 5 = none []

49. Who do you perceive as having greater power in the black wattle value chain?

1 = producers [], 2 = traders [], 3 = processors [], 4 = none []

50. How do you assess the current performance of the black wattle value chain?

1 = best [], 2 = good [], 3 = worse [], 4 = worst []

51. What are the values added activities do you perform in your business?

.....

52. How do you think the performance of the value chain can be improved?

.....

.....

What are the main challenges while undertaking the black wattle transportation work?

.....

.....

.....

53. What do you think should be done to make your work easier?

.....

.....

.....

“Thank you for your cooperation”

Appendix 4: Questionnaire for Black Wattle Customer

Questionnaire Number.....

Date of interview.....

District.....Village

Section A: Personal information of a respondent:

1. Name of the respondent
2. Respondent age in years.....
3. Gender: 1 = male [], 2 = female []
4. Marital status:1= Married [], 2= Single [], 3= Divorced [], 4= Widowed [], 5= Separated []
5. Level of education.....

Section B: Information on the use of black wattle products

6. List your main sources of income i).....
 ii)
 iii)
7. List your most important/main occupation.....
8. What products of black wattle do you use? Please tick 1=firewood [], 2= Pole for building [], 3=Tannin [], 5= others (specify).....
9. Where do you get? 1= farmyard [], 2= market [], 3=processors/industry [],4=others (specify).....
10. Why do you prefer to use black wattle products?

11. Is there any value added activities in black wattle product which you're involved?

12. Are you satisfy with the product(s) 1 = Yes [], 2= No [].

Explain your answer in question 12, why.....

13. How much do you pay for a unit (kg) of the following black wattle products?

S/No	Product(s)	Buying price (TZS)
1	Fire wood(s)	
2	Tannin	
3	Pole	
4	Others (specify)	

14. What is your opinion on the price you pay per unit? 1= price is too high [],

2 = reasonable price [], 3 = lower than expected [] 4 = other [] (specify)...

15. Do you buy black wattle products throughout the year? 1 = Yes [],2= No [].

16. If yes which months in a year there is a high demand of black wattle products.....

17. What constraints do you face in getting black wattle products? (Rank) 1= high price [], 2=long distance [], 3 = low quality [], 4=inadequate supplies [], 5=others [](specify).....

18. What do you think should be done to solve the problems?

.....

What suggestions do you have for the black wattle producers, transporters, retailers and other stakeholders to improve the performance of the black wattle value chain?

.....

“Thank you for your cooperation”

Appendix 5: Checklist for Key Informants

Date of interview.....

District.....Village.....

Section A: Respondent's characteristics:

6. Name of the key informant

7. Title/position.....

Section B: Information on black wattle activities

8. Who are the key actors along the black wattle value chain activities?

9. How can you describe the structure, linkage and performance of black wattle value chain?

10. Who do you perceive as having greater power and share in the black wattle value chain?

11. What are the values added activities performed in a black wattle value chain?

12. How many black wattle value dealers have been registered in your district in year 2013/14?

13. How much do you charge them as royalty and cess/levy for black wattle business in kg?

14. What other charges do you collect from black wattle dealers/traders?

15. Do you think royalty / cess and other charges paid by black wattle dealers have influence on the final price?

16. If yes to question 9 above, what is the contribution of other actors to final black wattle price?

17. What strategies/programs/policies/incentives by government or development partners if put in place would enable growth in the black wattle business and improve chain value addition?

“Thank you for your cooperation”

Appendix 6: Focus Group Discussion Check List

[A] INTRODUCTION

- Introduction of members, both research team and focus group participants.
- Purpose of gathering.

[B] DISCUSSION

- What is the nature of the black wattle product(s) in a chain?
- Which are the main key actors involved in the chain and how can they be categorized?
- What are the values added activities performed in a chain
- What are the volume of products and services that flow through the chain?
- What types of supplies and services feed into the value chain?
- Who is your major source of information regarding pesticides/insecticides?
- Who is your major source of information regarding price, supply, and demand?
- Discussion on credit received, source and challenges associated with their ability to access credit (terms and conditions, interest charges payment schedule and timeliness of the credit).
- Discussion on the type of livelihood activities engaged in Nature and characteristics of livelihood assets from which they draw their livelihood; nature and trend of capital inputs (financial, social, natural, physical and human capitals)
- Questions on Nature and characteristics of accumulated assets
- A discussion about the shift in livelihood and the extent to which it has occurred.
- A discussion about the possible causes.
- A discussion about the perceived outcomes of the shift.
- Has there been any cultural change.

- Has there been and social change.
- Which NGO's or social groups are operating here.
- Which of them have been most helpful?
- Discussions on community characteristics (source of water, fuel wood, roads, clinic, school etc.) and how it influences their livelihood?
- Intra-household characteristics (role of spouse in domestic responsibilities, control of household resources) and how it impact on their livelihood?
- What are the general problems inhabiting your livelihood?

“Thank you for your cooperation”