VALUE CHAIN ANALYSIS OF SAWNWOOD FROM TANZANIAN FOREST PLANTATIONS: CASE STUDY OF MUFINDI AND KILOMBERO DISTRICTS AND DAR ES SALAAM CITY

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A THESIS SUBMITTED IN FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

2018

ABSTRACT

The study was conducted to analyse value chain of sawnwood from government and private plantations in the selected locations. Specifically, the existing sawnwood value chain actors' characteristics and behaviour were assessed. Analysis of sawnwood efficiency on production and marketing in the value chain was done. The intensity of business enabling environment in sawnwood value chain was also assessed. Samples of 579 actors were selected from government plantation while on private plantation a total of 10 actors were also selected. Data was collected using questionnaire survey and direct observation. The analysis was done using Statistical Package for Social Science (SPSS), SAS, Microsoft Excel, mapping matrix and content analysis. For hypothesis testing, Tobit model was used to estimate the influence of various transaction factors. The study found that, in government plantation four main sawnwood value chains were existed. On the other hand, three value chains were detected in private plantation. Also in government plantation at production site the average price (TZS 333 837) per m^3 is lower by 18% compared to market site (TZS 460 000) while on private plantation the average price per m^3 is 11 % of increase in price of sawnwood at the export zone. The results reveal that the market information, operation system, negotiation and enforcement costs before transaction, increases the likelihood of producing a certain volume at 100%, 59%, 17% and 69% respectively. Also from government plantation, lack of market differentiation results the gross margin of the sawnwood produced using small scale technology to be higher than that produced by advanced technology. For private plantation the profit is TZS 644 000 which is higher because of line of production and market arrangements. It was also found that, policies and legislation has contribution towards enabling environment to sawnwood stakeholders. The study concluded that the sawnwood value chain from government plantation is long and complex. Further, the private plantations gain more profit in sawnwood business due to efficiency in utilizing the resource and

chain arrangements. The study recommended that, for development of sustainable sawnwood value chain, production and marketing systems should be improved by government, private and individuals.

DECLARATION

I, Consolatha Benedict Kapinga, do hereby declare to the Senate of Sokoine University of Agriculture that this Thesis is 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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ACKNOWLEDGEMENTS

The work of this nature would not have been possible without considerable support from a number of individuals. It is my pleasure to acknowledge their support.

I unreservedly acknowledge the precious and assiduous guidance of my esteemed supervisors Professor J. F Kessy and Professor Y. M. Ngaga. whose accumulated experience, intellectual comments, constructive criticism, serenity and encouragement made this study a success. I would have been in a wild without them.

I would like to express my sincere gratitude to Tanzania Forest Research Institute (TAFORI) for granting permission to study. I'm also grateful to COSTECH for financial support without which my studies at SUA would have been impossible. I would like to specifically thank Professor E. Senkondo, Dr. J. R Makindara and Dr. W. Mugasha, for their assistance and encouragement which made my workload lighter. My heartfelt gratitude to Mr. Aloyce Mpiri from TAFORI for his support during data collection and the staff in the Department of Forest and Environmental Economics and other administrative staff at SUA, for their support during my study.

I am also highly indebted to Tanzania Forest Service, TFS Ilala zonal office, TFS Kinondoni zonal office, TFS Temeke zonal office, Sao Hill Forest Plantation Management, Kilombero Valley Teak Company, Mufindi District Commissioner, Kilombero District Commissioner, Iringa Region, Morogoro Region, Pwani Region and Dar es salaam city for granting me a permit to conduct my study in their areas of jurisdiction. I also extend my thanks to all respondents in the study area and those who have contributed information in one way or another for their valuable cooperation,

without which this study would have remained a day dream. I especially thank the assistants who worked with me during the field survey in a spirit of generosity and commitment.

I owe the greatest debt to my adorable husband, Ernest Rogers Malimbwi for providing loving environment. I also appreciate his tireless advice, encouragement, support, assistance and remarkable ideas provided to me during the entire period of this work. I also wish to thank my daughter Rachel and my sons Tamilwai and Kepha for their patience during my absence which continuously kept my spirit high. A personal vote of thanks goes to my father Mr. Benedict Simon Kapinga and father in law Professor Rogers Malimbwi for their support, love and encouragement. All were keen to see this thesis accomplished. My dear relatives Oresta, Bahati and Rose will always be appreciated for their support to my family during accomplishing this study. They have demonstrated extraordinary courage and made difficult sacrifices

I also honour the following; Joyce Mwakalasya, Navoneiwa Chikira and Tumaini Allan and the altar prayer team for their indispensable prayers and adulation throughout my quest to accomplish this study. Neither words nor complex mathematical equations can fully articulate their roles in making this work a reality.

Above all, I thank God from the bottom of my heart, for giving me the courage to invest time in this study. He made it possible for things to happen.

DEDICATION

This work is dedicated to my beloved and esteemed family, my husband Ernest Rogers Malimbwi and my daughter Rachel Ernest Malimbwi and sons Tamilwai Ernest Malimbwi and Kepha Joshua Malimbwi whose blessing and patience have been the perennial source of my strength and inspiration.

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ABBREVIATIONS AND ACRONYMS

AAC	Annual Allowable Cut
AFF	African Forest Forum
CCA	Chromated Copper Arsenate
ECA	East and Central Africa
ERP	Effective Rate of Protection
ERV	Exchange Receipt Voucher
FAO	Food and Agriculture Organization
FBD	Forest and Beekeeping Division
FITI	Forest Industries Training Institute
GDP	Gross Domestic Product
Ha	Hectare
HSS	Harvest Scheduler Simulator
IFAD	International Fund of Tropical Agriculture
IITA	International Institute of Tropical Agriculture
KM	Kilometer
KVTC	Kilombero Valley Teak Company
LMDA	Logging Miscellaneous Deposit Account
m^3	Cubic meters
MBV	Market Based View
MNRT	Ministry of Natural Resources and Tourism
MPM	Mufindi Paper Mills
MUET	Mufindi Environmental Trust
NDC	National Development Corporation
NSSF	National Social Security Fund

PFP	Private Forestry Programme
RBV	Resource Based View
RM	Relationship Marketing
SAFIA	Southern Highlands Forest Industries Association
SAS	Statistical Analysis System
SCP	Structure Conduct Performance
SHFP	Sao Hill Forest Plantation
SHI	Saohill Forest Industries
SHIMIVITA	"Shirikisho la Viwanda vya Misitu Tanzania"
SMFEs	Small and Medium Forest Enterprises
SPSS	Statistical Package for Social Science
TAZARA	Tanzania and Zambia Railway Authority
TBS	Tanzania Bureau of Statistics
TCE	Transaction Cost Economics
TFF	Tanzania Forest Fund
TFS	Tanzania Forest Service
TP	Transit Pass
TRA	Tanzania Revenue Authority
TWICO	Tanzania Wood Industries Company
TZS	Tanzania Shillings
UN	United Nations
URT	United Republic of Tanzania
USAID	United States Agency for International Development
USD	United States Dollar
VAT	Value Added Tax

CHAPTER ONE

INTRODUCTION

1.1 Background Information

The forestry industry is a major global economic sector, with gross forest production projected to grow to USD 299 billion by 2020 (Brack *et al.*, 2002). Logging, trade and export of forest products form a major source of local and international revenue for many countries (Milledge *et al.*, 2007). In Tanzania, forests and woodlands cover around 48.4 million ha of the land area and yet support over 90% of poor population who lives in the rural areas (MNRT, 2015, FAO, 2010, World Bank, 2004). Also forests and trees are important in food security, providing economic alternatives and their support to other sectors is also being recognized (Nidumolu *et al.*, 2014; Kapinga, 2010). Thus, forest-based income accounts for a large share of rural income in many places in Tanzania (Kapinga, 2010).

Demand for forest products in Tanzania is growing rapidly as factors like population and other demand drivers are growing strongly. This demand is forecast to double by 2030 to 4.2 million m^3 creating a significant supply deficit of about 2.2 million m^3 (MNRT, 2015; Indufor, 2011). Due to the fact that population increase has strong bearing on wood consumption and that majority of Tanzanians' lives in rural areas depend heavily on forestry for their livelihood, it is evident that more forests are, and will be heavily subjected to more deforestation and degradation (TFS, 2014). The contribution of the forestry sector to national Gross Domestic Product (GDP) is around 4%, while economic growth, and rural wealth remains a small fraction of its actual potential because of underestimation, and illegal and unsustainable practices (TEITI, 2014; DPG, 2005). Wood consumption exceeds legally available growth by 1/3 and the gap is growing, so legally available resources are not sufficient and protected forest areas are at risk

(MNRT, 2015). The area under plantations is only 3% of that required to meet the rapidly growing demand of forest products in Tanzania (MNRT, 2015; Hardcastle and Evans, 2009). This subsector employs approximately 1 million people in Tanzania and contributes about 10-15% of the value of Tanzania's registered exports, and provides 95% of Tanzania's energy supply and 75% of construction materials in Tanzania (DPG, 2005).

Tanzania forestry industry has changed from using not only the indigenous wood from natural forests but also wood from plantations (Kapinga, 2010). The reason behind is that, natural forests are decreasing and demand for forest products is growing rapidly. Also, the annual growth of the natural vegetation types is low compared to plantations. The total annual supply of wood is estimated at 83.7 million m^3 and only about 42.8 million m^3 is available for harvesting at a sustainable level (MNRT, 2015). Therefore, the current supply of the raw materials does not match with wood demand for both domestic and foreign markets (TFS, 2014). It is estimated that 85% of the total log consumption in Tanzania is from wood plantations, mostly softwood (FBD, 2010). Currently, the total gross area of forest plantations in Tanzania is estimated to be about 250 000 ha (AFF, 2011). Government plantations (85 000 ha) are the major supply of wood raw material where by Sao Hill Forest Plantation (SHFP) alone currently supplies over 85% of raw material consumed by industries (AFF, 2011; Msuya *et al.*, 2006 and Wells and Wall, 2005). On the other hand, private plantations have emerged due to increased demand of forest industrial products and the decline in supply from government plantations due to overharvesting and under investment in replanting. Indufor (2011) estimates that by the year 2025 the 70% of the round wood will be coming from private plantations. Currently, the Kilombero Valley Teak Company Ltd. (KVTC) is the one of the oldest private company grows teak on their plantations and has the ability to supply up to 40 000m^3 annually (KVTC, 2014).

According to the present economic forces, the majority of population in Tanzania will continue to depend on wood products for a long time to come (Kapinga, 2010). This will continue due to increase as population projected to grow at 3.1% annually (URT, 2012). Thus, will continue to put pressure on the natural and plantations forests, where most timber species are exploited (TFS, 2014; Kapinga, 2010). According to Annunzio *et al.* (2015), Per capita consumption is increasing as well, especially in fast-growing economies, resulting in an unprecedented demand for resources.

Wood products include firewood, charcoal, poles, sawnwood, industrial round wood, furniture and wood-based panels, paper and pulp which generate value over time (FAO, 2007). The most important industrial wood product from the woodlands is sawnwood, which is the most important contributor to the national economy. It is used primarily in building and construction, joinery, furniture making and packaging (Kapinga, 2010).

1.1.1 Sawnwood supply and demand situation in Tanzania

There are ranges of factors that influence demand and supply for sawnwood and wood products which include population growth, economic growth, urbanization and special demand drivers (Indufor, 2011). In addition to these factors, most forest products are intermediate goods (Kapinga, 2010). They are used in other industrial processes or commercial activities (e.g. construction), such that technological changes in these processing or end-use sectors can have major impact on the demand for forest products through the efficiency with which they are transformed into other products (FAO, 1999). Global demand for industrial wood and wood products is expected to increase by 25% to 1.90 billion m^3 approximately per year by 2010 (FAO, 2004). The world's population is growing rapidly: UN predicts a 15% population increase in the next 15 years to a total of 8.4 billion people (UN, 2012). It is estimated the total demand for round wood is

estimated to be 1.46 million m^3 (Indufor, 2011). Currently, government plantations supply over 70% of raw material requirement, whereas by year 2020 the same plantations will be supplying only about 40% and private forests will provide the balance. It is forecasted that, the annual demand for wood from plantations will surpass supply by about 400 000 m^3 by year 2030 (Table 1). Therefore, taking into account the factors or demand drivers, particularly population, economic growth and urbanization, if the economy grows in the same pace as well as the population, forecast demand will significantly exceed supply from plantations by about 2 200 000 m^3 by 2030 (AFF, 2011).

Table 1: Forecast demand scenarios between 2010 to 2030

Year	Supply (1000 m^3)	Baseline Demand (1000 m^3)	Realistic Demand (1000 m^3)
2010	89 190	40 140	40 140
2015	89 350	46 308	53 716
2020	89 050	53 423	71 885
2025	89 300	61 632	96 198
2030	89 560	71 102	128 734

Source: AFF (2011)

1.1.2 Wood product consumption in Tanzania

The total number of trees in Tanzania Mainland is estimated to be 87 billion (all species and all land uses) whereby 60 % of the growth comes from unprotected areas (MNRT, 2015). The estimated total consumption is 62.3 million m^3 (mainly for energy) with an annual deficit of 19.5 million m^3 (Table 2). The continual harvesting of wood in excess of the growth leads to degradation of the resource. The price of the products themselves; the price of substitute products; population and income levels; and trends in consumer preferences are factors that increase pressure on remaining forests - including the ones in protected areas (FAO, 1999).

Table 2: Estimated forest consumption in Tanzania

Total forest	Total consumption/ M^3
Allowable cut	62 700 mill
Consumption	83 700 mill
Deficit	19 500 mill

Source: MNRT (2015)

In Tanzania roundwood (logs and pulpwood) is consumed for paper industry, furniture and joinery sector, and packaging sector and in utility poles, manufacturing and additionally some volumes are exported (Indufor, 2011). The forest based industry in Tanzania is largely dominated by sawmilling, woodworks/furniture marts and joinery. Other industries include paper, wood based and poles treatment plants (AFF, 2011). It is estimated that, there are 512 sawmills, out of which 70% are micro-mills ("dingdongs"), 25% small (Kara type) and only 5% medium size mills (AFF, 2011).

1.2 Problem Statement and Justification of the Study

Sawnwood is among the leading industrial wood products produced in Tanzania. The demand for sawnwood is growing fast and this has attracted a lot of people to engage in sawnwood trade. The rapid growth of demand for sawnwood is met through a sawnwood value chain, which stretches from users' end of demand back to resourced area industry. Sawnwood value chain involves several interconnected stages from production to consumption (Hughes *et al.*, 2014; Kapinga, 2010; Harland, 1996).

Some studies have been conducted in relation to the value chain of sawnwood in Tanzania, for example, PFP (2016) examined value chain of the forest sector in southern Tanzania focusing on developing forest industries , Indufor (2011) examined value chain of sawnwood produced by micro mills (Dingdong), Shayo (2006) presented an empirical analysis of indigenous timber extraction and the supply chain of the hardwood and timber

trade in Tanzania, Wells and Wall (2005) explained the sustainability of sawnwood supply in Tanzania and Udeaja and Tah (2001), explained how economic, social and environmental changes associated with sustainable development are impacting the timber supply chain in Tanzania. Most of these studies elucidate the supply chain of sawnwood explaining the possible routes and channels, through which sawnwood flows from the source to the purchaser. However, these studies have not examined in detail the key actors and their relationship in the value chain. These studies have also not given enough attention to sawnwood demands and how to satisfy these demands.

Moreover, these studies have not examined in detail sawnwood production systems and costs involved and who is benefiting more or less within the chain. There is limited information on market segment of sawnwood produced from different producers (micro, small size and medium size) who supply to the same market. In this observation, little is known concerning the value chain of sawnwood in Tanzania.

Sawnwood value chain analysis plays a key role in understanding the need and scope for systemic competitiveness position in the chain, the number of stages in the process that a dealer controls (i.e. the degree of integration in the chain) and the volume of timber traded (Shayo, 2006). The efficiency of activities in the value chain delivers competitive advantage through lower cost structure and therefore provides higher profit potential. This has not been adequately researched in Tanzania and calls for greater concern to study value chain analysis in more detail. Moreover, there is also limited information on how business enabling environment is created to satisfy value chain actors from different categories who are all involved in the same market. In this view, little is known concerning the actors who build the value chain of sawnwood in Tanzania.

This study therefore, aimed at assessing the value chain of sawnwood from selected government and private forest plantations. The findings from this study will provide significant understanding of sawnwood value chains and map the flow of inputs – goods and services – in the production chain which allows each firm to determine who else's behavior plays an important role in its success. Information concerning constraints and opportunities facing the chain is provided. Moreover the study acts as the point of reference for more studies intended to take advantage of the available opportunities and constraints in the forest sector.

1.3 Research Objectives

1.3.1 General objective

The main objective of this study was to analyse sawnwood value chain for effective programmes and investments to improve chain productivity from Government and Private Plantation forests of Tanzania.

1.3.2 Specific objectives

The specific objective of this study was:

i. To examine all actors along the sawnwood value chain including their numbers, roles and existing relationships

ii. To analyse efficiency of sawnwood production and marketing systems in the value chain

iii. To perform in depth analysis business enabling environment in sawnwood value chain in the study area

1.4 Research Hypothesis

Ho = The value chain structure does not affects the competitiveness of the entire sawnwood industry.

H1 = The value chain structure affects competitiveness of the entire sawnwood industry.

1.5 Organisation of the Thesis

The thesis is organized into five chapters, including introduction, literature review in the subject matter, the methods used in previous studies to address the problem, results and discussion of results and conclusion and recommendation. Specifically chapter one introduces the study and explains the existing problem, chapter two reviews value chain analysis and its theories, sawnwood production and marketing. Chapter three describe the conceptual framework, approach and methodology applied in the study. Choice of the study area, sampling method, model settings procedure of data collection, processing and analysis are key methodological issues discussed in this chapter. Chapter four presents and discusses the results of this study. Specifically the chapter presents the main results, discussion and testing the hypothesis. This thesis winds up with chapter five which provides the conclusions and recommendations emanating from the major findings of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Definition of key Concept

2.1.1 The Value chain

A value chain describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumer, and final disposal after use (Kaplinsky and Morris, 2001). Also according to McCormick and Onjala (2007), a value chain is the sequence of production, or value adding activities leading to and supporting enduse manufacturesrs of a particular product. Each process step of the chain of activities gives the product more added value, of which can be seen as the difference between expenses (materials etc.) to produce and the sales price of the product (Teischinger, 2009 ; Bair, 2005). These definitions are quite similar and the perspectives are sometimes interchangeably used (Hughes *et al.*, 2014).

The "value chain" is a concept from business management that was first described and popularized by Porter (1985) in order to understand the behaviour of costs and the existing and potential sources of differentiation and categorizes the generic value adding activities of an organization/ enterprise. Gereffi's global commodity chains, and Humphrey's world economic triangle, are the last two who joined the concept of the global value chain (Faße *et al.*, 2009). Therefore, the value chain concept quickly made its way to the forefront of management and thought as a powerful analysis tool for strategic planning and has been extended beyond individual organizations and provides an important construct that facilitates the understanding of the distribution of returns from the different activities of the chain (Kaplinsky and Morris, 2001).

According to Sturgeon (2001), value chains have three dimensions, namely organizational, spatial, and the type of actors involved (i.e. production actors). From the organizational aspect, value chains are both complex and dynamic or simple depending on their sustained supply of a variety of critical inputs i.e. human resource requirements, capital equipments and services. The second dimension is spatial that entails some value chains are global and are sometimes referred to as "global commodity chain" (Daviron and Gibbon 2002, Gerrefi, 1999), since they separate at international levels. The third dimension in the value chain is the production actors; it involves firms that participate in the chain these actors can either be producers, suppliers', retailers/wholesalers or lead firm (Sturgeon, 2001).

2.1.2 Global value chain

The world economy has changed in significant ways during the past several decades, especially in the areas of international trade and industrial organization (Gereffi *et al.*, 2005). "Internationalization" refers to the geographic spread of economic activities across national boundaries. "Globalization" is much more recent than internationalization because it implies functional integration between internationally dispersed activities (ibid). Two of the most important new features of the contemporary economy are globalization of production and trade, which have fueled the growth of industrial capabilities in a wide range of developing countries, and the vertical disintegration of transnational corporations, which are redefining their core competencies to focus on innovation and product strategy, marketing, and the highest value-added segments of manufacturing and services, while reducing their direct ownership over 'non-core' functions such as generic services and volume production (Gereffi *et al.*, 2001). Globalization has been promoted by industrial and commercial firms alike, which have established two distinct types of international economic networks that have been called

"producer driven" and "buyer-driven" global commodity chains, respectively (Gereffi, 1999). In global value chains, the different processes of design, supply, and production take place in different parts of the world. While international value chains operate in more than one country, global value chains operate in two or more regional blocs. Value chains at the scale of supranational regions operate at the level of trade blocs (Gereffi *et al.*, 2001). Thus, global value chain to sawnwood value chain analyzes which actor enforces parameters under which other up- or downstream actors have to operate. This refers to institutional mechanisms and inter-firm relationships through which non-market coordination can be achieved.

2.1.3 Value chain analysis

Current global economic conditions are changing very fast owing to development of information and communications technology and biotechnology (Makindara, 2011). Speed, agility and value creation are critical components of industrial and business competitiveness (Mudimigh *et al.*, 2004). This situation forces the business organisations to make fast decisions and to reduce production costs. Thus, new concepts of business organization, especially value systems are necessary. Producers are in forging relationship with suppliers to make sure that they minimize costs and are being forced to adopt value chain management in order to remain competitive (Mudimigh *et al.*, 2004).

Value chain analysis focuses on the interaction of actors along each step of the production system (from raw producer to consumer) as well as the linkages within each set of actors (FIAS 2007; Kaplinsky and Morris 2001; UNCTAD 2001). Value chain analysis is often described as more focused towards processes in the chain, which brings value to the product or service (Hughes *et al.*, 2014). It considers international trade relations as being part of a series of networks of producers, exporters, importers, and retailers, whereby

knowledge and relationships are developed to gain access to markets and suppliers. Researchers from various disciplines (e.g. economists, environmentalists, and political scientists) work in the field of value chain analysis (Faße *et al.*, 2009). Hence, many methods for value chain analysis have evolved in recent years. They can be classified into two groups: The first group consists of methods with a more descriptive and qualitative emphasis (Kaplinsky and Morris 2001), and the second group refers to specialized tools with an analytical focus that deal with modeling and simulation of supply chains in the field of business administration e.g. optimizing chain logistics (Ondersteijn *et al.*, 2006; Kotzebue *et al.*, 2005). Kaplinsky and Morris (2001) identifies the approaches used in assessing value chain which includes; the point of entry for value chain analysis, mapping value chains, product segments and Critical Success Factor's in final markets, how producers access final markets, benchmarking production efficiency, governance of value chains, upgrading in value chains and distributional issues .

A major benefit of value-chain analysis is through the identification of the nature and extent of barriers to entry along the chain. As a result, such an approach is amenable to explain many of the distributional outcomes that occur in the course of globalization as well as the evolution of such relationships over time (Kaplinsky and Morris, 2001). Value chain analysis has been applied to the understanding of commodity chains and export strategies in a number of developing countries. Dolan, Humphrey, and Harris- Pascal use this approach to analyze the impact of consolidation and market power in the UK supermarket industry on fresh vegetable suppliers in developing countries (Dolan, 1998, Humphrey *et al.*, 1998).

2.2 Theories Governing Value Chain Analysis

This study is focusing on sawnwood value chain analysis. The sawnwood value chain structure is based on the theories such as transaction cost theory, competitive advantage theories which includes; resource based value (RBV) theories and market based view, dependency theory, organisation theory as well as the resource concepts which are discussed in the subsequent subsections of knowledge-based view, capability based view, the relational view of strategy.

2.2.1 Transaction cost theory

The principal theory for this study is on transaction cost economics stated by Williamson (1985). The transaction cost theory has been developed to facilitate analysis of the "comparative costs of planning, adapting, and monitoring task completion under alternative governance structures. Williamson (1985) suggests an approach which would carefully consider integration of activities into the firm's value chain. He identifies the causes of transaction costs that are human factors (Bounded rationality and opportunism) and environmental factors (uncertainty, small number of trading and asset specifity).

The classical economists argue that the basic coordinating mechanism between firms in a supply chain is the market (Dunne, 2001). However, this is contrary to Coase (1937) who points out that market transactions outside the firm are the ones that directs production while owner/manager coordinates production inside the firm (Dunne, 2001). Dunne (2001), points of the transaction Costs Economics (TCE) propounded by Coase (1937) and developed by Williamson (1979) provides a firm theoretical base for firms' existence and explaining the scope of firms' activities.

Transaction costs are defined as the costs involved in the transfer of goods and services from one operating unit to another. When these transactions are carried our between firms or between individuals, they usually involved the transfer of Property Rights and are defined in contractual terms. When they are carried out within the enterprise, they are defined by accounting procedures (Chandler, 1990).

Transaction costs are categorized by Hobbs (1996) into three main headings which are;

- Information Costs : that is costs of looking for potential supplies or buyers and their relevant prices,
- Negotiating costs: that is costs involved in sales including time, hiring of negotiating staff and the conditions required in the sales activities, and
- Monitoring costs: that is costs associated with monitoring activities when the contract has already been signed.

Thus, Dunne (2001) argued that, firms will vertically integrated up to the point where the transaction costs associated with the activities of the firms equals the costs of using open market. Hence for the firms in value chain, the transaction cost will shape the nature of the integration among them. Similarly, Williamson (1979) also argued that firms will form alliances in order to minimize their costs and/or risk. Forming a strategic alliance represents an internalization process for an organization, thereby removing it from the price related problems in the market, influence the nature of negotiations the firms requires and reduces business risk. Thus, transaction costs influence the nature of the alliances and relationships of firms in the value chain. Therefore for the sawnwood value chain to be competitive, the transaction costs among the player should be minimized. The study recommends better alliance with low costs to be established between them. In this, way chances of establishing a potential and sustainable value chain will be high.

2.2.2 Competitive advantage theory

Competitive advantage is defined as the strategic advantage one business entity has over its rival entities within its competitive industry (Porter, 1985). The theory of competitive advantage was developed by Porter (1985). He developed his concept to analyze specific activities through which companies may create value by breaking down their activities into value-added and he argued that analyzing the value chain of a firm provides the source of its competitive advantage. This may either be as a result of cost advantage or through product differentiation.

Competitive advantage theory suggests that states and businesses should pursue policies that create high-quality goods to sell at high prices in the market. Porter emphasizes productivity growth as the focus of national strategies. Competitive advantage rests on the notion that cheap labor is ubiquitous and natural resources are not necessary for a good economy (Porter, 1985). Compared to other theories like comparative advantage, countries specialize in exporting primary goods and raw materials that trap countries in low-wage economies due to terms of trade but competitive advantage attempts to correct for this issue by stressing maximizing scale economies in goods and services that garner premium prices (Stutz and Warf, 2009).

Competitive advantage occurs when an organization acquires or develops an attribute or combination of attributes that allows it to outperform its competitors. These attributes can include access to natural resources or access to highly trained, skilled personnel and human resources. To gain competitive advantage a business strategy of a firm manipulates the various resources over which it has direct control and these resources have the ability to generate competitive advantage (Rijamampianina, 2003). Superior performance outcomes and superiority in production resources reflects competitive advantage (Lau, 2002).

Competitive advantage is obtained when an organization develops or acquires a set of attributes (or executes actions) that allow it to outperform its competitors. Governing sawnwood value chain, there are two dominant theories of competitive advantage: the *Market-Based View* (MBV) and the *Resource-Based View* (RBV). The notion of *core competencies* is closely related to the resource-based view of strategy. The *knowledge-based view* and *capability-based view of strategy* also have been derived from the resource based view (Wang, 2014).

2.2.2.1 The Market-Based View (MBV)

The Market-Based View (MBV) of strategy argues that industry factors and external market orientation are the primary determinants of firm performance (Wang, 2014; Peteraf and Bergen 2003; Porter, 1996). The sources of value for the firm are embedded in the competitive situation characterizing its end-product strategic position (Hughes *et al.*, 2014). The strategic position is a firm's unique set of activities that are different from their rivals. Alternatively, the strategic position of a firm is defined by how it performs similar activities to other firms, but in very different ways. In this perspective, a firm's profitability or performance are determined solely by the structure and competitive dynamics of the industry within which it operates (Schendel, 1994). In formulating strategy, firms commonly make an overall assessment of their own competitive advantage via an assessment of the external environment based on the five forces model (Porter, 1985). The five forces under consideration consist of the following: barriers to entry, threat of substitutes, bargaining power of suppliers, bargaining power of buyers and rivalry among competitors (Porter, 1985). In this perspective, a firm's sources of market power explain its relative performance. Three sources of market power are frequently highlighted: monopoly, barriers to entry, and bargaining power (Grant, 1991). When a firm has a monopoly, it has a strong market position and therefore performs better

(Peteraf, 1993). High barriers to entry for new competitors in an industry lead to reduced competition. Higher bargaining power within the industry relative to suppliers and customers can also lead to better performance (Grant, 1991).

The five-force model enables organisation to analyse the current situation of their industry in a structured way. However, Rumelt (1991) argue that the most important determinants of profitability are firm-specific rather than industry-specific.

2.2.2.2 Resource based view (RBV) theory

The Resource Based View (RBV) is another competitive theory which was presented by Wernerfelt (1984). The resource based view suggests that, the value proposition is based on the most valuable offering that the firm can make in accordance with its strategic assets which are vital to the capacity to gain and hold competitive advantage. It draws attention to the firm's internal environment as a driver for competitive advantage and emphasises on the resources that firms have developed to compete in the environment. In the point view the firm in the same industry having the same opportunities with few or any differences, remains the same for a short period of time and is different from each other (Guevero, 1996). This theory is very important in explaining firm heterogeneity. According to Furrer *et al.* (2008), from 1980s on wards, the focus of inquiry changed from the structure of the industry, e.g., Structure-Conduct-Performance (SCP) paradigm and the five forces model) to the firm's internal structure, with resources and capabilities (the key elements of the Resource-Based View (RBV). Since then, the resource-based view strategy (RBV) has emerged as a popular theory of competitive advantage (Furrer *et al.*, 2008; Hoskisson *et al.*, 1999). Therefore, sawnwood value chain is very important in determining the influence of resources in the chain in order to increase competitiveness. A resource-based view of a firm explains its ability to deliver sustainable competitive

advantage when resources are managed such that their outcomes cannot be imitated by competitors, which ultimately creates a competitive barrier (Hooley and Greenley, 2005; Smith and Rupp, 2002).

2.2.3 Dependency theory

According to Borgatti (1996), dependency theory focases on power relations between players in value Chain. Borgatti, (1996) defined power as the ability to make others do things they would not otherwise want to do. Therefore, the basis of power is dependency which is also practiced in value chain. In addition, the dependency theory purported that dependence is also a function of supply and demand (Borgatti, 1996) whereby the demand side gives motivation for investment while the supply side deals with the availability, quality and costs alternative to satisfy needs. Alternatively, Borgatti (1996) argued further that dependency may be mutual whereby the demand and supply must be equal. Hence, there must be a balance of power. Thus, in this study, the power between the producers and enduse manufactures is known from the beginning for the sawnwood value chain to be profitable and sustainable. However, there must be a mutual understanding between them in terms of what to supply, quality requirement and the cost to be involved.

Resource dependency theory

Also Dune (2001) discusses the resource based view theory from the availability of the resources. That is, the firm has specific resource but very few organisations are self sufficient to resources. Dunne (2001) argued further that, if a firm is deficient of one of the resources which are strategic and that resources influence its core competencies, then that firm has no other obligation than forming collaboration or an alliance that will reduce the companies uncertainty and risk it faces for the insufficiency of those resources.

The resource dependency theory considers alliances as strategies used to access other firms' resources, and increase competitiveness of the value chains. Therefore, for value chain to be competitiveness the nature of the alliances formed must be trusted among the players, otherwise the chain will not be sustainable.

2.2.4 Organisational theory and knowledge management

Value chain management is closely related or explained by the organisational theory (Makindara, 2011). The study on how organisations are organized and behaves is called organisation theory. In particular, organisational theory explains how organisation structure, design and behaviour influence the company's efficiency and effectiveness (Astley and Van de Ven, 1983). Several organisational theories discuss the development and organisation of firms such as resource base and organisational learning (Makindara, 2011). An early view of organisational learning was "encoding inferences from history into routines that guide behavior" (Levitt and March, 1988). So, organisational learning has to do with embedding what has been learned into the fabric of the organization (King, 2009). From this perspective, organizational learning is one of the important ways in which the organization can sustainably improve its utilization of knowledge.

Knowledge Management (KM) is seen as a key factor in realizing and sustaining organizational success for improved efficiency, innovation and competition (Sumner *et al.*, 2009). KM field is considered one as of the new fields that concentrates on the growing interest in knowledge-based organizations. KM is the process of creating, capturing, and using knowledge to enhance organizational performance (Koenig, 2012). KM focuses on knowledge arrival; also it is considered as strategic activity help organizations to achieve sustainable competitive advantage.

Value chain is the good source of sharing this knowledge that can be transferred by learning alongside individual in the same or similar value chains (Kristern *et al.*, 2004). Organization can use KM as a means of acquiring and maintaining and developing values and principles which may increase company competitiveness at different points in the value chain. KM may be conducted across multiple organizations, such as with suppliers, partners and customers (Van de Ven, 2005).Value chain analysis is one of the tools which influence continuous competitive advantage on organizations.

Therefore, in the sawnwood value chain, the issue of knowledge creation among chain players and how it is shared is assessed. That knowledge is on production, processing, transportation and selling.

2.3 Approaches Used in Assessing Value Chain

The world of production and exchange is complex and heterogeneous. Of course, value chains are much more complex, since they tend to have many more links in the chain (Kaplinsky and Morris, 2001). Each chain has particular characteristics with distinctiveness and wider relevance that can only be effectively captured and analyzed through an understanding of the broader issues which are involved (Cosmas, 2008). The approaches used in assessing value chain includes the point of entry, mapping value chains, product segments and Critical Success Factor's in final markets, how producers access final markets. Other issues include benchmarking production efficiency, governance of value chains, upgrading in value chains and distributional issues (Kaplinsky and Morris, 2001). Mapping is the range of activities in the chain which provides the capacity to decompose total value chain earnings into the rewards that are achieved by different parties in the chain. A major benefit of value-chain analysis is through the identification of the nature and extent of barriers to entry along the chain.

As a result, such an approach is amenable to explain many of the distributional outcomes that occur in the course of globalization as well as the evolution of such relationships over time (Kaplinsky and Morris, 2001). Value chain analysis also highlights the issues of chain coordination or governance. The pattern of direct and indirect control in a value chain is called its governance (McCormick and Schmitz, 2001). Chains vary in the degree of overall control that is exerted, in the location of control within the chain, and in how much of it is concentrated on a single firm (Gereffi *et al.*, 2001).

2.3.1 Relationship of marketing and value chain success

Recently, trends in business to business transaction have been more relational, rather than pure exchange as has been argued by traditional economists and marketers (Makindara, 2011). Dunne (2001) argues that buyer-seller interactions are moving into a cooperative relationship because buyers downsize the supply base and sellers tailor their marketing mix to individual buyers. This change in relationship between buyers and sellers is what is called relationship marketing (Dunne, 2001). Relationship marketing (RM) is a chain of activities that represent a holistic attitude to marketing (Ravsald and Gronroos, 1996; Gummesson, 1994). Morris *et al.* (1998) also define relationship marketing as a strategic orientation adopted by both buyer and seller, an organisation which represents a commitment to long term mutual beneficial collaboration. Dunne (2001) argues that, there are two assumptions that lead to formation marketing. The first assumption is from sellers' perspective, whereby they assume that it is easier and cheaper to keep existing customers than finding new ones. The buyer perspective is that it is more beneficial to have a reliable source of supply in terms to total cost, delivery and time (Makindara, 2011).

Several scholars like Dwyer *et al.* (1987), and Morgan and Hunt (1994) have explained the development of the relation marketing. Dwyer *et al.* (1987) explained that the development of the relationship marketing has to be a five step processes, starting with awareness creation between buyers and sellers, expiration of possible exchange partners in business, expansion of activities after developing trust from exploration stage, commitment in business venture after each partner is satisfied by the level of trust among them and lastly dissolution after when the usefulness of relationship is found to be declining.

Morgan and Hunt (1994) explain the relationship marketing based on their commitment and trust theory. The argument is that, commitment and trust are central to successful relationships between firms because they encourage managers to work at preserving relationship investments by operating with exchange partners resist attractive short term alternatives in favour of the expected long term benefits of staying with existing patterns and view potentially high risk actions as being prudent because a lot of their belief that their partners will not act opportunistically. Morgan and Hunt (1994) have suggested five major precursors of relationship commitment and trust. These precursors are termination costs, relationship benefits, shared values, communication, and opportunistic behavior.

Spekman *et al.* (1998) is among other scholars who contributed to the theory of relationship marketing. They argue that there are four stages in the development of relationship marketing. These stages are open market negotiations where by price and adversaries dominate the transactions; cooperation whereby few supplies are contracted, coordination whereby the suppliers are preferred and therefore there is information sharing and lastly is the development of partnership where by buyer and seller have joint plan of investment. Thus the arguments presented by Morgan and Hunt (1994), Spekman

et al. (1998) show that, performance of the value chain is also based on well developed relationship marketing between the sellers and buyers. Similarly, for a value to be competitive and sustainable, the nature of marketing between the players is based on the relationships that have been built for a long time. To manage the relationship successfully, it requires some efforts and commitment by all chain players. Thus, the development of competitive and sustainable sawnwood value chain the actors must be linked. This will create loyalty among chain actors as well as the customers and hence maintaining chain profits.

This study asses the nature of relationship between the chain actors in the sawnwood value chain. The nature of relationship is very important as it will ensure the potentiality of the chain as well as its sustainability.

2.3.2 Technology and value chain development

Technology development is one of the key factors that has influence on the increase in the performance and productivity of most business and manufacturing in the world. In sawnwood value chain, technology development and transfer in terms of modern inputs such as sawing machines, FSC, processing technology hence increase competitiveness. Choice of technology will have an impact on resource utilization efficiency, profitability of the operations and consequently on the whole timber value chain (PFP, 2016).

2.3.4 Value chain performance and sustainability

Value chains performance is based on how best these chains are operated. Mulani and Lee (2002) argue that the best practice in supply chains depend on the ability of the chain leader to use modern technology, have good relationships with customers and application of the appropriate technology, to suit its demand needs. Lummus (2004) also argues that

using the right channel in the supply chain increases barrier to entry to competitors and thus decreases chain competitiveness. Additionally, value chain performance is evaluated by the way the chain is governed, institutional arrangements and the relationships that are built between the buyer and the suppliers (Hilderbarg, 1998). All in all value chain performance and sustainability is the function of technology, chain governance, organisation, knowledge management and relationship marketing (Makindara, 2011). This study examined how these variables influence sawnwood value chain performance and hence its success.

2.3.5 Value chain organisation

The way value chain is organised also influences it competitiveness. Value chain organisation depends on the nature and types of institutions existing in the particular value chain. The institution can be political, legal or social and may influence the nature of transactions taking place among chain players and hence influence chain competitiveness through practicing or individual decision making processes (Sykut and Harvey, 2004; Hobbs, 1996). Hence value chain players may be obliged to establish institutions in the value chain in order to enhance their performance and decisions making processes, lowering their transaction costs (Coase, 1984) and consequently increases their competitiveness in the value chain. Thus the way sawnwood based value chain is organised will influences its competitiveness and its sustainability.

2.4 Sawnwood Production

2.4.1 Sawnwood industries in Tanzania

Wood is one of the world's main building materials which is widely used in housing and construction activities. It can be sawn longitudinally, with or without its natural rounded surface with or without bark to produce sawnwood (IPPC, 2010). Solid wood products

(sawnwood and wood based panels) are the potential building materials in most of the countries worldwide (FAO, 2011; Indufor, 2011).

The sawnwood industry in Tanzania started more than 100 years ago, when Indian settlers and missionaries owned and operated mills, which mainly utilized hardwoods while the first softwood sawmills utilized thinning (Kapinga, 2010). The forest industry in Tanzania has traditionally been dominated by sawmilling and to a lesser degree, fibre board, chipboard and joinery and furniture).

The sawnwood production from Tanzania has low quality and quantity and thus has low share in the international market and dominated by small sawmills, which can only handle medium size logs of 20 - 35 cm diameter (Indufor, 2011 ; Ngaga,1998). Overall, over 70% are micro-mills ("dingdongs") and 25% small size (Kara type) and only 5% are medium size mills (PFP, 2016; AFF, 2011). The mills are using good quality saw logs to produce low quality sawnwood at fairly low recovery rate (33%), resulting in a lot of sawdust (AFF, 2011). The major causes of this situation are related to limited knowledge and skills on markets, managerial, financial and technical aspects (MNRT, 2008).

2.4.2 Ownership and types of industries

2.4.2.1 Sawmilling and its capacity

Earlier processing capacity of sawmills was 900 000 m^3 roundwood in the country of which 33.3% is related to natural forest and 66.7% to plantations (Ngaga, 1998; Ngaga *et al.*, 2001). Sawnwood industry in Tanzania has increased from 367 sawmills with an annual capacity of 2 203 703 m^3 of soft wood logs and 458 482 m^3 of hardwoods to 512 sawmills in 2008 with increase of about 64 sawmills which increased 420 000 m^3 per year from Government forest plantations and 25 000 m^3 from private forest plantations

(MNRT, 2008; MNRT, 2005). However, its utilization capacity is only 16% of the total installed capacity is being utilized (MNRT, 2005). Most of these sawmills are reported to be small scale with input not excceding 5000 m^3 of logs and providing employment for only 5-8 skilled and unskilled employees per sawmill (AAF, 2011).

2.4.2.2 Types of sawnwood industries

Most of the sawmills (400) are small scale wood machinery (locally fabricated circular saw or roller bench with rails or micro-mills), most of which are found around government plantations like Sao Hill Forest Plantation. The micro-mills are characterised by simple mobile technology, powered by a diesel engine, and an all manual operation. Inadequate financing, very small investments to equipment and low level of maintenance lead to poor quality timber products. For example, out of over 200 mills found at SHFP, 100-150 are micro-mills (AFF, 2011). Each of these micro-mills employ about 4-5 persons. The mills are using good quality sawnlogs to produce low quality sawnwood at fairly low recovery rate (33%), resulting in a lot of sawdust.

Other small scale types of sawmills (Kara/Amec, Laimet, CVT, Forester; in all, there are about 50 of these at SHFP) have a log inputs not exceeding 5000 m^3/year and employs about 5 to 8 persons. Also, there are a few medium sized sawmills, like Sao Hill sawmills and KVTC use twin band saw plant which produce over 20 000 m^3 of sawnwood annually with fairly good recovery rates (over 40%) and good quality Sawnwood.

2.4.3 Market of sawnwood products in Tanzania

In recent years, the demand for sawnwood products has been growing, as the population levels increases (TFS, 2014; Indufor, 2011; FAO, 1999). The growth and sustainability of sawnwood industries in Tanzania is influenced by factors that includes; type and

distribution of forest resources and local demand transportation system (Shayo, 2006). Despite the high prices, markets for sawnwood in Tanzania have been expanded; recent trends indicate that the export of sawnwood is increasing (Indufor, 2011; FOSA, 2003). For example, Tanzania markets her wood products in India, Indonesia, China, United Arab Emirates and European countries and in the Africa region (MNRT, 2000). However, source of raw materials, reliable market information, infrastructure, pricing, knowledge on physical distribution, political and economic changes are major impediments to improved processing and marketing of sawnwood, both for the domestic and export markets (Kapinga, 2010; MNRT, 2000).

2.5 Role of Sawnwood Actors in the Value Chain in Tanzania

2.5.1 Role of producers in sawnwood value chain

Producers are key players that are involved in sawnwood production. The sawnwood production is done by small holders and few giantly producers. Their main activity is to produce the quality sawnwood product to meet customers demand in timely manner. Sawnwood marketing is faced with a lot of obstacles like availability of resources throughout the year, site allocation, lack of proper machines, poor quality products due to type of machines used in sawnwood production. In addition to this, government regulations, poor infrastructure, training and advertisements are also the challenges most of the producer undertake (Kapinga, 2010). Thus, the value chain approach in assessing sawnwood value chain assists in obtaining the information concerning challenges and risks they face and recommend the best way to minimize them. The recommendations to producers ensure competitiveness and sustainability of the sawnwood value chain.

2.5.2 Role of trader and middlemen in sawnwood value chain

These are the second key players in sawnwood value chain. Most of the sawnwood producers work together with the traders and middlemen to bring their products to the market (Kapinga, 2010). The players normally operate independently or in collaboration as long as the deals are profitable. Traders/middlemen are risk takers to the business and engage themselves in sawnwood trading from producers to the buyers. One of the unfortunate results of the insufficient information concerning marketing channels is causing the role and the services provided by the middlemen to be misunderstood or distorted. Sometimes middlemen try to forge the chain (Kotler, 1985). These services provided by the middleman/trader are therefore proving to be vital.

2.5.3 Role of transporter in sawnwood value chain

Transporters are facilitators of trade but not traders themselves. They take the goods from one trader to another or to final customer for an agreed fee which is paid for in cash. The transporters may be part of a large transportation company but most often work on freelance basis, driving hired trucks or paid by the owners to drive goods on demand. Large trucks like semi-trailers were found out to be mostly used in transportation due to their capacity to carry large quantities of sawnwood of different sizes over long distances (Kapinga, 2010). The problem with these means of transport is that trucks are not for sawnwood transportation. Most of them are used to transport other products and on their way back is when they undertake sawnwood business

2.5.4 Role of enduse manufactures in sawnwood value chain

For the product to sell in the market there must be a demand or consumers who will buy that product (Makindara, 2011). Mankiw (2001) explained that the rate at which a consumer is willing to buy one good for the other depends on the satisfaction that a

consumer receives from the goods which he or she is already consuming. They mostly consume sawnwood for furniture making and construction purposes. The customers receive product from different actors in the chain as long as they are satisfied. They can communicate directly with producer and sometimes have linkages with traders or middlemen. These expectations have been given with the assumption that all consumers seek to maximize satisfaction from the combination of goods they wish to consume.

2.6 Framework for Evaluating Efficiency of Sawnwood Marketing System

Structure, Conduct and Performance (SCP) Model

The basic view of this approach is that, given certain basic conditions, the structure of an industry or market, determines conduct of buyers and sellers which influences its performance (Aremu *et al.*, 2015). The basic conditions refer to characteristics which are exogenous to the market, for example infrastructure, legal and policy environment and available technology. Efficiency factors can be evaluated by examining marketing enterprises for structure, conduct and performance (Abbott and Makeham, 1981). SCP model is one of the most common and pragmatic methods for analyzing marketing systems. It analyzes the relationship between functionally similar firms and their market behavior as a group and, it is mainly based on the nature of various sets of market attributes and relations between them and their performance (Scarborough and Kydd, 1992). This analytical method is based on the theory that market structure and market conduct determine the performance of a marketing system (Tadesse, 2011).

2.6.1 Structure of the market

The term market structure refers to the number of buyers and sellers, their size distribution, the degree of product differentiation, and the ease of entry of new firms into an industry (Branson and Norvell, 1983). Examples of such dimensions include, degree of

buyers and sellers concentration (Number and size distribution of buyers and sellers in the market), barriers to potential entrants (Refers to the relative ease or difficulty with which new dealers may enter into market, technological, economic, regulatory, institutional, and other factors that inhibit firms from engaging in new businesses or entering new markets),degree of product differentiation (refers to the extent to which competing products in a market are differentiated and it is expected to influence the competitive interrelationships of sellers in the market).

Market concentration can be defined as the number and size of sellers and buyers in the market. Concentration is believed to play a large part in the determination of market behavior within an industry because it affects the interdependence of action among firms. The relationships between concentration and market behavior and performance must not be interpreted in isolation. Other factors, such as firms' objectives, barrier to entry, economies of scale, and assumptions about rival firms' behavior, will be relevant in determining the degree of concentration and relationship between concentration and behavior and performance (Schere, 1980). Market structure can also be defined as characteristics of the organization of a market, which seem to strategically influence the nature of competition and pricing behavior within the market (Bain, 1968).

Structural characteristics may be used as a basis for classifying markets. Markets may be perfectly competitive; monopolistic; or oligopolistic (Scott, 1995; Meijer, 1994). The organizational features of a market should be evaluated in terms of the degree of seller concentration, entry barriers (licensing procedure, lack of capital, know-how, and policy barriers), degree of transparency and degree of product differentiation that condition or influence the conduct and strategies of competitors (Wolday, 1994).

2.6.2 Conduct of the market

Market conduct refers to the market behavior of all firms. In what way do they compete? Are they looking for new techniques and do they apply them as practicable? Are they looking for new investment opportunities, or are they disinvesting and transferring funds elsewhere? (Mogaji *et al.,* 2013). Market conduct also deals with the behavior of firms that are price searchers and are expected to act differently than those in a price-taker type of industry (Cramers and Jensen, 1982; Abbott and Makeham, 1981).

2.6.3 Performance of the market

It is reflection of the impact of structure and conduct on product price, costs and the volume and quality of output (Mogaji *et al.,* 2013; Cramers and Jensen, 1982). If the market structure in an industry resembles monopoly rather than pure competition, then one expects poor market performance. According to Abbott and Makeham (1981), market performance is how successfully the firm's aims are accomplished, which shows the assessment of how well the process of marketing is carried out. As a method of analysis the SCP paradigm postulates, there exists a relationship between the three levels distinguished. One can imagine a causal relation starting from the structure, which determine the conduct, which together determine the performance (technological progressiveness, growth orientation of marketing firms, efficiency of resource use, and product improvement and maximum market services at the least possible cost) of agricultural marketing system in developing countries (Meijer, 1994). The performance of a certain market or industry depends on the conduct of its sellers and buyers which, in turn, is strongly influenced by the structure of the relevant markets (Scarborough and Kydd, 1992). In this study, market performance was evaluated by analyzing the costs and margins of marketing agents in different channels. The sawnwood value chain performance is commonly measured by marketing margin or price spread. Margin or

spread can be a useful descriptive statistics if it used to show how the consumer's food price is divided among participants at different levels of marketing system (Getachew, 2002).

2.6.3.1 Marketing costs

It refers to those costs which are incurred to perform various marketing activities in the transportation of goods from producers to consumers. Sawnwood marketing costs includes handling costs (packing and unpacking), costs of searching for a partner with whom to exchange, screening potential trading partners to ascertain their trustworthiness, bargaining with potential trading partners (officials) to reach an agreement, transferring the product, monitoring the agreement to see that its conditions are fulfilled, and enforcing the exchange agreement (Holloway and Ehui, 2002).

2.6.3.2 Marketing margin

It is a commonly used measure of the performance of a marketing system (Abbott and Makeham, 1981). It is defined as the difference between the price the consumer pays and the price that is obtained by producers, or as the price of a collection of marketing services, which is the outcome of the demand for and supply of such services (Holt, 1993;William and Robinson, 1990 ; Cramers and Jensen, 1982). The size of market margins is largely dependent upon a combination of the quality and quantity of marketing services provided the cost of providing such services and the efficiency with which they are undertaken and priced. For instance, a big margin may result in little or no profit or even a loss for the seller involved depending upon the marketing costs as well as on the selling and buying prices (Mendoza, 1995).

Under competitive market conditions, the size of market margins would be the outcome of the supply and demand for marketing services, and they would be equal to the

minimum costs of service provision plus "normal" profit. Therefore, analyzing market margins is an important means of assessing the efficiency of price formation in and transmission through the system. There are three methods generally used in estimating marketing margin

1. Detailed analysis of the accounts of trading firms at each stage of the marketing channel (time lag method);
2. Computations of share of the consumer's price obtained by producers and traders at each stage of the marketing chain; and
3. Concurrent method: comparison of prices at different levels of marketing over the same period of time (Mendoza, 1985 and Scarborough and Kydd, 1992).

CHAPTER THREE

METHODOLOGY

3.1 Conceptual Framework

Figure 1 is the schematic illustration of the conceptual framework for the study. The conceptual framework for this study is a translation of the competitive theory (Porter 1985), transaction costs theory (Williamson, 1985) and Value chain approach (USAID, 2006). The conceptual framework depicts the linkages between structural factors and dynamic factors involved in value chain of sawnwood in Tanzania. The value chain factors influences each actor to benefit from the chain. The factors are the basic instruments to reach the markets, satisfy the needs of customer and make profit (FAO, 1996).

The structural factors involve all individuals and firms that conduct sawnwood business by adding value and helping to move the product towards the end markets. The structural factors are characterized by five elements which include; end market opportunities at the local, national, regional and global levels which depict demand of sawnwood in end markets that defines the characteristics of a successful business. Business enabling environment at local, national and international levels which include; laws, regulations, policies, international trade agreements and public infrastructure that enable the sawnwood to move through the value chain (Magnusson, 2015). Vertical linkages between firms at different levels of the value chain, these are critical for moving sawnwood to the end market and for transferring benefits, learning and embedded services between firms up and down the chain. Horizontal linkages between firms at the same level of the value chain, these can reduce transaction costs, enable economies of scale, increase bargaining power, and facilitate the creation of industry standards and marketing campaigns. Supporting markets which include financial services, cross-cutting

services (example business consulting, legal advice, telecommunications) and sector-specific services (Sawing equipment, design services for handicraft).

Dynamic factors include the determinants of actors and sectors behavior and their effect on the functioning of the chain and showing the relationship between value chains. The participants in a value chain create the dynamic elements through the choices they make in response to the value chain structure (Helein and Meijer, 2006). These dynamic elements include; upgrading which increases competitiveness at the firm level through product development and improvements in production and marketing techniques or processes. Inter-firm cooperation is another element to which firms work together to achieve increased industry competitiveness. Transfer of information and learning between firms is a key element to competitiveness since upgrading is dependent on knowledge of what the market requires and the potential returns on investments in upgrading. Power exercised by firms in their relationships with each other, this shapes the incentives that drive behavior and determines which firms benefit from participation in an industry and by how much.

Thus structural factors influence the dynamics factors and the dynamics factors influence the value chain performance. These factors are supported by a range of technical, business and financial service providers.

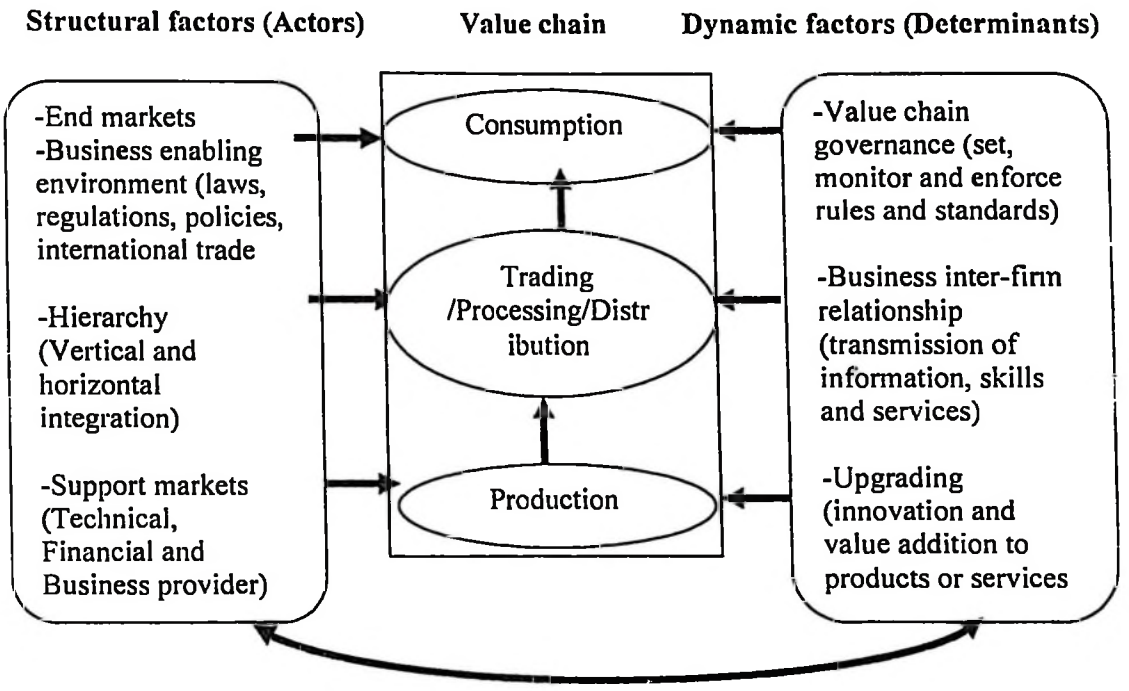

Figure 1: Conceptual framework for the study

[Developed by the author based on theories revised and concepts put forward by USAID, (2006) Williamson, (1985) and Porter, (1985).

From the modified conceptual framework, the initial step in sawnwood value chain is the sawnwood production and the final stage is when the sawnwood product reaches the market. The producers will sell the sawnwood product to traders/processors/distributors in wholesale or retail and later supplied to consumers. Thus, from value chain perspective, producers will produce and sell and make profit when the structural and dynamic factors influencing each other. This is because sawnwood value chain is complex due to its interlinkages and approaches used to and each stage of the chain is influenced by both supply, which includes product management, market opportunities and socio-cultural aspects and demand including population growth, economic growth, urbanisation and special demand drivers (like construction sector, pulp and paper industry, furniture and

The study is therefore endeavoring to examine these factors in the Tanzania context in order to establish the value chain of sawnwood with consideration of the influencing factors.

3.2 Study Area

3.2.1 Description of the study area

The study was conducted in Mufindi District, Kilombero District and Dar-es-Salaam City. These sites were selected because of their close market relationship and the volume of sawnwood traded (Kapinga, 2010). Mufindi and Kilombero Districts are treated as the supply side (producer market). Mufindi District has large forest plantations (Government and Private) which supply raw materials consumed by individuals and industries. The study concentrated at Sao Hill forest plantation which is the largest forest plantation in Tanzania covering about 50% of the total Government planted area and currently supplying over 85% of wood raw material consumed by industries. The main species planted in Sao Hill are pines and eucalyptus. There has been a significant increase in harvesting levels from 600 000 m^3 in 2006 to 1 million m^3 in 2010 (AAF, 2011). The large wood consumers are Mufindi Paper Mills (MPM) and Sao Hill Industries consuming about 250 000 m^3 and 100 000 m^3 yearly respectively. Small and medium size saw millers consume an estimated 650 000 m^3 per year.

Kilombero Valley Teak Company (KVTC) in Kilombero District is among four major large scale private forest plantation investors in Tanzania (AFF, 2011), having planted 8150 ha of teak. KVTC was involved in this study because of its importance in producing over 40 000 m^3 of sawnwood annually with fairly good recovery rates (over 40%) and good quality sawnwood (KVTC, 2014). On demand side, Dar-es-salaam City represents the major sawnwood markets (consumer market) in this study. Dar-es-salaam City is the

largest city with an estimated population of about 4.3 million people and comprises 5.6% of the annual growth rate (URT, 2012). It is the most commercial and business centre as influenced by demand factors like population growth, economic growth, urbanization and special demand drivers, e.g. the construction sector. Also it is an important area for export of sawnwood to other countries in Africa, Europe and Far East.

3.2.2 Description of the producers market

3.2.2.1 Mufindi District

Mufindi district is one of the 7 Districts in Iringa, Region of Tanzania (Figure 2). It is located at longitudes 30^0 - 36^0 E, and latitudes 8^0 - 9^0 S. The District covers an area of 7 122 km^2, with the altitude varying from 800 to 2 200 meters above sea level. The climate of the District varies with altitude which can be distinguished as highland and lowland. The temperatures vary from 13.2^0 C in July to mean monthly maximum of 18^0 C in November. Rainfall ranges from 950 - 1600 mm. The District population is estimated at 265 829 (URT, 2012). The main economic activity in the Mufindi District is agriculture, which employs more than 90% of the population. Other activities of economic importance are livestock keeping and forestry. There are wood related manufacturing industries in the District, of which the most important ones being Mufindi Paper Mill, Sao Hill Industries, Mufindi Wood Pole Plant and Timber, and Wood Works, and other small processing units (URT, 2006).

3.2.2.2 Kilombero district

Kilombero is the amongst the six District of Tanzania's Morogoro region south-western Tanzania (Figure 2). It is located with a latitude of -8.25 (8° 15' 0 S) and a longitude of 36.42 (36° 25' 0 E. According to the last census in 2012, the population of Kilombero District is 407 880 (URT, 2012). It receives a rainfall of about 1200 mm to 1400 mm

annually. Majority of the villagers are subsistence farmers of maize and rice, however there are large wood and sugar cane plantations in Kilombero. Kilombero valley is a unique and complex area, the site is amongst the largest seasonal wetland in East Africa, and this wetland is an important source of nutrients and sediment for the downstream area. It has a link to selous wildlife and encovers Udzungwa mountain which is very good attraction for tourist in Kilombero District.

3.2.3 Description of the enduse manufactures (Dar es Salaam City)

Dar es Salaam City is located at an altitude of about 14 m above sea level (URT, 2003). It is located between latitudes 6°36 'and 7° South and longitudes 33°33' and 39° East. It is bordered by the Indian Ocean on the East and by the Pwani Region on other sides (Figure 2). Administratively, Dar es Salaam is divided into 5 districts namely Ilala, Kinondoni, Ubungo, Kigamboni and Temeke. The city has a total land area of 1350 km^2, a land mass with eight offshore islands, which is about 0.19% of the entire area in Mainland Tanzania.

The City experiences a modified type of equatorial climate. It is generally hot and humid throughout the year with an average temperature of 29°C. It experiences the hottest season from October to March where temperature raises up to 35°C. The city is moderately cool between May and August, with temperature of about 25°C. The city experiences two main rain seasons; a short rain season from October to December and long rain from March to June.

The city shares borders with Indian Ocean on the east and is surrounded by the Pwani Region on Northwest. Dar es Salaam has a coastal climate typical of equatorial regions, characterized as hot and humid, with small seasonal and daily variations in temperature.

The rainfall regime is bimodal with two rainy seasons and two dry seasons in which monthly average rainfall is about 250 mm.

The city is highly populated with a population of 4.3 million according to 2012 Census (URT, 2012) and inhabited by people of different ethnic groups from different parts of the country who have migrated to the area. The Tanzania National Bureau of Statistics reported that from 2002-2012 population growth rate of Dar es Salaam Region is 5.6 percent (URT, 2012).

Dar es Salaam is a commercial city, with 80% of the residents engaged in non - agricultural production. Most Dar es Salaam city dwellers are employed workers, and business persons who are permanently or temporarily living in the city. Dar es Salaam city accommodates about 40% of the total manufacturing industrial units in the country contributing about 45% of Tanzania's gross industrial manufacturing output (Unhabitat, 2009). The city is endowed with a major harbour and is considered to be an epicenter for manufacturing industry. The city attracts commercial and transportation activities from both formal and informal sectors. Increasing rates of unemployment and underemployment plays a great role in the growth of the informal sector and settlements.

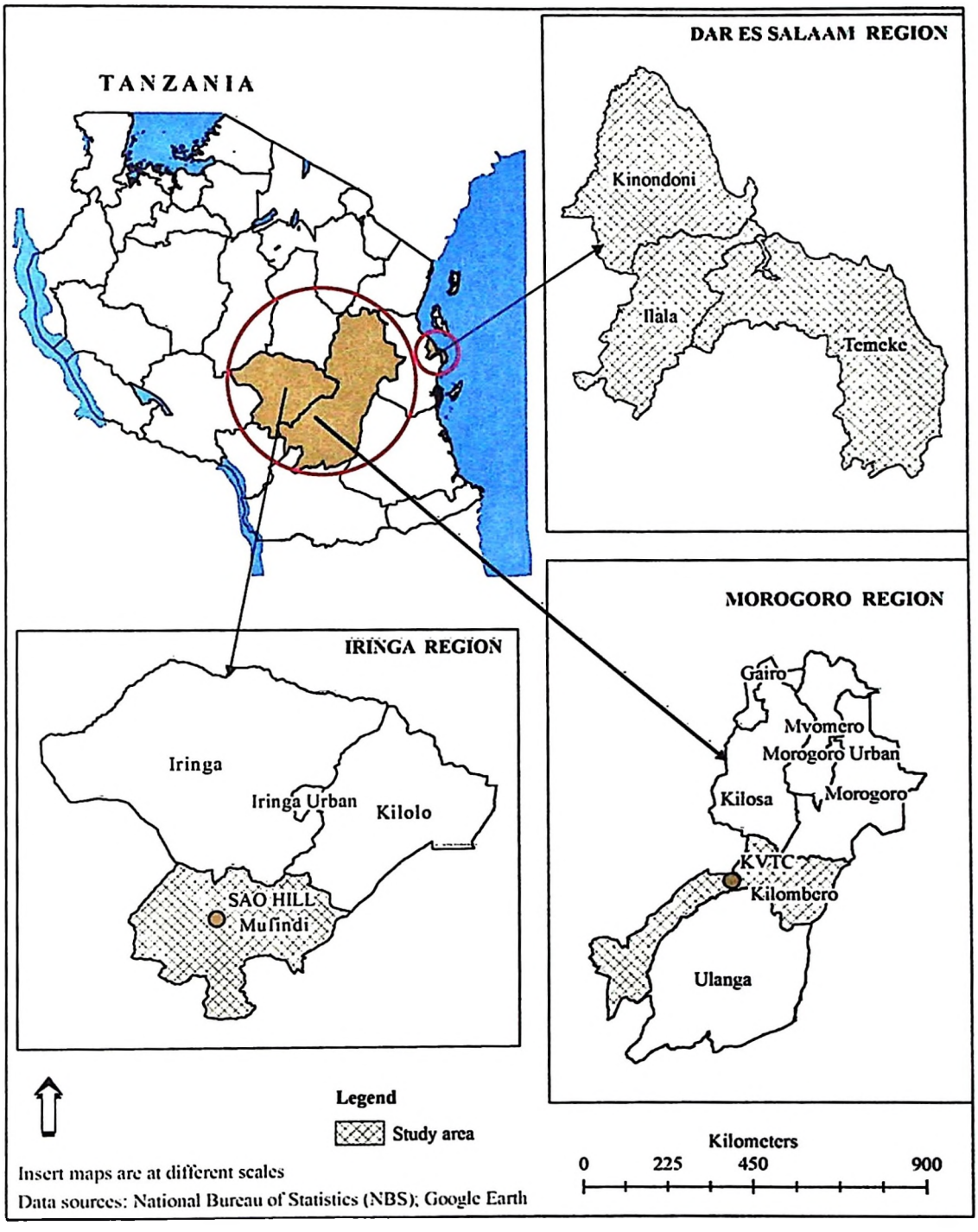

Figure 2: Map of Tanzania showing study area

3.3 Data Collection

3.3.1 Research design

A cross sectional research design was used in this study. Cross sectional data was collected from sawnwood production to consumption levels. The population of interest was sawnwood producers and traders in Mufindi District, Kilombero District and Dar es Salaam City. In Mufindi District and Kilombero District the study concentrated to chain activities carried out in Government plantations and Private plantations respectively. On the other hand, Dar es Salaam, various markets with stake in the trade of sawnwood from Ilala, Kinondoni and Temeke Municipalities were visited and data on sawnwood consumption from timber yards was be collected.

3.2.2 Sampling procedure

In this study, the target population was all stakeholders in sawnwood chain actors from production to enduse manufactures. Preliminary survey was done to identify actors involved in the sawnwood value chain. An attempt was done in distinguishing between actors at different levels. The survey was also used to identify the number of actors at different levels of the chain together with the scale of their business. The survey involved interviewing sawnwood producers at Mufindi and Kilombero districts. Also traders, transporters, middlemen and enduse manufactures were interviewed at Mufindi district, Iringa municipality, Morogoro municipality, Kibaha district and Dar es Salaam city.

Spot survey procedure was used in this study to obtain market information. The procedure has been used by previous researches (Kapinga, 2010, Ngaga, 1998, Openshaw, 1971). The procedure is considered to be one of the most effective in obtaining market information since the survey is done on the spot. A list of producers, traders, transporters and enduse manufactures was first requested from village, District,

and city authorities. Stratified sampling was used to categorize the actors at each node in the chain. Random sampling technique was applied for categories with large number of respondents; to get at least 30 respondents irrespective of the population size (Bailey, 1994). Purposive sampling was used in category with fewer respondents. Based on the preliminary survey, samples of sawnwood producers, traders, middlemen and enduse manufactures for the study was were drawn as described;

3.2.2.1 The sawnwood producers

Stratified, purposeful and random sampling was used in for producers' survey. The sawnwood producers harvest raw materials from government plantation (Saohill forest plantation) and private plantations (Kilombero Valley teak company). From Saohill forest plantations, producers were categorized into large, medium and small sawnwood producers. Large producers dominated by three respondents who are contracted by plantations to harvest pines and eucalypts for 20 years. They include; Mufindi Paper Mills (MPM) which consumes some 250 000 m^3, Sao Hill Industries about 100 000 m^3 and Mufindi wood plantation. Sao Hill Industries has a 300 000 m^3 annual supply contract with the government for 20 years. Therefore, demand for wood from SHFP in the next few years will significantly exceed the capacity of the plantation supply. For medium producers, (5) purposeful sampling were used, while in small holder sawnwood producers random sampling were used to get 275 out of 538 producers Table 3. The allocation for small scale producers have one year contract of harvesting between 500-2000 m^3. In 2012/2013 total of 2250 m^3 were harvested. On the other hand the Kilombero Valley Teak Company was purposefully visited. This is one of the powerful companies dealing with sawnwood with capacity of processing up to 40 000 m^3 sawnlogs annually. The plantation process sawnlogs (70%) with few logs (30%) sold to two local companies namely; Teak Tanzania limited and A.J Quality Timber who have contracted them to sell

sawn logs for allow two companies to harvest from them, only the owner and other two stakeholders were interviewed.

Table 3: Sample size of producers' summary

Category	Producer	Actual	Contacted	Location
Sao hill Forest (Government plantation)	Large	3	3	Mafinga,
	medium	5	5	Mafinga,
	Small	538	275	Mafinga
Total		**546**	**283**	
Kilombero valley teak company (Private plantation)	Large	1	1	Kilombero
	Medium	2	2	Kilombero

3.2.2.2 The sawnwood traders, middlemen transporters and enduse manufactures

Spot survey was adopted and purposeful, random samplings were used in selecting interviewed stakeholders. Traders are registered and got their list from the visited district. Traders are available at different areas from production sites to their yards. Most of contacted traders were met at their yards and few contacted along the road, to the checkpoints and production sites whereby they were busy negotiating prices with producers and middlemen. In this study 146 traders were contacted. Middlemen are links between producers, traders and enduse manufactures. Their task is to search for market for sawnwood and its ability for transportation. They act as market links between producers and traders or enduse manufactures. They make sawnwood business possible by opening eyes to chain actors' availability of sawnwood. In this study a total of 50 middlemen were contacted. Transporters were also an important category in sawnwood value chain. Their role is to transport the product to the market. This group is too mobile so the contacted were found at the site, along the way and at yards during uploading and offloading of sawnwood. Some of transporters are sawnwood producers, thus they produce and transport sawnwood product from production site to the market.

In this study a total of 50 respondents were contacted in production sites, on the road and at yards. Enduse manufactures are also the important category in sawnwood value chain. The enduse manufactures were selected randomly from Kinondoni, Ilala and Temeke Munipalities at Dar es Salaam city. The selected enduse manufactures involved contractors, furniture centers, carpenters and builders. A total of 50 respondents were visited to accomplish sawnwood value chain study. Also from private plantation 2 transporters, 1 middleman and 4 enduse manufactures.

3.3 Data Collection Methods

The research involved both qualitative and quantitative approaches. Both primary and secondary data were collected.

3.3.1 Primary data collection

Primary data on marketing chain of sawnwood was collected in the selected districts and the city using reconnaissance survey, questionnaire survey, semi structured and unstructured interviews and participant observation.

3.3.1.1 Reconnaissance survey

Reconnaissance survey was conducted so as to provide a general picture of the research area and element included in the chain. The survey helped to identify the research site and size of sawnwood producers, traders, transporters and enduse manufactures. The information gathered was helpful in mapping the existing sawnwood value chain. Also pre - testing of the questionnaire was done in order to verify if questions could be understood and to check if they address matters under investigation.

3.3.1.2 Questionnaire survey

A mixture of open and closed - ended questionnaires was used. The design of the questionnaires was such that they allowed acquisition of both quantitative and qualitative information. Five types of questionnaires were designed and were administered to five target groups (Appendices1-5): producers, middlemen/ brokers, traders/processors, transporters and enduse manufactures from which stakeholders were interviewed to end up with a data matrix that was analyzed statistically.

3.3.1.3 Semi structured and unstructured interviews

This exercise was done to supplement information obtained through structured questionnaires surveys whereby, unexpected, relevant issues was followed-up with further questioning and probing. This exercise was conducted through interaction with a group of stakeholders in a sawnwood chain, producers, transporters, traders, brokers, enduse manufactures and key informants at different levels of the value chain. Key informants were representatives of the institutions and organisations taking part in the value chain.

3.3.1.4 Direct observation

Supplementary information was collected through personal observation in the field where sawnwood is produced and pay a market visit for the purpose of cross - checking some of the information obtained from questionnaire survey. The information such as sawnwood production, pricing, handling, storage, packing and means of transport used was observed.

3.3.1.5 Secondary data collection

Secondary data was obtained by reviewing relevant documents like publications, journals and books. Some information was obtained from Mufindi District, Sao Hill Forest

Plantations, Kilombero District, Kilombero Valley Teak Forest Plantations, Iringa regional offices, Morogoro regional offices and Dar-es-Salaam City offices and Tanzania Forest Service. Secondary data was collected so as to form an overview of what has been done in relation to the study, and identify gaps in the available information.

3.4 Data Analysis

The components of verbal discussion were analysed in detail with the help of content analysis method. Recorded conversations with respondents were broken into smallest meaningful units of information or themes and tendencies. Statistical Package for Social Science (SPSS), SAS and Microsoft Excel computer programmes was also used in the data analysis. Quantitative data collected were summarized to ensure that they are suitable for addressing both the objectives and the method of analysis used. This was done while ensuring that original meaning of the statements made by respondents is maintained. The summarized data was then coded and used for subsequent statistical analysis.

3.4.1 Descriptive analysis

The analysis involved the use of statistical means, standard deviation, ranges and frequency distribution to describe general characteristic of the data. The approach was adopted to describe and characterize the chain, the diagrams and tables that were used to illustrate the map of the value chain, transaction costs, market power, market size and gross margin at different level of the chain.

3.4.2 Sawnwood value chain mapping

Value chain mapping enables to visualize the flow of the product from conception to end consumer through various actors, as well as the supporting markets and enabling environment affecting the value chain. In this study, mapping of sawnwood value chain

was done through collection of data from reconnaissance survey, secondary sources, semi structured and unstructured interviews surveys (Table 4). The information gathered was analysed using actor and function worksheet. The map was drawn by linking between actors and function parameters. The functions and actors is crossing in a worksheet, where by actors' information like sawnwood resource, producers, processors, traders, brokers transporters and exporters and function information like raw material supply, production, assembly, processing ,transport, wholesale, retail, and export. The functions and actors were positioned into a matrix to show who is doing what and to indicate which actors.

Table 4: Value chain mapping matrix

Functions	**Actors**					
	Small and medium Producers	large producers	Brokers/ middlemen	Traders	Transp orters	End use manufa-ctures
Consumption	x	x	x	x		x
Retail	x	x	x	x		x
Wholesale	x	x	x	x		x
Transportation	x	x	x	x	x	
Value addition	x	x			x	x
Assembly/storage	x	x				
Production	x	x				
Raw material supply	x	x				

3.4.3 Structure conduct and performance (S-C-P) model

The model examines the fundamental relationships between market Structure, Conduct and Performance is usually referred to as the Structure, Conduct, (S-C-P) model (Bosena, 2008). Aremu (2015), Tadesse (2011), Rehima (2006), Wolday (1994) also used this model to evaluate sawnwood, Mango, paper and cotton marketing. Therefore the study used S-C-P model to evaluate transaction costs, market margin and value chain analysis, market power and market size at different level of sawnwood value chain.

3.4.3.1 Marketing margin analysis

Market margin refers to the difference between the buying and selling price of a commodity in question. Cost and price information is used to construct marketing cost and margin. Computing the total gross marketing margin (TGMM) is always related to the final price paid by the end buyer and is expressed as percentage (Mendoza, 1995).

In this study, the marketing margin was estimated to find the efficiency measures and performance of production and marketing sawnwood by making comparison between prices at two different market levels i.e. retailers and wholesalers at different technical efficiency. Margin was based on the different technology used in sawnwood production (i.e. Dingdong and Kara from government and advanced technology from private plantation).

This explains distributional dynamics of the total value chain income and rewards at different players along the chain. Assessing chain income distribution among the players can assist one to devise policies that influence income redistribution and therefore influence income redistribution and therefore influence chain development, competitiveness and sustainability. Also calculation of return equity, margin and the share of the total value chain profit for each player in the value chain (Kaplinsky and Morris, 2000). It was done by was done by comparing percentage to all level of income distribution along the chain.

MM = SS-BP

MM = Market margin

SS= Selling price for sawnwood in specified level

BP = Buying price for sawnwood in specified level

3.4.3.2 Buyers concentration index

The concentration ratio is a way of measuring the concentration of market shares held by particular suppliers in a market. In sawnwood marketing, numbers of buyers and producers are suggestive of competitive conditions and therefore the main focus in analysing market structure is on the number and size of market participants (degree of concentration). It is the percentage of total market sales accounted for by a given number of leading firms. If at any point in the marketing chain, only one or few buyers dominate the market, uncompetitive behavior is possible. Sellers and buyers concentration ratio indices are common measure for market structure (Caves, 1992). In this study producers buyers /traders concentration index was examined because of its influence to the chain in the market.

$$C = (XP/IP)*100$$

Where

C = Index of concentration

XP = aggregate number of output for few large buyers in the market

IP = Total number of output of the buyers' in the market

Whereas a concentration ratio of over 50% is both an indicator of high buyers' concentration and strong oligopolistic industry, that of between 35 - 50% is both an indicator of moderate buyers' concentration weak oligopolistic and less than that it is uncontrolled industry (Kohls and Uhl, 1990). To obtain the output in volumetric terms for the largest few sawnwood buyers/traders, the respondents were divided into two groups; The first group comprised respondents whose volume handled was above the sample mean and the second group comprised respondents whose volumes were less than the sample mean. The mean for the first group was calculated and those above the mean were taken as a few largest buyers/traders in the marketing system.

3.4.3.3 Transaction costs

The contribution of the transaction costs to the sawnwood value chain technical efficiency both at production and marketing stages was examined by using Tobit model. This was helped to assess factors for inefficiency by examining the impact of transaction costs on Technical efficient (TE) both at the production and marketing process as well as the chain level.

Tobit regression model was used in assessing factors contributing to inefficiency, because it can account for the censoring of the dependent variable. When the dependent variable is censored, values in a certain range (>1) are transformed to a particular value (one).

Tobit regression model is formulated as

$TE_i = \alpha_0 + \alpha_1 L_i + \varepsilon_i$

$TE_i = 1$ if $TE_i^* \geq 1$

$TE_i = TE_i^*$ if $TE_i^* < 1$, $i = 1 \ldots n$

Where;

TE_i = The measured (censored) scores of technical efficiency of a firm

i = Firm

L_i = Transaction costs (negotiation costs, information costs, transportation Costs, enforcement cost and monitoring costs)

TE_i^* = Original scores of the *Technical Efficient*

ε_1 = Error term

When the coefficient estimate a_1 for transaction costs is found to be significantly positive, we are provided with statistical evidence to corroborate that transaction costs exert a positive total effect on the actor's technical efficiency in certain stage.

3.5 Business Enabling Environment Analysis

The enabling environment consists of the critical factors and trends that are shaping the value chain environment and operating conditions but that may be amenable to change. The "enabling environment" factors are generated by structures (national and local authorities, research agencies, etc.) and institutions (policies, regulations, and practices) that are beyond the direct control of economic actors in the sawnwood value chain. In this study analysis was done by using a content analysis. It includes the list which contains successive opportunities, constraints that prevent those opportunities from being seized, the factor's potential for contributing to chain upgrading, and the quality of the relationship (Table 5). Each factor analyzed in terms of its contribution to the upgrading of the value chain under consideration. This knowledge can help determine avenues and opportunities for realistic action, lobbying, and policy entrepreneurship perform which functions in the value chain (MacroLINKS, 2009; Kit *et al.*, 2006).

Table 5: Business enabling environment analysis

Policies/ Legislation/procedures	Opportunities	Constraints
Forest act/legislation	√	√
Concessions of forest plantations	√	√
Production of quality product	√	√
Production and technology development	√	√
Extension services	√	√
Training	√	√
Value adding information	√	√
Marketing system and information	√	√
Permits and licenses and fee structure to forest product	√	√
Infrastructure development	√	√
Contract	√	√
Incentives and credit to facilitate investment	√	√

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Mapping of the Players in Sawnwood Value Chain

The first objective was to identify players involved in the sawnwood value chain. It starts with elucidating the source of raw material for making sawnwood which is Sao hill government plantation at Mufindi district. The Saohill plantation is the major source of raw materials among 16 government-owned plantations. It has capacity of supplying up to 1 million m^3, which is 85% of the raw material consumed by industries per year (TFS, 2012). SHFP is the largest government forest plantation; there is an assurance of availability of resources throughout the year (Kapinga, 2010). Therefore such an advantage has made it possible to accommodate most of the producers. It mainly contains pine plantations and some areas of eucalyptus and other species. The plantations have a forest management plan mainly prepared for 5 years which acts as a guide in preparing annual allowable cut (AAC). In every financial year the plantation officially relates the management plan and the actual volumes to be harvested then prepare the allocation for every selected producer. It is important to monitor that the harvesting volumes do not (constantly) exceed the sustainable harvesting potential.

On the side of the private plantation, the KVTC plantation was the representative. KVTC is the one of the largest private plantations established in 1992 with 28 000 ha out of which 8162 ha planted teak. The plantation produces over 40 000 m^3 of sawnwood annually with fairly good recovery rates (over 40%) and good quality sawnwood. Plantation has integrated facilities including sawmill, drying plant and processing plant that produces sawnwood, flooring and paneling for local and export market. It has well established sawmill with capability of processing 75 000 m^3 yearly. The plantation is the

one of the main suppliers of the processed plantation 70% of teak produce to oversee like India, which is the largest teak consumer in the world and 30% to the local market (KVTC, 2014).

From 2009 the plantation started commercial yielding of small dimension logs mainly from thinning. All the harvesting is done by the plantation itself and sells logs or sawnwood and other products to their stakeholders in response to the orders they receive. They have three months to five years contracts with their stakeholders. They review price after every three months.

4.1.1 Players from the government plantation

The key players in this category are producers to whom they access raw materials and produce different products related to forests. The producers are not part of the plantation but they apply to use raw materials from the plantation to produce sawnwood. Producers are of three categories; largest, middle and the smallest producers. The largest group involves few giant producers with 20 years contract with the plantation. The largest share 65% goes to small and medium size saw millers (TEITI, 2014). The main industries based on plantations are sawmilling, paper, telephone and building poles. The largest producers are the ones with allocation between 40 000 to 500 000 m^3 per annum. The middle and the smallest producers receive 500 to 10 000 m^3.

The forest producers are registered between July and September each year and certificates of registration are valid for one financial year. Registration fees differ depending on the type of production. It ranges from 25 600 to 2 000 000 TZS (MNRT, 2014). The registered producers make applications via plantation managers and after screening the eligible producers receive their allocation. The allocation is not the same every year; it

depends with the available or allocated amount of standing volume to be harvested on the stated year. The producers are paying royalty for allocated areas from 3 920-37 690 TZS per m^3, and LMDA which is 11 000 per m^3, CESS which is of 5% of the royalties charged by the central government and TFF which 3% of royalty (MNRT, 2014). Harvesting is mainly done by customers in what is known as '*customers own logging*'. So they are allowed to install their machines around the allocated areas and harvest for one year. After production in relation with their stakeholders, the producers supply the produce to traders or consumers themselves or sometimes via middlemen. Sometimes the producers are traders and transporters.

Traders are also supposed to full fill forest trade conditions. They need to be registered by the Ministry of Natural Resource and Tourism and possess business licenses from the Ministry of Industries, Trade and investment make all the necessary payments for trading forest produce. They are supposed to have all documents with them all the time in undertaking sawnwood businesses. The traders make personal communication with producers or middlemen about availability of the produce and purchase them direct from producers or middlemen. Then after transportation arrangement is done by producers themselves or traders or middlemen depending on the type of communication used. It happens some transporters approach the business as their on the way back from transporting other product to the nearby region or around Mufindi. Then the consumers receive products either directly from producers or traders or other traders. Therefore, the key players in the sawnwood value chain are producers, traders, transporters, middlemen or other traders and the enduse manufactures. The value chain in this category is complex that has evolved over time; the system operates in 4 levels;

The first channel: Producers /Traders and Enduse manufactures at production site

This is the shortest sawnwood value chain (Figure 3). This channel involves all producers who can sell directly to the enduse manufactures and the producer has control to the channel. This can happen for enduse manufactures visit the production site or have communication with direct with producers. That is, they deliver product straight to the enduse manufactures. On the other hand, this group involves some of producers who sometimes act as traders and transporters. Some of them have their own yards or have direct communication with enduse manufactures without influence of traders or middlemen. The study found some few enduse manufactures who devoted to find sawnwood at production site. The product can be value added or not in dependence to the order given. Most of these producers, like Sao hill Industries have their own timber yards in Dar es Salaam and sell value added product like dried and treated sawnwood also value added product like windows, doors and wood pallets.

The second channel: Producers/Traders/Middlemen and Enduse manufactures

This involves all the producers who can sell directly to the traders/middlemen from production site (Figure 3). The key players in this channel are producers and traders who agreed on sawnwood business just around production sites. This channel is dominated by small producers with small capital who can produce small amount and don't have ability to transport or look for market. They always produce low quality product. After production, they are waiting for traders /enduse manufactures at production sites. On the other hand, traders in this category visit the production sites for sawnwood produce and negotiate prices with producers or facilitate producers with a certain amount of capital. Few of them add value by treating sawnwood in the local method and the price is low. From other producers, they sell directly to the enduse manufactures industrial site and they get orders from large enduse manufactures like big constructors companies.

Value addition is by selling dried and treated sawnwood also value added product like windows, doors and wood pallets.

The third channel: Producers/Traders/Middlemen/Transporters and Enduse manufactures

This is the longest and most practical channel of which all the actors are involved. Producers communicate with traders, middlemen and vice versa upon availability of products (Figure 3). This channel is not straight and it has a lot of crossing. In between, there is prior communication with transporters on management of the product to the destination. In this all actors (55%) participate fully in the chain as far as the product reaches the destination (Figure 3). All categories of producers are in this group as the result some of them add value to the product in dependency with category of producer is involved with and the order given.

The fourth channel: Producers, Enduse Manufactures and Export

This is the shortest and longest channel depending on the origin of the product to export unit (Figure 3). The producer or other traders or enduse manufactures have communication between themselves and enduse manufactures at export unit. There is also linkage between producers and the export zone. This is always done by the largest producers and few other producers with good capital. The actors receive orders and produce sawnwood or other value added product in relation to the amount and size needed. The study found that, most of the product sold in this channel is value added product. TEITI (2014) states that, Tanzania export to Kenya, imports a large amount of sawnwood but also imports wood wool and wood flour, which are wood extracts and are hence considered processed goods.

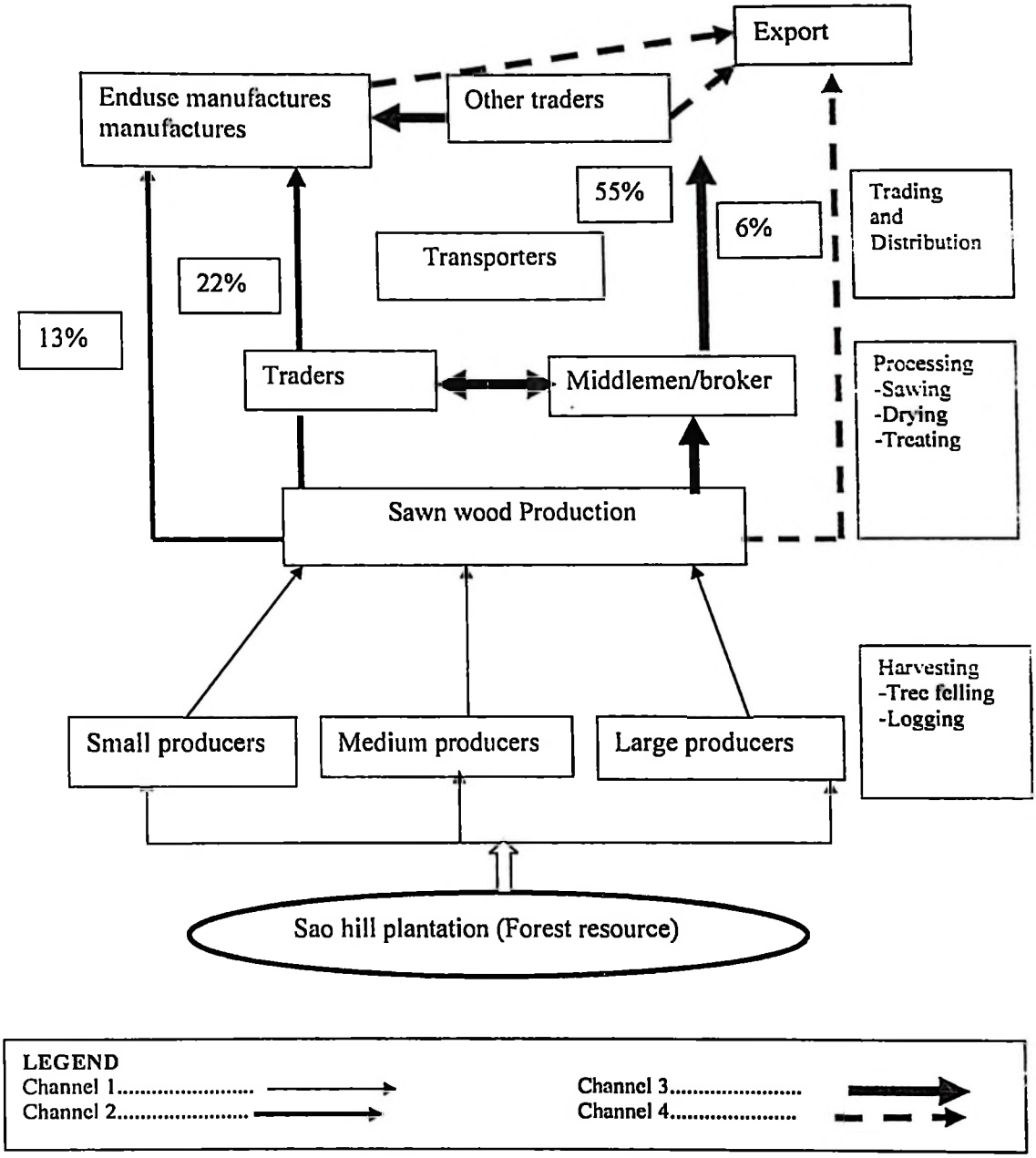

Figure 3: Sawnwood value chain from government forest plantation (SHFP)

4.1.2 Players from private plantation

The key players in this category include KVTC plantation as the producer, other producers, traders, middlemen, transporters and enduse manufactures. They add value by not selling standing tree, they produce either logs or sawnwood or any other value added product like floorings, doors and finger joints. The sawnwood sold is always dried and treated.

The producers in this category are KVTC themselves who do all the harvesting to produce logs for production of different products like Sawnwood and sell some of the logs to other contracted companies. The companies with contracts to buy logs from KVTC are AJ Quality Timber and Teak Tanzania Limited.

In each harvesting year the plantation has plans for harvesting as a result of marketing research done in prior. So the KVTC management is a major trader and sometimes involves other traders/middlemen internationally or locally to attain their business goals. On the other hand, KVTC has contracted Master One company for transportation or use TAZARA railway to facilitate movement of its product to the local market or to the port for export arrangement. It was also found that, some enduse manufactures visit the industry for fetching the product they ordered. On international basis, Dar es Salaam port is the major transport center used for international shipping. From this type of movement is where the enduse manufactures receives their aimed product.

The value chain in this category operates in 3 levels;

The first channel: KVTC/International traders/Middlemen/ Export

This is the shortest and most practiced sawnwood value chain (Figure 4). The key players in this channel are producers who sell sawnwood from production area to international

middlemen to the export. The 70% of the total produce from KVTC is sold in the export market. They supply value added product like rough squares, floorings and finger joints. KVTC supplies teak product via middlemen who have links with the customers in different countries. The amount of supply depends with the amount available on the concerned year and the existing export market. The price is agreed for six month contract between stakeholders and the agreed price is reviewed after every 3 months.

The second channel: KVTC and Local market

The KVTC sold 30% in local markets (Figure 4). They supply logs to two contracted companies and the remained is processed and sold to individual customers. They receive orders of products like sawnwood and value added product like floorings, doors and table tops from different consumers. Hence products are sold directly to the enduse manufactures

The third channel: Contracted companies from KVTC/ Traders/Middlemen/ Transporters and Enduse manufactures

The two companies have 5 years contracts of being supplied logs by KVTC (Figure 4). The companies are included in every year plan and receive amount not exceeding 5000 m^3. They buy logs and produce sawnwood of different sizes. They are also in the international market where they export sawnwood to different countries such as India and to the local market.

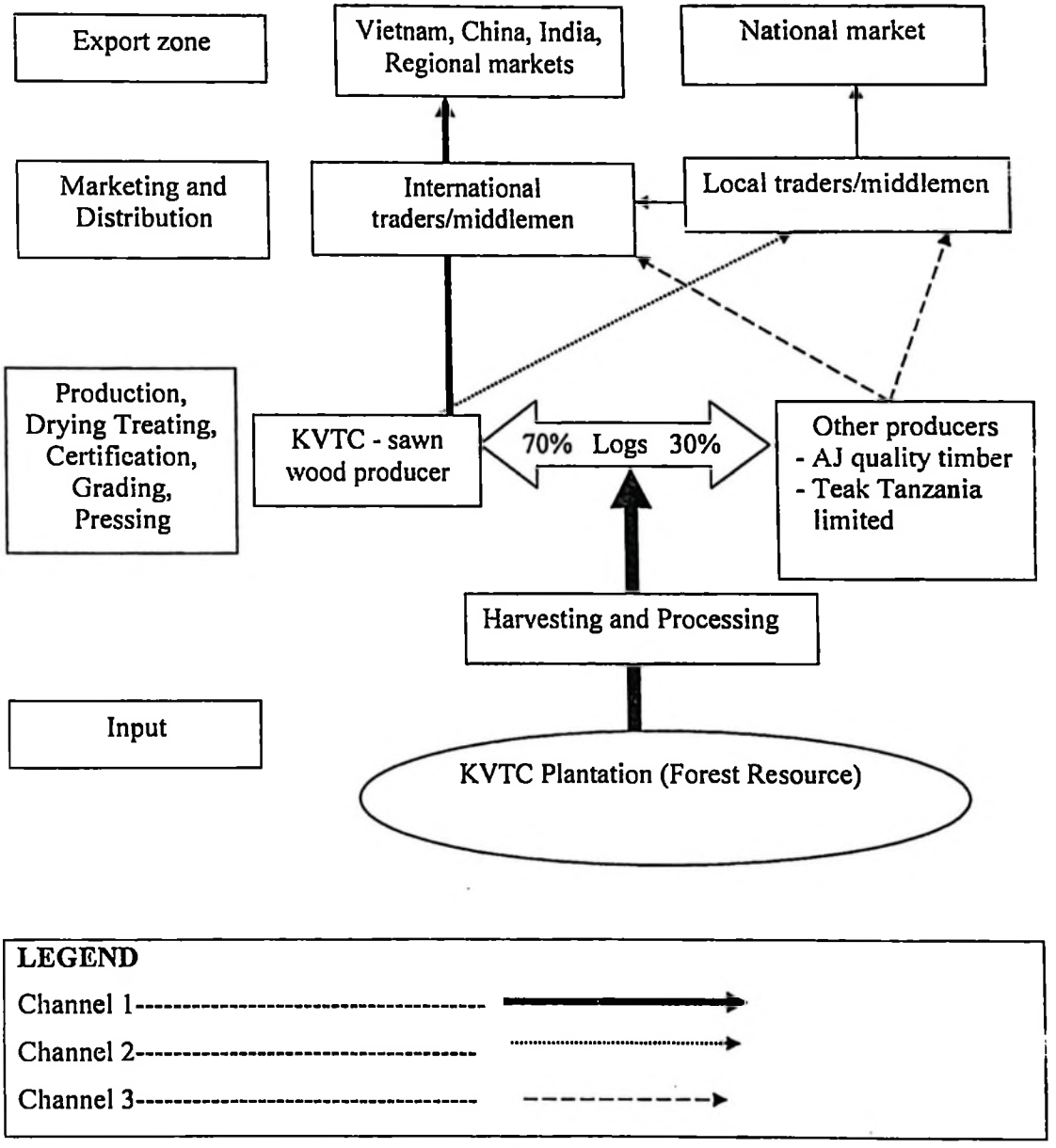

Figure 4: Sawnwood value chain from private forest plantation (KVTC plantation)

4.1.3 Characteristics of the sawnwood Actors

4.1.3.1 Producers characteristics in the sawnwood value chain at Sao hill plantation

The results show that, sawnwood producers at SHFP are grouped into major 3 categories. It is dominated by small producers by 98% with allocated range between 500-5 000 m3 followed by medium producers 5000 to 10 000 m3 and the smallest number is with largest producers allocated greater than 10 000 m3 (Figure 5). About 62 % of people dealing with this business in the plantation are residents of Mufindi District specifically from the villages which surround the plantation (TFS, 2013). In 2012/2013 there were 3 large producers, 5 medium producers and 538 small producers (Figure 5). The small producers have the largest number of members compared to other categories (Kapinga, 2010, Indufor, 2011). As a result the largest share is going to small producers.

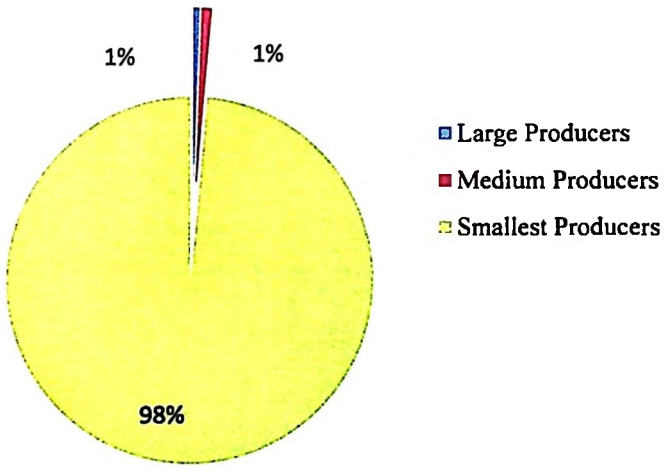

Figure 5: Number of producers receives allocation at SHFP

Large scale producers are the ones under contract with the government for 20 years in sawnwood production and receive a large portion of the area which is greater than 100 000 m^3 per year. This also means that they have a large capital which enables them to utilize effectively the area allocated (Kapinga, 2010). The results found that, large scale producers have big wood industries for utilizing the allocated resources. The large scale producers who have large industries for sawnwood production include Mufindi Paper Mill which mainly produces pulp and paper and saw dust. The industry has contract of 500 000 m^3 per year but the plantation proposes 200 000 m^3 per year. Sao Hill Industries is another large industry mainly producing sawnwood and by products. They are contracted for 250 000 m^3 per year and plantation offers 100 000 m^3. The last industry is Mufindi Wood Pole Plant and Timber Ltd which produces sawnwood and by products.

The industry contracted 40 000 m^3 per year and always offered about 20 000 m^3. The results found that plantation still supplies less than what they agree on the contract due to fact that, demand for wood from SHFP exceeds the capacity of the plantation supply. Mufindi Paper Mills (MPM), which consumed 250 000 m^3 in 2011and 2012 was allocated only 110 000 m^3 in 2014, and to Sao Hill Industries, which consumed 100 000 m^3 in 2011 and 2012 but has been allocated only 50 000 m^3 in 2014 and Mufindi wood Plantation and industries contracted 40 000 and received 5000 m^3 in 2012 (TEITI, 2014, TFS, 2013).

The middle scale producers are part of large producers without contracts. They have good qualifications for utilizing the allocated resource as it done by large scale producers. It was found that their number is more than that of the large scale producers and receive a relatively large allocation of up to 10 000 m^3 of round wood per year. The results found that, they have mills with good capacity for producing quality sawnwood, poles, and

wood pulp also have modern treating plants and match box industries. On other the hand they have good records at Sao Hill Forest Plantation. In 2012/2013, the middle scale producers with 5 different industries receive 36,000 m^3 out of 849 840 m^3.

The small scale producers are those producing less than 5000 m^3 of sawnwood per year. This is the group with the largest number of members compared to other groups. In 2012/2013 there were about 538 small scale producers out of 548.This number is not constant, it varies with Annual Allowable Cut (AAC). The result found that, most of the producers in this group are Mufindi residents from the villages around Sao Hill Forest Plantation. The villages surrounding the forest plantation are considered in the allocation due to their influence in the conservation of the SHFP. The results found that, the largest portion of allocation is in this group as they receive out of 357 700 out of 900 054 m^3 2012/2013 and allocated 236 300 m^3 out of 488 100 m^3 in 2013/2014. It was also found that 650 000 m^3 in 2010/2011 out of 1 000 000 m^3, and 387, 700 of 849 840 m^3 in 2011/2012 (TEITI, 2014; TFS, 2013; Indufor, 2011).

4.1.3.1.1 Sawnwood producers production technology

The results found that, under current regulations, sawnwood producers must qualify technically in terms of the types and performances of the machinery and the technical experts and all the machines to be used in sawnwood production at SHFP. The machinery has to be inspected by saw doctors as one of the category of getting allocation. This criteria is for medium and small scale producers who have no contracts. This way to get the number of intended producers. It was found that, majority (72%) of the producers operating in Sao Hill Forest Plantation (SHFP) are small scale producers using simple machines called micro mills or Amec as presented in Table 6. These machines are small scale wood machinery, locally fabricated circular saw or roller bench with rails are

characterised by simple mobile technology, powered by a diesel engine and an all manual operation (AFF, 2011). These machines are capable of producing up to 7m^3 per day. Also, AAF (2011) found that 70% are of the machines used are micro mills. The results found that, inadequate financing resulted into poor investments and low level of maintenance which lead to poor quality and time consumption in producing just small amount of timber products. The mills are using good quality saw logs to produce low quality sawnwood at fairly low recovery rate (33%), resulting in a lot of sawdust (PFP, 2016; AAF, 2011). The results found that for 22% of respondents using amec and laiment, 13% using Kara and laiment which are capable of producing between 10 to 15 m^3 per day and only 3% of the medium and large scale producers the use industrialized mills which are computerized with fairly recovery rate. The type of sawmill include hew saw, wood miser, Lindqvist scotter, band saw and Forester which is capable of producing up to 100 000 m^3 per year. The study confirm that few medium sized sawmills, like SHI has implemented a new plant called hew saw which is capable of producing up to 250 m^3/day. The mill provides high recovery rate for 9-26 cm diameter logs. The new high tech scanner is seen in front of the control room. The guard of the debarking machine is seen to the very right where bark is separated.

Table 6: Type of machine used in sawnwood production

Type of machines	Frequency	Percent
Micro mills (Amec)	203	72
Amec and Laimet	62	22
Laiment / Kara	10	4
Other medium sized machine like (hew saw, wood miser, Lindqvist scotter, band saw)	8	3
Total	**283**	**100**

In harvesting process at SHFP 100% of the producers confirm to use chain saw for cutting and disbranching (Plate1). This is a machine with one operator which helps them to cut the trees very fast. By using chain saws could cut 100 trees per day. Harvesting at SHFP

is always done by customers known as '*customers own logging*'. The study found that, using chain saws may cause damage to the immature or and much of the mechanical damage is not seen until the log passes through the sawmill operation (Plate 1).

The harvesting areas are not designated but government points them out to harvest. This does not enable any forest management of the areas which would be beneficial for the wood quality (Indufor, 2011). The lack of harvesting training and the transient nature of the chain saw operators have impacts on the quality of the harvesting operation ultimately reducing the yield from the compartment and creating large number of damaged logs (PFP, 2016).

Plate 1: Cutting and disbranching by chain saw at SHFP

The results found that most of the customers at SHFP (100%) using pine in their production and with few eucalyptus. The reason for this is that SHFP is dominated by Pine for 42 500 ha and few of 3500 ha eucalyptus plantation. Another reason is the emerging demand of softwood to the market for difference purposes and unavailability of hardwood to the market. Most of the trees allocated for harvesting are mature trees with age ranging from 21- 40 years. For example in 2012/2013 the trees allocated are those planted between 1979 and 1983, so the trees harvested were between 29-33 years of age. The amount of trees to be harvested depended on the AAC on plantation management plan. Producers were asked where they source their sawnwood raw material and the findings show that 78.8% depend to get raw material from SHFP only and 20.1% get from SHFP and private plantations, and 1.1% from SHFP and own plantations.

Thus, majority of producers got raw materials from SHFP and others depended on other sources like some private plantations and their own plantations around the SHFP and from other areas such as Njombe, Ruvuma, Mbeya, Sumbawanga and sometimes from outside the country (Malawi). This is because the number of producers at SHFP is increasing and the demand is also increasing with the fact that allocation given to producers is not enough to meet the demand.

Table 7: Sources of sawnwood raw materials

Source	Frequency	Percent
Saohill Forest Plantation	223	78.8
Saohill Forest Plantation and Private plantation	57	20.1
Saohill Forest Plantation and own plantation	3	1.1
Total	**283**	**100.0**

The results found that 99.3% resources given to producers are not enough and the allocation given is below what they requested. The results found that in 2012/2013 small scale producers ranges from 500 to 2050 m^3. Middle scale also ranges from 5000 to

12 000 m^3 and large scale ranges from 5000 to 250 000 m^3. So the producers upon finishing the given allocation shift to private plantations or their own plantations. The allocation given is supposed to be finished after one year but the results found that most producers 51%, finish what their given after 2 months from the day they started harvesting (Figure 6).

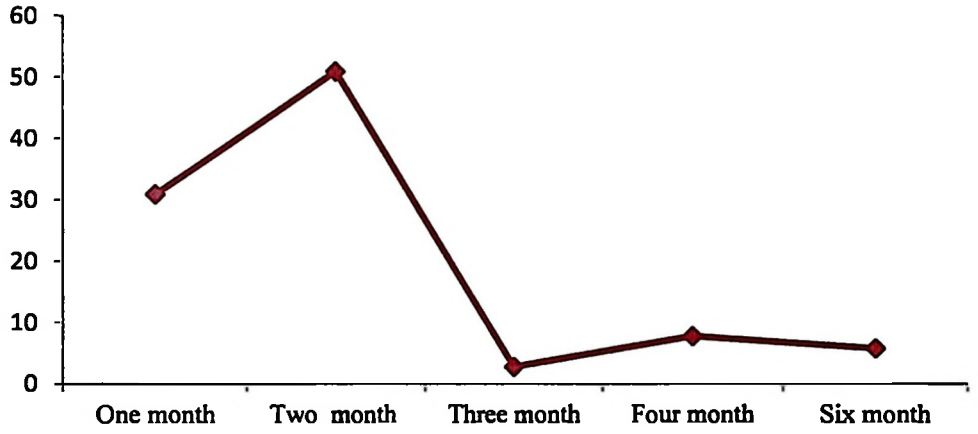

Figure 6: Months to finish allocation from SHFP

4.1.3.1.2 Producers knowledge management at production level

Producers (56%) have completed primary education and few have secondary and post education (Table 8). In sawnwood production, it was revealed that 69% of producers reported to receive knowledge from different institutions to facilitate their production activities (Table 8). It was found that through their organization known as Southern Highlands Forest Industries Association (SAFIA), "Shirikisho la wenye Viwanda vya Misitu Tanzania" (SHIMIVITA), the producers were able to get professional advice from Forest Industry Training Institute (FITI), SHFP and District forest and marketing offices. Also the organization has been preparing yearly meetings of which all stakeholders and the government meets, discussing different matters concerning forestry development.

Apart from that, producers get an opportunity of being trained by different service providers like financial institutions and Tanzania Bureau of Statistics (TBS) on how to get credits and the quality of product they produce. On the other hand, the results found that at production site, 74% most of the operators are not technical staff but have some knowledge on how to run the machines. It was also noted that most of the small scale producers do not have the required technical staff as per forest regulations (AFF, 2011).

Table 8: Knowledge description of sawnwood producers at SHFP

Variable description	Frequency	Percentage
Education		
Primary education	39	56.0
Secondary education	21	30.0
Post education	10	14.0
Total	**70**	**100**
On job training		
Training	22	31.0
Not trained	48	69.0
Total	**70**	**100**
Professional level		
Not technical staff	51	73.0
Technical staff	19	27.0
Total	**70**	**100**

4.1.3.1.3 Value addition processes at production level

The sawnwood production process is characterised by small scale sawmills using poor technology with very little or no value addition. The smallness of the processors means that they cannot have influence on the marketing chain and end up reaping low profit. Some sawmills especially medium ones such as Sao Hill sawmills are improving their production lines to increase value additions (AFF, 2011). In production process, there are some value addition activities that are done to improve value of the sawnwood product. This was highlighted by both categories of producers who engaged in sawnwood production. But practically only 56% claim to add value to their sawnwood produces. Value-based descriptions of marketing practices are notably rare in spite of the fact that,

ultimately, the buyer is directed by the values that are provided through the physical activities (Eskola, 2005). It was found that most of the producers add value by treating sawnwood, drying, storing and packing, the use of by products and production of door and window frames, flush doors and other furniture products. The market for these products is gradually growing especially for commercial and office buildings (Indufor, 2011).

Treating sawnwood is done in order to protect sawnwood from fungi and insect attack. This means treating sawnwood helps in increasing quality and life span. It can be done by using pressure methods and non-pressure methods like dipping in preservatives (local method) and spraying preservatives and diffusible preservatives like water borne preservatives (Findlay, 1975). By doing so it adds value to the sawnwood, hence deserving high grade and thus higher prices too (Kapinga, 2010). The market price of the treated sawnwood is higher compared to untreated one. The study found that most of the producers (97%) treat sawnwood by using non pressure methods (shallow dipping) in preservatives in order to win the market (Plate 2).

This type of treating sawnwood gives a superficial coating on the outside of the timber. The majority of the producers use non pressure method due to insufficient capital and consistency of the customers. On the other hand some of producers (3%) use pressure method in treating sawnwood. The study found that, they have treatment plants of which the sawnwood is sprayed with controlled high pressure process which is more effective and ensures total protection against wood destroying insects, termites and fungal decay (Plate 2). This type of treatment ensures sawnwood is treated to the highest standards for its intended purpose. There was difference in prices between treated and untreated sawnwood. The average price for treated sawnwood was TZS 400 000 per $m^3$and that of untreated sawnwood was TZS 330 000 per m^3 at production site.

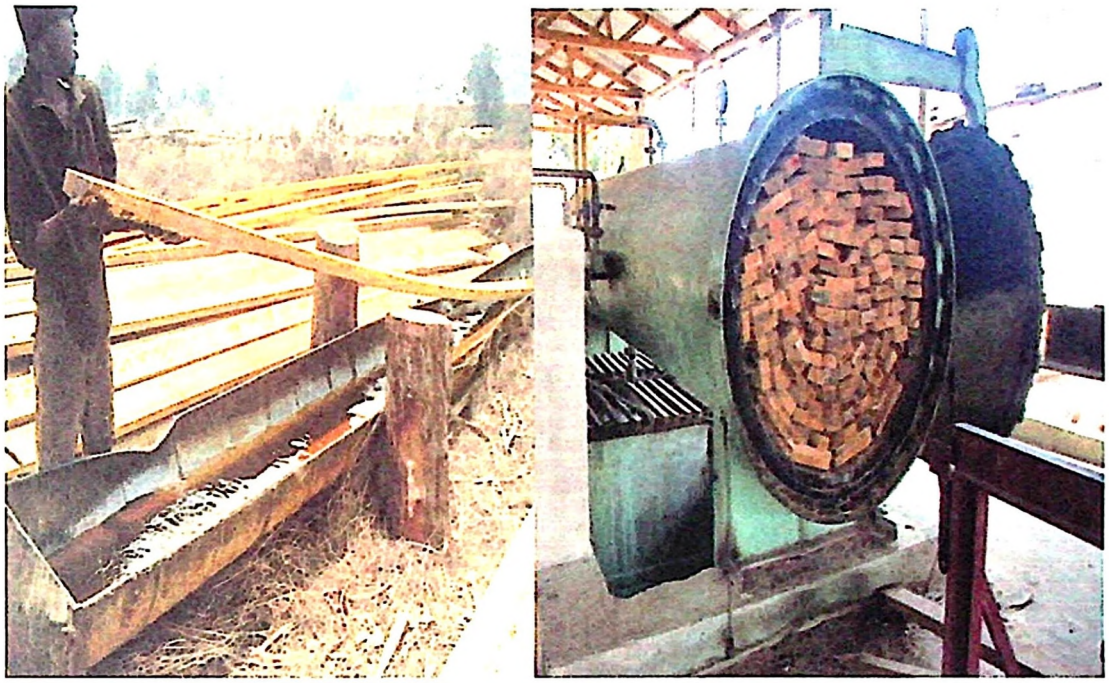

Plate 2: Method of sawnwood treatment at SHFP

Drying of sawnwood is one of the important steps in adding value to the products (Indufor, 2011). Sawnwood is dried in order to reduce moisture, in order to keep sawnwood straight and to stop its warping as well to improve the product quality and value adding. Sawnwood needs to be dried so that the moisture content at its core reduced to 13%. The results found that 99% of the sawnwood was currently air dried (outside in the sun) (Plate 3). This type of drying reduces core moisture content to around 30% which still allows sawnwood to wrap and bend, sometimes the sawnwood timber is sold green / wet. It was found that, most of the producers' use this type of drying because of significantly lower investment costs since no kiln is needed (Indufor, 2011).

Plate 3: Sawnwood air drying at SHFP

On other the hand the remaining 1% of producers use drying kilns of 12%-15% which ensures there is no wrap or bend (Plate 4). Also, the new kilns provide high quality dried timber for glue-laminated sheets, doors, furniture and other value added production. The lighter dried timber is also reducing the transport costs to the market.

For example British-Tanzania Timber Ltd uses electronic monitored seasoning kiln which are computer regulated system to dry sawnwood to attain the optimum core moisture. According to Indufor, (2011), there are several possible kiln sizes from different manufacturers. Kiln drying technology producers include: The kiln may include Secea, part of Hilde Nardi, Lignomat, Heinola Sawmill WSAB, Jartek part of Valutec Machinery Incomac. For softwood sawnwood the large kilns have 6 m, 4 m and 3 m long pieces. The height of chambers is 4 bundles stacked so that the total height of the load is typically 5m.

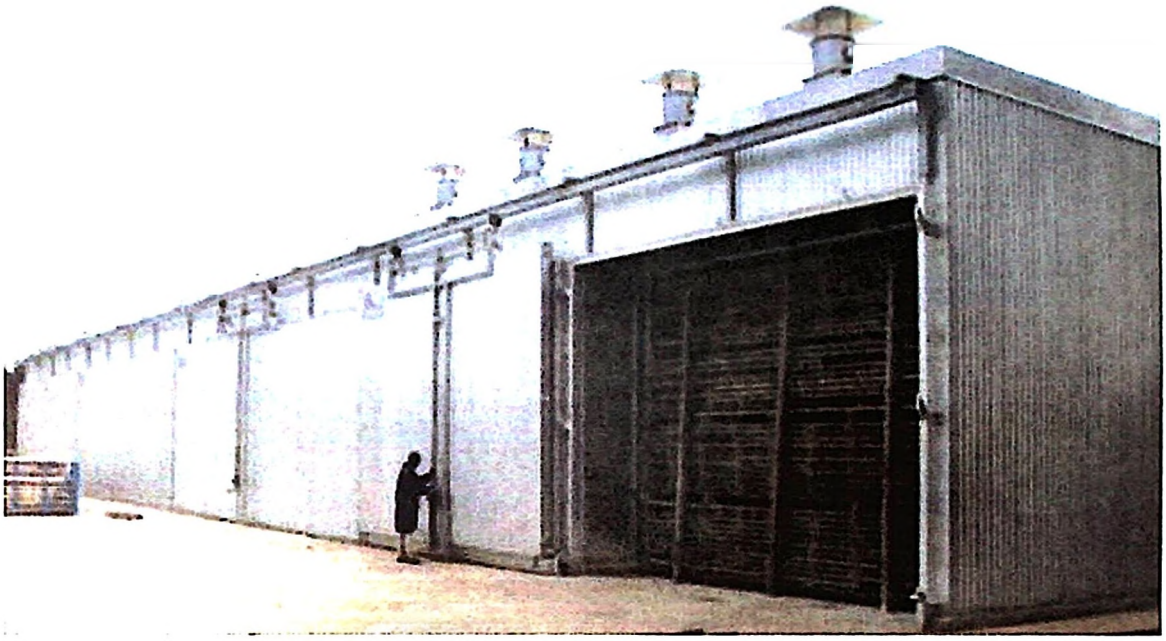

Plate 4: The Saohill forest industry new dry kilns (3x150m^3 and 2x60m^3 chambers) and the new 2.1mw boiler

Storing and packing is done in such a way that sawnwood are neither bending nor breaking. The storage area should be roofed and have a concrete base; no walls are necessary. The study found that most of producers (99%) do not properly stored (under shelter) which reduces its value. After production, they stack sawnwood in non roofed areas and without a concrete base before supply or for treatment.

The few producers have proper places for storing the sawnwood produced. According to Indufor (2011) also found that, sawnwood is typically not stored under roof after processing year which causes the timber to crack in the sun when drying too fast, or absorb moisture during the rainy season.

Also it was found that 90% of by products produced during sawnwood production like sawdust and wood bark is left in the production areas. Majority of producers use poor saw blades, using quality logs to produce poor quality sawnwood with low recovery rate. So due to insufficient capital and knowledge, you can find huge piles of by products in the production areas. But, some producers have access to supply and to use these by product to produce different products. For example Sao hill industries managed to produce briquettes from sawdust. Also other saw millers like MUET and Sao hill get opportunity of exporting saw dust to Dubai.

Most of the sawnwood producers supply sawnwood only with few of them adding value to the sawnwood produced. The study found sawnwood producers such as Sao hill sawmill and MUET, add value on the products through production of doors and window frames, flush doors pallets and other furniture products (Plate 5).

Plate 5 : The coca cola pallets transported to the coca cola industry

4.1.3.2 Sawnwood producers market characteristics

Sawnwood producers' characteristics are described by the availability and price of sawnwood product to the market. Due to increasing demand of sawnwood product, there is increase in the market of the sawnwood. Almost all producers are getting raw materials from government industrial plantations. The quality of saw logs from government plantations is relatively good compared to saw logs from individual woodlot where immature sawnwood is common. The study found that most of producers (97%) receive minimal amount of allocation which result into less availability of quality sawnwood to the market. The result found that in 2012/2013 the small scale producers receive between 500-2 050 m^3 and the medium and large producers between 5 000-100 000 m^3 which gets finished to the maximum in 4 months. The study found that the average quantity produced ranges from $7m^3$ - 250 m^3 per day depending on the type of machine used in production. As a result, producers finish allocation earlier and wait for allocation in the coming year or get access to private plantation, or their own woodlots which are not well matured.

It was found that, most of the harvesting is done by producers after communicating with traders or consumers on availability of sawnwood market. But also because the harvesting has one year time frame, the producers have to utilize the allocation they have within that time frame. On another hand, some producers don't have enough capital for sawnwood production, so they are assisted by traders to produce the given amount to be supplied. But for medium and large producers they mostly have marketing a plan of which all produce has allocated market.

It was found that, most of producers (83%) the sell product in the production site. It was found that the average selling price of sawnwood in the production site is TZS 330 000 per m^3 for untreated sawnwood and for treated sawnwood average price is TZS 400 000

per m^3. Pricing is always done by producers in reference to the market price, quality of the sawnwood, value addition, distance from production site, size and the length of the sawnwood. Most of the sawnwood is produced in reference to the prior market information between stakeholders. Another reason is that, most of the producers don't have enough capital to transport or to fetch market outside production area. They stay to in the production areas until the product is finished. Although that there are producers who are capable of transporting product to the market.

4.1.3.3 Major sawnwood production and marketing challenges

Most of the respondents at production level identified a number of production and marketing challenges from availability of raw materials, insufficient capital, infrastructure, forest regulation, quality of raw materials, insufficient knowledge about the industry and unreliable marketable (Table 9).

Market reliability is the heart of the sawnwood product business. It was also found 28% of respondents claim unreliable market of the sawnwood produces. This is mainly a result of unreliable information about the demand of the sawnwood product. Also the market has been dwindling due to economic recession, sawnwood substution and quality of the product. The perception of quality may be different depending on actors in the value chain.

The study found that 19% of the producers claim about raw material availability for sawnwood production is not enough to satisfy their needs. This is because the allocation given is not enough compared to what they request. The current wood allocation system has been severely distorted. Customers have increased in the past years although the number of sawmills has not increased that rapidly (Indufor, 2011). The study found that

the number of producers has increased from 38 in 2001/2002 to 543 in 2012/ 2013. This happened due to increase in demand of sawnwood products for different purposes. So the yearly allowable cut (AAC) is not enough to satisfy all customers. AAF (2011) found that, the wood processing capacity continued to grow with time while government plantations were not being expanded and harvested without replanting which created the current uneven age distribution. On the other hand, increasing share of wood allocation to "brief case sawmillers" who have wood allocation permits but do not have sawmills. Also TEITI (2014) found, it is estimated that more than 500 permit holders cannot afford to harvest, instead re-sell their permits to traders who were originally denied full allocation. It was also noted that, not all entrepreneurs having allocation had machinery for production of sawnwood, so almost 50% of the allocation assigned to some small scale producers was actually used by the large and medium producers (PFP, 2016). This causes some producers with sawmill to get and find it very difficult to operate there in a sustainable manner. This resulted into forest resources is being finished and absence of high quality products in the markets.

Also it was found that, there is increase in the number of sawmills, but most of the machines are inefficient. It was found that most of the machines used are simple machines which use good quality trees to produce poor sawnwood with low recovery rate. The simple machinery is neither designed nor capable of producing exact dimensions and most of quality problems are related to dimensions (AFF, 2011). Majority of the sawnwood produced is produced is not based on standards or reference to quality.

The results found that, 12% of producers claim to have insufficient capital to undertake sawnwood production (Table 9). Indufor (2011) found that, currently some traders are financing sawmillers in Saohill production area by facilitating them with working capital

loans in exchange for sales contracts. This is a form of vertical integration in the chain where companies with client contacts extend their operations to processing and even raw material sourcing (Indufor, 2011). This is a situation sawnwood producers have complained about but is a result of low profitability along the chain, especially in primary processing.

Table 9: Challenges faced by producers in sawnwood production at SHFP

Challenge	Frequency	Percent
Unreliable marketable	80	28.0
Quality of raw materials	53	19.0
Availability of raw materials	55	19.0
Infrastructure	40	14.0
Insufficient capital	35	12.0
Forest regulation	20	7.0
Total	**283**	**100**

The study assessed about the quality of trees used in sawnwood production. It was found that 10% of the producers complain about the trees allocated to them that are of poor quality (Table 10). Most of them have not well attended and some of them were burnt. Government plantations were not properly attended (suffered from postponed pruning and thinning) due to inadequate financing of forest operations. This has resulted into poor quality sawnwood produced. The study also found that infrastructure (14%) is also a problem to the logging areas (Table 9). It was found that the road conditions in the logging areas are very poor resulting difficult transportation of the logs to the sawmills. This increases costs of transportation and use of more than one car to transport a single item.

It was also found that, 7% of respondents claim to be affected by some forest regulations especially in harvesting procedures (Table 9). The allocation system is a problem as some producers are allocated with poor areas with poor quality of trees. So because the

producers pay for trees before visiting the area, they have no choice to select the area for harvesting. It was found that, the distance from logging areas to the mills is increasing gradually which leads to increase in production cost and hence is a limitation in day working hours within the forest. PFP (2016) found that, working hours in the SHFP are from 6 a.m.to 6 p.m, the restrictions on working hours are reported to be one of the obstacles to companies to move to mechanical harvesting.

4.1.3.4 Traders in the Sawnwood value chain at Sao hill plantation

4.1.3.4.1 Traders characteristics in the Sawnwood value chain at Sao hill plantation

Traders are part of sawnwood value chain and they are placed in a second part of the chain. This study found that majority of the sawnwood traders are from Ilala district (28%), Kinondoni district (21%) and Temeke district (17%) in Dar es Salaam city (Table 10). The city is a business centre with high demand of sawnwood for both domestic use and export. Ilala district has a lot of traders located at one sawnwood market centre named Buguruni where all the sawnwood from Mafinga has to be unpacked before being distributed to other markets. Along the chain more traders (18%) were found at Mafinga District where it is a source of the sawnwood compared to other surveyed areas. Also in Morogoro (10%), whereby there is market centre for sawnwood and it is also a junction to up countries. In Pwani Region (9%) where is most of the sawnwood from Mafinga and other places is downloaded to some shops while it is being transported to Dar es Salaam. In this most of sawnwood traders were those selling building materials/equipment (Hardware shops). These traders sell sawnwood among other products in their stores (Kapinga, 2010).

Table 10: Surveyed traders of sawnwood product from Dar es Salaam, Iringa, Morogoro and Coast Regions

Region	Number of traders	Percentage
Dar es Salaam		
Ilala	41	28.0
Kinondoni	30	21.0
Temeke	20	14.0
Iringa	27	18.0
Morogoro	15	10.0
Coast	13	9.0
Total	**146**	**100**

4.1.3.4.2 Traders involvement in sawnwood business

The study found that that majority, (82%) of the traders involved in the sawnwood business from SHPF are those with enough capital to buy and transport sawnwood from production to the market areas. The study found that, increase in demand of sawnwood from SHFP has resulted to increase in number of traders to the sawnwood market.

Traders work from different areas and have tendency of communicating directly with producers or middlemen through cellular phones on availability and price of sawnwood. The traders then orders the amount of sawnwood needed and the producers prepare the same. Kapinga (2010) found that, majority of sawnwood traders (45 %) receive market information from the middlemen. For traders to be recognized, they must follow forest regulations of being registered and possess relevant documents for trading sawnwood. This process helps them to have access to sawnwood products to their timber yards and transport to the market.

Also the study found that, there are two categories of traders. Small traders, who are categorized with small capital of which they buy small amount of sawnwood product and sell to the nearby market and or buy sawnwood from large traders and solely sale on their timber yards. Kapinga (2010) found that, these are normally small scale traders who have

small capital, hence unable to travel or to place sizeable orders of sawnwood from producers or middlemen.

On the other hand, large traders are capable of transporting the product to the next market or store to their timber yards waiting for customers. The large traders source sawnwood either directly from producers or from the small traders and sometimes, these traders may not necessarily be at the town but communicate directly through cellular phones. Indufor (2011) found that large traders can operate several truck loads (hired or own) at a time and often have their own timber yards and or have direct contacts in the export markets. They often finance smaller traders and can therefore secure the raw materials in advance.

Interestingly, it was that there are some few cases where some traders are also producers at the same time. This type of group may harvest the produce from their own woodlots as well as from government plantation or private woodlots and transport to the selling yards and /or sell directly to enduse manufacturesrs. For example Saohill industry are producers at the same time traders with market centres at Iringa, Morogoro, Dar es Salaam and Dodoma. Another Matekeleza company is the producer from Government plantation and his own woodlot and a trader with market centre Dar es Salaam. These types of traders produce sawnwood from their own woodlots or government plantation and transport to their marketing areas for selling to enduse manufactures. However, this category has few numbers of traders because it involves woodlot ownership, large capital and time to excel.

4.1.3.4.3 Value addition at traders' level

The study found that, some of the traders 45% add value to the sawnwood through standard storing and packaging. During transportation of sawnwood, the traders pack sawnwood in a certain system as the product does not bend, twist or get crack. Also some

traders have timber yards which are roofed with concrete base as selling yards but also for storing purposes at the same time as a shop for selling their product. But also the study found that, some of the traders don't add any value to product unless they receive a certain order of the treated sawnwood.

4.1.3.4.4 Sawnwood traders knowledge management

The researcher assessed the training received by traders on undertaking sawnwood business. The findings show that most of the traders have not yet attended any training except for the few who received credit management training, the course was available to them because they wanted to access credit to banks and also those who joined hands with producers associations like SAFIA. Thus, formal business training available to most of the traders was almost negligible.

4.1.3.4.5 Challenges faced by sawnwood traders in the sawnwood business

The study found a number of challenges faced by traders in sawnwood business. Most of the respondents' at all trading level identified a number of challenges from availability of sawnwood product, insufficient capital, and infrastructure, and forest regulations, quality of the sawnwood product, seasonality and unreliable market (Table 11).

The study found that, 25% of traders claim about the price of sawnwood product. The price of sawnwood is not stable due to production, transportation and buying prices. AAF (2011) found that, high prices of forest products relative to population income caused partly by increased logging, raw material and finished forest product, transportation costs, increased price of fuel, lubricants. In addition to that, poor infrastructure and means of transport increase price of sawnwood availability in the

market (Kapinga, 2010). Also, the study found that, due to increase in price, some traders face challenges of buying enough sawnwood to satisfy market.

The study found that 14 % of the traders claim about in availability of the sawnwood at the right time. It was found that in the market sometimes sawnwood product is not available at the market at the right time due to some factors. Demand for sawnwood increased with time due to different factors like population and urbanization. The rapid expansion of towns as a result of high rate of urbanization and commercial activities indicate an imbalance between the amount of wood products that can be supplied to the consumers and the actual requirements (Mgana, 2013).

Quality is another challenge faced by traders. This has been claimed by traders (18%) concerning the quality of sawnwood. The perception of quality may be different depending on actors in the value chain (AFF, 2011). Majority of the sawnwood is produced based on standard dimensions without any standards or reference to quality. The study found that in production processes some trees used in production have been burnt and sometimes poor management of the plantation leads to deformation of the trees as a result of poor quality trees. But to producers the presence of blue stains and even cracks and twists in the timber are not quality problems unless sawnwood is just undersize in width, sometimes in thickness. This has resulted due to lack of any functioning grading system in place. This is a loss to traders because buyers can't accept sawnwood with those qualities.

It was also found that 10% of the respondents claim to be affected by forest regulations especially in transporting the product and documentation. The results found that sawnwood is supposed to be transported from 6.00 am up to 6:00 pm of which for the

long journey to Dar es Salaam increases transporting days and costs. Also some traders have claimed to face some problems with registration and transporting documents due to multifunctioning on the same task. There is no single registry for forest businesses during transportation of the product to the market. All forest traders are legally obliged to register their business (TEITI, 2014).

The study also found that infrastructure (14%) is also the problem especially from sawmills to the main road. It was found that poor road conditions cause big trucks to get stuck, as the roads condition to the logging areas are very poor hence results to difficult transportation of the logs to the sawmills. This increases costs of transportation and the use of more than one car to transport a single item.

Seasonality is another challenge mentioned by visited traders (8%) during this study. It is found that during the rainy season traders face problem of transporting sawnwood from production area. It is difficult to dry due to rainfall as a result of because of poor storage. Sawnwood turn greenish, heavy and twist which results into loss to traders.

It was also found that, market reliability is also a problem as confirmed by 11% of the traders. It was found that traders business depends on market information, availability and promotion of the sawnwood product. So, sometimes if the factors are not well utilized, it may slow the business as a result a bunch of sawnwood can stay in the yards up to 3 months without being sold. Also, the quality, availability, tastes, and prices of sawnwood have resulted into a strong competition with substution of sawnwood. The emerging competition between wood products in the building and construction work with substitute materials like concrete, steel, plastic and aluminum may result into dwindling of wood markets (FAO, 2007).

Table 11: Responses traders on major challenges faced along the chain

Challenges	Frequency	Percent
Price of sawnwood product	36	25.0
Quality sawnwood product	27	18.0
Infrastructure	21	14.0
Availability at sawnwood at production area and market	17	12.0
Reliable market	16	11.0
Forest regulation	14	10.0
Seasonality	12	8.0
Total	**146**	**100**

4.1.3.5 Middlemen participation in sawnwood business from SHFP

4.1.3.5.1 Characteristics of middlemen participating in sawnwood business

Middlemen are the ones who serve as intermediaries between the producers and the traders. Sawnwood trade depends on personal relationships. Majority of sawnwood traders (45 %) receive market information from the middlemen (Kapinga, 2010). The result found that, 100% of middlemen work to facilitate rapid dissemination of large quantities of products to the market. They sell the products to wholesalers or to retailers coming from different markets. They first communicate with producers on the availability of sawnwood and its price at a specific time. With this information on hand, traders are informed on availability and prices of the product to be supplied for sale. Later, they buy sawnwood from producers and supply them to traders in different areas at negotiable prices. The middleman knows the local demand for transport services and sells the information to the transporters for 10 % commission of the transport fee. The middlemen can facilitate transport of up to 5 trucks a day depending on the availability of product and transport.

The study found that, using middlemen is the safest and often the way of getting goods to transport. The middlemen are paid in cash immediately after the sawnwood is ready for transportation even though the transporters themselves are often paid after the goods safely reach the final destination. However, the middlemen can also be a good mediator

for people who are looking for working opportunities to load and offloading trucks when coming to their market.

It was observed that, most of the traders were reluctant to do business with unknown partners. Thus middlemen are crucial in several parts of the supply chain to transfer information on quantities and prices and acting as guarantors of the parties involved in the market. However, something notable for middlemen, they do not have sufficient working capital to act as large scale traders and transport goods to markets but serve as a link between the producers, traders and enduse manufactures for small commission. Very few traders own their own means of transport; many hire trucks once they have bought the goods. It is pointed out that middlemen are needed to link the producers or traders in need of transport to the drivers waiting for sawnwood to be transported.

4.1.3.5.2 Challenges faced by middlemen in facilitating sawnwood business

The study found a number of challenges faced by middlemen in sawnwood business. Most of the middlemen claim to face challenges during facilitating movement of sawnwood to the market. The challenges include insufficient capital, unreliable communication and lack of trust (Table 12).

The study found that 55 % of the middlemen claim about insufficient capital. Most of the middlemen depend upon producers, traders or enduse manufactures capital on the sawnwood business. So if one of the stakeholders fails to consume sawnwood the middlemen have no task to perform. It was also found that, 30% of the middlemen face problem in communication. The middlemen depend much on communication between stakeholders on availability of the sawnwood and the price of the sawnwood at that period of time. So the middlemen have to convince both stakeholders on the quality, quantity

and price at a certain concession and come into agreement. By poor communication among stakeholders may disturb the chain which results into failure of the business.

In linking stakeholders, trust is very important. The study found that, lack of trust (10%) between stakeholders causes failures and conflicts in accomplishing sawnwood business. Middlemen are trusted in such a way can be paid by traders in prior and made the payment to producers. Also middlemen can convince producers to produce and sell under credit and repayment made after selling sawnwood. So sometimes the traders fail to pay on agreed time and the responsibility falls to middlemen who have been trusted by the producers. Sometime middlemen are untrue by using money received from traders to purchasing sawnwood and run away, as a result such a loss occurred to trader and producer.

Table 12: Challenges faced by middlemen in sawnwood business from SHFP

Challenge	Frequency	Percent
Insufficient capital	28	56.0
Unreliable communication	18	36.0
Lack of trust	4	8.0
Total	50	100

4.1.3.5 Sawnwood transporters from SHFP

4.1.3.5.1 Characteristics of sawnwood transporters from SHFP

Transporters are part of the chain by taking goods from one trader to another for an agreed fee which is paid in cash. Most transporters use separate trucks for the off-road section, which delivers materials to distribution points on main tarmac highways. This study found that, transporters (97%) are not traders but they help producers and traders in delivering sawnwood product to the market with the exception of few traders and producers like Sao Hill industries who have the ability to transport and deliver the product to the market themselves (Plate 6).

Plate 6: Sawnwood from SHFP off to consumers

Most of the sawnwood from SHFP is transported by road as other means of transport like railway are not well organised. Kapinga (2010) found that, large trucks like semi trailers were found out to be mostly used in transportation due to their capacity to carry large quantities of sawnwood of different sizes over long distances. The study found that, 90% of transporters use trucks in transporting sawnwood to the desired market. This helps them to transport large quantities of sawnwood from 35 m^3 to 50 m^3 per trip. The transporters may be part of a large transportation companies but most often they work on freelance bases, driving a hired trucks or paid by the owner to drive goods on demand (Kapinga, 2010). The study found that most transporters get information about sawnwood to be transported through middlemen at production centre as well as in Dar es Salaam city.

4.1.3.5.2 Valuation addition process taking place at transportation sites

It was found that in transporting sawnwood, most of transporters (60%) add value to the product via packing in such a way the sawnwood docs not get cracked and bent on the way to the market. A part from that some transporters cover sawnwood or have covered trailers which protect sawnwood from sunlight and rain fall.

4.1.3..5.3 Sawnwood transport volumes transported, distance covered and transportation costs

The total transport fee depends on the distance, condition of the road and a possibility of getting something to carry back on return. The study found that poor road conditions and the distance to production areas become costly as the driver and the team has to pay for food, communication and accommodation while being stuck. Also regular changing in fuel price has resulted into increase in costs of transportation of sawnwood to the market. An assessment was made of the volume of sawnwood shipped, the distance covered by and the transportation costs. The findings show that, mean quantity of sawnwood transported per trip was 47 m^3. The distance covered per shipment is 700 kilometres from Mafinga production area to Dar es Salaam city. The mean costs of sawnwood transportation per trip is TZS 48 756 which takes 15 % of the sawnwood price to the market and the cost of driver and assistants who are popularly known as turn boys was TZS 6326 per m^3 (Table 13). It is estimated that 177 332 m^3 of sawnwood is transported annually on 3941 journeys 1031 (PFP, 2016). The driver of the truck often gets a very modest fee as the owner of the truck takes share of the profit. Sometimes it may happen, transporters are paid after selling sawnwood and deduction of other costs like transportation costs. The mean costs of fuel and oil was about TZS 11 388 per m^3. Due to fact that trucks do not transport sawnwood alone, the study could not establish other costs of transportation business such as motor vehicle licensing and wear and tear of the machine.

Table 13: Average quantity, distance and cost from Mafinga to Dar es Salaam city

Place	Value per m^3	% of price that goes to transport
Quantity	47	
Distance	700 km	
Transport cost	48 756	
Fuel cost	11 388	
Other costs	8 326	
Selling price	450 000	15

4.1.3.5.4 Sawnwood transporters knowledge management

The researcher assessed whether the transporters receive any training concerning sawnwood business. The findings show that, transporters (80%) haven't received any training concerning sawnwood business. That is, only 20% of the transporters receive market information on forest products transport regulations especially in the checkpoints or when caught with a problem of exceeding weight of the consignment (Table 14).

Table 14: Knowledge of transporters concerning sawnwood business

Training	Frequency	Percent
No training	40	80.0
Training	10	20.0
Total	**50**	**100**

4.1.3.5.5 Challenges faced by transporters in sawnwood business

The study found challenges faced by transporters including infrastructure, transport cost, location and security (Table 15). Logistics are important and always expensive component of the forest industry (Indufor, 2011). It was confirmed that, 36% of respondents indicated that transportation costs of sawnwood products are quite high. The cost is high in relevance to increase in fuel prices and maintenance. The study found that there is regular change in fuel prices which resulted into increased fluctuation of transport costs. Also long distance and poor infrastructure to the mills also increase costs. This observation is similar to what is reported in the study by Binomugiz *et al.* (1991) that

long distance transport from the roadside to the mills is the major costly item due to high costs of trucks and their maintenance and spare parts.

The poor infrastructure is one of the problems faced by transporters in accomplishing sawnwood business. The study found that most of sawnwood is transported via roads. The situation of roads in areas where the transporter is supposed to take sawnwood is not promising. MNRT (1998) indicated that, poor transport and communication infrastructure as well as limited accessibility to and within the plantations as major constraints, which have made all forest management and harvesting operations cumbersome to implement. In addition, some of them pointed out that the distance between the mills and the raw material sources aggravates the situation. Unfortunately in Tanzania, just like in most countries, the forest resources are located far away from the consumption centers (Indufor, 2010).

The study also found that, there are some check points which cause delays on weighing and road blocks by the police. There are several weighing stations along the roads to ensure that trucks are not carrying loads beyond recommended weight. The fine for excessive weight must often be paid by the transporters. This happens mostly because the trucks used in wood transportation are not specifically designed for sawnwood transportation as a result they get problems in balancing the weight. Most of them are used to transport other products like cement to other regions like Mbeya and Ruvuma and on their way back is when they venture into sawnwood transportation (Kapinga, 2010).

On transporting sawnwood, some transporters gave out their personal experience of being attacked by armed bandits who stop the vehicles by blocking the road with either a fallen trees, or nails which may cause a puncture. During the attack the drivers are forced out of

the vehicles and the goods transported are stolen. Sometimes the bandits drive away the truck leaving the driver in remote areas.

Table 15: Challenges faced by transporters of sawnwood to different regions

Type of vehicle	No. of Respondents	Percentage
Transportation cost	18	36.0
Infrastructure	12	24.0
security	7	14.0
Check points	8	16.0
location	5	10.0
Total	**50**	**100**

4.1.3.6 Sawnwood enduse manufactures from SHFP

4.1.3.6.1 Sawnwood enduse manufactures characteristics from SHFP

An assessment was made of the influence of enduse manufactures to the sawnwood market from SHFP. Results show that show that, most of the enduse manufactures were mostly consume sawnwood from SHFP for construction purposes (57%) furniture making (32%) and other activity creating crates (11%) (Figure7). Being a commercial city, Dar es Salaam has a lot of commercial activities and facilities therefore its economy is expected to grow year after year due to high rate of population growth and urbanization (Mgana, 2013).

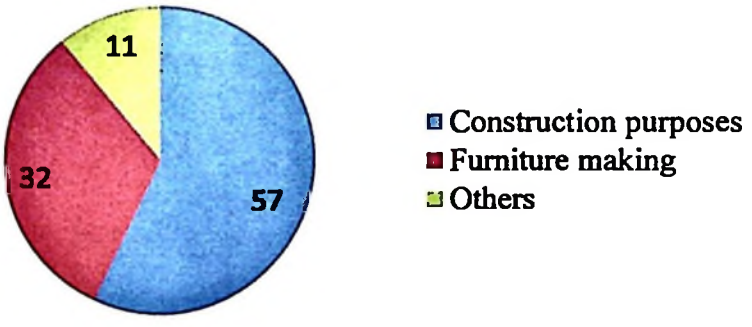

Figure 7: Categories for sawnwood consumption

Also the study found that, enduse manufactures (64%) dealing with sawnwood were individuals, 24% were private companies and 12% Government Institutions (Table 17). The implication is that, majority of individuals depend upon sawnwood to meet their requirements for basic household furniture making and construction. There are many carpentry, furniture marts/woodworking units scattered all over the country which add value on sawnwood by producing more or less same type of products such as doors, windows, beds, cupboards, chairs, tools, tables, shelves .Products from these units are characterized by poor finishing and are therefore largely consumed in the domestic market. The market for these products is gradually growing especially for commercial and office buildings. Some few individuals are attempting to produce packaging crates.

4.1.3.6.2 Factors contributing to sawnwood consumption to Dar es Salaam city from SHPF

The study found that sawnwood consumption was attributed by some factors like population growth, urbanization and economic factors. The quantity of wood used by households to meet their demand for furniture making and construction industry was calculated in relation to population growth, urbanization and economic factors. According to the data collected from the interview with enduse manufacturers, it was revealed that an average of 576 267 m^3 of sawnwood was used in Dar es Salaam City in 2013/2014.

The Dar es salaam city population increased to 4.3 million with growth rate of 5.3% which is higher compared to 2.5 million of growth rate of 4.3% in 2002 (URT, 2012). This shows that the population of Dar es Salaam will continue to grow rapidly for a number of years in future and hence increase in demand for housing, commercial activities and other basic social services. The demand of sawnwood is higher in Dar es Salaam city because as the major commercial, administrative and industrial centre. In

addition; Dar es Salaam city has a unique status hence, it is easy to access all parts of the world through airline, marine port and rail connection.

The study found that, the economic situation in Dar es Salaam differs from other regions in various aspects making the city an attractive investment destination for many different stakeholders. It was found that, the per capita income of the residents of Dar es Salaam Region was TZS 1 990 043 (equivalent to US $ 1,213) in 2013. The average annual per capita income of the residents of Dar es Salaam Region increased from TZS 1 337 257 in 2008 to TZS 1 990 043 in 2013. The Regional Gross Domestic Product (RGDP) at current prices for DSM Region amounted to TZS 5 428 503 (16.81%) in 2010 compared to 4 848 914 million shillings in 2009 representing an increase of about 12.0% and its respective per capita GDP was TZS 2 797 694 compared to 12 383 368 TZS of 2012 in current prices (NBS, 2012). The 1000 per capital consumption of sawnwood for Dar es Salaam City was 2.7 m^3 in 2011. This implies that Dar es Salaam city consumed a lot of sawnwood for difference purposes compared to other regions.

The rate of urbanization in Dar es Salaam for year 2012 was 6.5% which is higher compared to the country's rate 5.3%. It was estimated that the city needed 200 000 new plots per year to meet the housing demands (NBS, 2012). This confirms that, there is influx of people from up country, moving to Dar es Salaam city which results into increase in demand of the sawnwood product for housing and furniture.

Table 16: Category of sawnwood enduse manufactures observed in the study area

Category	No. of Respondents	Percentage
Individuals	26	52.0
Private companies	17	34.0
Government Institutions	7	14.0
Total	**50**	**100**

4.1.3.6.3 Sawnwood availability to the end market

The study found that, most of the interviewed enduse manufactures (90%) get sawnwood products from traders around timber yards found in nearby areas. This is with exceptional of the large enterprises (10%) that purchase sawnwood directly from the wholesale traders and producers. This is a result of the relationship and reliable markets with regular payments influencing consumption to specific areas. A relationship developed after trading together for a long period (Kapinga, 2010). Pascal (2006) also found that, the relation they had compliances with the relationship among partners in trading, facilitate marketing of sawnwood, build trustworthiness among trading partners and reduce transaction costs of sawnwood. This relationship informs who wants to venture in the marketing of sawnwood because it may take sometimes to get customers. This kind of relationship enabled producers to communicate directly with traders in Dar es Salaam to provide information on availability of sawnwood. Mgana (2013) found that, 23.3% of the building contractors get sawnwood from Dar es Salaam while 30% purchased from other regions.

Plate 7: Sawnwood consumption at Buguruni sawnwood market

The study found the consumption of sawnwood depended on the on the type of product produced, architectural designs and size of the building and its associated parts. Mankiw (2001) explained that the rate at which a consumer is willing to buy one good over the other depends on the satisfaction that a consumer receives from the goods which he or she is already consuming. It was found that construction aspect consumes more sawnwood from SHFP for roofing (67%). The study found that, the building with about 15 storeys, it uses up to 22 m^3 (Mgana 2013). On average, the lower category (none storey) buildings consumed about 2.7 m^3 of sawnwood per building while medium buildings (with 1 to 3 storey) consumed about 3.1 m^3 per building.

In construction activities, building more storeys uses more sawnwood for concrete molds and building ladders (Plate 8). PFP (2016) construction industry is growing and the use of wood will increase as a result of many forms like window frames, doors, plywood forms in concrete molds. Since sawnwood from SHFP are easy to handle and dry, the quality of products made from it is good. The result found that, most of contractors prefer to use this kind of sawnwood especially for roofing in order to reduce weight. The sawnwood can easily be treated using chemicals like water-based CCA and Tanalith E which are available in Tanzania. National Housing Corporation does buy large volumes of sawnwood for their construction activities (PFP, 2016). On the other hand sawnwood is consumed for doors and windows 18% and 15% respectively. The visited enduse manufactures report that, there is a limited market for sawnwood from plantations like doors and those that have been made are characterised by stability and good finishing. The main market demand for doors is for hardwood doors from indigenous hardwoods.

Plate 8: Sawnwood in construction building with more than 10 storeys

4.1.3.6.4 Responses on substitution of sawnwood from SHFP with other products

It was found that, 84% of enduse manufactures showed that, there was substitution of sawnwood by other products like aluminum, steel and plastic. The rest 16% were not aware of any substitution issues going on in the building industry. During interviews most of the respondents showed that majority understands substitution of beds, doors and window frames by none sawnwood building materials. Study by FAO (2011) show that substitution of sawnwood has also been driven by the decline in the quality and scarcity of good logs for production of good quality sawnwood products.

Surveys revealed that aluminum materials are currently popular in the building industry as most are substituted for roofing, sawnwood doors and windows (Mgana, 2013) found that, in buildings, sawnwood window frames are the most affected by substitution compared to sawnwood doors in the building industry and its effect increases with the increase in the number of storeys.

4.1.3.6.5 Sawnwood enduse manufactures challenges

According to the enduse manufactures, quality attributes were stated in terms of wood size, knots and straightness. Enduse manufactures (45 %) claimed to find undersize and bended sawnwood at the market. Another observed challenge is the price (30%). The price of sawnwood in the market is increased due to increased production, transport costs and increased demand of sawnwood products. For untreated sawnwood, the price ranges between TZS 2800 to TZS 10 000 per m^3 dependence with size and length. Availability of sawnwood is another observed problem (25%) especially during rainfall season. Unavailability in production areas also affects the market

4.1.4 Characteristics of producer, trader, transporter and enduse manufactures at Kilombero Valley Teak Company (KVTC)

KVTC is one of the oldest private plantations in Tanzania. The result found that, the plantation is the main teak sawnwood producers with capacity of producing up to 40 000 m^3 per year with fairly good recovery rates (over 40%) and good quality sawnwood. The other producers of sawnwood from KVTC include AJ Quality Timber and Teak Tanzania Limited. The plantation was established in 1992 and started harvesting in 2009 with mostly thinning. The study found that harvesting has increased from 92 ha 2013 to 354 ha of mature trees and thinning were 1 474 in 2013 ha to 516 ha in 2015.

4.1.4.1 Producers production technology

The study found that, the plantation has a guideline for harvesting and does all the harvesting and produce logs for production of different products like sawnwood. The plantation has management plans for harvesting after researching the existing market for teak in the prevailing period. The matured trees are monitored and harvested in between 20 to 25 years of age depending on the growth site. Harvesting is done using

harvester to avoid harvesting of unwanted trees. Thinning is done for selective teak trees to reduce competition between trees and favours the best trees for long term growth. First thinning is done at the age of 9 years, (density reduced to 650 trees/ha) then at age 13 (density reduced to 400 trees/ha) and lastly at age 20 to reach the final density of 250-280 trees/ha and expected to be finally harvested at 30-32 years old. The three interim thinning are planned to be utilized for commercial production. The plantation has ability to harvest up to 4500m^3 per month, of which 70% goes to the mills for sawnwood production and 30 % are sold as logs. It was also found that the contracted companies receive 5000 m^3 of logs per annum for sawnwood production. The study found that the logs are then sorted and graded in reference to its Diameter at Breast Height (DBH) (Table 17). This helps to decide what type of product to produce in relation to the grade of tree. The study found that the plant use twin band saw plant in processing the sawn log. The plant has ability of processing 100-170m^3 of logs a day.

Table 17: Sorting logs in reference to its size

Grade	Size of logs
A	10-16
B	16.5-21
C	21.5-25
D	25-up

The study found that, sawmilling is working yearly with only two weeks holidays during December. There are different sizes produced with width of 6 to 9 inches (Table 19). The mostly produced sizes are 3x3 and 4x4 but for other sizes it has to be a special order. All the sizes produced have to follow in among 3 characteristics; the first category is sawnwood which is with fine surfaces in all sides. The second category is characterised with rough squares with unclean ages and third category is characterised with bark on one side (Plate 8).

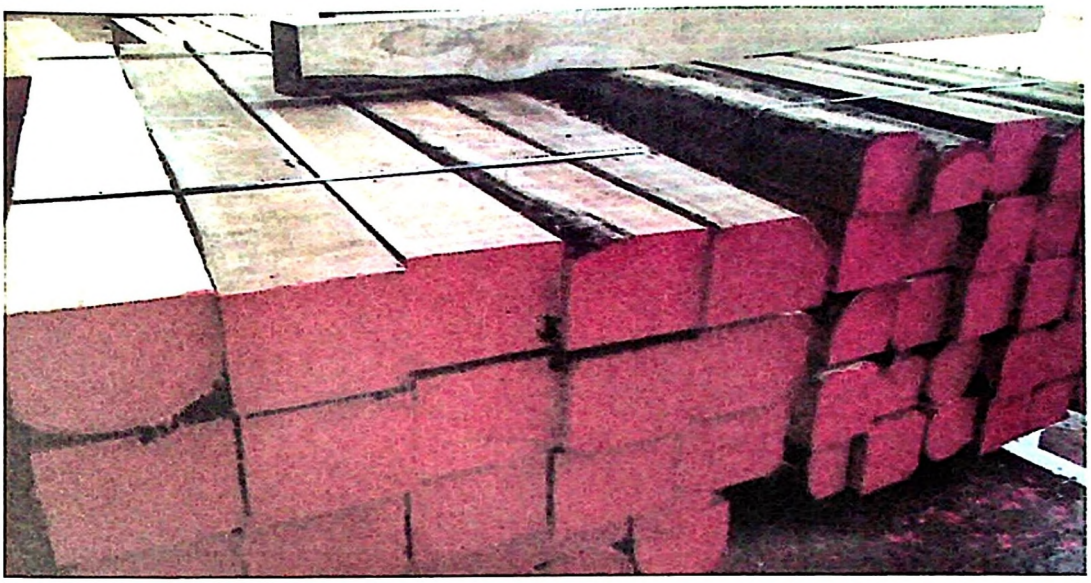

Plate 9: The rough square with bark in one side from KVTC ready for transport

The sawnwood with square faces is one intended for the market locally and internationally. Also in marketing, the sawnwood can be either Kiln Dried/Air Dried-Export with good qualities for export and Kiln Dried/Air Dried -Reject for those which are not eligible for export. Also it is divided into categories in reference to size (Table 18).

Table 18: Characteristics of the sawnwood produced by KVTC

Size	Wood characteristics	Categories
3x3	1-sawnwood	1-KD/AD Export*
	2-rough square(ages)	2-KD/AD Reject
	3-bark on one side	
4x4	1-sawnwood	1-KD/AD Export
	2-rough ages	2-KD/AD Reject
	3-bark on one side	
6x6 6x8 6x7 5x6	1-sawnwood 2-rough ages 3-bark on one side	This is special order 1-KD/AD Export 2-KD/AD Reject

*KD/AD represent Kiln Dried/Air Dried

In this product category 1 and 2 are normally produced with respect to the existing market but category 3 is the one with very special order from the customer. In production system, the plantation has operated with 100 laborers per shift.

4.1.4.2 Value addition to the teak sawnwood produced

The study found that, KVTC does not sell standing trees rather they add value by either logs or sawnwood or any other product. The study found that the plantation has integrated facilities for value added products including pressing rough squares, air and kiln dried rough sawnwood, finger jointed edge glued panels, unfinished solid floorings, and decking products for local use and export (Plate 10).

Plate 10: Teak sawnwood air drying, storing and finger jointed product from KVTC

It was also revealed that, KVTC has performing Forest Sterwdship scheme (FCS) to Control Wood and Chain of Custody certification .This adds value to the sawnwood they produce and it is easy tracking their sawnwood to the market.

4.2.1.3 Producers knowledge management at production level

The study found that, most of the employed workers at KVTC are Kilombero residents which brings opportunities and skills training to the area whose the main source of income is subsistence farming. The plantation has employed fulltime job to 300 people and subcontract additional 200-300 workers to assist growing, cultivation, harvesting and extraction. In the management team, the study found that 89% of the employees are junior, 10% are trained Tanzanians in the management team and 1% are expatriates (Figure 8).

It was found that most of the employees at KVTC receive different on job training facilitated by the plantation. Plantation provides technical and specialized skills training in all aspects of sustainable forest management (KVTC, 2014). It was also revealed that between 2011 to 2014, there were different courses offered to KVTC employees by the plantation (Figure 8). Also the study found that, a part from knowledge imparted to employees, the plantation offers some fringe benefits including medical support for staff members and their families, a month of paid leave and a housing allowance, as well as covering school fees for the children of its employees.

Also, KVTC goes to next level of undertaking high priority on the health and safety of its workers and contractors. The company is certified and annually audited by ISO 14001 to the OSHAS 18001 standard, an internationally accepted standard of assessing and auditing occupational health and safety management systems. Workers are provided protective clothing and equipment and regularly trained in safe work procedures.

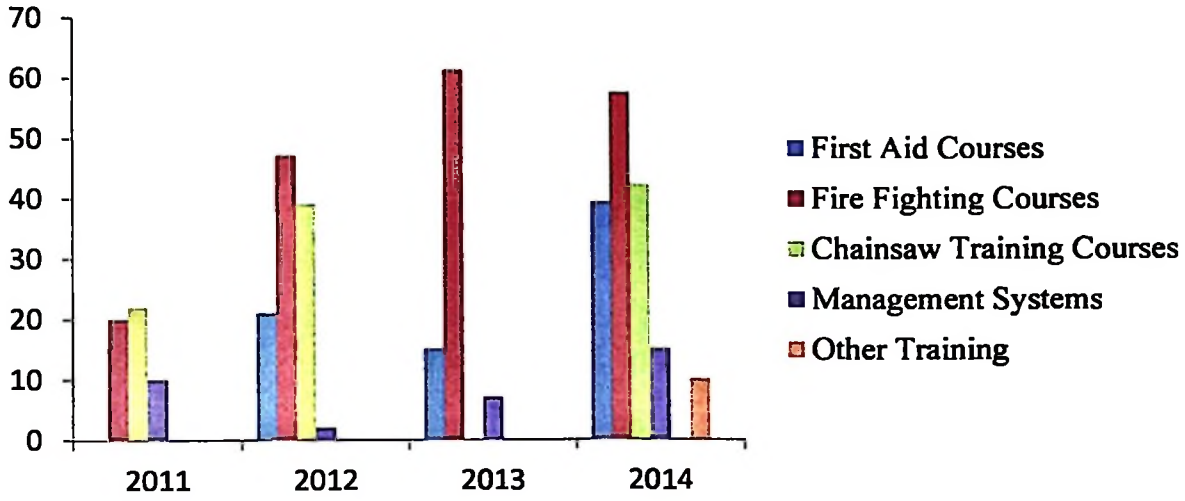

Figure 8: Knowledge description of sawnwood producers at KVTC
Source: KVTC (2014)

4.1.4.4 Trading Teak from Kilombero Teak valley (KVTC)

KVTC is the main source for trading teak sawnwood and other product .The plantation is the one of the main suppliers of the processed plantation 70% of teak produce to the international market like India, which is the largest teak consumer in the world and 30% to the local market (KVTC, 2014). The plantation trade of logs and the processed product is guided by inventory, the market plan and market research which are done in prior. In marketing research, the management visits different teak exhibitions looking for teak price and export market. In export market, they have 3 to 6 months business contracts for total supply of teak sawnwood to their stakeholders. The agreed price is reviewed after every 3 months. The plantation has an office at Dar es Salaam for planning and logistics. The study found that, the industry has ability of supplying 25 m^3-50 m^3 per day. The study found that, the volume exported was increased from 5293 in 2010 to 12 988 m^3 in 2014 (Table 19). PFP (2016) found that, in 2015 the export of teak to India and China was accounted around 15 665 m^3.

Pricing is an entity which looks upon different aspects before placed. KVTC sets price on the basis of the production cost which involve the costs of management, production, processing and transportation to the market. Also the price is determined by market situation especially on the existing market teak market price and quality of sawnwood product which include the size, the quality of tree used to produce product. Sawnwood price ranges from $250 - $750 per m^3 and logs Range from $70 - $250 per m^3. KVTC have 5 years contract with two companies at the local market namely; are AJ Quality Timber and Teak Tanzania Limited. These have contracts of receiving 5000 m^3 of logs per annum. These companies have ability to export up to1000 m^3 per year.

Table 19: KVTC sawnwood export

Year	Volume of teak exported (M^3)
2010	5 293
2011	9 902
2012	10 700
2013	10 511
2014	12 988

Source: KVTC (2014)

KVTC management as a major trader, they involve other traders/middlemen internationally or locally to attain their business goals. The middlemen work a lot with the management in linking the consumers. On the other hand KVTC is a major transporter of its product locally but they have contracts with transporter called Master One to transport products to the consumers locally or to the port for international shipping. Also the plantation is located near TAZARA railway so some of the product is transported by railway to Dar es Salaam port for international shipping. From this type of movement is where the enduse manufactures receives their aimed product (Plate 11).

Plate 11: Teak from KVTC transportation to the market

It was found that most of the teak is consumed at international market where by India, china and Dubai are the major teak consumers. For the company to be eligible to export sawnwood, they have to follow government rules by receiving, export registration certificate, export license, TRA and TP. Also the company is supposed to have incorporation certificate, tax clearance, order letter and invoice. The government offers approval for conducting the business. In the local market, teak is mostly consumed by government institutions and big private sector consumers.

4.1.4.5 Challenges faced by KVTC plantation in sawnwood business

The plantation has identified a number of challenges from production to marketing which include forest regulations, infrastructure and unreliable marketable. Market reliability is the heart of the sawnwood products business. It was found that market fluctuation is one of the challenges faced by KVTC in marketing sawnwood produces.

The market for teak sawnwood has been dwindling due to economic recession and regular change in teak world price. Also there is influx of teak sawnwood from other country which creates a lot of competition. The perception of quality may be different depending on actors in the value chain.

The study also found that transport is a problem. The plantation has contracts with transporters in facilitating sawnwood to the destination. The study found that, sometimes transportation can fail due to miscommunication among partners. This causes failure of the product to arrive to consumers' places or exporting zones on time. It was found that the road from Kilombero to Ruaha is tarmac road, during rainfall it is very difficult to transport logs to the sawmill. This increases costs of transportation and the use of more than one car to transport a single item.

It was also found that, KVTC has been affected by some forest regulations especially in sawnwood processing and marketing. The plantation has faced challenges with forest bans especially in log export and size of the sawnwood to be transported. The government has banned log exportation in order to minimize theft and to add value to the product. This limits the plantation to get market for the variety teak products. Also the government dictates the size of the sawnwood to be exported. For teak sawnwood must not exceed 6 inches width.

4.2 Sawnwood Value Chain Analysis and Marketing Practices

4.2.1 Raw material supplied from SHFP government plantation

Forest resources from SHFP, which covers about 85% of the total softwood resources used in Tanzania, has impact on the development of the wood-product industry, market and the volume of materials reach the Tanzanian market. The plantation forests contain

pine, cypress, and eucalyptus. The plantation has a total area of 135 903 hectares out of which 46 000 ha are planted with Pines (42 500) and Eucalypts (3500) and 104 cypress with 52% sawnwood plantation and become the largest among the 16 National Forest Plantations; 48 200 ha are natural forests and river valleys managed as water catchment areas; 41 003 ha are extension areas and 1 700 ha are areas for other uses including residential (MNRT, 2014, AFF, 2011).

The study found that, registered enterprises are qualified for government plantation resources allocation. The fee structure is all-encompassing: It comprises categories for business sizes (micro, small, medium and large) as well as for business activities. The lowest fee, for sawmills which produce less than 5000 m^3 of logs per annum, is TZS 512 000 per year. Those businesses which process between 5001 and 10 000 m^3 of logs per annum pay TZS 1 million (MNRT, 2014). The majority of operators fall into the smaller category followed with medium and large enterprises. Under current regulations, a wood enterprise must qualify technically in terms of the types and performances of the machinery it uses and the technical experts it employs. The last survey of the technical machinery used in the Sao Hill Forest Project (SHFP) was reportedly carried out in the 2012/13 season (PFP, 2016). According to TFS, of the total resources allocated in 2012/2013 was 900 054 m^3 of which 44% goes to large scale producers and 56% goes to medium producers and goes to small scale producers. The allocated pine was processed with varying recovery rate from 30 to 40%.

4.2.2 The raw material from Kilombero Valley Teak Company (KVTC)

KVTC is a private owned forestry company, a plantation forest, saw milling and value adding integrated company. This is one of the oldest private plantations introduced in 1992 with teak plantation. The Company has a total of 28 000 ha of land allocated for

conservation and tree growing purposes in Ulanga district near Ifakara. 8165 ha land is planted with Teak of Indonesia origin and the rest 20 000 ha is left for purely conservation flora and fauna. The study found that one of the main objectives of KVTC is to establish a processing industry in the same area where the timber is sourced.

The plantation is the main sawnwood producer with ability of producing up to 45 000 m^3 annually. The annual allowable cut is determined through the Micro forest system by running a simulation with the Harvest Scheduler Simulator – HSS (KVTC, 2015). In 2013/2014 about 42 000 m^3 of round logs were harvested. The optimum sustained volume is an indication of business sustainability and maximum volume production (KVTC, 2015).

The Company has already started harvesting (thinning) and produces over 100 m^3 teak sawnwood per day. This has brought high income to the company just after 20 years since the first planting. Company main market is still wet sawnwood which represents approx 70% of sales income and the current main market is India. This is a registered company with 99 years land lease with 1 000 000 registration payment. The industry has to pay for taxes like TRA, NSSF, CESS, Excess Duty, Land Rent, Withholding Tax and Import Duties. The study found that the industry in 2014 paid 718 000 $ for taxes and received 168 000 $ VAT refund. Other costs include;

-TZS 160 000 for inspection and grading fee per 20 cubic meters consignment

- TZS 160 000 for export permit issued

-TZS 5 000 export permit certificate by the Ministry of Natural Resources and Tourism

4.2.3 Sawnwood production costs from government and private plantation

In this study transaction costs are grouped into six classes, namely resource cost, Market information costs, transportation costs, negation costs, monitoring costs and enforcement costs. Resource costs are incurred during set up for resource transaction. Market information costs are incurred previously before the transaction while attempting to obtain information on the transaction. Negotiation costs are represented by all costs encountered during the set-up of the transaction. Transportation costs are incurred during packaging and transferring product and monitoring costs are the transaction costs incurred to monitor agreed conditions and finally, enforcement costs on the exchange of the agreement.

4.2.3.1 Producers resource transaction cost for processing logs

The results found that the price of buying trees from SHFP is calculated by including royalty fee. According to field survey, most of the trees (standing tree) exceed 30 cm diameter at breast height, so the average royalty for standing trees by estimate between 19 635 and 37 690 TZS per m^3 (MNRT, 2014).

Others costs included in the purchasing of the standing tree are,

- Tanzania Forest Fund (3% of the royalty),
- VAT 18% charged from the royalty,
- Logging miscellaneous deposit account (LMDA) and road maintenance, Transport permit of TZS 7500 per truckload less than seven tons and TZS 15 000 for heavier
- CESS 11 000 for documents
- SAFIA

The average total cost per m^3 for a mature stand, including all costs listed above is TZS 44 000 per m^3 of standing trees, as per the scaled volume. On the other hand, in private industrial plantations, the resource materials are coming from their own plantations. They process majority of their resources by themselves and released some logs (not a standing tree) onto the market. The cost of tree is established from management costs of the tree from plantation to rotation age. The resources are mainly used for industry's own operations and sell the product obtained. Kilombero Valley Teak Company Ltd. (KVTC), grows teak on their plantations, processing approximately 70% of its resources while selling the other 30% to local sawmill businesses.

i) Resource processing cost

The study found in government plantations, cutting and de-branching are done by chainsaw contractors who provide harvesting services on a performance-rate basis. It is used by both small scale, medium and large sawmills such as Sao Hill Industries. The study analysed costs for complete harvesting service to be TZS 6000 – 20 000 per m^3. Chain saw operators costs between TZS 1500 – 2500 per tree harvested. The total harvesting costs assessed was between 21 000 – 35 000 TZS per m^3 with an average of 28 000 TZS per m^3. On the other side, private plantation harvesting is done by the plantation using harvesters which select the wanted trees and leave the unwanted ones. The study analysed the costs of complete harvesting operations and transportation to the mill to be from TZS 80 000 to 195 000 depending on the distance, condition of the plantation and operation from plantation to the mill.

ii) Operation cost in relation to sawmill technologies

The study found that, Dingdong or /micromills or Amec sawmills (72%) are the most extensively used technology at the Sao hill forest plantations, but there are also other

sawmill technologies in use, namely circular sawmills of Kara/Laiment, horizontal band saws, CVT and medium advanced saw machines. The cost of investment of sawmills is different between dingdong and other technologies. The study found that the investment cost ranges from USD 2000 to USD 60 million depending on the type of machine invested.

The study found that the average operational cost from harvesting to processing for smallest machine costs TZS 287 000 per m^3 and most of sawnwood produced are sold to the near markets around production areas, like Mafinga (Table 20). In contrast, larger sawmills located in Mafinga manage the whole value chain from stumpage to selling sawnwood with average cost of 304 034 per m^3 (Table 13). The reason for this is that, sawmilling technologies differ in investment costs, need for labour, fuel and maintenance, production capacity and recovery rates. But the amount produced is different between small scale production (up to $7m^3$ per day) and for advanced technology is from 16-250 m^3 per day. Choice of technology has impact on resource utilization efficiency, profitability of the operations and consequently on the whole sawnwood value chain (PFP, 2016).

The study found that, KVTC (100%) of the product produced is value added with average processing and value adding costs is up to TZS 120 000 per m^3 (Table 21). KVTC uses MULTISAW (South African made) band saw milling technology in the saw mill, logs are sorted prior sawing into several different diameter groups to enable the saw mill to perform its best output. Log sorting conveyor feeds logs to the saw mill where twin 4" band saw breaks the log in to blocks, secondary line re-saw cuts to various size of sawnwood which will be taken to green chain for grading to different sizes. The plant has ability of taking from 100 to 170 m^3 of logs a day and producing up to 100 m^3 a day.

KVTC has 8 chamber drying kilns (new) and state of the art value adding plant supplied by German origin WEINIG (PF-CT, 2015). This value adding processing including teak flooring, decking, laminated solid wood boards for export market. It was running only approximately 25 600 m^3 which is only 20% of its capacity (PF-CT, 2015).

It was found that, the value added sawnwood in prime grade is sold up to TZS 1 600 000 per m^3 while lowest grade (mix with sapwood and heartwood boards will sell at an average price of TZS 600 000 per m^3 and Logs range from TZS 140 000 – 500 000 per m^3. On the other hand, the product like laminated boards fetch over S 1000 per m^3 (16 mm x 1200 mm x 2400 mm) depending the grade and the selling figures indicate a highly profitable business.

4.2.3.2 Market information transaction cost

One of the factors influencing transaction costs is uncertainty of the markets. Market information can be costly and difficult to obtain, especially in conditions of reduced information flow. The factors incurred in obtaining market information can be activated by the sawnwood actors involved in disseminating market information and the price of the sawnwood product. Market information is one of the essential factors in enabling marketing of sawnwood.

Results have indicated that most producers (39%), traders (41%) and traders (100%) from both government and private plantation respectively, provide market information through market price and communication among actors (Table 20). Public price information improves the market to all participants and reduces opportunistic tendencies and the problem of market uncertainty that induces transaction costs (Charles, 2008). Similarly, Indufor (2011) exchange of price information is common and prices are discussed openly.

On the other hand, most of producers are price takers because of their limited information on the existing sawnwood markets. The producers receive information from traders, middlemen, or enduse manufactures Results show that, producers (21%) and traders (36%) set prices with reference to the existing market price (Table 20). White (1992) found out that, retailers, brokers and distributors also have interest on how they price products since it must allow them to make profit while distributing the product. This implies that producers who obtain accurate price information from reliable sources deliver their produce to remunerative markets. With cost-oriented pricing, producers try to recover all expenses of bringing the product to the market including labour costs, delivery costs and profit (Kapinga, 2010). However, it was found out that, price is set by both traders (14%) and producers (19%) (Table 20). The percentage of traders is greater than that of producers because they normally have prior information on the current supplies and demands of sawnwood in relation to the needs of their customers. Traders from different areas have tendency of communicating directly with producers through cellular phones on availability and price of sawnwood. The traders then orders the amounts of sawnwood needed and the producers prepare the same. It was also revealed that producers (3%) and traders (6%) depend on all both market price and negotiations.

Further scrutiny shows that, in the production and market centres, it was found out that, there was a difference in price between treated sawnwood and untreated sawnwood. Treated sawnwood was sold at TZS per 333 837 m^3 while untreated sawnwood was sold at 400 000 per m^3 at production centres. On the other hand the average price of sawnwood at market centres was between 460 205 per m^3 for untreated and 520 000 TZS per m^3 for treated. There was a considerable price premium for better quality sawnwood in Dar es Salaam, better quality sawnwood prices are ¼ higher than poor quality timber (PFP, 2016).

Table 20: Response on sawnwood price information along the value chain

	Government plantation				Private plantation	
	Producers		Traders		Producer/Trader	
Price setting mechanism	Respondents	%	Respondents	%	Respondents	%
Market price and negotiation	110	39.0	60	41.0	3	100
Market price	60	21.0	52	36.0	0	0.0
Trader/producer	54	19.0	21	14.0	0	0.0
Negotiation	49	17.0	8	6.0	0	0.0
Trader/producer/consumer	10	4.0	4	3.0	0	0.0
Total	**283**	**100**	**146**	**100**	**3**	**100**

It was also found that that, majority of sawnwood traders (40%), receive market information from middlemen. Similarly to private plantations, KVTC (100%) receive market information from middlemen. Middlemen are the ones who serve as intermediaries between the producers and the traders. Middlemen were observed to be the ones who connect producers to sellers and then enduse manufacturers through facilitation for rapid dissemination of large quantities of products to the market. They first communicate with producers on the availability of sawnwood and its price at a specific time. With this information on hand, traders are informed on availability and prices of the product to be supplied for sale. Later, they buy sawnwood from producers and supply them to traders in different areas at negotiable prices.

On the other hand, the study revealed that 60% of the producers received information from traders and other producers (Table 21). This shows that there is a good link between traders and producers in the marketing processes. On the other hand, 28% of traders received information from enduse manufactures. It was noted that through phone calls and good relationship among members, the market information is transferred easily between and among business members.

Table 21: Response by producers and traders of sawnwood on sources of marketing information

Sources of Marketing information	Government plantation				Private plantation	
	Producers	%	Traders	%	Producer/ Trader	%
Enduse manufactures	45	16.0	41	28.0		
Traders and Other producers	170	60.0	46	32.0		
Middle men	68	24.0	59	40.0	3	100
Total	**283**	**100**	**146**	**100**	**3**	**100**

4.2.3.3 Transport costs for sawnwood

Transportation costs in terms of time taken to reach the market are incurred by the households when transporting the produce to the chosen market. The study found that, the total transport cost depends on the distance, condition of the road, and a possibility of getting something to carry back on return. It was found that, logs are transported to sawmill and sawnwood is transported to local and main markets. The study included analysis of transport rates from most main distribution points as well as points starting off-road in the forest. Transportation to saw mills is mostly on poor-quality and poorly maintained roads with little or no tarmac cover. The distance from allocation areas to the sawmill are far from the main road as a result uninspected lorries and tractors are used. It was also found that, they pass through TFS checkpoints, at which logs are inspected and CESS collected, most of trucks do not go on main roads and therefore avoid costs of annual inspection, insurance and tax. Findings indicate fairly low rates for log transport as rates per m^3 varied from 8000 – 12 000 TZS per m^3 for short distance. Large stationary sawmills have considerably higher transport rates from 25 000 – 40 000 TZS per m^3 were estimated for long distance transport to the mill.

On the other hand the distance from sawmills to the main road (Mafinga) has effect to the type of transport used, time and transport charges which has also direct effect to the price

of sawnwood. It was found that the distance between kitasengwa and Mafinga is more than 70 km, they use local transport facilities like small pickups and lorries which can reach remote areas to take sawnwood to the markets which doubles the costs.

On the other hand, Transportation to markets is mainly on tarmac roads and although in some cases such roads are poorly maintained, they are of better quality than forest roads. Trucks pass numerous checkpoints and weighbridges on the way to the market. It was found that most of the trucks load from 25-35 m^3. Transportation rates from distribution points to the main market in Dar es Salaam are more uniform. The average rates for transportation to markets is TZS 48 756 per m^3 trip. Rate per truck was difficult to assess as different trucks carried different volumes between 25 -50 m^3 per trip. Transportation to markets is mainly on tarmac roads and although in some cases such roads are poorly maintained, they are better quality than forest roads.

The study found that, the plantation is divided into three blocks which are distant from each other, so KVTC uses lorries and tractors from plantation to the mill. Transportation to saw mills is mostly on poor quality and not tarmac road with little maintenance by the plantation. The plantation uses road and TAZARA railway on transporting products to the local market or to the Dar es Salaam port for international shipping. The contracted company transports products to Dar es Salaam and for export costs the average fee was TZS 120 000 per m^3. The transport costs took 12% of the total transport cost. It was found that the industry transports about 2 containers carrying 25-50 m^3 (Table 22).

Table 22: Average quantity, distance and cost from Mafinga to Dar es salaam City

Place	Government plantation		Private plantation	
	Value per m^3	% of price that goes to transport	Value per m^3	% of price that goes to transport
Quantity	47		47.5	
Distance	700 km		700	
Other costs	8 326			
Fuel cost	11 388			
Export cost			60 000	
Transport cost	29 042		60 000	
Total cost	48 756		120 000	
Selling price	450 000	15	1 047 00	12

This hints that some places around the study area are poorly accessible and thus exposed to high transaction costs which hinder their participation in the markets. Escola (2005) also reported that, infrastructure barriers coupled with high transaction costs diminish the volume of traded goods in Tanzania. Producers and traders who perceive difficulties while travelling to better market avoid the underlying costs by opting for the local market. The average time required for travelling between the seller and the buyer has been used elsewhere to measure negotiation costs in other studies (Temu, 2005; Vakis *et al.*, 2003). From government plantation, sawnwood traders are buying sawnwood in Mafinga and selling it in Dar es Salaam. But some of the producers with more processing capacity are also themselves organizing transportation and selling the sawnwood in Dar es Salaam instead of Mafinga.

There was price difference at different levels of market chain from production site to the market destinations where sawnwood were sold. The results show that at production site the buying price was lower than that of market centres. The results, further show that, at the production areas the average price was TZS 333 837 per m^3 and for private plantation the average price was TZS 1 047 000 (Table 23). According to producers, prices are determined based on costs incurred in the production process. But in some circumstances

a producer may be forced to sell at a price lower than the cost based price in order to maintain his / her market share. For example in a case where the consumer is so weak, the products may have to be sold at a loss (Eskola, 2005).

On the other hand, the price starts to increase with distance. For sawnwood transported from production site to Mafinga town the average price of sawnwood was TZS 144 000 per m^3 which was an increase by 3 % from the production site. When the wood was further transported, the price increases even more. For instance from Mafinga to Dar es Salaam city the price increase range from 18% to 30% (Table 23). The increase in price from one destination to another was due to transport cost, storage, seasonality and demands of sawnwood at that particular time and place. At production site, most of sawnwood produced was sold at whole sale price. At most of the destinations like Dar es Salaam, most of traders sell sawnwood on retail basis. A piece of sawnwood is sold between TZS 1000 to 10 000 depending on size. Also from private plantation the prices increased by 11% from production to marketing site. This is due to increased cost of production, transportation and shipping.

It was also found that prices differ throughout the year following production trends. It was found that, weather condition has influence in sawnwood production, transportation and availability of customers. This increase in price of sawnwood and hence result lowers the quantity of sawnwood produced and sold.

Table 23: Price comparison in different destination from Mafinga to Dar es Salaam City

Area	Government plantation			Private plantation		
	Average buying price per m^3 (TZS)	Price increase	% increase in price	Average buying price per m^3 (TZS)	Price increase	% increase in price
Production site	333 000	0	0.0	925000	0	0.0
Mafinga town	350 000	17 000	3.0			
Iringa	377 000	27 000	7.0			
Morogoro	410 000	33000	.08			
Coast	450 000	40 000	1.0			
Dar es salaam	460 000	10 000	18.0	1 047 000	122000	11.0

4.2.3.4 Monitoring or enforcement costs for sawnwood.

The study found that, relation with buyers on low quality product entail delays in receiving payments, other time losses and even reduction in price. PFP (2016) state that, the market for sawnwood is gradually starting to acknowledge quality differences in sawnwood and pay higher price for better quality. Table 24, present results on quality acknowledgement by actors. Producers were asked to acknowledge the quality of sawnwood delivered. According to the analysis a mere handful (20%) of enduse manufactures admitted that time they had arguments with traders and producers over quality dissatisfaction put up on their sawnwood for sale. The average price premium of high quality timber is 27% per cubic meter for lower quality timber from small sawmills. Some producers (9%) claimed to face problem of being allocated to areas with poor trees which are not suitable for sawnwood production.

Traders also described quality attributes according to their customers' needs. About 48 % of visited traders reported to supply to their customers sawnwood of good quality. Sawnwood produced by advanced technology sawmills is of better quality than the timber produced from dingdong saws, and consequently paid a higher price. When asked about

the size, they claimed that sawnwood with size up to 3m long was the most preferred by customers. The majority of sawnwood from dingdong saws is 12" or 3.6 m long and is sold based on the price per piece. Higher quality sawnwood is now becoming available in lengths from 4 – 6 m long and is sold based on a price calculation per running meter or running foot. The implication is that if the wood is undersize i.e. Less than 12", it is difficult to get customers and it fetches low price.

On the other hand, a fairly large proportion (65%) and (55%) of producers and enduse manufactures who declared that they have never encountered such problem with buyers delivered producer to the markets. PFP (2016) noted that, the large industry sellers with high quality sawnwood and tight size tolerances sell with published price lists showing prices per running foot, running meter and cubic meters. If a trader or enduse manufactures engenders conflict over producer quality, the producer will not be sure that the transaction will be completed successfully. In this case all previous information and negotiation costs will have been misspent, a new buyer might need to be found and time will have been lost with the wrong customer (Charles, 2008). Quality uncertainty has been also used by Hobbs (1997) to represent monitoring costs.

Table 24: Sawnwood quality attributes

Category	Good size, no Colour and straight	Moderate size, coloured and straight (%)	Undersize, greenish and bended (%)	Total
Producers	65	26.0	9.0	100
Traders	48	35.0	17.0	100
Enduse manufactures	55	27.0	20.0	100

Trustworthiness of the enduse manufactures is another form of monitoring and enforcement costs. Confidence in enduse manufactures assists the producer in carrying out smoothly and thus reducing all the transaction costs. According to the survey results,

75% of producers have high trust to traders and middlemen in conducting sawnwood business (Figure 10). On the other side producers of (25%), transporter (32%) and enduse manufactures (27%) who had low trust or total distrust in traders and middlemen put up their sawnwood for sale to steer clear of the costs of searching for information on the reliability of the market. However, the evidence was not clear for sales in the niche markets. This implies that trustworthiness of buyers is also an imperative determinant of where a producer sells.

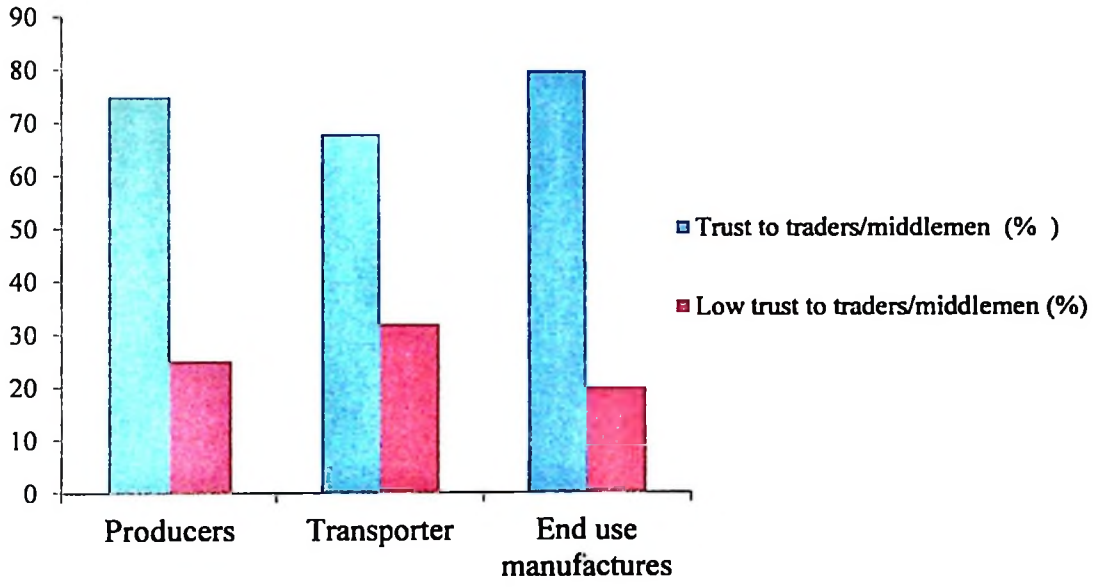

Figure 9: Trustworthiness in sawnwood business

4.2.3.5 Negotiation costs and technical efficiency

Thought recruitment and negotiation between producers, traders and transporters is conducted by the middlemen. The trading of sawnwood product is done by negotiation. The study found that, middlemen are the ones who serve as intermediaries between the producers and traders. The middlemen have to monitor availability of the product at the production area and communicate with traders and vice versa. Through mobile phone is where the business is undertaken and sometimes the payments are done.

In this study, Middlemen were observed to be the ones who connect producers to sellers and then enduse manufacturers. Middlemen are working to facilitate rapid dissemination of large quantities of products to the market with a certain amount commission. They sell the products to wholesalers or directly to retailers coming from different markets.

They first communicate with producers on the availability of sawnwood and its price at a specific time. With this information on hand, traders are informed on availability and prices of the product to be supplied for sale. Later, they buy sawnwood from producers and supply them to traders in different areas at negotiable prices.

4.2.3.6 Econometric results for transaction costs versus Technical efficiency

Table 22 and 25 present the Tobit model results for the relationship between Transaction efficiency at two-stage value chain model infer sawnwood production and marketing and the explanatory factors. Following the theoretical explosion, insight from literature and analytical results, most explanatory factors were significant at 1% level and the coefficient signs concur with the aforementioned expectations. The significant coefficients support the hypothesis that market structure is significantly influenced by transaction costs factor. Moreover, the log likelihood value of 1.8929E10 and 35.75069 for production and marketing was significant 1% level ($p < 0.001$) respectively.

According to the result two out of the seven variables in production stage included in the analysis have a significant passive effect with the probability of technical efficiency, defined as access to type of machine used against volume traded. Significant variables included; the operation system, maintenance, transport, fuel, resource availability and market information. The marginal effects of this variable were observed to have positive impact on technology used. Marginal effects of these variables were observed to account

for the probability of producers to produce with reference to technology used resulting from unit increase in explanatory variable.

The results show that, the maintenance in sawnwood production has negative effect to the volume produced and technology used. The increase in the marginal effect of the variable has decreased the likelihood to technology used. The operation cost on volume of sawnwood produced was observed to have positive effect on technology used in production. A marginal effect of 0.999999 indicate that, larger quantities of sawnwood produced had a significant ($p < 0.01$) impact on technology (Table 25). This implies that, every additional unit of operation cost in sawnwood production increased by technology used for 56%. In fact, when the producers use high technology, the operation cost increases and the volume produced is higher compared to low technology.

Table 25: Sawnwood production transaction cost

Variable	DF	Estimate	Error	t -Value	P-value
Constant	1	-10.665616	0.000000622	-1.71E7	0.001**
Operation cost	1	0.999999	0.000001784	5.60670	0.001**
Maintenance cost	1	-5.82602E-10	1.5435662E-9	-0.38	0.7058
Transport	1	6.205056E-10	8.575506E-10	0.73	0.4693
Fuel cost	1	0.000001298	0.000001782	0.72	0.4666
Resource availability	1	4.171708E-9	3.2710344E-9	1.23	0.2022
Market information	1	5.9741891E-9	2.5657342E-9	2.33	0.0199*
Dingdong	1	3.8534421E-9	6.9632516E-9	0.55	0.5800
Advanced machine		0	0		

** and *=p < .001 and (p < .05)

Furthermore, producers with large volumes of output are likely to acquire written contracts and other relational based contracts which can provide some insurance against resource availability and market. The market information also has high marginal effect at 5.9741891E-9 at $p < 0.01$ on likelihood technology. This implies that, access to information through various sources increases the chances of good market by 23%

(Table 25). The findings suggest that, the producer's decision to produce and sell sawnwood depends on access to price and market opportunities. Thus, producers who have access to price information are more likely to sell their produce to esteemed customers and even to other market than the regular customers. In fact, information increases the ability of producers to make more informed decisions at lower transaction costs. Insufficient price information leads producers to sell to sawnwood buyers at production area to avoid uncertainties with insufficient market information.

On the other hand, the results on marketing stage showed that, sawnwood value chain has highest chain efficiency at 1.0 and 0.6 by 38% and 140% level in marketing information and negotiation costs respectively (Table 26). This indicates the opportunities to improve the income lie in the relationship between actors in the value chain. Results indicate that sawnwood traders should pursue the low transaction costs rather than ask for a higher market price. But the trading has low significant efficient on monitoring at 3% where by the payments time frame and trust is still a predicament.

The market information also has high marginal effect at 1.018092 at $p < .01$ on likelihood technology. This implies that, access to information through various sources increases the chances for good market by 38 % (Table 26). The finding suggests that, market information to trader's on the volume and the quality of the sawnwood give access to market opportunities. This has positive advantage to traders to select type of market to deal with and the amount to trade. The better the market information the better the marketing system and hence lowered transaction costs.

Another positive and significant factor is the monitoring cost. This has marginal effects of 0.6 by 140% on the volume traded from a certain technology. The finding proposes that,

availability of proper price setting and middlemen enhance bargaining power which is a good source of reducing opportunistic behavior by buyer in the sawnwood business.

We used a composite of various indicators to disentangle the effects of different components of transaction costs on the technical efficiency of sawnwood value chain in marketing stages. Transferring the concept of transaction costs to the operational domain remains elusive (Grover and Malhotra, 2003). The transaction costs generally have a significant positive impact on chain technical efficiency for sawnwood value chains. This means that there is relationship between sawnwood traders and their stakeholders. Normally, the longer the relationship, the more trust between them, which lead to low level of information and negotiation costs that can reach a more effective marketing solutions. The only exception we found is the monitoring costs, which negatively influence technical efficiency for marketing stage. This may be because the number of times the trader has to approach the buyer to get paid (length of credit period) increases the transaction costs and thus the traders become discouraged.

Table 26: Sawnwood marketing transaction cost

Variable	DF	Estimate	Error	t -Value	P -Value
Intercept	1	-15.888818	3.722554	-4.27	0.0001*
Market information	1	1.018092	0.265971	3.83	0.0001*
Transportation	1	0.011501	0.029924	0.38	0.7007
monitoring	1	-0.034883	0.056046	-0.62	0.5337
Enforcement	1	0.060541	0.149442	0.41	0.6854
Negotiation	1	0.601849	0.041472	14.51	0.0001*

*=p < .001

4.2.4 Costs and profit for small scale and sized medium sawmill government plantation and medium sized sawmill at private plantation

The study assesses the cost and profit of the small and medium enterprises in government and private plantations. The two types of mills (Dingdong /Amec and Kara/Laiment) are used to represent investment costs and capacity to produce sawnwood from government

plantation. Majority of producers were observed to sell their sawnwood product under wholesale basis. The chain then reached to DSM to the final consumer to be able to show the benefits and beneficiaries along the chain. In using government resources the profit for dingdongs profit per quantity produced is estimated to be TZS 46 594 per m^3 and the profit for Kara/laiment per quantity produced is estimated to be TZS 44 599 per m^3 (Table 27).

Table 27: Dingdong/Amec and Kara/laiment sawmill cost and profit calculation from the government plantation

Item	Dingdong/Amec	Kara/Laiment
Initial investment costs	4 000 000	118 800 000
Daily production, log intake (m^3)	7	16
Conversion rate to sawnwood (%)	33	37
Quantity produce per day (m^3)	3.5	8
Millgate price for logs (TZS /m^3)	230 857	230 204
Harvesting and log transport (TZS/m^3)	15 000	22 000
Consumption of fuel (TZS/per m^3)	9 386	14 000
Daily labour input (TZS/m^3)	12 857	15 034
Maintenance costs (TZS/m^3)	20 000	13 000
Total production costs (TZS/m^3) *	**287 243**	**289 238**
Sales price (TZS/m^3)	333 837	333 837
Profit margin (TZS/m^3)	46 594	44 599
Returns per labour (TZS/hours)	3 882	3 716
Returns per quantity produced	13 312	5 574
Returns per shilling invested	16	15.4

*Variable cost excluding fixed cost

The gross margin is higher at ding dong compared to Kara type of technology because of increased cost of production and the selling price. PFP (2016) found that, traders to whom they buy sawnwood from dingdong and sell in Mafinga are making good profit margins, 1.5 times the stumpage price. On the other hand it was found out that returns per shilling invested were found out to be TZS 16 for dingdong and TZS 15 for Kara (Table 27).

This implies that, the total cost incurred in sawnwood production from Kara is high with low selling of the product in the same market with the same price. Sawnwood produced

by technically advanced technology needs to be transported and sold in Dar to gain the price premium for good quality (PFP, 2016). This was also proved by other measures of efficiency such as labour. On the other hand for KVTC, the gross margin is 644 000 TZS per m^3 (Table 28).The gross margin from government plantation is lower to private plantation. This is due to fact that the line of sawnwood production and price setting in sawnwood business is very different with government plantation.

Table 28: Costs and Profit advanced machine at KVTC plantation

	Medium sized plant
Initial investment costs (USS millions) (including infrastructure) *	60
Daily production, log intake (m^3)	170
Quantity produce per day (m^3)	100
Conversion rate to sawnwood (%)	40
Wood cost (TZS /m^3)	190 000
Consumption of fuel/electricity (TZS/per m^3)	120 000
Daily labour input (as TZS/m^3)	60 000
Maintenance costs (as TZS/m^3)	60 000
Total production costs (TZS/m^3) **	430 000
Sales price (TZS/m^3	1 047 000
Profit margin (TZS/m^3)	644 000
Returns per labour hours (TZS)	53 666
Returns per quantity produced	6 440
Returns per shilling invested	149

* Exchange rate 1USD ~2000 TZS
**Variable cost excluding fixed cost

4.2.5 Value chain analysis

4.2.5.1 Sawnwood value chain analysis from government plantation

The study also analyse sawnwood value addition from both government and private plantation. The analysis for government is based on the sawnwood is sold the landing, at Mafinga (ex-mill) and then to the main market in Dar es Salaam city (Table 29). On other side, in private plantation the analysis is based on landing to the export unit in Dar es Salaam (Table 30).

The study found that, at production site, most the sawnwood is sold under wholesale basis especially for small scale producers. Their small size restricts their ability to have a salesperson or sales team to market and sell the sawnwood, they rely on the regular arrival of traders. On the other hand large scale producers have their own network of sawnwood traders in Dar es Salaam and Morogoro. The producers also sell directly to major end-users, constructors, and factories.

i) **Sawnwood market (1st level market)**

Sawnwood traders visit SHFP (production area) to buy sawnwood from producers. Sawnwood which is ready for collection is sold immediately to traders. A trader collects and pays for materials immediately on whole sale basis which took 97% of the price of sawnwood. The average selling price is TZS 333 837, sawnwood traders are paying in cash which allows very small enterprises to exist. Once the lorry is full, a trader returns to his yard to unload and stack the wood for air drying. This is done in order to reduce weight of the timber and maximize the amount that can be loaded on a lorry for transport to market. Traders hire and very few use their own lorries for collecting and transporting sawnwood to the next market. These lorries are not in good conditions, enough to travel long distances, but they are able to travel on local forest roads. Very few traders have their own lorries for delivering timber to the market and most traders say that it is simply cheaper and more flexible to hire transporter companies or single owner-drivers. The total cost for the first market is 287 243 which took 83% of the price and the profit is TZS 46 594.The value added is TZS 69 345. The average 140 957 m^3 is sold volume of sawnwood sold and bought varies across the year.

ii) Sawnwood second market (2nd level market)

In the second market, is at Mafinga where the traders communicate with other traders from other areas for sawnwood transaction. Traders that buy sawnwood from producers and sell in Mafinga are making good profit of 28% greater than profit at production area.

The total costs incurred in this took 3% of the ex-mill price. The sawnwood in this market is always sold on whole sale and some sold in retail. Traders have some yards in different areas but most famous sawnwood market is at Kinyanambo where the sawnwood are stalk or laid down waiting for customers. In this, the middlemen play a big role of connecting traders in the business. This also involved facilitate to market activities which includes transport companies. The transport companies are informal groups of laborers who provide loading services to traders. The total cost for the second market is 251 630 which took 73% of the price and the profit if TZS 93 388. The value added is TZS 30 500.

iii) The third sawnwood market (3rd level market)

Traders in the third market are found in major market areas around Dar es Salaam city in all municipals. They buy from traders or trading agents on behalf of traders and sell sawnwood to builders, carpenters, private buyers, and end-users. The sawnwood yards are owned and operated by traders with ability to sell between one to four trucks per month. The volumes sold vary considerably from month to month depending on market demand and supply. The total cost for the first market is 396 00 which took 73% of the price and the profit if TZS 62 405. The value added is TZS 19 203 per m^3. Most of the buyers of sawnwood and timber products include both large and small construction companies, craftsmen, carpenters, furniture manufacturers, domestic home-builders, and government departments. The degree of a customer's operations determines the type of seller he deals with. Many major buyers have credit terms with suppliers, but small and cash flow-

challenged companies rarely do. Instead, they buy from all types of sellers and pay as they collect.

Table 29: Sawnwood market margins and value addition from Saohill Forest Plantation to Dar es Salaam

	Sales per m^3	% of ex-mill price	% of retail price
Total costs for sawnwood (1st market)	287 243	83.0	
Selling price for sawnwood (1st market)	333 594	97.0	
Profit for 1st market	46 837	14.0	
Value added (like treating, drying, storing and production of other products)	69 345	20.0	
Transport costs to Mafinga (2nd market)	12 000	3.0	
Less Taxes at Mafinga	20 212	6.0	
Total costs for sawnwood at Mafinga	251 630	73.0	
Selling price at Mafinga	345 018	100	
Profit for 2nd t market trader in Mafinga	93 388	28.0	
Value added (storing and packing)	30 500		0.1
Transport costs Mafinga – Dar es Salaam	48 756		8.0
Other costs	216 744		47.0
Total costs for sawnwood in DSM	396 000		86.0
Value added (storing)	19 203		0.04
Selling price in Dar es Salaam	460 205		100
Profit for trader in DSM	64 205		13.0

4.2.5.2 Sawnwood value chain analysis at Private plantation

i) Sawnwood market (1st level market)

Sawnwood business is done at KVTC production area. The traders orders are deposited and are fulfilled at production area. Sawnwood traders are paying for the ability to collect the product and transported to their areas. The average selling price is TZS 925 000. After production the sawnwood are laid in the open air yard for drying and waiting for transportation to specific customers. The plantation contracted for transportation of sawnwood to next market. The total cost for the first market is 310 000 which took 32% of

the price and the profit is TZS 615 000.The value added is TZS 69 345. The average 42 000 m^3 is sold volume of sawnwood sold and bought varies across the year (Table 30).

ii) Sawnwood second market (2^{nd} level market)

KVTC supplies the product to major market areas around Dar es Salaam city and export market. Buyers took products from KVTC itself or trading agents in order to enduse manufactures like carpenters, private buyers, and end-users. The volumes sold vary considerably fiom month to month depending on the order placed to the named period. The total cost for the first market is TZS 430 000 which took 41 % of the price and the profit if TZS 644 000. The 70% of the traded sawnwood was exported. Most local buyers are large carpenters and furniture manufacturers. The degree of a customer's operations determines the type of seller he/she deals with (Table 30).

Table 30 : Sawnwood market margins and value addition from Kilombero valley teak company to Dar es Salaam

	Prices	% of selling price
Total production cost at 1^{st} market	190 000	20.0
Value addition	120000	12.0
Selling price at 1^{st} market	925 000	100
Profit at 1^{st} market	615 000	66.0
Taxes (TZS /m^3)	60 000	
Transport cost to 2^{nd} market to Dar es salaam (TZS/per m^3)	120000	11.0
Shipping cost (TZS/m^3)	60 000	0.05
Total costs (TZS/m^3)	430 000	41.0
Sales price (TZS/m^3	1 047 000	100
Profit margin (TZS/m^3)	644 000	61.0

4.2.6 Comparison of profits and value added for Government and Private plantation

Due to the price premium at Dar es Salaam markets, summarized profits of sawmillers, traders buy sawnwood in the dingdong technology which is slightly lower than the profits of a saw miller and traders in the advanced technology from both government and private

plantations. For advanced technology, the profit margin is TZS 644 000 per m^3 and TZS 64 025 per m^3 from private plantation and government plantation respectively. This is different with the profit at production area in Mafinga, whereby the producers selling from ding dong receive high profit of TZS 46 594 compared to advanced technology TZS 29 803 from government plantation. The local market cannot however absorb all the volume produced and the majority of the timber has to be transported and sold in Dar es Salaam or other major cities.

Total value added includes financial profits and labour inputs and describes the economic value creation from a macroeconomic point of view (PFP, 2016). Also value added is higher in the advanced technology. This is because the entire produced products using advanced technology are value added. Harvesting and log transport costs are considerably lower in the beginning of the value chain for dingdong technology because most dingdong sawmills are located in or close to the forest harvesting does not include skidding and loading to lorry. For the advanced technology financial profit in this stage is decreased by the need to transport logs to the sawmill which are not close to the forest

4.2.7 Sawnwood market power

The market of sawnwood from private plantation was found out to have relatively more market power than government plantation. This was revealed by the efficiency measures of returns per labour, returns per shilling invested and returns per quantity invested (Table 31). Returns per labour (53 666), returns per quantity invested (6 444) and returns per shilling (149) in technology used in private plantation are have shown better results than other technology used in government plantation. The reasons for the large returns at private plantation are accounted with good efficiency in utilizing the resource and the recovery rate. They use quality trees to produce value added products. It was found out

that, the private plantation has planned in investing in time, quantity, money in production and selling. A part from that, the private plantation has control of the product from plantation to the processing then to the market. So there is calculated period for organising the amount, the quality and marketing of a certain consignments. Thus, limited time to sell loads produced and what is invested to labour is high due to involvement of industries from plantation to technology used in sawnwood production to marketing. On the other hand, the government plantation producer has specified time for loading the resource from plantation but sawnwood production depends with availability of customers. As at the government plantation, less number of labour are involved in production and selling as they don't have enough capital to hold many labours at a time. During the study, it was revealed that most of labourers are operators, sellers and supervisors of sawnwood in the timber yards rather than the traders themselves.

Table 31: Market power at different chains

	Technology	Returns per labour	Returns per quantity invested	Returns per shilling invested
Government	Dingdong	3 882	13 312	16
	Kara laiment	2 716	5 574	15.4
Private	Twin band	53 666	6 440	149

Another reason for the high market power of private plantation; is the large volume of sawnwood handled. In a day, the private plantation can produce up to 100 m^3 of sawnwood while government plantations most of the producers can produce up to 7 m^3 of sawnwood per day. On the other hand access to market information of which most of them get it from traders made the wholesaler to have power in the chain. Through improved technology, the use of cellular phones has a big influence on market availability and price determination. The market power along the chain was distributed from

sawnwood produced with private plantation to what is produced from government plantation.

4.2.7 Sawnwood market concentration

During the study, it was revealed that, there is a great number of traders and buyers of sawnwood in the marketing system. This was confirmed by this study through communication with stakeholders, District, Region, City and Ministry of Natural Resource and Tourism. This is also supported by the results of buyers concentration ratio obtained from Government plantation. From government plantation, the total volume for sampled traders was 7360 m^3 of sawnwood with the average of 50.4 m^3per trader. The total output above this average was 1880 m^3 and the average for the group was 52.2 m^3 per trader. The total volume above this average was 779.5 per m^3 and was used in the calculation of buyer's concentration index (Table 32).

Table 32: Sawnwood buyers concentration ratio at market level

Unit	Government plantation	Private plantation
Average total volume traded(m^3)	7 360	42 000
Number of cases (number of people)	146	1
Average volume traded per trader(a/b) (m^3)	50.4	42 000
Quantity above average volume per trader (m^3)	4 150	42 000
Number of cases (number of people)	68	1
Average volume traded above the sample (d/e) (m^3)	61.03	42 000
Quantity above average of the sample 61.03 (m^3)	1 780	42 000

It follows that; the concentration ratio of buyers for government plantation is:

C = 100*(1780/7360)

= 24.02~24%

It follows that; the concentration ratio of buyers for private plantation is;

C=100*(42000/4200)

=100%

According to Scarborough and Kydd (1992) unconcentrated industry, is that, with no group of traders that is strong enough to control the sawnwood market. This is an indication of the competitive situation in the market system. Thus, it can be concluded that the number of buyers in the sawnwood market in Iringa, Morogoro, Coast and Dar es Salaam is high enough to break monopolistic tendencies among traders. On the other hand, in private plantation, the market is concentrated as the KVTC is strong enough to control the sawnwood market. This is an indication of monopoly situation in the market. There are many numbers of buyers is many in local and export market. Reynolds (2005) stated that, monopoly is the market structure that is usually associated with the greatest market power Kohls and Uhl (1990). Similarly states that, a concentration ratio of over 50% is both an indicator of high buyers' concentration and strong oligopolistic industry, that of between 35 - 50% is both an indicator of moderate buyers' concentration weak oligopolistic, and less than that it is uncontrolled industry

4.3 Business Enabling Environment to Sawnwood in the Value Chain

The findings from this study elaborate the influence of business enabling environment to stakeholders working in sawnwood value chain from government plantation (SHFP) and private plantation (Kilombero valley teak company). The study has found out that the National Forest Policy, Forest Act and legislation have created an enabling environment for the development of the sawnwood value chain. The Forest Policy of 1998 has the objective of ensuring sustainable supply of forest products and services by maintaining sufficient forest area under effective management (MNRT, 1998). The policy instructed that trade in wood offers considerable potential for increased economic development through income and employment generation as well as export earnings. Main legal instruments supporting forest trade include: the Forest Act No. 14 of 2002; the Forest Act Regulations of 2004 and the Government Notice number 433 of 2014 and 324 of 2015 of

Forest Act (subsidiary) Regulations (Appendix 6). The Forest Act empowers local authorities to license timber extraction in local authority forest reserves, while Central Government is empowered to license timber extraction from territorial forest reserves and unreserved land. It was found that there are some areas where policies and legislation have contributed to an enabling environment to sawnwood stakeholders which include sustainability of forest resource, training, forest harvesting and wood processing technology and incentives.

4.3.1 Sustainability Forest Resource

The enabling environment for assisting sustainability of forest resource in attaining sawnwood value chain from plantation is stated in Forest Policy (1998) statements numbers 1, 3 and 8 and section 3 of part III, IV and VIII of the Forest Act No 14 of 2002 (Appendix 6). To ensure sustainable supply of forest products and services and environmental conservation, all types of forest reserves will be managed for production and /or protection based on sustainable management objectives defined for each reserve (MNRT, 1998). All type of forests are important to policy and legal instruments and technical tool for guiding sustainable forest resources management to archive a sustainable supply of quality forest products (Mgoo, 2005). The management of all types of forest reserves is based on forest management plans. The study has revealed that forest management planning is theoretically influencing and facilitating development of forest based industries in terms of ensuring raw material availability on sustainable basis. In order to bring about sustained timber harvesting, knowledge of the growing stock is prerequisite (Mgoo, 2005). Since most of the actors are at SHFP, there is little information on forest resources base and data generated through periodical forest resource assessments provides the basis for planning sustainable harvesting of forest product.

It was found that, most of the sawnwood stakeholders' claim about decreasing amount of raw material allocated to them from the SHFP. It was found that what they receive is not what they asked for. Apart from that there is no any concrete information about the future of the SHFP's log resources. The Government-owned and managed Sao Hill Forest Plantation offers one million m^3 of raw material a year in 2010/11, representing 85% of all plantation harvesting in the country, but issued permits for only 488 $100m^3$ in 2014/15. Mufindi Paper Mills (MPM), is sold under contract which consumed 250 000 m^3 in 2011 but has been allocated only 110 000 m^3 in 2014, and to Sao Hill Industries, which consumed 100 000 m^3 in 2011 but has been allocated only 50 000 m3 in 2014. Small and medium size saw millers who received 650 000 m^3 in 2011, but allocated only 236 300 m^3 in 2014. So producers with enough cash have to purchase allocations from other stakeholders. The minimal information about availability of raw materials to producers worried them about the effects of sawnwood reductions in the future.

The result from this study shows that, there is still gap existing between practice and policy desire and legal provision on forest management plans. It becomes evident that, despite plantation forest has to a large extent been based on forest management there is no open data and information to stakeholders over availability of the forest resource.

This policy and legislative gap creates unfavorable environment in terms of sustainability on quality and quantity to ensure continued investment and growth for business profitability of forest-based industries regardless of whether they are small, medium or larger sized enterprises. This study and other reports such as PFP (2016), TEITI (2014) and Indufor (2011) have shown that insecurity or shortage of raw material supply represents risks to investors and threatens the continuity of forest industry operations. Their small size and very limited income surplus meant that entrepreneurs of small scale

processing enterprises do not have the possibility in the long-term forest resources development (Mgoo, 2005).

Due to inadequacy of resources to carry out frequent systematic forest resources assessments, management of forests have, to a small extent been based on forest management plans. MNRT (2015) has been designed to facilitate periodical forest resource assessments order to assist forest Resources Management Planning to provide reliable information on raw materials availability for forest industries on regular basis. But this information is general.

This study proposes that, an open trading market could be developed to allow ail businesses, large and small, to increase the range of log suppliers they have access to and thereby reduce the risks associated with relying on a single main supplier.

The results found that, the Forest Policy (1998), statement number 28 and 38 call the creation of an enabling environment for the private sector involvement in forestry. This involves clear ownership and tenure rights, information on forest resources and raw material, financial incentives and credit facilities, improved access to markets and market pricing of products as well as effective training and extension. The interview with KVTC as representative of private sector forest companies claims to manage their forest and production meet the current demand. Plantation forest resources are correctly managed with well prepared management plans they produce different raw material outputs at different stages. KVTC started harvesting commercially harvesting in 2009 at the age of 17 years with 5000 m^3 and expect to reach its peak in 2024 at the age of 33 with 1 000 000 m^3. Overall forest management and utilization is largely based on estimated forest data as a basis to allocate raw materials to forest industries. Inventories are done on

regular basis to address sustainability of raw material allocation to forestry industries. KVTC undertakes regular assessment through regular data collection, analysis, interpretation, dissemination, storage and updating of forest resource information for sustainable forest management planning. This always ensures the continuity of forest industry operation in terms of sustainability and quantities for business profitability of forestry based enterprises.

4.3.2 Training

This study has found out that, policies and legislation have created an enabling environment in terms of skills development in conjunction with extension services in dealing with sawnwood business. Forest policy statements number 33, 34, 35 and 38 highlight the importance of training and extraction services in promoting use of appropriate technology from forest harvesting, wood processing and involvement of private sector in the forest industry (Appendix 6). Part X of the Forest Act on Financial Provisions and Establishment of a Fund, has created the legal envelopment in terms of raising awareness, technical advice and access to grants which offer development opportunities' for the target of sustainable use of forest resources (Appendix 7). The Fund should urgently be established so that target enterprises can access funds to promote awareness of the importance of the protection, development and sustainable use of forest resources through public education and training. Also be enabled stakeholders to participate in any public debates and discussions on forestry industry.

The current study revealed that, some of the stakeholders dealing with government plantations receive training from Forest Industries Training Institute (FITI), SAFIA, SHIMIVITA and some financial institutions on the development of wood based industries. FITI is a government institution that offers different courses in sawmilling,

logging and saw doctoring. Following change of ownership to public owned, the major target of training is the wood industry owners, managers, technicians, other workers and the public. The FITI team sometimes get chance to visit stakeholders in their production zone and conduct training. Consequently, FITI is now strengthening its relationship with saw millers and other woodworking industries. The study has also revealed that, through their networking SAFIA and SHIMIVITA the stakeholders get time to sit together and discuss their matter concerning forest product trade. This involves introduction of quality management routines, product planning, and operations management considering firm specialization. It was also revealed that some financial institutions have declared to collaborate with sawnwood stakeholders especially on credit aspect.

This study found that, there is still a training gap in terms of forest appropriate harvesting and wood processing techniques, marketing information and inadequate stakeholder participation in strategic decisions concerning use of forest resources. This has resulted to inadequate knowledge of the industry, financing and marketing strategies. Example the wood processors with poorly trained and lacking good-quality equipment do not achieve maximum forest recovery rates and levels of forest waste are high. The fact that many of the people engaged in or working within forestry are unskilled with limited levels of education, there are limited training opportunities and investments in human capital (Mgoo, 2005). Harvesting companies or harvester groups are poorly trained and lack good-quality equipment, so they have little experience in gauging environmental factors and very little regard for safe working practices (PFP, 2016).

The study found that, training in private plantation has focused on wood production and other related expertise in the market which has resulted into good quality produced logs with fairly recovery rate. Example between 2011- 2014, KVTC conducted different courses on sawnwood processing and about 407 employees have attended the course.

This study proposes that, the government intervenes on processing and value adding skill should also be imported to local people or private sector to stimulate the establishment of processing centres within districts. Training and education should be provided to improve working practices and safety procedures. Consideration can be given to introducing a code for safe working practices and licensing to allow harvesting activities by qualified persons.

TFS should work in close collaboration with different institutions such as FITI and small industries Development Organization (SIDO) to develop curricula and skills for the wood-based industry. Greater valued added wood products should be sufficient to attract attention of current entrepreneurs and potential SMFEs not only to increase their contribution to local people income and SMFEs revenues but also serve as a check on over exploitation.

4.3.3 Forest harvesting and wood processing technology

The current study indicates that the policy has created an enabling environment for the development of wood-based industries in terms of promoting rehabilitation of existing technology and establishment of efficient forest industries using appropriate technology. Part VII of the Forest Act on Trade of Forest Produce has also created the requisite legal environment of improving wood processing technology and quality forest product through legal requirements for grading timber and other forest produce before they are exported. The legal provisions on export restriction of unprocessed or semi-processed product are also one of the strategies to promote investment in value added products and improved technology.

The study found out that, the policy and legislation is influencing, to a larger extent, the use of appropriate wood processing technology for the enterprises engaged in trade of sawnwood and other forest produce for the export market. However, there are legal gaps in terms of development and use of appropriate and wood processing technology as whole. Tanzania depends on imported technology including forest products processing technologies. There is no legal influence on use of appropriate wood processing technology for the enterprises engaged in trend of sawnwood and other forest produce for the domestic market. PFP (2016) found that, lack of harvesting training and the transient nature of the chain saw operators impacts the quality of the harvesting operation ultimately reducing the yield from the compartment and creating large number of damaged logs (splits and shakes caused by felling trees on top of logs and un-level ground). Sawnwood and other forest produce traded in the domestic market are not subject to grading. Given this environment, there is a need for legal requirement to enforce grading of timber and other forest produce for the domestic market.

This study and a report by Indufor (2011) indicate that wood wastage is a serious problem in plantation forest where by the products from most industries often exhibit low quality as a result of use of absolute and inappropriate processing technology. As a result of this, the current wood recover from most SMFEs saw mills is about 33% and for few industries with good processing plant like SHI and KVTC. There are only few primary and secondary processing industries with modern and capital –intensive suitable technology that have wood recovery rates of about 40%. This high wastage and poor quality of products is due to low investment in efficient technology by SMFEs. Wood wastage is also attributed to absence of diversification of forest products possessed by enterprises.

This comprises the whole value-chain from raw material to finished product. A secondary aim to introduce interventions, triggers structure chain in the industry towards a stricter division of labour between firms based on specialization in the value-chain. Experience worldwide shows that processing technologies are undergoing big advancement in major wood product categories such as sawnwood, wood-based, panels, woodchips, pulp and paper products and miscellaneous other including poles and railway sleepers (FAO, 1991).

4.3.4 Incentive and credit facilities for investments

The study has revealed that the national forest policy and legislation have created an enabling environment in promoting financial and credit facilities for the development of the private sector in general (policy statement number 38). The policy and legislation recognize the importance of promoting financial and credit facilities for the greater sector involvement in forestry and forestry industries.

The Forest Act has also created an enabling legal environment on provision of financial incentives under Section 72 and 80 of the Forest Act No 14 of 2002. The policy is influencing, to a large extent, private sector involvement in forestry and forestry industries through cooperation between forest administration and relevant private sector associations. The policy states that provision of reliable information on forest resource base to private industries and investment opportunities is essential for performance and development of the private sector.

This study and others such as PFP (2016), Kärkkäinen (2005), Mgoo (2005) and Thomas *et al.* (2004) indicate that, there are some inadequacies in financial incentives. It was found that, for most of the stakeholders find difficult to collaborate with financial

institutions to finance forestry industry due to insecurity to their investment. It was found that they have one year license which is not strong enough for financial planning outlook and to encourage lenders to consider long term loans. Example most of the sawnwood producers at government plantation lack access to loans and hence cash-flow difficulties restricted their ability to grow. Also interest rates for loans are at least 16-18%, and with the uncertain supply of raw materials, small industries are unwilling to risk loans for capital. Short-term loans are used to finance specific production or sales objectives.

It was noted that, an enabling environment provided by the Forest Policy and legislation as well as adoption of market economy by the government since mid-1980's, there is emergence of private plantation due to an increased demand, shortage of raw material from government plantation, the forest industry is growing and been adopted as an economic activity by individuals in the study from Mufindi, and Kilombero districts. Despite this emergence; there are still inadequate financial incentives and limited markets for wood product. In Tanzania today, there is not a single financial institution, which is lending money to forest industry. There are, however, externally funded projects such as the Kilombero Valley Teak Company (KVTC) which is funded by the Commonwealth Development Corporation and Sao Hill Forest Plantations which was funded the Word Bank in 1970's (KVTC, 2014; Mgoo, 2005).

Due to lack of capital and credit facilities, most of the enterprises remain small scale. The possibility for those enterprises to expand is low, unless there is a deliberate intervention from the government, donor community and the business community as a whole. This is a serious constraint for the development of the sector, which should be addressed urgently. Kärkkäinen (2005) also reports that SMFEs are more dependent on financial aid as they do not have access to credit at fair interest rate. The current 20% interest rate in the market does not make investment in forest product viable.

The study found that, community bargaining power and the ability to mobilize capital has remained weak. Mgoo (2005) found that, there are still inadequate mechanisms on financial incentives and credit facilities to promote private sector involvement in forestry and forest industries. However, opportunities for number of partnerships between larger forest industrial companies and small-scale and low-income producers are making significant contributions.

It is crucial for the government to improve access of finances from formal sources as most of SMFEs depend on own finding. There is need to design programmers to provide assistance to entrepreneurs in organizations, record keeping and accounting so that they can access finance from institution lenders. The Forest Act has also created an enabling legal environment on provisions of financial incentives through section 72 and 80 of the Forest Act No 14 of 2002 which allow establishment of Tanzania Forest Fund (TFF). The TFF is funded by various sources namely, levy 2% of every prescribed fee payable under this Act, grants, donations and sale of confiscated forest produce. The Forest Act requires the Tanzania Forest Fund (TFF) to promote forest-related activities including investments. One of the most relevant objects of the Fund to SMFEs is to promote and assist in the development of community. The Fund is used by government to demonstrate how to leverage problems related to financial incentive in order to support implementation of forest-related activities within the objectives of the Fund. The study also suggests that the Government of Tanzania should create financial packages which motivate SMFEs to own or lease plantations of their own.

4.3.5 Forest product trade

It was found that, the policy and legislation have created an enabling environment for generation and accessing free trade of forest produce in the long-term without causing

destruction of the resource base. The importance of marketing strategies to capture the full potential forest products and services is revealed in policy statements number 14, 28, and 30 and Forest Act of 2002 under part vii, indicates creation of an enabling legal environment in terms of export of forest produce.

This study revealed that there is very limited policy and legal influence on organization of markets and marketing systems and channels. As a result, access to information and knowledge among stakeholders on markets and market opportunities continue to be very limited. Consequently, there are no data available to assess the supply and demand potentials and marketing and income generation opportunities. The harvesting and marketing of wood from plantations is declining due to dwindling supply of raw materials and increasing stakeholders in the sawnwood industries. This can be done through marketing strategies to enhance a gradual chance for government plantation to plant more trees and enhance private factors to intervene the market.

It is evident that information on prices, product availability and product characteristics is limited. It is therefore difficult to compare products and their sources. Lack of such information inhibits the free and efficient operation of the markets, restricting both and in some instances, producer. It also prevents potential producers from entering the business. PFP (2016) found that, TFS decides on the volumes to be harvested of which SMEs feel that they have too little support from the government and that allocations are too small. On the other hand large enterprises reported that they feel they should get priority because they risk investing in better technology and improved systems that meet the demands of the government for improved recovery, efficiency, and quality.

This study has revealed that the policy and legal framework is influencing, to a large extent, development of small-scale processing enterprises in terms of access to institution markets. Forest Regulation of 2004 and Government Notice no 324 of the Forest (amendment) Regulations, 2015 prescribe procedures for sale and disposal of forest produce. Mgoo (2005), reveals that the procedure have potential influence development of small enterprises because specific positive discrimination strategies can be applied to favour small-scale enterprises to access official and semi-official markets means of product reservation or price preference in tendering. It is apparent that forest products will continue facing challenges arising from globalization. This implies operating in an environment of increasing competition for the supply of forest products and services. It is evident that under existing free market conditions, forest products such as office and domestic furniture from abroad have penetrated into the local markets. Forest products from abroad are therefore creating stiff competition to forest products produced locally by secondary wood processing enterprises. These stakeholders should therefore strive to improve quality of forest products in order to withstand the competition.

This study has revealed that the government has been taking the following measures to increase transparency sawnwood business:

- An open sawn log market operates efficiently when sufficient information is available to all stakeholders and information covers a wide range of sector.
- Log sellers should understand the grade requirements of each product required by different industries. Although there could be more products, there is no reason to sort logs for industries that do not exist or for which there is no demand.
- Grade standards that have industry-wide agreement and acceptance will give sellers confidence to sort and deliver (or prepare for collection) specifications for their customers without worrying about rejections or quality disputes.

- The export standards also should be reviewed in such a way the producers meet the market demand. Example Teak size should not exceed 6 inches width.
- There must be communication links among all government and private stakeholders. Each party must know its potential customers and/or suppliers in order to formulate a comprehensive procurement policy.
- Information technology and spread of internet coverage available on the mobile phones can facilitate the growth of the forest industry.

4.3.6 Permits and licenses

The study has revealed that an enabling policy and legal environment has been created in terms of procedures that facilitate licensing including; fees for any license permit or certificate and legality of business in forest products by government and private actors. The policy is stated under Part VI and of the and Forest Act 2002 and Government Notice number 324, Part II of the Forest (Amendment) Regulations, 2015 and policy instruments, Government Notice no. 69 and 70 of forest product harvesting (URT, 2007) which underscores the importance of free trade of forest produce in the longer-term without causing destruction.

In order to facilitate a legal business in forest products, the government has put in place clear procedures to be followed by investors. Traders of forest products are required to fulfill the following conditions (MNRT, 2004):

- Be registered by the Ministry of Natural Resources and Tourism;
- Obtain a trading license from the ministry of Trade and Industry
- Obtain an Income Tax Clearance Certificate from Tanzania Revenue Authority; and

- Where harvesting is involved should have harvesting license from the Ministry of Nature Resources and Tourism.

Exporters of forest products are required to apply for an export permits from the MNRT attaching to the application form certified of the following documents;

- Company registration certificate
- Business license
- Income Tax Clearance Certificate
- An order from Importer;
- Evidence of Export returns for previous years; and
- Legislation certificate from the Ministry of Natural Resources and Tourism

When approval is granted, the exporter pays TZS 160 000 inspection and grading fee per 20 m^3 consignment and an additional TZS 160 000 for export permit issued and Tourism and TZS 5000 export permit certificate by the Ministry of Natural Resources. License, is influencing to a larger extent, the development of the stakeholders through regulating access and activities in forests by ensuring legality of forest products for all types of forestry enterprises regardless of their sizes. Certificate of Registration is compulsory for any one engaged in forest product trade as stated by Forest Act 2002 (MNRT, 2002). This is a one year certificate that is issued in July and expires by the end of June the following year (Kapinga, 2010). After registering, a license is required to fell trees and royalty has to be paid on the standing volume. Traders dealing with sawnwood are also required to pay annual registration fees to the Ministry of Natural Resources and Tourism in addition to business license to local authorities.

It was also found that, Forest licensing and monitoring system to ensure legality, is constrained by a number of technical and administrative problems such as competing claims over forest revenue by different authorities (District Council and Central Government. Unfortunately, few incentives exist to promote compliance with transparent licensing. Inadequate transparency coupled with unclear procedures for obtaining licenses undermine forest business activities and leads to market distortions. But tree products trade can create opportunities for corruption if law enforcement is not done properly (Nshubemuki *et al.*, 2006).

This study found that, Transit passes (TP) are provided to allow transport of sawnwood product from harvesting site to storage or business town. Licensee has to apply for Transit Pass before the expiry of the license (MNRT, 2002). Transit passes were introduced for control but their use is not enforced effectively, for example Transit Passes issued in some regions indicated some volumes obtained from respective licenses without proof of any surcharges (MNRT, 2002). TP's are to be used within a region for one month and being checked to every checkpoint during transporting forest produces.

Check points are purposely established by Forestry and Beekeeping Division at strategic location. These are established along the roads to check and control movement of forest produce from production areas to the markets. Sawnwood traders have to stop at each check point and have forest produce checked for illegality and the Transit Passes endorsed. Despite a number of checkpoints along all major roads entering Dar es Salaam, still a lot of illegal forest products coming from as far Lindi, Tabora, Iringa and Morogoro regions are encountered (Savcor, 2005). Since many traders however bypass the checkpoints, a significant amount of revenue is lost. Also some check points do not keep any records for monitoring. For example few consignments may be recorded to in the

check points register and sometimes all the recorded are illegally taken. In other cases, the legislation does not allow heavy goods vehicles on the road between 6 p.m. and 6 a.m. This regulation is not ordinarily enforced, hence allowing corruption (PFP, 2016). Many drivers continue to drive up to the next manned checkpoint after the restricted time. Since many drivers pay bribes to pass checkpoints, trucks can be found travelling at any time of day or night.

The study found that, forest produce dealers are required by law to maintain stock registers, keep copies of licenses, Exchange Receipt Vouchers (ERV), Transit Passes (TP) and when sales take place, they are required to enter details regarding quantity sold and keep record properly for inspection. But very few forest produce dealers keep and maintain such registers. Lastly, reporting is done every month by the forest plantation managers and other Government officials to the Ministry of Natural Resource and Tourism all licenses issued for harvesting.

It is evident that the following mechanisms should be further instituted to promote managerial culture in terms of transparency, individual accountability and responsibility.

- Increase staff motivation. For example compensation system and other incentive can reduce irregularities, corruption and collusion.
- Streamline reporting and monitoring of revenue collection in order to reduce unnecessary bureaucracy in acquiring licenses, permits and registration.
- Simplify licenses and improve control through checkpoint, stock registers and transit passes.
- Define clear roles and responsibilities of forest-licensing and train them.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This study was concentrated on value chain analysis of sawnwood from government and private plantations. Specifically the study has identified the potential players in sawnwood value chain; analyses of efficiency on sawnwood production and marketing systems in the value chain and also performed business enabling environment analysis in sawnwood value chain.

For this study, the population of interest was sawnwood producers, traders, middlemen transporters and enduse manufactures in Mufindi District, Kilombero District and Dar es Salaam city. In Mufindi and Kilombero Districts, the study was concentrated on chain activities carried out in government plantation and private plantations respectively. On the other hand, in Dar es Salaam, various markets with stake in the trade of sawnwood from Ilala, Kinondoni and Temeke Municipalities were visited and data on sawnwood consumption from timber yards were collected.

(i) Overall conclusion

Form the first specific objective, this study concluded that, there is a good number of actors in sawnwood value chain from both government and private plantations. Government plantation is characterised by involvement of many active actors from production to consumption and the chain is very long and complex. It involved producers, traders, middlemen, transporters and enduse manufactures. The most practiced sawnwood value chain value starts from producers who supply sawnwood to traders or middlemen then to enduse manufacturers. The market centre for this is always at the production site

and is most practiced because of its efficiency to the market. The channel saves time, improves market relationship and reduces disturbances among actors even though processes are usually long. On the other hand, the least practiced channel occurred when producers sell sawnwood to traders who sell to other traders who then sell to enduse manufactures and/or producers who sell directly to export zone. In all practiced channel value addition is done, even though in some areas it is not a preference.

On the other hand, the private plantation is characterised with three value chains. In all the involved chain the value addition is preference. The most practiced chain is from producers to international middlemen then to enduse manufactures. This is mostly done because the main objective of the plantation is exportation (70%). In diversification of the production activities, a certain amount of sawnlogs produced was then sold to other producers for processing. The least chain is from producer to local market. This is done with the remained 30% of which is done in relation to the existing demand.

It is also concluded that, government plantations are a good source of raw materials for sawnwood production. This is confirmed with its ability to supply 85% of raw materials to be consumed by industries and the number of actors accommodated by the plantations. The SHFP plantation is dominated by small scale producers (72%) and the number increased yearly due to increase in demand of different development activities like construction and furniture making. Thus, it creates employment to some of the population especially residents surrounding the plantation.

It is also concluded that, from government plantation, most of the actors have little capital and knowledge which reduce chance to produce quality product. As a result of poor value addition to sawnwood and other products, mostly done locally 97% with few advanced methodology done by medium and large enterprises.

It is also concluded that, there was price difference for sawnwood between government and private plantation. The difference is due to difference in objective of plantation, line of production and market strategies. From government plantation sawnwood prices ranges between TZS 330 000-400 000 per m^3 while for private plantation sawnwood prices ranges from TZS 500 000 – 1 400 000 per m^3 and for logs ranges from TZS 140 000 – 500 000 per m^3.

The study also concludes that, the distance from production to the marketing sites, physical infrastructure, quality and seasonality factors effect sawnwood consumption. When sawnwood is transported from production sites, prices increase due to increased costs of loading, transport, storage and offloading. It costs TZS 48 756 per m^3 and TZS 60 000 per $m^3$to transport sawnwood from production site to Dar es Salaam city from government and private plantation respectively.

From the second objective, this study concluded that, production and marketing systems has great contribution in sawnwood value chain. This is confirmed by the study findings as market information, operation system, negotiation and enforcement costs before transaction increase the likelihood of producing certain volume of sawnwood using different types of technology at 100%, 59%, 17% and 69% respectively. However, lack market differentiation for sawnwood product from government plantation resulted into gross margin from small scale technology (TZS 49 599) higher than that by advanced technology which is TZS 44 594. On the other hand for private plantation gross margin is TZS 644 000 which is higher than that produced from government plantation because of differences in line of production and market arrangements. Furthermore, the market of sawnwood from private plantation was found out to have relatively high market power than government plantation as returns per labour (53 666), returns per quantity invested (6444) and returns per shilling (149) in technology used has shown better results

than other technology used in government plantation. The reasons for the large returns at private plantation are accounted with good efficiency in utilizing the resource and the recovery rate.

The study has also concluded that, for government plantation there is a great number of traders in the sawnwood marketing system. This was confirmed by government officials and supported by the results of buyers concentration ratio obtained. The results shows that there is no single group of traders that is strong enough to monopolize the sawnwood market. Every trader has equal chance of entering the market. This is different to private plantation, where there is low number of traders in the sawnwood marketing system. These findings reveal the monopolistic behavior in marketing system.

From the third objective, it is concluded that, there is influence in business enabling environment to stakeholders working in sawnwood value chain government plantation (SHFP) and private plantation (Kilombero valley teak company). The study has found out that, the National Forest Policy, Forest Act and legislation have created an enabling environment for the development of the sawnwood value chain. The Forest Policy of 1998 has the objective of ensuring sustainable supply of forest products and services by maintaining sufficient forest area under effective management. Main legal instruments supporting forest trade include: the Forest Act No. 14 of 2002; the Forest Act Regulations of 2004 and the Government Notice number 433 of 2014 and 324 of 2015of Forest Act (subsidiary) Regulations. It was found that, there are some areas where these policies and legislation have limitations towards enabling environment to sawnwood stakeholders to achieve sustainable and profitable sawnwood value chain through sustainability use of forest resource, training, forest harvesting and wood processing technology and incentives for both government and private plantation.

(ii) Contribution of the study to the knowledge

This study has great contribution to sawnwood stakeholders to understand the real situation of sawnwood business for government and private plantations. This will bring chance to many stakeholders to decide which method to venture in sawnwood business. On the other hand, knowing the increased demand of sawnwood, the information in this study creates opportunity to the players to decide which technology and marketing systems to undertake. Also, this study helps stakeholders to understand how policies and legislation guide sawnwood production and marketing. The stakeholders will understand their chances and boundaries in attaining sustainable sawnwood business.

5.2 Recommendations

With reference to the results obtained from the study and the conclusion made, the following recommendations are made:

(i) Recommendation for sawnwood value chain actors

For development of sustainable sawnwood value chain, the improved production and marketing system should be attained among players. Improved technology used in production of sawnwood will improve quality of the product especially in government plantation. On the other hand, the linkages between stakeholders in price information, availability of the products and the quantity of sawnwood should be improved. Also improvement of physical infrastructures such as roads should be given priority by responsible institutes so as to improve sawnwood business. This is because, most of sawnwood production areas are found in remote areas and use feeder roads of which most of them are in poor conditions, this will help in reduction of costs of produces and increase quantity of the sawnwood in the market.

(ii) Recommendation for sawnwood production and marketing practises

It is also recommended that market differentiation for the sawnwood products from different technology should be considered to suit the quality of the product in relation to the exact market. This should be done by the government and its authorities in establishing commonly accepted and workable quality, grades and standards for sawnwood for improving the quality of sawnwood sold in the market. This is because most of the stakeholders use local methods of adding value to the sawnwood.

Most of the sawnwood actors have little knowledge on the sawnwood business. This can be achieved by responsible authorities to conduct seminars on business administration, marketing and policies governing sawnwood business at least once a year. This is important because all actors will be familiar with procedures on sawnwood business to avoid illegal business.

(iii) Recommendation for business enabling enviroment

The Government is one of the institutions which is required to create conducive environment for business development. Development of the value chains for different products is a business venture whereby the developed value chain is supposed to be competitive and profit oriented. Thus, when government policies and interventions do not support the value chain, they bring negative effect in developing potentials as well as chain sustainability. Therefore the study recommends that government policies should create all necessary environments for sustainable sawnwood value chain

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APPENDICIES

Appendix 1: Questionnaire for sawnwood producers

A: Identification variables

1. Name of interviewer..... 2. Date .....

3. Name of interviewee..... 4. Questionnaire number.....

5. District..... 6. Region.....

13. Place of data collection .....

14. Individual or Organization (institution).....

15. Education level a) Informal education

b) Primary education ☐

c) Secondary education

d) Post education

10. Sex of respondent a) Male ☐

b) Female

11. Marital status of respondent a) Single

b) Married

c) Widowed ☐

d) Divorced

B: Information regarding production

What are Trees/ plants species used to produce your products

Tree species/plant	**Preference (Rank)**	**Products produced**

12 Do you sell sawnwood you produce? **Yes/No**

13 If yes, to whom do you sale a) Middlemen b): Final consumer

c) Other producers ☐

d) Others specify.....

14 Type of machine used in producing sawnwood .....

Type of machine	Amount sawnwood produced(m^3) per day	Fuel (lt)/electricity(unit) used per day	Labour cost

15 Are there any other cost incurred in sawnwood production

Item	**Unit cost**	**Total cost**

16. Do you add any value to your sawnwood? **Yes/No/Don't know**

If yes what do you do.....

If no why.....

17 List the type of sawnwood you sold, quantity sold and price

Type of sawnwood	**Quantity**	**Price (TZS)**	**Revenue**

From above list type of sawnwood, which are, preferred most by your customers.....

18. Who are your customers (Institutions, Individuals, Private companies)?

Customer	Specify

19 What are the sources of raw materials for making these products?

Raw materials	Source

20 Are the sources satisfactory? **Yes/No/Don't know**

If no what are your suggestions.....

21 What suggestions do you have for the sustainability of the sources of forest products?.....

22 How do you sell sawnwood products a)Taking them to market b) On site ☐

Others, specify.....

23 What benefit do you gain from the business .....

24 How do you get market information.....

25 Do you pay tax for the sawnwood you are producing? Yes/No

26 To whom or where do you pay tax? .....

Policy	Favouring	Hindering

27 Amount of Tax payable per m^3.....

28 Do you know policies, policy statements favouring, or hindering sawnwood trade? Yes/No

29 Are there any problems of getting customers for your products **Yes/No**

List them .....

30 Are the products satisfying your customers? **Yes/No**

If no what are your suggestions? .....

31 Are there any opportunities favoring your business? **Yes/No**

If yes List them .....

If no, what do you consider to be the opportunities .....

31 Are there any constraints related to policy instruments hindering your activities?

.....

Appendix 2: Questionnaire for Transporters

A: Identification variables

1. Name of interviewer.....2. Date .....

3 Name of interviewee..... 4. Questionnaire number.....

5 District..... 6. Region.....

7 Place of data collection (market, office).....

8 Individual or Organization (institution .....

9 Education Level a) Informal education

b) Primary education ☐

c) Secondary education

d) Post Secondary education

10 Sex of respondent a) Male b) Female ☐

11 Marital status of respondent a) Single b) Married

c) Widowed d) Divorced ☐

B: Information on supplying sawnwood

12. What type(s) of sawnwood do you supply?.....

13 Quantity of sawnwood supplied and how much you charge per month

Sawnwood	Quantity	Unit Price (TZS)	Revenue

14. Where do you get these sawnwood you transport.....

15 How do you get sawnwood you sold?.....

16. How far is the sawmill from which the products you collect?.....

17 In comparing with the past 5 -10 years, how can you consider the distance?

a Increasing
b Decreasing
c Constant ☐
d Do not know

18Where do you supply sawnwood,

a. Inside the country ☐

b. Outside the country

c. Both

19 Costs involved per month

Sawnwood supplied	Place of supplying	Quantity of sawnwood	Buying price	Other cost

20 Who determines the price of the sawnwood you supply? .....

21 Could you rate your frequency for supplying the products?

a. Daily

b. Weekly ☐

c. Monthly

d. Occasionally

22. What is importance of doing sawnwood trade? **Yes/No**

23. For how long do you think these products will continue to be available .....

24. Is there any attempt of establishing your own woodlots/forest plantation? **Yes/No**

If yes, for which species and why.....

If no, Why.....

25. Who are your customers? .....

26. How do you get customers? .....

27. Why have you decided to supply sawnwood forest products.....

28. Do you know institutions regulating sawnwood products trade? Yes/No

29. If yes, what are these institutions? .....

30. Do you know the resource base of the products you are supplying? **Yes/No**

31. Can you tell us the status of the resource base in comparison to the past five years?

    a. Increasing

    b. Decreasing

    c. Constant/ stable

    d. Don't know

32. Do you think sawnwood trade is profitable and why.....

33. Do you pay tax for the sawnwood you are trading? **Yes/No**

34. To whom or where do you pay tax? .....

35. Amount of Tax payable per product.....

Sawnwood Product	Tax payable (amount TZS)	Quantity

36. Do you know policies/policy statements favouring or hindering sawnwood trade? Yes/No

List them .....

37. Do you know other stakeholders dealing with supplying sawnwood products? Yes/No

List and categorize them .....

38. Can you comment on the sawnwood products business? .....

39. Are there problems of getting customers of your products? **Yes/No**

List the problems .....

40. Are the products satisfying your customers? **Yes/No**

41. If no what are your suggestions? .....

42. Are there any opportunities favoring your business? Yes/No

If yes List them .....

If no, what do you consider to be the opportunities .....

Appendix 3: Questionnaire for sawnwood traders

A: Identification variables

1. Name of interviewer .....2. Date .....

3. Name of interviewee..... 4. Questionnaire number.....

5. District.....6. Region.....

7. Place of data collection (market, office).....

8. Individual or Organization (institution .....

9. Formal education

a) Primary education ☐

b) Secondary education

c) Post education

10. Sex of respondent

a) Male ☐

b) Female

11. Marital status of respondent

a) Single

b) Married ☐

c) Widowed

d) Divorced

B: Information on selling sawnwood

12. What type(s) of sawnwood do you sell?. .....

13. Quantity of sawnwood sold per month

sawnwood	Quantity(m^3)	Unit Price (TZS)	Revenue

14. Where do you get these sawnwood products

    a) producer

    b) Transporters

    c) Middlemen/broker

    d) Other trader

    e) Others specify.....

15. How do you get sawnwood you sold? .....

    How far is it? .....

16. In comparing with the past 5 -10 years, how can you consider the distance?

    a) Increasing

    b) Decreasing

    c) Constant

    d) Do not know

17. Where are your customers coming from,

    a) Inside the country

    b) Outside the country

    c) Both

18. Costs involved per month

Type of cost involved	Sawnwood Quantity (m^3)	Total cost
Buying price		
Other costs		

19. Who determine the price of the sawnwood? .....

20. . Could you rate your frequency for selling the products?

    a. Daily

    b. Weekly

    c. Monthly

    d. Occasionally

21. Could life be possible without these products? **Yes/No**

22. For how long do you think these products will continue to be available .....

23. Is there any attempt of establishing your own woodlots/forest plantation? **Yes/No**

If yes, for which species and why.....

If no, Why.....

24. Who are your customers? .....

25. How do you get customers?.....

26. Why have you decided to sell sawnwood forest products .....

27. Do you know institutions regulating forest products trade? **Yes/No**

28. If yes, what are these institutions? .....

29. Do you know the resource base of the products you are selling? **Yes/No**

30. Can you tell us the status of the resource base in comparison to the past five years?

a) Increasing

b) Decreasing ☐

c) Constant/ stable

d) Don't know

31. Do you think forest products trade is profitable and why.....

32. Do you pay tax for the forest products you are trading? **Yes/No**

33. To whom or where do you pay tax? .....

34. Amount of Tax payable per product.....

Product	Tax payable (amount TZS)	Quantity

35. Do you know policies/policy statements favouring or hindering forest products trade?

Yes/No

List them .....

36. Do you know other stakeholders dealing with forest products production and trade?

Yes/No

List and categorize them .....

37. Can you comment on the forest products business? .....

38. Are there problems of getting customers of your products? **Yes/No**

List the problems .....

39. Are the products satisfying your customers? **Yes/No**

40. If no what are your suggestions?.....

Are there any opportunities favouring your business? Yes/No

If yes List them .....

If no, what do you consider to be the opportunities .....

Appendix 4: Questionnaire for sawnwood middlemen/broker

A: Identification variables

1. Name of interviewer .....2. Date .....

3. Name of interviewee..... 4. Questionnaire number.....

d) District.....6. Region.....

7. Place of data collection (market, office).....

8. Individual or Organization (institution .....

9. Formal education

a) Primary education

b) Secondary education

c) Post education

10. Sex of respondent

a) Male

b) Female

11. Marital status of respondent

a) Single

b) Married

c) Widowed

d) Divorced

B: Information on selling sawnwood

21. What type(s) of sawnwood do you sell?. .....

22. How do you sell the sawnwood.....

23. Quantity of sawnwood sold per month

Sawnwood	Quantity(m^3)	Unit Price (TZS)	Revenue

24. Where do you get these sawnwood products

a) Producer

b) Transporters

c) Other trader

d) Others specify.....

25. How do you get sawnwood you sold? .....

How far is it? .....

26. In comparing with the past 5 -10 years, how can you consider the distance?

a) Increasing

b) Decreasing

c) Constant

d) Do not know

27. Where are your customers coming from.....

28. Costs involved per month

Type of cost involved	Sawnwood Quantity (m^3)	Total cost
Buying price		
Other costs		

29. Who determine the price of the sawnwood ? .....

30. Could you rate your frequency for selling the products?

a) Daily

b) Weekly

c) Monthly

d) Occasionally

29. Could life be possible without these products? **Yes/No**

30. For how long do you think these products will continue to be available.....

31. Is there any attempt of establishing your own woodlots/forest plantation? **Yes/No**

If yes, for which species and why.....

If no, Why.....

32. Who are your customers? .....

33. How do you get customers?.....

34. Why have you decided to be the middlemen in selling sawnwood .....

35. Do you know institutions regulating forest products trade? **Yes/No**

36. If yes, what are these institutions? .....

37. Do you know the resource base of the products you are selling? **Yes/No**

38. Can you tell us the status of the resource base in comparison to the past five years?

a) Increasing

b) Decreasing ☐

c) Constant/ stable

d) Don't know

39. Do you think forest products trade is profitable and why.....

40. Do you pay tax for the forest products you are trading? **Yes/No**

41. To whom or where do you pay tax? .....

42. Amount of Tax payable per product.....

Product	Tax payable (amount Tshs)	Quantity

43. Do you know policies/policy statements favouring or hindering forest products trade?

Yes/No

List them .....

44. Do you know other stakeholders dealing with forest products production and trade?

Yes/No

List and categorize them .....

45. Can you comment on the forest products business? .....

46. Are there problems of getting customers of your products? **Yes/No**

List the problems .....

47. Are the products satisfying your customers? **Yes/No**

48. If no what are your suggestions?.....

Are there any opportunities favouring your business? Yes/No

If yes List them .....

If no, what do you consider to be the opportunities .....

Appendix 5: Questionnaire for sawnwood enduse manufactures

A: Identification variables

1. Name of interviewer.....2. Date .....

1 Name of interviewee..... 4. Questionnaire number.....

5. District.....6. Region.....

7. Place of data collection (market, office).....

8. Individual or Organization (institution)..... .....

9. Education level

a) Formal education

b) Primary education ☐

c) Secondary education

d) Post education

11. Sex of respondent

a) Male ☐

b) Female

12. Marital status of respondent

a) Single

b) Married ☐

c) Widowed

d) Divorced

B: Information on consumption sawnwood

1 Which type of sawnwood do you use or consume?

2. Quantity of sawnwood consumed per month and its cost.

Sawnwood	Quantity	Unit Price (TZS)	Total expenditure

3. How can you compare the price with those for the past 5-10 years.....

4. Where do you get sawnwood products? .....

5. How do you get sawnwood products?

   a) Free ☐

   b) Purchase

   c) Both

6. Are there any changes on the availability of the products for the past 5-10 years? Yes/No

   If yes, what are the changes.....

7. Problems encountered in getting sawnwood products? .....

8. Do you know other stakeholders involved in sawnwood consumption? Yes/No

   If yes, list them .....

9. Do you know institutions governing sawnwood products consumption/utilization?

10. What are constraints and opportunities in obtaining and using sawnwood?.....

11 Do you have any special preferences for the sawnwood products? Yes/No

Product	Preference (Rank)

If yes, fill the following table

12. What are your suggestions for improving future availability of forest products?

    .....

13. Problems encountered in getting sawnwood products? .....

14. Do you know other stakeholders involved in sawnwood consumption? Yes/No

    If yes, list them .....

15. Do you know institutions governing sawnwood products consumption/utilization?

16. What are constraints and opportunities in obtaining and using sawnwood?.....

17. Do you have any special preferences for the sawnwood products? Yes/No

If yes, fill the following table

Product	Preference (Rank)

18. What are your suggestions for improving future availability of forest products?.....

Appendix 6 : Checklist Questionnaires

1: Regional /District Natural Resources Advisor/plantation managers

1. Which forest products are being traded in your region/plantation?
2. Which stakeholders are involved in sawnwood trade?
3. What are their role in sawnwood trade
4. What opportunities are there regarding policy instruments on trade of sawnwood in the region/plantation?
5. What are the policy constraints on sawnwood trade?
6. How do the district/ region benefits from the trade of sawnwood?
7. What advice/support to stakeholders dealing with forest products' trade do you normally offer?
8. Do you have problems related to sawnwood trade in the district/ region/plantation?
9. What is the market chain from production to consumptions?
10. Tell us about market centres/segments you know?
11. Who collect tax/royalties during trading process?
12. What categories of taxes/royalties are there?
13. Are all sawnwood traded legally harvested?
14. How about illegal harvesting of sawnwood
15. How can one know that the sawnwood traded are legally or illegally harvested?
16. Who are stakeholders dealing with forest products trade in your region? Categorize them
17. Mention problems affecting marketing of sawnwood
18. Where the sawnwood is traded coming from?

2: Mnrt/Forest Division

1. Which policies/policy statements supporting sawnwood trade/marketing?
2. Which policies/legislations regulating trade/marketing of sawnwood ?
3. Policy opportunities to sawnwood trade/marketing
4. Policy constraints to sawnwood trade/marketing
5. Do stakeholders dealing with sawnwood trade know policies and legislations supporting or hindering this trade
6. Training and seminar to the stakeholder involved in sawnwood on policy related issues
7. How do you involve regional administrations and district councils in getting information and regulating sawnwood trade?
8. Are your collaborators in the regions and districts known policies and legislation related to sawnwood trade?
9. Is the trade of forest products legally and illegally conducted?
10. What are penalties/fines/regulations for illegal harvesting?
11. List forest products which are need permits and those which do not need permits in harvesting?
12. What is the contribution of the sawnwood to the National income?

Appendix 7: Policy statements

Policy area 1: Forest land management

Objective: Ensured sustainable supply of forest products and services by maintaining sufficient forest area under effective management.

Policy statement (1): To ensure sustainable supply of forest products and services and environmental conservation, all types of forest reserves will be managed for production and/or protection based on sustainable management objectives defined for each forest reserve. The management of all types of forest reserves will be based on forest management plans

Policy statement (3): To enable participation of all stakeholders in forest management and conservation, joint management agreements, with appropriate user rights and benefits, will be established. The agreement will be between the central government, specialised executive agencies, private sector or local

Policy statement (8): To enable the mechanical and chemical wood industry to plan its investments, information on raw material base will be ascertained through periodical resource assessments, and made available to the industry. The rehabilitation of existing technology and establishment of efficient forest industries using appropriate technology will be promoted

Policy area 2: Forest-based industry and products

Objective: Increased employment and foreign exchange earnings through sustainable forest-based industrial development and trade.

Policy statement (14): Internal trade and exports of forest produce, excluding those regulated by international agreements of which Tanzania is a party, will be promoted. To prevent forest destruction and degradation through commercial exploitation, trade of certain forest products may be regulated.

Policy area 3: Ecosystem conservation and management

Objective: Ensured ecosystem stability through conservation of forest biodiversity,

Policy statement (28): Pricing of forest products and services sold from central and local government reserves will be determined based on free market values.

Policy area 4: Institutions and human resources

Objective: Enhanced national capacity to manage and develop the forest sector in collaboration with other stakeholders.

Policy statement (30): The capacity of the local governments to administer and manage forest resources will be strengthened and a coordination mechanism between the local and central governments established

Policy statement (33): To ensure adequate professional, technical and specialist staff in the sector, forestry training institutions will be strengthened. Specialist training will be promoted.

Policy statement (34): To facilitate manpower development a regular demand-driven manpower needs assessment, curricula review and training planning will be

Policy statement (35): To ensure increased awareness and skills amongst the people on sustainable management of forest resources, the forestry extension services will be strengthened

Policy statement (38) An enabling environment and regulatory framework for the private sector involvement in forestry will be created through secured raw material procurement, training, research, and transfer of technology. Incentives and credit facilities for investments will be promoted and joint ventures will be encouraged