



Swedish University of Agricultural Sciences
Faculty of Forest Sciences

Department of Forest Products, Uppsala

**A value chain analysis for timber in four
East African countries – an exploratory case study**

*En värdekedjeanalys av virke i fyra Östafrikanska länder
– en explorativ fallstudie*

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Keywords: Value chain, analysis, timber, East Africa

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*Supervisor SLU: Lars Lönnstedt
Examiner SLU: Lars Lönnstedt*

Sammanfattning

Denna studie är en värdekedjeanalys för virke i Östafrika. Uppdraget att genomföra studien kom från Vi-skogen, en icke-statlig biståndsorganisation registrerad i Kenya, Rwanda, Uganda och Tanzania som arbetar med program för fattigdomsbekämpning genom utbildning av småbrukare i bland annat trädjordbruk och företagande (Vi-skogen, 2012). Syftet med studien var att identifiera och beskriva vanliga värdekedjor för virke i respektive land där Vi-skogen verkar.

Värdekedja är ett koncept och ett ramverk för hur man ordnar information om de aktiviteter som ingår i ett visst förlopp med syfte att tillfredsställa ett visst kundbehov. Exempel på aktiviteter är anskaffning, logistik, transaktioner, produktion och marknadsföring. Ett av huvudsyftena med värdekedjeanalys är att kunna visa uppbyggnaden från produktionskostnad till konsumentpris för hela kedjan av aktiviteter samt hur överskottet fördelas mellan de aktörer som utför aktiviteterna. Denna studie har genomförts som en explorativ fallstudie med fokus på att få en bred första inblick. Datainsamlingen skedde främst genom semi-strukturerade intervjuer som hölls med aktörer inom de aktuella kedjorna.

Skogsindustrin i allmänhet präglas av försäljning av handelsvaror med *push*-marknadsföring, relativt långa ledtider i produktionen och produktionsprocesser som genererar en relativt hög andel konsekvensprodukter (Haartveit, Kozak, & Maness, 2004). Den generella bild som framträder av resultaten i denna studie överensstämmer med den beskrivningen. De observerade kedjorna bestod av bönder som odlade träd, entreprenörer som sönderdelade stockar till virke, transportörer som tillhandhöll logistik från avlägg till marknad, virkeshandlare som samordnade aktiviteter mellan olika steg i kedjan samt sålde virke och snickare som antingen utförde konstruktionsjobb eller möbeltillverkning för slutkunds räkning. Företagande var mycket småskaligt, enskilda firmor med en eller två anställda som agerade på mindre lokala marknader.

Ett resultat som utmärkte sig var den effekt som ärlighet och förtroende hade som viktiga inslag i företagens konkurrensstrategier. Tillit var en nyckelfaktor för bland annat kreditgivning. Eftersom tillgång till likvida medel ofta var en begränsande faktor för aktörer ägde ett omdöme att vara pålitlig stor betydelse för dem.

Den största potentialen för ökade överskott förelåg i ökat samarbete och samordning, både horisontell och vertikal. Utnyttjande av skalfördelar skulle innebära ökad kostnadseffektivitet men för att ökad vertikal integration skulle vara meningsfull ur böndernas perspektiv måste det först etableras samarbete mellan aktörerna i det första steget. Den genomsnittliga gårdsstorleken var en kraftigt begränsande faktor för att skapa stordriftsfördelar och med tanke på kostnaden för nödvändiga insatsvaror för vidareförädling var samarbete en nödvändighet.

Svaren i studien pekar på möjligheter att öka det totala överskottet i värdekedjan till nytta för alla involverade aktörer. Resultaten från studien kan främja Vi-skogen i deras arbete för ökad ekonomisk aktivitet och tillväxt med syfte att effektivt minska fattigdom och bidra till att etablera långsiktigt hållbar försörjning för småbrukare i Östafrika.

Nyckelord: *Värdekedja, analys, virke, Östafrika*

Abstract

This study is a value chain analysis for timber in East Africa. It was commissioned by Vi Agroforestry, a nongovernmental organisation registered in Kenya, Rwanda, Uganda and Tanzania engaged in a rural development program that involves promoting tree planting and enterprise development (Vi Agroforestry, 2012). The purpose of the study was to identify and describe common value chains for timber in the countries where Vi Agroforestry operated.

Value chain is a concept and a framework describing how to structure information regarding activities included in satisfying a certain customer need, e.g. procurement, logistics, transactions, production and marketing. One purpose of value chain analysis is to show the build-up from production cost to consumer price and how surplus is distributed between actors within a chain. The study was conducted as an exploratory case study focusing on gaining broad initial insights. Data collection was done mainly through semi-structured interviews with actors engaged in activities throughout the chains.

The forest products industry in general is characterised by sales of commodity products with push marketing, relatively long lead-times in production and a production processes that generates a relatively high percentage of consequence products (Haartveit, Kozak, & Maness, 2004). The general picture painted by the results in this study correspond with this description. The observed chains consisted of farmers engaged in silviculture, independent contractors providing processing of timber into boards, other independents providing transporting services from interior sites to markets, timber dealers coordinating between different stages plus handling retailing and finally contractors or carpenters engaged in construction or furniture making. Businesses were very small-scale, sole proprietorships with mainly one or two employees and markets were local.

One result that stood out was the impact that honesty and trust had as key elements in the competitive strategies of actors. Trust was a key condition for allowing credit and since cash flow was a big issue and liquidity often a limiting factor for most actors, being considered trustworthy had great significance.

The biggest potential for improvement that I found for the observed value chains was in increased cooperation and coordination, both horizontal and vertical. This could increase scale and reduce costs but from the farmers' perspective, for more vertical integration to make sense, there had to be a firm horizontal cooperation between actors in the first stage. Average farm size was a seriously limiting factor to creating economies of scale and considering the cost of required inputs for processing this would need to be in place.

The findings point to opportunities to increase the overall surplus to the benefit of all value chain participants. The results from this study can support Vi Agroforestry in their work to increase economic activity and growth with the aim to effectively reduce poverty and contribute to establishing sustainable livelihoods for smallholder farmers in East Africa.

Keywords: Value chain, analysis, timber, East Africa

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Daniel Hulusjö
Jönköping in May 2012

Table of contents

Sammanfattning

Abstract

Acknowledgements

Table of contents	5
1 Introduction	7
1.1 The state of the world's forests	7
1.2 Vi Agroforestry	8
1.3 Objectives and constraints	8
1.4 The research questions	9
2 Theoretical framework	10
2.1 An introduction to the value chain concept.....	10
2.2 Value chain analysis.....	11
2.3 Mapping for the forest products industry	11
3 Methodology	12
3.1 Exploratory or descriptive approach	12
3.2 The case study	12
3.3 Design.....	12
3.4 Processing the data	13
3.5 The respondents.....	13
Strengths and weaknesses in the design.....	13
4 Results and analysis	15
4.1 Mapping the structure of the value chain	15
4.2 Describing the different activities at each stage	15
4.2.1 <i>Silvicultural activities</i>	16
4.2.2 <i>Processing</i>	18
4.2.3 <i>Transporting</i>	20
4.2.4 <i>Retailing</i>	21
4.2.5 <i>Production</i>	23
4.3 Assembling costs, revenues and assessing value-addition over time	24
4.3.1 <i>Silvicultural activities</i>	24
4.3.2 <i>Processing</i>	25
4.3.3 <i>Transporting</i>	25
4.3.4 <i>Retailing</i>	27
4.3.5 <i>Production</i>	28
4.3.6 <i>Compilation</i>	29
4.4 Competition, collaboration and trust	30
4.4.1 <i>Competition</i>	30
4.4.2 <i>Collaboration</i>	31
4.4.3 <i>Trust</i>	31
4.5 Demand and the market.....	32
4.5.1 <i>Seasonal variations</i>	32
4.5.2 <i>Briefly about trends and drivers</i>	32
5 Discussion	33
5.1 Conclusion and final remarks.....	34
6 References	35
Appendices	36

List of Tables

Table 3.1 A list of respondents for each region listed by how they classified their businesses.	13
Table 4.1 Species described as in demand or commonly traded by interview persons in the different regions.....	18
Table 4.2 A compilation of frequently occurring dimensions for timber.	22
Table 4.3 Price list for timber (USD per foot) and poles (USD per piece) obtained in Kenya.	27
Table 4.4 Price information (USD per foot) obtained in Rwanda.	28
Table 4.5 Price list for timber (USD per foot) from Sondu.	28
Table 4.6 Examples of average cost and revenue (USD per foot) in Kagera region.	28
Table 4.7 Price information (USD per foot) obtained in Uganda.	28
Table 4.8 Estimations of maximum and minimum price, average cost and time spent in process and inventory per board.	29

List of Figures

Figure 1.1 Development in forest cover for the different continents 1990-2010.	7
Figure 3.1 Schematic value chain mapping: Theory and reality (Brown, Bessant, & Lamming, 2000).	14
Figure 4.1 Structure of the constructed common case value chain.	15
Figure 4.2 Breakdown of activities in the value chain for wood forest products.	16
Figure 4.3 Intercropping tea and trees in Kenya.	17
Figure 4.4 Chainsaw operator processing Cypress into boards.	19
Figure 4.5 Carrying timber from the harvesting site down to nearest road.	20
Figure 4.6 Transport vehicles parked at a market place in Sondu.	21
Figure 4.7 Men working a planer in Bukoba.	22
Figure 4.8 Eucalyptus poles used for scaffolding and shoring.	23
Figure 4.9 Graphical representation of the revenue span for the different links.	30
Figure 4.10 Urban population in % of total (The World Bank, 2010).	32

1 Introduction

1.1 The state of the world's forests

The year of 2011 was proclaimed ‘the year of forests’ by the United Nations. According to the writings in the adopted resolution the purpose of this action was to emphasise the need for sustainable management of all types of forests, including fragile forest ecosystems, and further that jointly arranged efforts should focus on raising awareness at all levels to strengthen the sustainable management, conservation and sustainable development of all types of forests for the benefit of current and future generations (United Nations, 2006). There are reasons why sustainable forest management should be given this much attention. The Global Forest Resources Assessment 2010 (Food and Agriculture Organization, 2010) noted that the total forest area amounts to approximately four billion hectares, equivalent to thirty-one per cent of the total land area of the world or roughly 0.6 hectares per capita. Forests are important for both humans and animals. Apart from economic values the world’s forests are also home to approximately three hundred million people and natural habitat to eighty per cent of all terrestrial species. Forests are the source of a variety of renewable resources. Besides wood, forests produce a host of other things, e.g. ecosystem services like soil and water conservation. Approximately eight per cent of the world's forests (330 million hectares) are designated for this purpose. For many people forests are also a source of different foods. The economic value of the non-wood forest products (NWFP) has been estimated to 18.5 billion US dollars but the figure is most likely grossly underestimated. Judging by all this it is easily deduced that the state of the world’s forests is something that greatly affects us.

In Figure 1.1 below data on forest cover for the different continents over a twenty-year period is presented (FAO, 2012).

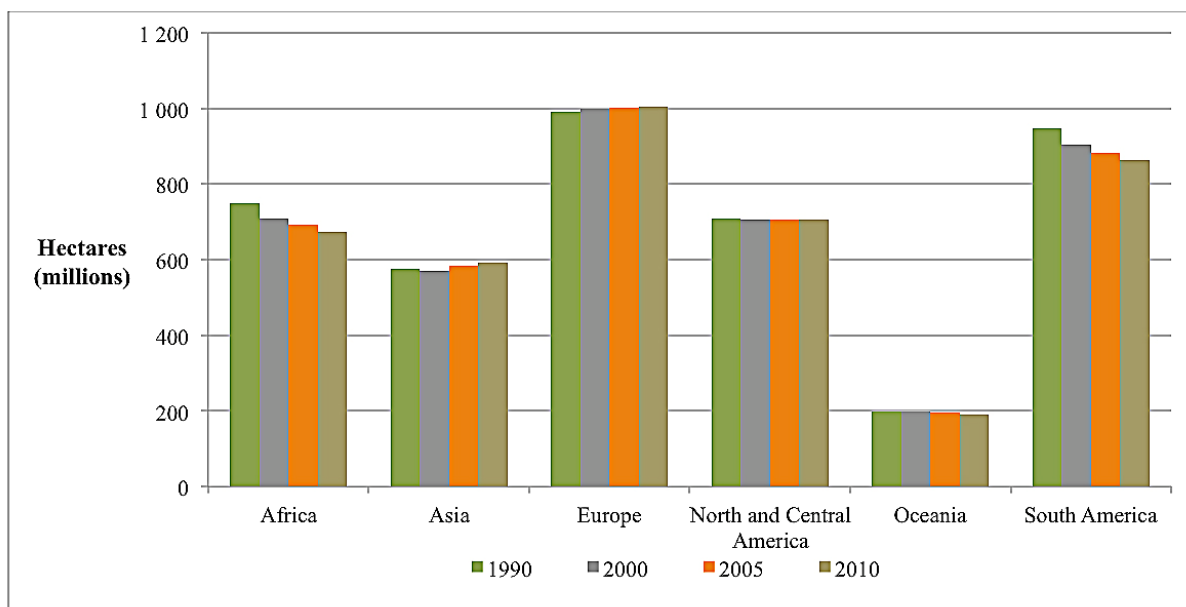


Figure 1.1. Development in forest cover for the different continents 1990-2010.

Africa and South America distinguish themselves by showing distinct decline in forest cover. For Africa the direction for the past twenty years is clear even though the rate of deforestation seem to have declined over last few years. However forest cover alone does not tell us what kinds of forests we have, what benefits they might provide, how well they are managed or if they are degenerated. (FAO, 2010) In the Lake Victoria basin where this study has its primary

focus the problems with among other things soil erosion and declining soil fertility have been attributed to loss of forest cover (World Agroforestry Centre, 2006). The situation is described by Maitima, Olson, Mugatha, Mugisha, & Mutie (2010):

The land was formerly rich in natural forests but this resource has been severely over-exploited. Deforestation combined with unsustainable agricultural methods has resulted in widespread, increasingly conspicuous land degradation. (Maitima et al., 2010)

1.2 Vi Agroforestry

According to World Bank statistics, sixty-three per cent out of roughly 850 million Africans living south of the Sahara reside in rural areas (The World Bank, 2010). Many of the people living in these rural areas are low-income, often subsistence farmers and many are undernourished (The World Bank, 2010). Vi Agroforestry is a Swedish foundation established in 1986 with the purpose of overseeing and managing fundraising for a tree-planting project in East Africa initiated by the founders. Over the years the concepts of the organisation have developed and today Vi Agroforestry is operating as a nongovernmental organisation registered in Kenya, Rwanda, Uganda and Tanzania engaged in a rural development program (Vi Agroforestry, 2012). The main objective of the programme *Planting for the future 2008-2011* was to capacitate smallholder farmers in agroforestry practices. Agroforestry is a term used to describe different agricultural practices involving trees or shrubs in combination with crops, animals or pasture (Rocheleau, Weber, & Field-Juma, 1988). Vi Agroforestry was also capacitating farmers in farmer enterprise development so that households could improve their living conditions and move out of poverty through establishing sustainable livelihoods. In their strategy document covering the period 2008-2011 Vi Agroforestry points out the potential for increments in income levels with an improved market based production (Vi Agroforestry, 2008). According to Webber & Labaste (2010) they are right to do so. The authors state that good agricultural practices remain fundamental to economic growth, poverty alleviation, and environmental sustainability (Webber & Labaste, 2010). The correlation between agriculture and poverty reduction has also been analysed by de Janvry and Sadoulet (2010) and they state that growth originating in agriculture can be three times more effective in reducing poverty than growth originating in the rest of the economy. In the light of all this the value chain perspective provides important means to understanding mechanisms for increasing efficiency, and ways to enable businesses to increase productivity and add value.

1.3 Objectives and constraints

As previously mentioned, Vi Agroforestry worked to promote tree planting and enterprise development to farmers in the Lake Victoria region. Tree planting for commercial use, with time and proper management, generates an output of wood forest products. Vi Agroforestry recognised that the raw material that farmers produced served as inputs in different value chains but could not say which ones, how they were structured or how surplus was distributed between the different stages and actors. For them to be able to assess the potentials and benefits for farmers to engage in more stages of the value chain they needed more knowledge. The purpose of this study was to identify and describe common value chains for timber providing Vi Agroforestry with some insight regarding the range of activities in use to bring wood forest products through the different stages to the final customer. The study should result in a mapping of the related flows of materials, funds and information. By also including the distribution of power within the chain it would be possible to examine other perspectives on any encountered inefficiencies.

Considering the time frame of the project the study was limited to specific regions in each respective country where Vi Agroforestry was operating. It was decided that I should focus on Masaka in Uganda, Kigali in Rwanda, Bukoba in Tanzania and Kisumu in Kenya. This was one the major delimitations of the study. It was also decided that instead of covering the entire group of forest products the study should focus on timber.

1.4 The research questions

The research questions that this study sets out to answer were deduced from the assignment I was handed from Vi Agroforestry: Identify and describe a common value chain for timber in each of the respective regions.

- What is the structure of a common value chain for timber?
- What activities are carried out at the different stages?
- Who are the most important actors within the value chain?
- What is the flow of materials, information and funds between different stages?

To what extent is trust and cooperation evident at each stage in the chain?

2 Theoretical framework

The following chapter presents the theories, models and tools that will be used and referred to in the analysis.

2.1 An introduction to the value chain concept

The value chain is a concept and a framework for organising and analysing information on how inputs and services are brought together and then used to grow, transform, or manufacture a product; how the product then moves physically from the producer to the customer; and how value is increased along the way. It is easy to get lost in terminological confusion when trying to delimit the different analytical entities. The *value chain* consists of *links*. A link is an *actor* (e.g. firm) employed in any of the relevant *activities* required in the chain. All of the traditional intra-link activities presented in the classic value chain model by Porter (1985) need not be performed within a single link in the chain but can be outsourced thus creating additional links (Kaplinsky & Morris, 2002). The ultimately sequential nature of the chain causes links to sometimes be referred to as *stages* putting emphasis on the function being served rather than the specific actor. There are many similar concepts dealing with different aspects of these matters:

Chains composed of companies (or individuals) that interact to supply goods and services are variously referred to as productive chains, value chains, filières, marketing chains, supply chains, or distribution chains (Webber & Labaste, 2010 p. 9).

According to Webber and Labaste (2010) the different concepts presented above differ mainly in perspective. Focus is on different aspects of what is essentially the same occurrence. The different concepts vary in emphasis on specific products or target markets, in what activities are highlighted, and in the way that they are applied (Ibid.). Why then out of all these different perspectives should the value chain perspective be the more appropriate one for this study? For example, Chopra and Meindl (2009) describe the supply chain concept as taking into account all parties involved, directly or indirectly, in fulfilling a customer request and further that the concerns of every supply chain should be to consider how to maximise the total surplus or *value* generated by the chain. The value chain perspective in turn also aims to catch and describe the relations and exchanges between actors or firms and also the different processes that are needed to create and deliver products to the final customer. It is evident that there is considerable overlap between the different concepts and this quote from Webber and Labaste further illustrates the precariousness with choosing just one:

The issue is not so much about which concept is superior or preferable, since they are complementary and their effective implementation can deliver improved business results. It must be noted, though, that practitioners of the supply chain approach often fail to consider to what extent cost reduction and inefficiencies in supply chain logistics actually add value, and if so, who benefits. On the other hand, value chain proponents sometimes forget that effective value chains must rest in efficient supply chains. (Webber & Labaste, 2010 p. 9)

In the end, from the point of this study, the strength in the value chain perspective is its inclusiveness. It incorporates supply logistics, transactions, market linkages and *value addition* (ibid.). One of the key purposes of this study is to generate results that will allow Vi Agroforestry to get a better idea of where in the chain and by what activity value increments occur so that they are able to better determine what recommendations to give farmers in their projects. To achieve this I chose to work with the value chain framework.

2.2 Value chain analysis

Value chain analysis can be used for wide variety of things, from improving business results to examining inequalities in global income distribution (Kaplinsky & Morris, 2002). To begin with, a few key points as presented by Webber and Labaste (2010). Value chain analysis focuses on more than overall revenue and gross physical output, it is also very much focused on net value added, the cost build-up and value accretion as well as the distribution of burden or benefit in both (Ibid. p. 11). Kaplinsky & Morris (2002) refer to Gary Gereffis writings on buyer-dominated versus supplier-dominated value chains. Whether a chain is buyer-dominated or supplier-dominated may depend on the nature of the product but it is also something to consider especially when actors are comparing alternative value chains. Domination can also be a matter of power structure within the value chain, either caused by information asymmetries or the level of rivalry among existing firms (Porter, 2008).

Another interesting point of analysis is collaboration and trust within a chain. Opening up to the idea of cooperation between stages or actors creates an exiting potential. Indeed, with establishing a “win-win” perspective, working within value chains and developing relationships where trust, knowledge, and benefits are shared among firms, there is a greater likelihood of generating collective efficiency and scale. (Webber & Labaste, 2010)

There are of course many more aspects possible to consider when performing a value chain analysis. However, the nature of this study will not allow for a comprehensive examination of them all. The research questions have been derived from literature on value chain analysis or related topics (Webber & Labaste, 2010; Kaplinsky & Morris, 2010; Porter, 2008).

2.3 Mapping for the forest products industry

The forest products industry is characterised by sales of commodity products with push marketing, uncertainty in raw material supply (it is difficult to forecast what assortments or quality a certain tree or stand will produce), relatively long lead-times in production and a production process that generates a relatively high percentage of consequence products (Haartveit, Kozak, & Maness, 2004). The study has mainly been focused on timber for construction and furniture making however in cases when I have come across information regarding fuel wood and charcoal production this has also been included to provide a more comprehensive overview.

3 Methodology

3.1 Exploratory or descriptive approach

The overall objective of this study is to identify and describe common value chains. The assumption is that what I will find during my exploration can be adequately described using the value chain concept. The reason why I choose to put emphasis on exploration is because I believe it highlights two important things. Primarily, that the focus of this study is to gain first insights and familiarity in the apparently unfamiliar cases and to examine what future research questions would be reasonable to pursue. Secondly, that through my work I evaluate whether applying the value chain concept to these essentially pre-industrial contexts is a feasible approach.

3.2 The case study

According to Yin (2009) every research method, e.g. qualitative, quantitative, experimental or case study, can be used for either exploratory, descriptive or explanatory purposes. Which one is most suited for the purpose of a study is determined by three conditions. Firstly the type of research question posed, secondly the extent of control the investigator has over actual behavioural events and thirdly the degree of focus on contemporary as opposed to historical events. (Ibid.)

This study concentrates on the respective situations in four specific regions, I have marginal or no ability to manipulate relevant behavioural events and focus is on contemporary events, therefore both experimental and historical research methods are excluded. The unfamiliarity mentioned previously and the uncertainty in what data is available requires that I am able to adapt to different situations. This ought to rule out quantitative studies. What is a case and what applies to the various concepts related to the idea of case analysis is, according to Ragin (1992), weakly defined in the social sciences. To equate the case study and qualitative analysis becomes problematic in particular in the sense that virtually all social science studies can be designed as a case study. Each social science study is an analysis of a phenomenon limited to a specific time and place. To separate qualitative study and case study Ragin proposes that one should start from what is in focus, investigated variables or cases. (Ibid.) My methodological approach does not support generalisation of the results. What is most important to Vi Agroforestry is to gain as much insight as possible in what applies in the different contexts where they operate. According to Yin (2009 p. 18) a case study is suitable when wanting to investigate a contemporary phenomenon in depth and within its real-life context, especially when the phenomenon involves important contextual conditions relevant to the study. These are my motives for selecting a case study approach for this study.

3.3 Design

Since this was exploratory research the initial strategy was adapted to the different contexts in order to gain as much insight as possible along the way. As previously mentioned it was decided that my starting points would be Vi Agroforestry's regional offices in Masaka – Uganda, Kigali – Rwanda, Bukoba – Tanzania and Kisumu – Kenya. The excellent field officers in each region having far greater knowledge about local conditions were designated as my guides helping me to an insertion point in the chain. I travelled in the different regions making contact and once I had a connection with an actor related to the flow of timber from producer to customer, information from that respondent was then used to guide me to another link, a form of snowball sampling. The local staff of Vi Agroforestry also assisted me as interpreters when needed. To ensure that information was not lost in translation they were

asked to not pose questions of their own but always translate the replies directly. We also spent time going through the interview guide in advance to clarify any uncertainties. However it proved difficult to keep respondents from having conversations directly with the interpreters. This means that the information in many cases can be considered second hand, which leaves bigger room for misinterpretation.

The methods used for data acquisition were semi structured qualitative interviews, informal conversations and observation. This means that I was not confined to a limited amount of formalised questions. (Kvale & Binkmann, 2009) The interviews were conducted according to a guide prepared to explore different aspect of the respondents business relating to the main themes of the value chain concept such as inputs, activities and processes, actors and their relations, cost and value addition and distribution. Twenty-six interviews with an average length of fifty minutes were included in the study. All interviews were recorded and later transcribed into written form. The interview guide can be found in Appendix 1.

3.4 Processing the data

Since many of the conversations had to be interpreted, as a first step of processing the data a summary for each interview was written. The summaries can be found in Appendix 2. To enable an overview of the information and comparison between the regions three types of mappings were done and then compiled; structural mapping, lead-time mapping where time spent in process and time spent in inventory was separated plus cost vs. revenue i.e. value addition mapping all based on what information I had obtained. National currencies were converted to US dollars using the following rates: 1 USD = 2487.5 UGX = 1579.8 TZS = 83.1 KES = 606.8 RWF.

3.5 The respondents

The respondents were actors within the chain. Whenever there were several potential respondents covering what appeared to be the same link in the chain the choice with whom to speak was made to gain as broad insights as possible. In Table 3.1 below, the people I talked to are presented by region and by how they classified their own businesses.

Table 3.1. A list of respondents for each region listed by how they classified their businesses

Masaka	Kigali	Bukoba	Kisumu
<ul style="list-style-type: none"> • Forest landowner • Timber dealer • Timber dealer • Contractor • Transporter • Timber dealer and Carpenter 	<ul style="list-style-type: none"> • Farmer • Timber dealer • Transporter and Timber dealer • Representative for the Adarwa association (Timber dealers and Carpenters) 	<ul style="list-style-type: none"> • Forest landowner • Forest manager (plantation) • Timber dealer • Transporter • Carpenter • Carpenter 	<ul style="list-style-type: none"> • Farmer • Forest landowner • Pit sawyer • Chainsaw operator • Timber dealer • Timber dealer • Timber dealer • Transporter • Transporter • Carpenter

Strengths and weaknesses in the design

The most apparent weakness in this study would be the lack of generalizability. The chosen approach can give some indication as to the “whom”, “why“ and “how” but it cannot tell us “how often” or “how many”. However, considering the uncertainty in what information was available and for purpose of giving initial insight and an idea of direction for further research

this exploratory, broad sweeping approach was more efficient. Kaplinsky and Morris (2002) point out another aspect of complex value chain analysis illustrated in Figure 3.1 below:

[...] the theory of value chains suggests simplicity and an easy clarity of focus. However, the real world can be much messier, [...] the researcher will sometimes have to make arbitrary decisions on what to map in charting a path through complex value chains. (Kaplinsky & Morris, 2002 p. 52)

Instead of trying to reduce the complexity by narrowing my perspective to that of a particular actor within the chain I have strived to maintain a holistic approach by concentrating on a specific product group i.e. wood forest products with primary focus on timber (Haartveit, Kozak, & Maness, 2004).

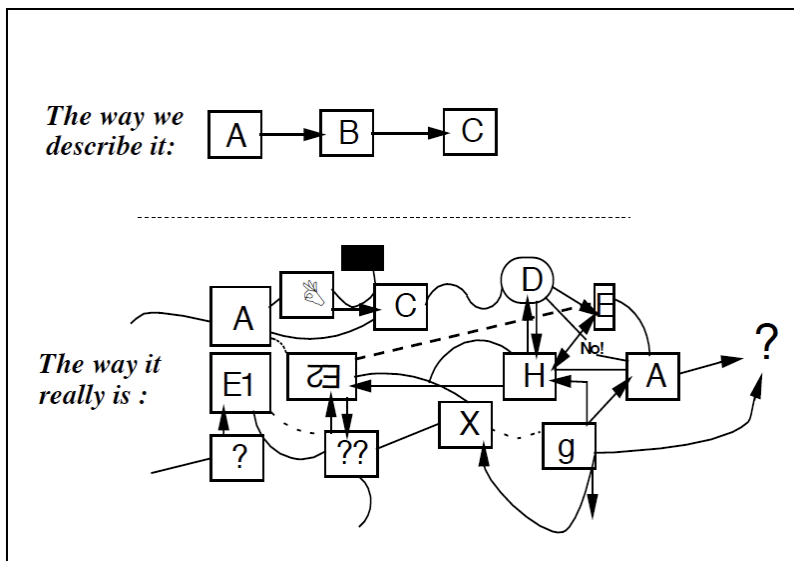


Figure 3.1. Schematic value chain mapping: Theory and reality (Brown, Bessant, & Lamming, 2000).

4 Results and analysis

When I started processing the collected material it quickly became clear that there were many similarities between the four regions. I therefore decided that I would present a constructed common case and then point out significant observed differences between the regions. The results are presented and analysed continuously throughout the chapter. The reader is reminded that any generalisation presented in the text only refers to the observed cases. Since there was a wide range of aspects to cover I organised the results to cover one research question at a time to enable a more coherent presentation and analysis.

4.1 Mapping the structure of the value chain

Since the aim was to understand value build-up, for each link a breakdown of the different relevant activities that may generate cost or revenue was done. To really establish what activities were performed within each link I had to look at labour and employment. Most businesses were being run as sole proprietorships and had only one or in a few cases two workers reasonable to describe as permanent staff. The majority of all labour was casual and based on either short-term contracts or day-to-day need for the employer. If an activity should be describe as outsourced, and consequently end up in its own link, or not depended on whether to regard these casual workers as independent contractors or employees. It was not at all obvious but I have based my classification on two things, whether labourers marketed their services or mainly worked with just one employer and whether the relationship between worker and employer was characterised by a high or low degree of supervision. A basic structure of links in the observed common case value chain is presented in Figure 4.1.



Figure 4.1. Structure of the constructed common case value chain.

The processor and the transporter are distinguished since they come in as intermediary suppliers of services and lacked ownership of the material. Mechanised transportation was in every case provided by a separate actor. Processing on the other hand proved to be somewhat of a grey area. There were many examples of independent contractors providing processing as a service but occasionally combining this with timber dealing and the other way around, timber dealers with in-house processing capabilities. In general markets were very local. In most cases the majority of the volume was being traded within a radius of 10 kilometres and depending on the intended end use of the timber (construction or furniture making) the scale of the farmer's operation and what connections he or she had there were examples of farmers procuring processing and transportation and bypassing the timber dealers completely.

4.2 Describing the different activities at each stage

Figure 4.2 shows a mapping of the chain of different activities that were employed in the process of satisfying the final customer need, based on the collected data. The circles and rounded boxes represent groups of activities, usually performed within one link starting from the farmer engaged in silvicultural activities and going through stages of processing, transportation, retailing and production to the final customer. These groups of activities will be explicated in the subsections below. The solid, dotted or dashed line indicates what actor

manages the activities, or in case of outsourcing commissions them. The rectangular boxes contain information regarding output and common case practice.

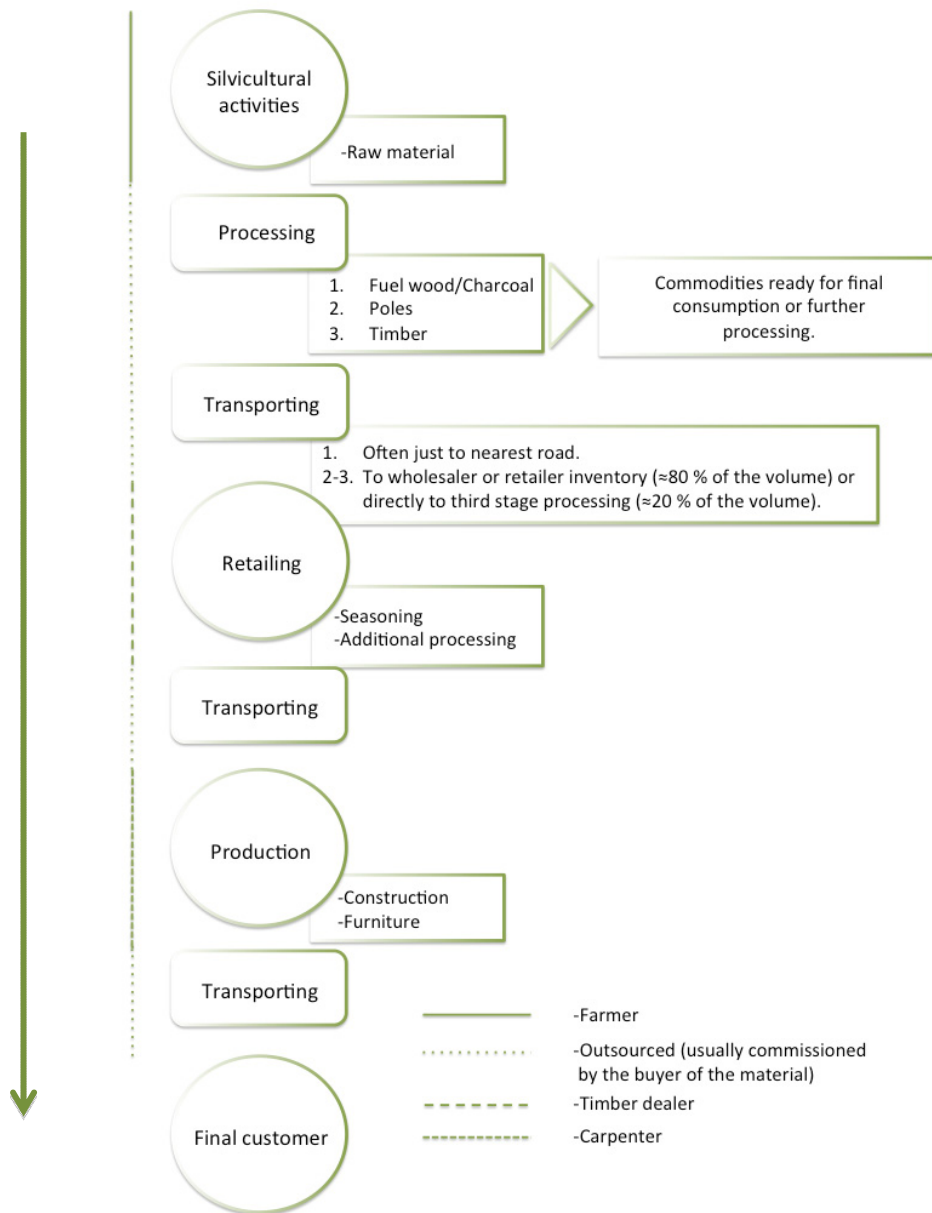


Figure 4.2. Breakdown of activities in the value chain for wood forest products.

Note: In general, even though processing and transportation had been outsourced the timber dealer was usually involved in coordinating the activities e.g. arranging permits and making sure there were casual labourers available for loading and offloading the transport vehicle.

4.2.1 Silvicultural activities

Talking to farmers, small forest landowners and managers of plantations in the four regions I was given an indication of practices and conditions. The resources and capabilities required for the first link of the chain were of course land and second, knowledge. Input in the form of information about required silvicultural activities such as bringing up seedlings, planting, weeding, cleaning, thinning, pruning and final harvesting was in most cases supplied by nongovernmental organisations that also provided a first round of seeds. For the silvicultural

activities the only equipment needed were ordinary farm tools. The average cultivated area was small, one half to one hectare per household, and it was only in a few cases farmers had designated wood plots. In many cases intercropping (Figure 4.3) was the only way for farmers to be able to grow trees for timber. Depending on whether wood was harvested from plantations, intercropped trees or patches of natural forest there was a difference in attitude towards forest management amongst farmers. In general acquired natural forest received much less management. People working as timber dealers also gave similar accounts. A forest landowner in Uganda mentioned one possibly contributing factor. He said that people were invading his patch of natural forest taking wood for charcoal production and went on to say that he now had to employ people to keep squatters of his land, attributing this to weaknesses in the land tenure system. This had a decidedly negative effect on his motivation to engage in forest management activities.

Selecting a tree species

There was often mention of hesitance as to whether planting trees was a good idea. Many had concerns regarding the time between planting and harvesting which was perceived as long. A group of farmers in Rwanda, a country with very high population density and therefore strong focus on land utilisation, provided a good summary of the decision process. They first looked at agroforestry tree species for intercropping because they did not have separate wood plots. After that the quality of the timber yield, what was highest in demand and what was fastest growing were the important factors. A tree was considered fast growing if it was mature within ten years. The time it took for most indigenous species to reach maturity was said to be approximately twenty-five years and this was repeated through the four regions. In Table 4.1 you will find an overview of the most commonly mentioned species in the different regions.



Figure 4.3. Intercropping tea and trees in Kenya.

Table 4.1. Species described as in demand or commonly traded by interview persons in the different regions

Masaka	Kigali	Bukoba	Kisumu
<i>Maesopsis eminii</i>	<i>Grevillea robusta</i> ,	<i>Pinus Caribaea</i>	<i>Cupressus lusitanica</i>
<i>Milicia excelsa</i>	<i>Eucalyptus spp.</i>	<i>Pinus tecunumanii</i>	<i>Eucalyptus spp.</i>
<i>Eucalyptus spp.</i>	<i>Pinus patula</i>	<i>Maesopsis eminii</i>	
“Mukusu”,	<i>Cupressus lusitanica</i>	<i>Eucalyptus spp.</i>	
(possibly	<i>Markhamia lutea</i>		
Entandrophragma	<i>Cedrela serrata</i>		
angolense)			

The species most often mentioned as highest in demand were *Eucalyptus spp.* *Eucalyptus spp.* are exotic species for the respective regions and the presence in East Africa is a much-debated issue (Gessesse & Teklu, 2011). The farmers said there were several reasons why they liked the *Eucalyptus spp.* so much. One was that they grow fast, another that they grow straight and especially the fact that most species of *Eucalyptus spp.* respond well to coppicing, which facilitates regeneration and saves a lot of cost. The timber dealers were happy to accept it because from their perspective *Eucalyptus spp.* were some of the few species that were usually available and therefore well known by the craftsmen who purchased timber. The timber was demanded for both furniture making and construction though most carpenters would prefer indigenous hardwood species for furniture making if they were available.

Something that stood out in Bukoba compared to the other regions was that pine was much more common. As in the average case the carpenters making furniture preferred indigenous species but for construction the softer coniferous species were better suited. Pine also had less tendency to curve when drying compared to the otherwise common *Eucalyptus spp.* Depending on what species you as a farmer chose seeds would be readily available or more costly to come by, e.g. seed for *M. eminii* could be collected in the forest free of charge. An example from Tanzania to put this into perspective; *P. patula* seeds could be bought from orchards within the country at 12 USD per kilogram and if you wanted *P. caribaea*, seeds were imported at a price of 400 USD per kilogram. Another relevant aspect to what species to choose was brought up by a plantation manager in Tanzania growing pines mainly to supply the local market. Conifers are traded within East Africa while the indigenous species are traded globally, to Europe or even Asia. If the ambition is to gain access to global value chains for wood forest products the indigenous tree species rather than the exotics represent an opportunity.

4.2.2 Processing

Once the raw material had been produced the next activity in the chain was processing. The traditional practice of pit sawing has gotten more and more uncommon since the introduction of chainsaws (Figure 4.4) due to taking longer time and being more labour intensive. However many of the respondents feared the increased waste that came with the use of chainsaws instead of traditional pit sawing. Using chainsaws in natural forests was said to be forbidden in all four countries. In Kenya the use of chainsaws was only prohibited in government forests. The motor-manual method for tree felling and processing was perceived as practicable and of course a lot quicker which seem to have lead to a situation where many willingly chanced it and took the risk of having the expensive saw confiscated in case of discovery. A chainsaw you could come by at a price of around 600 USD. Of course fuel and spare parts were also needed to operate the saw. Spare parts were both hard to come by and quite expensive. Alternatively pit sawyers used handsaws, pangas and axes. Pit sawing required working in pairs.



Figure 4.4. Chainsaw operator processing Cypress into boards.

All the processing was done on or adjacent to the site of felling. As indicated in Figure 4.2 processing was outsourced in most cases I encountered. One exception was a farmer who had processing as a side business. There were also a few examples of actors combining processing with timber dealing. People working either as chainsaw operators or as pit sawyers were said to be available but expensive. However if you did not have the money to pay for processing there was mention of a custom of splitting the revenues from selling the finished boards fifty-fifty instead of upfront payment. For Masaka, Kigali and Bukoba the most common case was that timber dealers bought standing trees from the forest landowners or farmers and then hired workers for felling and processing into boards. In the comparison between regions Kisumu stands out. Many of the timber dealers that I spoke with were based in more central markets and when buying from more interior places instead of dealing with farmers the people doing processing bought trees, processed them and acted as wholesalers i.e. a kind of timber dealers.

Outputs

When processing the trees nothing was wasted. Besides timber the branches of the tree were sold as firewood or processed into charcoal, the offcuts could be sold to less demanding customers and even the sawdust had its uses, e.g. to light fires, to be used as chicken litter or for mulching. Depending on the situation, if the branches were to be sold as fuel wood one practice was to cut them into one-metre lengths and arrange them into bunches. Hired casual labourers would then move the bunches to the nearest road where customers could come and buy. If the branches were to be processed into charcoal it required some work. First the wood had to be cut into small pieces, after that a kiln was built. The kiln had to be monitored during the burning process. Like with the other processing this was also done on the site of felling. Once finished the charcoal was loaded into bags and carried to the nearest road. Unlike fuel wood charcoal was usually taken to a bigger market, often a market for food commodities and sold there.

There were standard dimensions for width and depth and no standard lengths but pieces were usually cut to even feet. What dimensions the people processing used depended on whether they had been contracted by for example a timber dealer with a specific request or if they were just producing on their own. If there was no order dimensions were usually determined by the size of the tree. The risk of processing into wrong dimensions was not seen as very big since demand for timber was so high customers were willing to take bigger pieces and then split them into desired sizes. Around eighty per cent of what was being produced went directly to inventory and the remaining twenty per cent went directly to customers.

4.2.3 Transporting

The need for different types of transportation came in at different stages of the chain. In this study the mechanised part was outsourced in every case. Usually casual labourers were hired to transport timber to the nearest road. They carried on their backs as shown in Figure 4.5 or on their heads. Some used bicycles or motorbikes, however that was not very popular because of the increased risk that the unseasoned timber would crack. Once they reached a good enough road casual labourers loaded the timber onto a vehicle, usually a pickup or a so-called canter (referring to a series of lorries under the name Mitsubishi Fuso Canter) depending on the quantity, and the timber was then transported to its customer. In almost every case the actor in charge for arranging the transportation, including hiring casual labourers to do the manual transporting and loading and offloading of the vehicle, was the buyer of the timber. It was also that person's responsibility to obtain necessary permits or licences, which without, they would risk having the entire load confiscated.



Figure 4.5. Carrying timber from the harvesting site down to nearest road.

Availability and required inputs

Transportation was readily available and could usually be found near the local market place as shown in the example in Figure 4.6. There were vehicles in abundance, and the only perceived uncertainty was fluctuation in price levels that mainly varied with fuel cost. Interview persons said that instead of actual companies, actors were more like individuals who had access to a vehicle. Most commonly the driver did not own the vehicle he was using. Rent was paid on a weekly basis and it was either a fixed price or a share of the generated revenues. Paying for

six days, that is a normal workweek, you would have access to the vehicle for seven. Despite the fact that the driver paid rent the cost for maintenance, repair and operation still fell on him. The main inputs needed besides the vehicle were of course firstly fuel, then tires, labour, oil and general service on the vehicle. Fuel was mostly available but spare parts and such usually came from dealers in bigger cities like Dar es Salaam who in turn imported them from for example Europe. Since the transporters usually ran one or two man businesses they rarely had their own garage and most of them purchased needed repairs as a service.



Figure 4.6. Transport vehicles parked at a market place in Sondu.

4.2.4 Retailing

Talking to farmers, a few examples of selling directly to carpenters or final customers were presented. In those cases the buyers were local, often living in the same village. However most interview persons described situations where the main buyers were timber dealers, either located locally or in bigger markets. Either timber dealers came to the villages looking for trees or farmers who had trees for sale contacted timber dealers directly. Processing and transportation was arranged, as mentioned most often by the dealer, and the timber was taken to the market place where the dealer had his shop and the retailing began. The main service that retailing entailed was increased responsiveness. The lead-time for the preceding activities was long and, in general, customers did not order in advance but expected to find what they needed when they needed it. As mentioned, around eighty per cent of what was being produced went directly to inventory and only approximately twenty per cent went directly to customers.

Most common case was that timber dealers limited themselves to just retailing but a few of the people I talked to had also invested in further processing e.g. splitting timber into other dimensions, planing as shown in Figure 4.7 below and drilling. An alternative to investing in the equipment necessary to assist in processing, some timber dealers had established good relationships with other actors in possession of proper machinery. So instead of providing the actual service they could at least provide a connection to it.



Figure 4.7. Men working a planer in Bukoba.

Cash flow and obsolescence

There were two main issues for actors engaged in the retail stage. The first one was managing cash flow. Consider the cost of the material and all processing done including transportation and required permits in combination with eighty per cent being produced in anticipation of customer order rather than on actual order. The second one was managing the risk or cost of obsolescence or distressed inventory. Retailers bought timber in bulk and when receiving a canter loaded with 3000-4000 feet there would be variations in quality but when customers came to buy they selected the pieces they believed were best. All markets used standard dimension for timber, however not all dealers had every dimension available. A compilation of the most frequent dimension can be found in Table 4.2. Timber was sold per feet and poles were sold per piece. Since there were no standard lengths and customer paid per feet there was a risk of remaining with lengths that were less demanded that would have to be sold off as fuel wood at a lower price. By stocking timber dealers also risked having either rot or insects damage the wood. After two years in stock there was a high likelihood that the timber was ruined. One strategy for salvaging what money they could, timber dealers, when noticing that pieces had started to go bad would reduce price so that they could get rid of them fast.

Table 4.2 .A compilation of frequently occurring dimensions for timber

Dimensions (inches)
1 by 6
1 by 8
1 by 10
1 by 12
2 by 2
2 by 3
2 by 4
3 by 3

Required inputs and uncertainty in supply

Besides wood, processing and transportation services, a plot for a warehouse and store was usually rented. Also a permit to do timber dealing was required. The information supplied by timber dealers in the different regions painted similar pictures. It was exceedingly rare to find long-term relationships between dealers and forest landowners. The woodlots were as previously mentioned generally too small to allow recurring visits each year and it was highly unusual to contract that the timber dealer would come back next year or in the next two years.

Uncertainty in supply was a much bigger issue for timber dealers depending on natural forests for raw material. Many of them predicted that in one to three years uncertainty in supply would be so high that they were now considering leaving the business. The raw material was becoming more scarce and so people were actually pulling out of the business because the lack of especially hard wood timber from natural forests. As one man in Uganda put it: “We predict that by the end of next year there will be no timber coming from Kalangala because the reserves there are being cut at a high rate. [...] The few forests that are there they are very expensive and so you cannot get anything.” Other materials and labour were described as always available.

4.2.5 Production

Talking to timber dealers the main buyers were carpenters and contractors. Carpenters were mostly one or two-person businesses employing casual labour when needing extra hands. Private people working on their houses were also important customers though naturally only recurring for a shorter period of time. The biggest difference between contractors and carpenters from a timber dealer point of view was that carpenters would come and buy a few pieces at a time while contractors or people working in construction would buy big quantities. As an example, poles are often used for scaffolding, shoring and roofing and therefore customers usually buy many at a time contrary to for example a one by twelve inches piece of timber for furniture making. Figure 4.8 depicts a construction site in Uganda.



Figure 4.8. Eucalyptus poles used for scaffolding and shoring.

Required inputs

Working timber into finished products carpenters mainly relied on manual work with simple regular tools such as a hammer, saw, planer, square, clamp and measuring tape. These tools were said to be readily available and not very expensive. Machinery for additional processing such as making grooves or decorative mouldings, splitting, planing et cetera was expensive. In

many cases carpenters maintained a relationship with a workshop or timber dealer in possession of needed equipment so that instead of buying machinery they could just purchase the service. Besides timber other inputs used in carpentry were varnish, glue, different types of hardboard and different types of nails. Same as for timber dealers the plot where the carpenters had their workshop and warehouse was most often rented.

Uncertainty in supply

Many of the actors in the production stage described different strategies for obtaining the material they needed. For example a contractor in Uganda using a lot of wood from indigenous species said he would not rely on local timber dealers from the same town but instead established his own contacts in regions where natural forests were still available. Other interview persons established direct contact with farmers however most commonly the main suppliers were said to be timber dealers in the local market. Suppliers were selected based on availability and quality of timber and of course price. The availability of timber was said to be dropping and timber was getting more and more expensive. As previously mentioned carpenters said they favoured indigenous species for furniture making and consequently they would not benefit from increased planting of exotics. However since *Eucalyptus* spp. was popular among farmers and forest landowners it was therefore common in the market and many carpenters had grown so accustomed to it they even said to prefer it.

4.3 Assembling costs, revenues and assessing value-addition over time

Finding sufficient data showing the build-up from production cost to consumer price proved to be very difficult. The majority of my respondents did not keep books of their transactions or business statistics and based on the lack of answers or ambiguity in many of the answers I received I urge the reader to regard the figures in this section more as indications than factual. I have made a schematic presentation and focused on trying to identify principal price setting at the different stages of the value chain plus lead-time.

4.3.1 Silvicultural activities

Lead-time

Naturally producing the raw material was the longest taking process in the entire chain. For timber, growing a tree to maturity was said to take 10-25 years depending on species. A remarkably short period compared to for example boreal conditions. The amount of material that would be produced during this time of course varied but one example from Bukoba was 36 cubic metres per hectare and year or 900 cubic metres in total output per hectare, divided by the rotation period, 25 years. The diameter at breast height (dbh) was said to be between 25-40 centimetres. For poles the rotation period was substantially shorter. Trees were ready to be harvested after two to five years depending on the required dbh.

Costs and revenues

As previously mentioned seed was in most cases given to the farmers or collected from the forest free of charge. The tools used in land preparation and tending were regular farm tools most often already owned by the farmer. The source of labour for the silvicultural activities was the farmer family. To establish the cost for their time it would be possible to estimate opportunity cost by looking at wages for casual labourers, examples from Rwanda, Tanzania and Kenya points to an average wage somewhere between 0.15-0.16 USD per hour. However then it would also be reasonable to weigh in job availability and possible travel time. A probably more significant factor would be the cost of land and opportunity cost of land use. A farmer in Kenya told me that the cost for one acre of land in that region was 1200 USD.

Practicing boundary planting or utilising land that was degraded or otherwise unsuitable for regular farm crops mitigates this cost.

When buying standing timber the quality of the tree, the diameter at breast height in combination with height, i.e. the volume, and of course species were the main factors affecting price. Some general examples from Kenya mentioned figures between 36-60 USD, 16-36 in Rwanda and circa 40 USD in Uganda.

4.3.2 Processing

Lead-time

As for the time it took to process a tree into timber I have received very different accounts. One example from Masaka was that it took almost two days for a man with chainsaw to produce roughly one cubic metre of timber. An interview person in Kenya said that he could produce ten cubic metres per day, which seems highly unlikely. The piece of timber in Figure 4.5 is six inches by one inch by nine feet and it took seven minutes to cut from a log that had already been split and then cut perpendicular to the fresh surface on one side. That's approximately 10 dm³ in seven minutes or one cubic metre in 12 hours. Adding a few breaks plus time for felling and limbing perhaps one to two days is not too far off. As for pit sawing, one account stated that a log with a diameter of 40 centimetres could take two days to process and the pair would have produced 40-50 pieces of timber. From a tree with the same dimensions pit sawyers could produce around 120-150 pieces of timber consequently taking approximately one week to complete.

Costs and revenues

I have already mentioned the price for a chainsaw, around 600 USD, plus the risk of having it confiscated by authorities. Besides the cost of buying the saw it requires spare parts like chains and of course fuel and oil. The chainsaws I encountered were bigger models with fuel tanks holding approximately 0.75 litres and petrol was around one USD per litre. One tank would last the operator at least 1-1.5 hours depending on the type of work he was doing. The average pit sawyers on the other hand as one man told me need only a saw, a file and plenty of porridge. The time aspect comes in here too, pit sawyers worked in pairs and each person might spend around 1.2 USD per day on food while away working.

Chainsaw operators charged clients a price per foot by dimension or per fuel tank consumed. In the first case prices ranged from 0.07-0.12 USD per foot. The bigger dimension you wanted the lower the price would be, essentially another way to price time. In the second case price per consumed tank of fuel was 3.61 USD. A figure for average cost of processing from Rwanda was 0.66 USD per board giving an indication of an average length around nine feet.

As mentioned if, for example a farmer did not have the money to pay for processing there was a custom of splitting the revenues from selling the finished boards fifty-fifty. Since the value of the tree was increased 3-4 times with processing this would be a beneficial deal for the processor.

4.3.3 Transporting

Lead-time

There was no wait to be mentioned when it came to acquiring manual or mechanised transportation. Casual labourers were hired in the villages where the timber was harvested and mechanised transport service was by accounts readily available, usually at the nearest market place. The actual time it took to transport timber from one place to another depended on the

distance, whether it was dry season or rain season and the state of the roads. Bad roads in combination with tough terrain and rain season entailed high risk that a transport operation would be unsuccessful.

Costs and revenues

The price for a truck of course varied depending on its capacity. Since new trucks were expensive, common practice was to buy a used truck and then recondition it. Accounts from Kenya and Rwanda said that a used truck with a carrying capacities between 3.5-7 tonnes would be somewhere around 36 000-42 000 USD and a new engine around 3 610 USD. This compared to roughly 80 000 USD for a completely new truck. However, the most common situation was that someone else owned the vehicle that the driver was operating. The drivers had to pay 32-40 USD per day for renting a canter a vehicle with approximately 3.5-4 tonnes carrying capacity (Mitsubishi Fuso, 2012). As mentioned, rent was often paid weekly and there was either a fixed price per day or the rent was adapted to the amount of money the driver had earned. After rent all other costs for maintaining the vehicle plus everything it needed to operate also befell the driver. The biggest cost besides rent was fuel and prices were around 1.2-1.3 USD per litre for both diesel and petrol. The drivers had different strategies for handling cash flow; one was to always refuel after receiving down payment from the customer. After fuel tires were a big expense. Since roads were often in bad shape drivers prioritised good quality tires to decrease the risk of losing time. A tire cost 540 USD and depending on the roads and what cargo you carried they would either last two weeks or two months. After that came regular service and smaller things like parking fees plus of course a drivers allowance to cover accommodation and food.

The costs were high but according to respondents with a seven tonne truck you could make around 360 USD per day. Price determination was fairly straightforward and the drivers calculated the distance for fuel consumption, determined the road conditions and load for tear and wear. Of course you had some negotiations as well. Some price examples from the different countries:

The buyer of timber most often arranged the manual transporting from the felling site to the nearest road. Sometimes it could be as far as five or seven kilometres and the price per timber for this distance ranged from 0.012-0.024 USD in Kenya and Tanzania, seeming remarkably low compared with the price for other casual labour, to 0.32 USD per piece in Rwanda. Note that the price paid for loading and offloading was nearly the same, as the price for carrying the timber several kilometres despite the fact that loading ought to be a much quicker operation. The examples range between 0.01-0.06 USD per piece except for one from Uganda where workers received 0.24 USD. I found no explanation for this in the material. It is possible that the same casual labourers that did the forwarding participated in the loading. Using a pickup with a carrying capacity of one tonne the price ranged from 0.47-0.8 USD per km depending on the roads. A bigger truck like a canter would cost the buyer 1.3-2 USD per km but would carry approximately four times as much material.

One final cost associated with transportation of timber; in every case of mechanised transportation of timber on monitored roads a permit from the authorities was required. The buyer of timber was the one responsible for obtaining a permit and if it was not available at a time of inspection the whole cargo would be confiscated and auctioned off by the authorities. The time it would take to get a permit was said to be two weeks and during that time the official was supposed make a visit to the actual site of felling to verify the origin of the timber. I was given a few examples of how much a permit would cost. In Uganda it varied between

0.05-0.48 USD per piece, in Tanzania it was said to be 0.13 USD and in Kenya 0.16 USD per piece.

4.3.4 Retailing

Lead-time

The main function of the retailer stage was to coordinate flows and increase the responsiveness towards the final customer. The lack of advance ordering from customers put timber dealers in a difficult situation. It required a lot of capital to keep a big stock and striving to minimise capital employed and risk of obsolescence, or more commonly simply not having the means available to keep a big stock inferred increased risk that you would not be able to serve potential customers. The lack of advance ordering or inability to forecast also put customers in difficult situations. One interview person in Uganda gave an example. Receiving a government contract for 300 pieces of school furniture he had three months to deliver. The order required a lot of timber at short notice and he had no way of ordering ahead since he did not know if he would get the contract. If the material was not in stock all he would be able to get was raw timber and just the seasoning could take two months depending on the type of wood and the weather conditions. By then he would have lost two thirds of his available time.

Costs and revenues

Timber dealers were in most cases the initiators of all the preceding activities except silviculture. Their main costs naturally covered the expenses and profit margins of the previous links. In addition there were also costs associated with activities performed in the retailing stage. To work as a timber dealer, authorities required that the businesses be registered. Answers concerning the cost for the permit ranged from 43 USD per year up to 360 USD per year, a rather big span. Since retailers needed storage space and wanted central locations they generally rented plots in towns. The average rent was around 35 USD per month. The cost of casual labour was around 1-3 USD per day and most dealers had at least one worker for example working as shop assistant or doing additional processing.

Not all timber dealers offered additional processing e.g. planing. In case the customer requested it the dealer usually had a connection to someone who had the necessary equipment that they could refer to. The price for timber that the dealers charged varied with species, quality, dimension, requested quantity, required delivery time plus the current balance between supply and demand. I was not able to map the mechanics behind price setting in any more detail. In tables 4.3-4.7 I have summarised the price information I was able to obtain. All prices are in USD, for timber per foot and for poles per piece. The reader is reminded that the examples presented in tables 4.3-4.7 were based on single or few accounts.

Table 4.3. Price list for timber (USD per foot) and poles (USD per piece) obtained in Kenya

Dimension (inches)	Buy	Sell	Gross margin
1 x 6	0.20	0.23	11%
1 x 8	0.28	0.30	8%
1 x 10	0.34	0.36	7%
1 x 12	0.36	0.42	14%
2 x 2	0.17	0.19	13%
2 x 3	0.18	0.20	12%
2 x 4	0.19	0.22	11%
3 x 3	0.24	0.30	20%
Round poles for roofing	0.96	1.20	20%
Wall posts	1.20	1.44	17%

Table 4.4. Price information (USD per foot) obtained in Rwanda

Species	Buy	Sell	Gross margin
<i>E. spp.</i>	n.a.	0.57	-
“Mahogany”	n.a.	8.24	-
<i>P. patula</i>	n.a.	0.61	-
<i>G. robusta</i>	n.a.	0.52	-
Average case	0.47	0.52	9%

Table 4.5 Price list for timber (USD per foot) from Sondu.

Species	Dimension (inches)	Buy	Sell	Gross margin
<i>E. spp.</i>	1 x 6	0.14	0.19	25%
<i>E. spp.</i>	1 x 8	0.20	0.24	15%
<i>E. spp.</i>	1 x 10	0.22	0.30	28%
<i>E. spp.</i>	1 x 12	0.28	0.42	34%
<i>E. spp.</i>	2 x 3	0.19	n.a.	-
<i>E. spp.</i>	2 x 4	0.22	n.a.	-
<i>G. robusta</i>	1 x 6	0.14	0.19	25%
<i>C. lusitanica</i>	1 x 6	0.17	n.a.	-
<i>C. lusitanica</i>	2 x 3	0.19	0.24	20%
<i>C. lusitanica</i>	2 x 4	n.a.	0.30	-
<i>M. lutea</i>	1 x 6	0.17	n.a.	-

Table 4.6 Examples of average cost and revenue (USD per foot) in Kagera region.

Species	Dimension (inches)	Buy	Sell	Gross margin
<i>M. eminii</i>	2 x 6	n.a.	0.43	-
<i>E. spp.</i>	2 x 6	n.a.	0.54	-
<i>P. patula</i>	2 x 4	n.a.	0.55	-
Average case		0.34	0.43	21%

Table 4.7 Price information (USD per foot) obtained in Uganda.

Species	Dimension (inches)	Buy	Sell	Gross margin
Not specified		0.17	0.46	62%
Not specified		0.40	0.55	26%
<i>M. eminii</i>	11 x 1		0.57	
“Mukusu” possibly	6 x 2	n.a.	0.46	-
<i>E. angolense</i>				
Not specified	Small Poles	1000	1500	33%
Not specified	Big Poles	1500	2500	40%

4.3.5 Production

Lead-time

Considering that small-scale furniture making includes high levels of customisation and low volume output it is not surprising that I found that almost everything that carpenters produced was built to order. I had one deviating example from Kenya where a carpenter said that because of the quality of his work he could build exhibition pieces to attract customers and

still be sure to be able to sell them. Another example is from Tanzania where two carpenters who did some work in construction prepared certain basic elements like for example doorframes in anticipation of customer orders. However, just as for timber dealers doing retailing, carpenters also had the matter of managing capital employed and cash flow. Very few of the people I talked to had a financial situation allowing them to stock timber or finished products. The time it took to deliver an order of course depended on type of product and quantity. For example, a simple thing like a door was two days work for one person and a bed could be produced in half a day.

Costs and revenues

After purchasing timber, if carpenters needed processing to be done for which they lacked the equipment like for example planing, making grooves or decorative mouldings there were often machines around, at least in towns, where they could send pieces of wood for processing. The cost for this service was said to be around 0.036 USD per feet or 0.32 USD for an average piece. Besides wood, additional expenses included the cost for tools, regular things such as hammers, different saws, planers, squares, clamps and measuring tapes. I was told that these tools were available. One man in Tanzania told me that to start his carpentry business he had spent roughly 190 USD on equipment. Many carpenters had shops in town and paid rent. A plot was anywhere between 3-10 USD per month depending on what relationship the carpenter had with the landlord. The cost for extra labour if needed was the same throughout the chain.

4.3.6 Compilation

I estimated the maximum and the minimum price that respondents said they charged per board for each stage. To manage this I made the approximation that an average board was 9 feet. I have also estimated the average cost of inputs and intra-link activities for each board. The numbers presented in Table 4.8 are in cents (1¢ = 1/100 USD). To put the suggested profit margins in perspective I also included time spent in process or inventory for each stage. When examining the cost figures bear in mind that the proprietors did not include their own wages in the costs. This is especially important when looking at the really labour intensive stages like production. There was no separation between company money and private money and when asked how much of the profit respondents managed to put away as savings most of them answered that there were no savings.

Table 4.8. Estimations of maximum and minimum price, average cost and time spent in process and inventory per board

	Farmer	Processor	Transporter	Timber dealer	Carpenter
Maximum revenue	50¢	100¢	79,2¢	509¢	662¢
Minimum revenue	11¢	66¢	6.56¢	238¢	409¢
Average cost	0.5¢	7.5¢	1.15¢	221¢	315¢
Time spent in process/inventory	10-25 years	7 minutes	Depending on the distance	3 weeks -2 years	1 week

As I have already pointed out the processor and the transporter most often only came in as intermediary suppliers of services and had no cost for ownership of the material. Their money came directly from the timber dealer who in turn was paid by the carpenter or contractor. The value increment of a board through the stages of the chain is visualised in Figure 4.9.

The big span between min and max prices once we reached the timber dealer and carpenter stages can be attributed to an almost fifty per cent lower price level in the area around Kisumu than in the other three regions. Looking for an explanation for this I found that timber dealers I interviewed in Kenya always managed to get what they needed and did not really perceive any uncertainty in supply. Even though prices in for instance Rwanda were nearly twice as high as in Kenya the timber dealers average profit margin for the different assortments were nearly the same, 10-15 per cent suggesting that preceding actors are attaining a higher share of the overall surplus. However the calculations are based on just a few accounts.

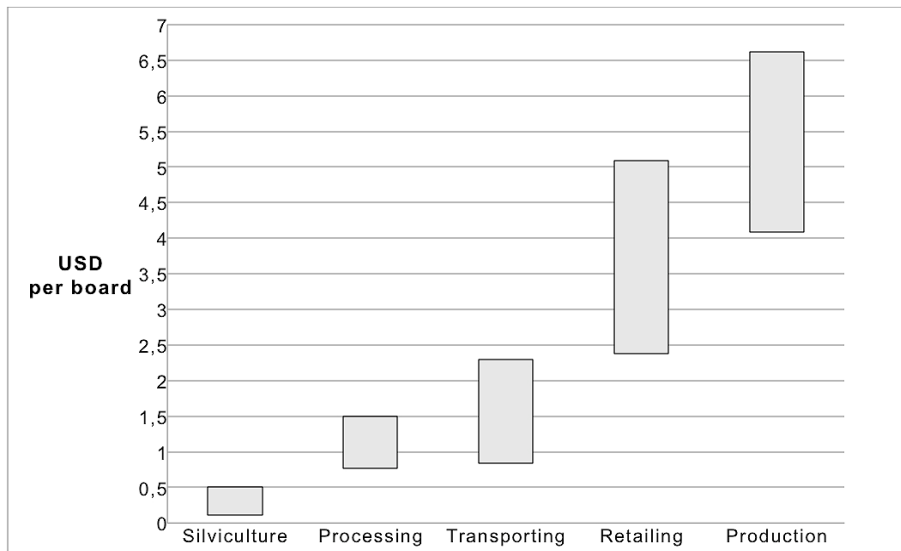


Figure 4.9. Graphical representation of the revenue span for the different links.

4.4 Competition, collaboration and trust

I described the different activities and the cost and revenues associated with them. In this section I will give a brief presentation of my results regarding the vertical and horizontal relationship between actors.

4.4.1 Competition

There was not any talk about competition until I reached the transporting stage where the general notion was that there was a lot of competition around. Differentiation was difficult and the competitive strategy was to create a reputation as trustworthy and maintain a good status of your vehicle.

Timber dealers also spoke of increasing competition but at the same time growing markets, so instead of one dealer being able to make a living there were now e.g. six dealers in the same market place, of course competing but still with everyone managing to make a living. Timber dealers mainly competed with price, the quality of the timber they supplied, accuracy in dimensions and reliability when it came to delivering on time. Establishing good relationships with their clients was important and if successfully done clients were likely to come to them first next time they were looking for timber.

Carpenters did not experience a lot of competition even though there were many of them around and did not bother to compete with price. It was more important to use good quality timber, do good quality work and deliver on time. Standing out with an attractive finish and having something to display was more useful than lowering prices.

4.4.2 Collaboration

There was little vertical collaboration between links. In supply chain management theory one of the prerequisites to achieving maximum overall surplus is information sharing between links to enable supply planning and minimising cost for e.g. keeping inventory (Chopra & Meindl, 2009). I have already presented a few examples of inefficiencies that arose as a consequence of lack of planning or inability to forecast. The way the situation was described to me was through statements like “they just come and say what they want to buy”. My interpretation is not that information was not shared for fear of losing power. My perception is that actors simply were not engaged in forecasting, likely due to the scale of business or the lack of means, and therefore had very little information to share. The push/pull boundary in this chain was most often between the timber dealers’ replenishment cycle and their customer order cycle since most of carpenter production was built to order.

The timber dealer was the most important actor within the value chain creating the connection between the farmer wanting to sell his raw material and the market with carpenters or other final customers, coordinating the required activities, cutting lead-times and balancing price levels. It is reasonable to suspect a situation with information asymmetry creating an imbalance of power favouring timber dealers and this was likely often the case. However, as mentioned, many markets were local and there were several actors available for each stage affecting the rivalry among existing competitors and in many cases farmers claimed to have a good idea of the market situation and the general price levels. To gain bargaining power and to enable mutually beneficial long-term relationships with timber dealers an increased collaboration between farmers would be necessary. However I found no coordination between neighbouring farmers when it came to harvesting and sales.

One form of horizontal collaboration that I did encounter was a practice among many of the timber dealers to direct customers at each other in case they lacked the material to supply customers themselves. In many cases this would grant them some kind of commission.

4.4.3 Trust

Honesty and trust were big issues through the entire value chain. I was given many accounts of agents receiving advance payment for goods or services and then disappearing without living up to their part of the agreement. For example farmers selling trees not belonging to them, or contracted processors accepting advance payment and then not showing up for work. Being perceived as honest or trustworthy was in many cases crucial for whether a deal was made or not and significantly affected what the terms of payment were going to be.

Since businesses generally had very little savings and strived to keep stock levels down, cash flow was a big issue for several links and to be allowed credit or advance payment was often necessary. I encountered examples of agreements concerning credit between transporters and petrol stations, processors and hardware stores, timber dealers and farmers and between carpenters and timber dealers. It was only in Kenya I encountered written agreements between parties when allowing credit or advance payment.

The most advanced collaboration and credit granting that I came across was between one farmer selling trees and one man running both timber dealing and a carpentry workshop. The actors had a completely open book relationship and no money was transferred between them until the dealer/carpenter had managed to sell the wood, either as timber or finished furniture. After selling the finished product the farmer and dealer sat down, looked at the total production costs and then negotiated how to share the surplus.

4.5 Demand and the market

In this section I will present accounts of what factors were affecting demand and how respondents perceived trends in demand.

Everyone had a similar answer to my question about whether they perceived uncertainty in demand – the market is there. Demand was described as higher than supply and for each stage, respondents’ assessments of the future were positive in that respect.

4.5.1 Seasonal variations

There were seasonal variations in demand over the year coinciding with the two rainy seasons. I was told that during the rainy seasons most people involved themselves in activities on their shambas and for those roughly six months business for the carpenters and consequently all preceding links was slowed down. This decrease in final customer demand corresponded with less supply of timber from the villages due to the same cause. Another factor also affecting the pattern of variation was variance in disposable income levels for many of the final customers. It was after harvest farmers had money to spend on furniture and construction. Accounts from carpenters spoke of turnovers more than doubling during the period between the long rains and the short rains (approximately June to October).

4.5.2 Briefly about trends and drivers

The long-term trend observed by near all respondents was that demand for both furniture and timber for construction had been rising for the last couple of years and continued to do so. One man said that demand was so high that people already bought whatever there was and it was “actually still rising”. Construction was the biggest market segment for timber in almost every case I encountered. There were many people building houses and the steady rate of urbanisation in the four countries (Figure 4.10) is a long-term development predicted not to halt any time soon. There is a good economic development in East Africa with an annual GDP growth between five and seven per cent. Even through the crisis year 2009 when Sweden had a receding GDP East African economies continued to grow between two to five per cent. There is also a population growth rate of between two and half to three per cent per year. These three drivers can be expected to contribute to continued high demand for timber both for construction and furniture making.

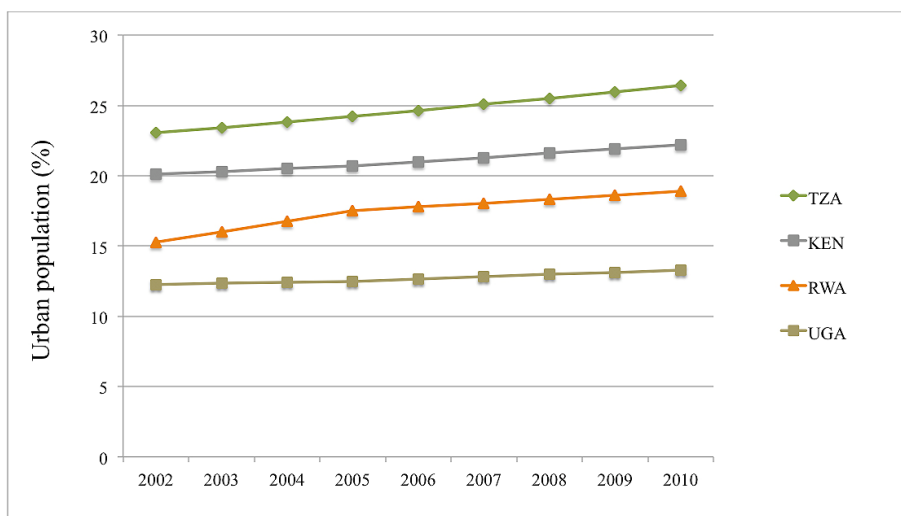


Figure 4.10. Urban population in % of total (The World Bank, 2010).

5 Discussion

The purpose of this study was to provide Vi Agroforestry with information regarding the range of activities in use to bring wood forest products through the different stages of the value chain to the final customer in the respective countries where they operate. The purpose was to show what actors were involved, how they interacted and to find data showing the build-up from production cost to consumer price. Understanding the value chain for timber will allow Vi Agroforestry to better advise smallholder farmers how to engage in this chain.

The majority of the results are quite self-explanatory. Figure 4.1 provides a good overview of the general structure of the observed value chains. An outline of what activities are carried out at the different stages can be found in Figure 4.2 and explicated in section 4.2. Table 4.8 together with Figure 4.8 provide an indication of how surplus is being distributed within the chain. Another value chain analysis for timber was performed by Kafakoma and Mataya (2009). They examined processing in the Viphya Plantations in Malawi and when comparing many of their both qualitative and quantitative findings to this study there are clear similarities. For example they calculated the cost for processing one board to 0.97 USD using pit sawing and 0.60 USD using a mobile sawmill (Kafakoma & Mataya, 2009), figures that correspond well with the estimates in this study.

The most dominant actor in the chain was usually the timber dealer but since all businesses were generally small-scale there were always alternative actors to turn to limiting the bargaining power of any one actor. However the biggest potential for improvement that I found for the observed value chains was in increased cooperation and coordination, both horizontal and vertical. Otherwise most of the results were in line with what was expected. One result that stood out was the impact that honesty and trust had as key elements in the competitive strategies of actors. Trust was a key condition for allowing credit and since cash flow was a big issue and liquidity often a limiting factor for most actors, being considered trustworthy had great significance.

One of the underlying questions leading to this study was whether farmers had anything to gain by venturing into more stages of the value chain. Webber and Labaste (2010) state that:

A firm becomes more vertically integrated when it takes on more of the activities that take place within its value chain. Vertical integration makes sense if, for example, the business is seeking to ensure supply or otherwise control inputs, capture more value, achieve economies of scale, or ensure access to information. (Webber & Labaste, 2010 p. 85)

From the farmers' perspective, for more vertical integration to make sense, there has to be a firm horizontal cooperation between actors in the first stage. Average farm size is a seriously limiting factor to creating economies of scale and considering the cost of required inputs for processing e.g. a chainsaw this needs to be in place. It is also important to point out that capturing more value does not necessarily have to occur at the cost of another link in the chain. There are opportunities to increase the overall surplus to the benefit of all value chain participants. Most interestingly by looking at opportunities to shift to global value chains connected to new markets. As mentioned by a forest manager in Tanzania, "our indigenous species are being traded to Europe and even Asia".

The biggest challenge with this study was without doubt mining the data that I collected during my two months in East Africa. I conducted 28 interviews that were included in the study and not a single one of the respondents could produce records of sales or any other kind of bookkeeping. Whenever asked questions about prices or costs the first reply was always, quite naturally, “it depends”. After settling that nothing was really fixed it was a matter of seizing what numbers I could, attached to whatever unit of measurement the respondent was most used to since that was the number most likely to be closest to reality. The next step was to translate the different answers into something comparable while rinsing the material of apparent misunderstandings though still maintaining the integrity of the material. Not all respondents had answers for all the questions and some information was inevitably lost in translation as for example when I was trying to ask a proprietor of a transporting business in Kigali how he calculated what price to charge resulting in the response: “He just takes the money and goes to the bank”. Unfortunately this meant that instead of having one set of answers from each timber dealer I interviewed I might have had one or just a few answers for a particular question. However, despite these obstacles, while putting together Table 4.8 comparing information from all four countries I was quite pleased to find that the figures showed significant traits of kinship.

5.1 Conclusion and final remarks

The focus of this study was to gain first insights and familiarity and to examine what future research questions would be reasonable to pursue. I believe that this has been achieved. In my opinion further research should explore opportunities and obstacles for small-scale farmers to connect with global value chains. Secondly, my attempt to apply the value chain concept to an essentially pre-industrial context has taught me some really valuable lessons and, I believe, pointed out a few important items to keep in mind for others attempting similar studies.

Hopefully these results will assist Vi Agroforestry in their work to increase economic activity and growth with the aim to effectively reduce poverty and contribute to establishing sustainable livelihoods for smallholder farmers in East Africa.

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Appendices

Appendix A. The interview guide

- 1) What is your business?
- 2) What product are you manufacturing / what service are you providing?
- 3) What inputs are required for this business?
- 4) What are the costs of the materials and inputs you use?
- 5) How do you go about procurement of materials and inputs?
 - a) Are there any principal suppliers or are all casual?
- 6) How would you describe your relationship with your different suppliers?
 - Collaboration, credit, trust, information sharing.
 - b) What trading relationships are long-termed respectively short-termed?
 - c) Is there any uncertainty in supply – do you always get what you need?
- 7) What is your production output – how much are you producing?
 - a) Per month/Per year – are there any seasonal variations in production?
 - b) Lead-time – how much time does it take, in average, between purchase of materials and inputs and delivery to customer?
- 8) What consumers are you targeting?
 -
- 9) What is the demand for timber in that market?
 - a) Does demand vary between different species and/or qualities?
 - b) In what way?
- 10) Do you start producing when receiving a customer order or do you produce in anticipation of customer orders?
 - a) How much of production is stocked and how much is delivered to customers?
 - b) How do you receive customer orders?
 - c) Are there any principal buyers?
- 11) How would you describe your relationship with your buyers?
 - Collaboration, credit, trust, information sharing.
 - b) Are the trading relationships long- or short-termed?
 - c) Do you perceive any uncertainty in demand – do manage to sell what you produce?
 - d) What are the trends in demand?
- 12) What about competition – how many firms and how big is their market share?
 - a) What is their competitive strategy?
- 13) What is your competitive strategy?
 - a) In what way are you trying to promote yourselves to customers?
 - Quality, Price (efficiency), Delivery reliability, Conformance to specification, Flexibility, Responsiveness?
 - b) Is responsiveness generally an issue?
- 14) What is your price – per unit?
- 15) What are your gross output values – the total value of *sales* per month/year?
- 16) What is the profit?

Appendix B. Summaries of conducted interviews

Masaka

Joseph Kavuma (Forest landowner)

I am owner of a small piece of forestland. It is around ten hectares. I've been supplying one particular store (Paul Senkindu) on and off for two years. It's not exactly my fulltime occupation. My land is divided into one part covered by natural forest and one part, covered by plantation forest. There isn't any formal management of the natural forest. My original idea was to set it aside for conservation. For the plantation I've used *Eucalyptus* and the reason why I chose to plant was to protect the natural forest from being invaded by people searching for wood for charcoal burning. They come in and clear or take wood for charcoal burning. This doesn't encourage me to engage in forest management activities. Actually, what brought me to town today is a court case regarding this kind of activity. Even though I have legal ownership of the land I still have a problem with trespassers and the police have not been able to help me. They say it's a special department who handles the issue and the court says I have to have permission from the presidency representative to evict squatters. I now have to maintain a few workers to look after the area.

The land tenure here has been a bit funny. You pay a landlord for a lease. This means you have the rightful claim to the forest. Usually when someone acquires forest they proceed to cut it down but I wanted to keep the forest. This was not common practice. After some time I managed to convince the landlord to sell. So I got a land title for a larger area. My idea was to leave the small area of natural forest and allow it to grow.

My relationship with Senkindu is long-term. We have a very open-book kind of situation and that's also why I'm eager to keep him on as a buyer. I've had people before who have swindled me and refused to pay. I keep my own chainsaw but it would be a bit of a burden for me to have to look after the workers so we agreed, me and Senkindu, that he gets his workers and he gets his fuel and then he gets his timber, and at the end of it we can calculate and see at what cost I give him. Rather than saying ok, I produce the timber, I bring it here and they say try to find out how much is this timber. So we went into that kind of agreement. We sit down after he's sold the timber and look at what his costs were and then we share whatever profit he's made. Sometimes we've even shared losses. I don't know whether this kind of relationship is usual. There are some other people I've supplied around here but they didn't pay. Honesty and trust is a big issue.

There are a number of technicalities for example you have to get a licence to do this and you have to get transporting and all that. The local forest office charges the timber dealer 850-1200 USH per piece of timber depending on the species. If you have a truck full of timber and you have not paid licence you can have the load confiscated and auctioned to the public at very reasonable prices. The illegal loggers in the past have been many but now the government is more strict. It is worth a great deal to me to not have to worry about everything it takes to process and sell timber.

Sharing of market information is reflected in the way he says ok, we would like to come for some timber. He does not come to me saying, you know you should really be planting this species or this type of tree. I have been trying, I tried to plant some pine. There's this project, Sawlog production grant scheme. If you have land, 5-25 hectares that you're ready to plant they will come and see the place. They give you technical data or practical advice. In some cases they even give you seedlings and then after some time they provide you with a

management plan. The time for maturity with for example *Maesopsis*, around here, is about 25 years. If you are planting pine and you practice thinning you'll only be able to sell that which you thin for firewood. Say you have bought the seedling at 500 USH per piece after four years you'll probably get 2000. So even though I'd started planting pine I halted that and decided to look again at the *Maesopsis* alternative. The main benefit with planting *Maesopsis* instead of pine is that I can have the seedlings for free from the forest and they are also easier to maintain since they are indigenous. Pine would be good if we had a paper industry but we don't so here it's not a suitable option. Also *Maesopsis* is suitable for intercropping whilst pine makes for a single species and even aged stand. I have never been approached by any big industry.

I don't know what the annual growth is in this forest I have. The rate I've been harvesting lately, I cannot tell you if I can maintain it even for another year. I don't think so, it's not a big area. You find the reasonable sized trees and you take them. When they're gone you go after the smaller ones until there are only those too small left. In the past people used to get wood from government forests but not anymore. They are exhausted, many of the good timber species are actually extinct and now people are going into private forests to satisfy their need.

(Transporter)

We run a transporting company here in Masaka. The inputs we require to perform our service are several. The most obvious ones are of course a vehicle, fuel and drivers. We also sometimes need people to load and offload. The most common situation though is that the buyers of the service (e.g. timber dealers) have their own people doing the loading and offloading. Another necessity is of course maintenance e.g. changing oil. We don't own our own garage, but we have established relations with mechanics who do.

The price for the service is composed of several different things. One is the cost for fuel; another is the cost for the vehicle. The most common situation is that you don't own the vehicle you're using. Someone else owns it and you pay rent on a weekly basis for using it. The type of vehicle we usually use is a "Canter" (Mitsubishi Fuso Canter), with a loading capacity of 3,5 tonnes. The rent is usually somewhere between 80 000 – 100 000 USH per day for a Canter and then of course less for a smaller vehicle. You usually rent the vehicle per week and out of the 7 days you're expected to pay for six, which is a normal workweek, even if you use it all seven days. The relationship between you and the owner is most often long term but it depends on your performance if it stands; how well you maintain the vehicle and so on. You also pay parking fees, around 3000 USH per day. When you rent you have to pay for any needed repairs. For fuel we have established relationships with owners of petrol stations but nowadays it is very uncommon to be allowed for example credit. Many drivers also have a person called turnboy. The turnboy is an assistant to the driver and his job is typically to clean the vehicle in the morning, to ride along and help out in case the vehicle gets stuck or if there's a need for loading or offloading.

So all these things are taken into account. To give a price example: To fetch 3,5 tonnes of timber from a location 30 kilometres away would render a price of somewhere between 250 000 – 300 000 USH. You'd be able to manage 2 such trips in one day at a total of 120 kilometres. The time it takes depends greatly on the time for loading and offloading and the conditions of the roads.

On an average week the gross revenue comes to around 600 000 USH and a normal workweek is 6 days.

There is plenty of competition and you mainly compete with how well known you are, that is how long you've been around and how trustworthy you are deemed; what price you're able to offer and also the state of your vehicle. The demand is good but it's seasonal. There are periods during the year when for example construction goes up and then you can have work for the same e.g. timber dealer for one week.

Bosco Abimanya (Timber dealer)

Our business is to sell timber. We buy it from Kalangala islands. We buy timber cut directly from the forest. Usually we hire some casual labourers for our expense. Others buy from those who cut but I have those timber sawyers. The way the process is, I go to Kalangala, I make a contract with the landlord, I put my hired men to work and they start cutting from the trees directly. When we've accumulated a big number we load the timber on a vehicle, usually a Canter (Mitsubishi Fuso Canter) or a lorry and then we bring it back here. After that it's just selling. We also have to pay a license to the forest department and they stamp our timber.

Six inches by two inches by seven feet of the best quality Mukusu (*Entandrophragma angolense*) is 8000 USH. Eleven inches by one by seven feet of best quality *Maesopsis* is 10 000 USH. *Maesopsis* is one of the best species we are remaining with. Those that used to be the best they are no longer there. The *Lovoa trichiloides* (Nkoba), the mahogany, those are no longer there. So we use *Maesopsis* now for furniture.

We do all the processing in the forest. The buyers themselves take the timber to the machines for smoothening and planing.

At the moment we have a water problem in Kalangala. That's why timber is scarce. There was talk of a palm oil project so most of the forests were cleared so you see the trees are now scattered. Earlier we hired people for three months and so on, now they just work on small contracts. So we no longer get permanent staff because cutting is not on a large scale. We now employ these people with chainsaws. The casual labourers come without any equipment and we just provide everything. We have had a lot of trouble in fact. Sometimes you give them money and they disappear. The chainsaws are expensive but it is easy and it's faster. We have to buy fuel and extra chains plus they are illegal so they can be confiscated. You pay 1,5 million USH for a saw. Some others use the handsaw. The handsaw is slow but it is legal and environmental friendly. I have also heard that it using chainsaws affect regrowth because it takes much longer for other trees to germinate in the sawdust.

We hire all transport. It easy to come by if you have money. Since Kalangala is an island, sometimes they tell you the ferry is blocked for a week but still the owner of the vehicle will charge you rent for the time. Otherwise the price is decided based on the distance, the contents which are going to be transporting and type of vehicle but they do also charge extra for delays. We don't just hire any. We have our own that we know. We usually use medium sized vehicles, so called canters and the average cost to Kalangala is around 250 000 and you can carry 250 pieces of the standard six by two which means the truck carries around four cubic metres.

We pay roughly 100 000 USH in taxes per route, 30 000 USH for stamping the timber for license, 30 000 USH for loading and offloading, another 150 000 USH for cutting, 200 000 USH for the trees and like I said 250 000 for transport. That gives a total cost of 760 000 USH for one trip to Kalangala.

If you load a canter with hard wood you can expect 2 million USH in revenue. Since timber is so scarce if you are using chainsaws you can bring six canters per year.

The way to get timber is by knowing someone who has a forest. You go there, you talk to him he sells you the trees in that forest. You pay the landlord before you enter the forest. You write a contract at the time you have depends on the number of trees that are there. You put in your men and they process the trees into timber. If you stay in an area you can become friends to those people. We just cut from natural forests. The owners don't even replant, they just sell and go away. I have been a teacher in that area so people might say that, oh he's taught my children I will do business with him.

We supply the timber in two ways. One, you bring it here to the store and wait for customers. Two, I may contract with someone who has a store in e.g. Kampala. He gives you money at once or he comes here and takes what he wants and gives me money at once.

It's not always we get what we need. Besides casual labourers running of after they're paid another problem we have is the forest department. They can confiscate your timber. You may go to the landlord and he says he's the owner of the land, you pay and then another one comes claiming that he is also the landowner. You end up either loosing or paying twice. He may chase you away from the land. This is common.

Timber is scarce, that is why you see empty stores. We can produce around four cubic metres per one and a half weeks but compare that to if you were using handsaws. You'd need five pairs working the handsaw for a month for the same amount.

We usually don't produce on order. Ok, sometimes someone will come in and say I want 500 of these then you go out but if there is no order you just cut depending on what you think is on the market. Thirty per cent of what we bring here is ordered and seventy per cent we just cut and bring. We produce what we can find. Softwood for beams and storage houses, the six by two by thirteen feet and also the four by two. The four inches by two inches is used by builders for sheltering and roofs.

The way we try to promote ourselves is just by displaying and convincing. It depends on the way you talk, the way you present yourself and also sometimes the price. Sometimes price varies. How fast people want their merchandise is also different from case to case. Some may be willing to wait others want it fast. But most people will want to buy at a lower price and will be willing to wait.

We have seasonal variations in demand. Construction is normally done during the dry season. We try to build up stock before demand rises. We plan it ahead. The way we get orders is usually by someone calling us, they have our phone numbers; others come by. We don't have any principal buyers only small buyers, like carpenters. The relationships with these people vary, for example some are allowed credit but not everybody.

We are thinking of doing something other than this business because it is diminishing now. Supply is scarce and demand is high. We predict that by the end of next year there will be no timber coming from Kalangala because the reserves there are being cut at a high rate. That is according to what we see. We have no business at all. The few forests that are there they are very expensive and so you cannot get anything.

Fortunate Kusaasira (Timber dealer)

We are selling these poles in different sizes.

We usually buy them in the forest (standing trees). I usually stay here and my husband usually goes to the forest. He buys it from landowners and transports it here and I sell it. We also sell fencing poles and fire wood. We sort them when he brings them, in three categories, building, fencing and firewood. We buy oil from the carriages and wood preservatives. We treat the fencing poles with preservatives. But you can also use it for building poles. And used oil from mechanics. We have 10 people working. Some go to forest to cut down, others process firewood into pieces, others load and offload. People normally come here to look for a job. We recruit them and they work for 1-3 years and then they move on. All of the staff is permanent. We use axes, pangas (machete) for felling and cutting of branches. We also hire a machine (chainsaw). We have our own lorry. And it needs maintenance from mechanics and the timber is brought wet and very heavy. Sometimes we can get customers that want small quantities or small sizes of poles and then we hire smaller vehicles but most of the time the customer hire for himself.

A panga costs 3000, but they don't last long. In average we buy a new one each week. The axe lasts but it costs 15000 but it can last for a year. The cost when we need to hire a chainsaw is not known to me, only my husband knows. They get the person who has the chainsaw and tells him what they want done. This and this many trees and then he gives a price for felling. But it isn't often we use them (ppl). The demand isn't so high for the big sized timber.

Some forest landowners come here to look for a market but often you go and look for the owners of the forest. And then you bargain with them and buy. It varies how much we buy per month. A lorry carries about 300 poles and we bring 2-3 lorries per week. The demand is high here. We have some landowners that we collaborate with on long-term basis. The rotation period is two years and some times the owners come back and say "oh you were good customers, come back and buy from us". If you are trustworthy they can even allow you to cut without paying money first and then you pay when you've finished selling. We have three people that we have long-term relationships with and each of them represent 5000 poles per two years.

For fuel we go and buy at a specific petrol station. Sometimes even if we don't have money we can go and refuel on credit because we know the manager. Our lorry is old and so we often have to take it to service. Sometimes it breaks down in the forest and therefore if you have a relationship with one mechanic it's easier to call him and he can take a "border-border" and just go and help.

Usually the demand is high and you fail to get the poles. The demand is higher than the supply. Two years is a long time to wait for the trees to regrow and for most plantations you have to wait even longer. This means we have to go around looking. We would go 32 kilometres to find poles.

Transportation isn't our biggest cost. Labour is our biggest costs. The workers are paid per tree that they fell, and then you have the loading and offloading. Sometimes when we are pressed for time because of customers waiting on their orders the workers increase the price they charge per tree. The salary/price isn't fixed. They charge 100-400 per tree depending on size. 400 / tree is the most common size/price.

The bigger sized poles have fewer buyers but instead they buy bigger quantities. The smaller poles people can come and buy maybe 1-10 poles and the bigger ones one can come and say “give me a hundred”. The price for loading and offloading depends on how many trees but one lorry is around 15000 for both loading and offloading.

My husband knows more about the costs for the lorry.

The main buyers are private persons and they buy 25-30 poles.

The turnover of the stock is 1 month and the rent of the plot is paid annually.

We have long-term relationships with constructors, they keep coming back but they are small customers. We don't allow them credit because they don't pay and then they go elsewhere, never come back.

There are 3 others selling poles and one time one of them came over to ask what we are charging and I told him. Other times customers give us information about prices elsewhere. There is no outspoken collaboration between us but if I don't have the quantity the customer wants I can tell them to go and look for it at one of the other dealers. Demand is higher than the supply sometimes, the situation varies depending season. During rain season the demand goes up because it's sleepy in the villages where we get the poles. Another reason why demand for poles go up during rain season is that people construct their houses up to roof level and then when the rain comes people rush to buy poles for roofing so that their houses don't get spoiled.

We charge 1500 USH for a small pole, 2500 for a big pole and 2000 for one that has been treated with preservatives. It is cheaper than the big ones but since they are of smaller size you can get more money out per volume.

I don't know how much money comes in per month in average. I don't know how big the revenue is this month, I just write down the number of poles I sell per day. Yesterday I sold 101 poles and the day before that I sold 73 poles. Perhaps the average is between around 85. We are open 6 days per week.

I have not saved so much and I don't know the profit margin. Some days we end up making losses depending on input prices. But I feel now that I need to get more involved and do more bookkeeping.

The total cost is 1500 USH for the big poles and 1000 for the smaller ones but this includes the cutting, loading and offloading and of course the money to the forest landowner. Not the transportation though.

You know men are very funny. They don't want their wives to know the actual money that comes in.

Paul Senkindu (Timber dealer and carpenter)

I work as a timber dealer. I buy trees from my suppliers, I then hire people to cut the trees into boards that I transport to my store wherefrom I sell. I also have a workshop where I can process timber into furniture. I hire people to do work for me. For cutting we hire a chainsaw. We don't have any special procedure for how we go about our procurement. Materials are

bought depending on the demand within the town here (Masaka), e.g. fuel etc. before we move out to forest and do our cutting. Our staff is permanent. The fuel we buy we just buy as any regular customer but for the timber we have a long-term relationship with one supplier that we're always buying from. The reason why we've chosen to work this particular supplier is that others we've tried have deceived us. They tell us 'come to our forest, we have this and this much wood that is ready to be cut' and then when we show up there's are but little or even no mature wood. It's also a matter of finding a supplier who has the tree species you're interested in. The relationship we have with the forest landowner we buy from is good. He even allows us credit. This allows me to postpone the actual payment until I have been able to process the wood and sell it. He also has what I need, so there's no uncertainty in the supply.

We don't have a vehicle of our own but we rent. Transportation is readily available, there are vehicles in abundance, but the only problem is fluctuations in price levels. There can be variations from day to day, greatly depending on the current fuel price. The price of transporting of course depends on what size of truck you use, which in turn depends on the quantity and dimension of the timber you want to move. If I hire a smaller vehicle, like a pick-up truck, the price of going to the forest and back is 130 000 USH. If I hire a bigger truck, like a canter, the price is 180 000 USH. We usually use the bigger vehicle since it is most cost effective. Whenever we go to the forest we have to pay a licence to the forest authority and whether we bring a small vehicle or a big one the fees isn't much different. Further, the loading capacity of a canter is approximately 12,5 m³, that is roughly 450 boards with a dimension of 1" x 12" x 12'. The loading capacity of a pick-up is around 250 boards of the same dimension or 7 m³. The capacity of our warehouse here in Masaka is approximately 1500 boards or three canters. We are an average sized firm for Masaka. If you go to Kampala you'll be able to find bigger dealers and industries.

Other dimensions we normally cut are: 2" x 4" x 12', 2" x 6" x 12' or 2" x 12" x 12'. First figure is the thickness of the board, the other the width and the third is of course the length of the board. What dimension we cut depends first of all on the size of the tree, the diameter of the trunk and secondly on what's demanded by the market. The most common case is that we cut and store based on anticipation of customer order rather than on actual order. Around seventy per cent of our production goes directly here and the remaining thirty per cent is produced on customer order.

So what we do is we cut and sell timber but we also have our own workshop where we can make for example, beds, tables and chairs. As for technical equipment what we use here are regular tools such as hammers, saws, planers and so on. If we need more advanced machinery we have a long-term relationship with another workshop near here. We just bring our materials, pay a fee for using their machines, process our materials and then bring them back here. The workers are not paid monthly wages but are paid according to the work that they've done.

We calculate price by how much we have put in. The cost of the raw materials, the cost for transporting the materials, how much time we have put into processing, what type of wood we are using and what dimensions are needed. If I try to estimate the cost we have for production including all inputs from the forest to here I would say 7 000 USH in average per board. That includes buying the tree, processing it in the forest and transporting it here. As for pricing, for example the price of *Maesopsis* ranges from 12 000 USH down to 7 000 USH per board depending on the dimension the person wants. The price also varies with the quality of the board. If it has any damage the price will of course go down.

The production rate varies with demand. If demand is high we go to the forest more often, our warehouse stock can be depleted in a matter of days and if demand is very low the timber can sit here for up to 2 months. The lead-time for producing 450 boards, the equivalent of one canter, is one week. The way we determine the market situation is simply by observing how many people drop by the store. As for our customer's ability to plan ahead, they are always in a hurry and can be said to prioritise fast delivery over lowest possible price. If you were to come in and say you want the product in a month's time, you would receive a better price than if you said you want it right away. Price is determined by the amount of timber the customer wants to buy. The price per piece is higher if you buy small quantities.

Almost all dimensions are in demand, that's one aspect of the current situation. Demand is so high that people buy whatever there is and it is actually rising. The number of trees has gone down so whatever you stock always has some demand. The problem we have is that we can't stock all different dimensions so we sometimes have to send customers away. There's no formal collaboration with other timber dealers but if there's a situation when you don't have what the customer wants, not the right quality nor quantity, instead of just sending the customer away, you usually help him to ask around and connect him with another dealer. Generally this kind of assistance will grant you a commission from the timber dealer who received the customer. A way of dealing with times when demand drops is granted by having our own processing. In this way we are always able to make use of assortments that are temporarily low in demand. Our principal buyers are carpenters or contractors. Contractors can for example get a tender to supply chairs to an entire school. They then come to us for timber or finished products.

Examples of species that are highly demanded for furniture making are: *Podocarpus* spp., *Maesopsis Eminii*, *Milicia excelsa* and various species traded under the name Mahogany (e.g. *Khaya anthotheca*). For construction, different species of *Eucalyptus* (eg. *E. grandis*) are of high interest.

As for our competitive strategy, we rely on the quality of the work that we do. We keep agreed delivery times and we also do our best to maintain the customers trust.

Our revenues vary much from one month to the other. Some months we don't make any money others are good. So far this year we have brought seven canters of wood from the forest and our warehouse stock is almost depleted. If you calculate $450 * 7 * (12000+7000)/2 \approx 30\,000\,000$ USH, you'll get a good estimation of the value of our sales so far this year.

Godfrey Mutemba (Contractor)

I work as a contractor. I get a contract from someone for chairs, tables for example for a school. I receive a sum of money from them and then I proceed to procure whatever materials are necessary to complete the task. We get the timber, we process it, we make the ex. chairs, we deliver them to the client and at the end of the day we get paid. Sometime I start with timber from a local dealer and sometimes I go to a dealer where the trees are actually being cut. It all depends on the cost. If you find out that the price here in Masaka is OK then you buy from a dealer here in town. Otherwise we can go all the way to Kalangala, were the trees are actually cut and make a deal with a timber dealer over there. They cut the trees and we deliver them here. This is especially common if it is a big contract because we cannot rely on the local suppliers (dealers). So we never trade directly with landowners.

The type of timber we usually need is hardwood timber. *Maesopsis* is most needed. Another wood comes from a species of *Albizia* spp. Very hard wood and very good timber. These are the two that we use regularly but mostly it's *Maesopsis*.

We produce chairs, school desks (very common) and beehives for farmers. From the dealers we take the timber to people who deal in machinery. Machines to trim, plain, design and do other kinds of processing and after that you take the materials to a craftsman who then produces your desks or whatever the order is.

The processing industry is not a big industry. You see the raw material is becoming scarce here and so people are actually pulling out because the lack of, especially hard wood timber. You can't find a very big workshop. If someone has four machines I would consider it a big workshop. We hire all such services.

We have a person at the company who makes a feasibility study before we accept a contract. He calculates the amount of things that we need and produces an estimate of how much money we can spend on each, for example, desk. We then offer the buyer a certain price. Since we don't have the capacity to craft all the things for the order, based on our calculations, we then subcontract carpenters.

As for our suppliers we have people in Masaka who we deal with regularly who have very good timber and also in Kalangala. They allow credit, at least for part of the sum, as long as we can show them that we have the order. Up until now we haven't had much uncertainty in supply. Timber has been somewhat readily available but the situation is changing. We are seeing it. The Kalangala forests are being destroyed by those who are planting palm trees for palm oil. Between contracts we communicate with our suppliers and let them know that we are still here. They also call us to let us know for example that they have received a fine shipment of timber. We also buy and stock timber if we have good indications from a former client that we will receive an order in near future.

We have gaps between contracts and our main client is the government and they spend money during certain periods (once per financial year). It is usually the same time period even between different districts.

Forecasting is not possible because we are so many bidding on the order that until you have the actual document saying you've been awarded the contract, the money's in the budget and you can start now, you don't know. The delivery time on most of our contracts is 90 days. The contract can be for as much as 300-500 chairs. Consider that each chair takes 4 pieces of timber with the dimension 12x1 inch times 6-7 feet.

For timber we pay according to dimension and quality: Ex. 12x1 inch and 6-7 feet. When you buy in bulk you pay 5000 USH per piece (in Kalangala).

So we need quite a lot of timber with quite short notice and sometimes you get disappointed because you get raw timber that hasn't been dried properly. It can take 2 months for timber to dry depending on the type of wood and the weather conditions. So if the dealer doesn't have the timber in stock it is a disaster because two thirds of your time will be lost. Then we communicate with the chief administrator and see if we can get more time.

You don't win contracts just because you have a long standing relationship with the client (usually the government). Every time you tender for a contract you have to pay a fee. Our experience is that the lowest bidder takes all. But if you don't meet the demands for quality and delivery time it will have serious consequences. You may even be blacklisted, i.e. rendered not eligible to tender for new contracts. There are many competitors and sometimes if several firms have placed similar bids you are required to pay some kind of bribe to the official handling the contract. It is quite common.

Once offered a contract you have one week to accept. During that week you have to contact all your suppliers and subcontractors and re-check prices to make sure there has been no serious changes in price levels to compromise profits.

The money for our contracts comes from government grants. These grants usually run over a period of a couple of years with funds diminishing for each year. But since we have access to their work plan we have a good idea of what demand will be. However we don't communicate this to our suppliers because we are not sure that we will land the contract and we don't want to risk putting them in a bad situation.

We'll sell a desk for 70 000 USH. You can fabricate that thing, transport it to the place where it is going to be, pay all your taxes including VAT for a sum of 60 000 USH. That means you'll make a profit of 10 000 USH per desk. If you have an order for 200 desks that means you'll make a net profit of 2 000 000 USH. Of course the business requires some money to go around since you can't buy everything you need on credit.

We are three directors, one forester (Godfrey), one engineer and one economist.

Kigali

Talking to farmers at a service providing co-operative

Eleven women and 6 men are participating. Some of us produce timber. The way we regenerate our woodlots is that we, just before the beginning of the raining season, cultivate the soil using hoes so that the seed that has fallen during the end of the dry season can germinate once the raining starts. Germination is good but we have a problem with termites that eat the seedlings. We try countering this by applying ash or lime. Outside woodlots where we don't have the alternative of natural regeneration we use seedlings from nurseries but nurseries need a lot of water and so we locate them near water sources, maybe in the valley.

When it comes to choosing what tree species to plant we first look at agroforestry trees so that we can mix tree planting with other crops. The quality of the timber and what's in highest demand are other factors. We also want trees that are fast growing. A fast growing tree would be a tree that matures in ten years. We use for example *Grevillea robusta*, "Popo" (common name, could refer to for example *Mitragyna ciliata* or *Mitragyna stipulosa*), *Persea americana* (var.), *Cedrela serrata*, *Eucalyptus* spp., *Casuarina equisetifolia*, *Jacaranda mimosifolia*, *Calliandra calothyrsus*, *Leucaena diversifolia* or *Sesbania sesban*.

Besides seedlings there are many required inputs or materials that we have so far not mentioned. To keep the tree from when it's a seedling to maturity we need for example plastic tubes for the nursery, watering cans, a panga (machete) for when doing intercropping activities, a hoe, a pole saw or pruning shears for cutting of small branches (pruning), axes for harvesting the mature trees and saws for cutting the log into boards.

Everyone can have 60 trees on their farm (initial number, not mature trees). An average farm is around half a hectare or five thousand square metres. When the trees are mature you look for someone to process them into boards and then you take the boards to the market for selling. People who are able to cut boards are available in the local area but they are expensive. If you don't have money to pay the people processing your trees there's a practice of splitting the revenue from selling the boards into two equal parts, you keep one and use the other one for payment. The average cost for processing is around 400 RWF per board. The timber is then sold to carpenters. There is a business centre 3 kilometres from here in Kabuga where we take the timber. For transporting of timber to the market we hire people with bicycles or wooden wheelbarrows. The cost for this kind of service depends on how much you want to have transported. In average the cost is something like 100 RWF per board. The demand for timber is very high at the moment. If you have enough timber the buyers will even send lorries to collect it from here and you can save the cost of transporting it there. The tree species in highest demand is *Cedrela serrata* but is it rare. Second in demand is *Eucalyptus* spp. The price of a board depends on the tree species, the quality of the board and board dimensions. As an example, a *Eucalyptus* spp. board with the dimensions 18-20 cm wide by 5 cm thick and a length of 4 metres costs around 3000 RWF. A *Grevillea robusta* board with the dimensions 18 cm by 2 cm and a length of 2 metres is 800 RWF. In average, the profit is 500 RWF per *Eucalyptus* spp. board and 300 RWF per *Grevillea robusta* board.

Our main motivation for planting trees is to be self-sufficient in firewood and secondly to earn some money from selling boards. There is currently no collaboration when it comes to selling boards, everyone sells on their own. The reason for this is that production is very low. When one is harvesting the other one is not and so that is the main reason for why we don't collaborate on the market. When it comes to procurement we procure seeds and produce seedlings together. We don't pay for seeds, we are given from either Vi-agroforestry or the government or we collect from the forest. No one buys seeds.

Taphet Bizinana (Transporter/Timber dealer)

I work as a transporter for timber dealers. Usually when I go the owner of the timber, i.e. the timber dealer will go with me and I might bring an additional driver. People to do the loading and offloading I usually hire on location and they are paid 25 RWF per piece they load or offload. The cost for buying a small truck is 18 000 000 RWF but a big truck is 30 000 000 RWF. The big one has a carrying capacity of 25 tons. (Interviewers note: In the next sentence he says it has a maximum volume of 8 m³.) For servicing the truck we do the small things but it's not done very often.

We charge our clients upon completion of the service. So any expenses we have for example for petrol are paid by us until that time but price is settled in advance.

After we've offloaded our trucks here at the market we look for something to bring with us going to wherever we're heading so that we don't have to drive with an empty lorry.

Sometimes we transport timber directly to contractors or builders and then we're able to increase the price with 300 compared to what we get when we sell timber to the cooperative. We produce roughly 5000 pieces of timber each month. Around twenty-five per cent is traded directly to contractors and the remaining seventy-five per cent comes here to the market. The cost for transportation is usually 450 RWF per board but it depends on season. When for example coffee or beans are harvested hiring a truck is more expensive and cost can go up to 500 RWF per board.

I believe I will be able to continue my business for where I am going, Cyangu, wood is available. I usually negotiate for a whole woodlot and not single trees. The price for a mature tree would be something like 10 000 – 30 000 RWF.

Savier Niyondamya (Timber dealer)

I buy trees, turn them into boards, then I sell the timber and there is no additional processing like planing. The processing is done before transporting the boards here to my shop. Some of the things we use are axe, panga, saw, limestone for sharpening, hammers to adjust the saw and a measuring tape to measure the size of the tree. Money is an issue. I need money to buy the tree and to pay for labour. I need people for felling and processing. After the processing is done transporting the boards from the site (forest/farm) down to the road is usually done by people carrying timber on their heads. When reaching the road, a group of people load the truck and then it's transporting to the market. You need to buy a certificate to do timber dealing and I have to pay taxes for each timber. Each timber costs one hundred francs in taxes to the district office. Another cost for me is when I'm away managing things I also have to eat. It's always good to carry some cash if there's an accident. For example if the road is slippery and the truck slides into a ditch I may need to unload the truck again.

When processing the trees we make use of the branches as well. Branches are processed into either charcoal or fuel wood. If it's going to be fuel wood I'll hire someone to cut them into one-metre lengths. These are then arranged into one cubic metre "bunches". I will again need casual labourers to move the fuel wood to the nearest road. When it's down I'll arrange for potential customers to come there and buy. I'm taking a risk because regardless whether anyone comes to buy it is still my responsibility to pay for the people who carried. If the branches are processed into charcoal it requires quite a bit of work. I'll need people to cut the wood into small pieces, build the kilns and supervise the burning process. Like with the other processing this is also done on the actual site. Meanwhile I'll get bags to load the charcoal in and then it's carried to the road. Unlike fuel wood I usually take the charcoal to a market, like a market for food commodities. To transport it I need to get a certificate or license to transport charcoal and again of course pay the people who've loaded, pay for transporting and then taxes. So you see it is very much a question of managing cash flow.

As for staff, I have a few technical permanent staff that will help me supervise other locally hired staff. This facilitates things because I work in many different places and can't keep moving casual labourers from one place to the other.

It takes substantial time to get a certificate to harvest government forests and for that reason I choose not to. My main sources of supply are private institutions like schools or churches and also individual farmers. The forests I harvest are exclusively plantation forests. The tree species that are most sought after are *Grevillea robusta*, *Eucalyptus* spp. and *Pinus patula* but also Cypress, (possibly *Cupressus lusitanica*), *Markhamia lutea* but that one is rare and *Cedrela serrata*. These are the main species that people are buying and that are available. *Eucalyptus* spp. are introduced species but they're very common and the craftsmen know the quality so they're very popular plus they're available. I buy mainly from the districts in the western province: Nyamasheke, Karongi and Rutsiro but also from the south: Kamonyi, Ruhango and Nyanza. It's a three hours ride to the southern province and a six hours ride to the western province.

The cost of production per timber depends on many factors. The average cost is 2000 RWF. I usually sell in bulk, not on retail and 2200 RWF is the average selling price. One truck or lorry

carries 250 pieces which means I make a profit of 50 000 RWF per truckload and I'm able to deliver one truckload per week (except during the prohibited season, see below). My salary is already deducted, i.e. included in the cost of production. (Interviewers note: In the next sentence he says he's able to use this money to buy for example new clothes for his children. This indicates that there's no real separation between the company's money and his private money.)

The cost for a tree varies between 2 000-10 000 RWF depending on size and species. The cost of processing a tree into boards is discussed per tree and it mainly depends on size of the tree. You count, how many big trees, how many medium and how many small trees and then set a price for each category. I always have to supervise the actual felling to make sure that my people don't damage surrounding trees because I'll have to pay for those too.

For my other inputs I don't really have principal suppliers. I just go to the market and select the supplier with the lowest price.

There are regulations regarding harvesting. Clear cutting is generally not practiced. You select single trees that are mature. After identifying a woodlot or forest I go to the local authorities and say that I'd like to buy this forest and I need authorisation to harvest it. After that the agronomist from the sector goes to check on the maturity. Depending on the situation he can tell you that it's ok to clear cut for regeneration or he marks trees that are allowed to harvest. If the soil is good the rotation period for some of these trees can be as short as 15 years.

There's no such thing as a long-term relationship with forest landowners. The woodlots are generally too small to allow recurring visits each year and we never contract that we'll come back next year or in the next three years.

As for uncertainty in supply, what can sometimes be difficult to get are the trees. Other materials and labour are always available. Lack of trees can depend on for example regulations saying that in this region no more tree felling for a certain period of time. For example, the authorities don't give authorisation to cut during summertime because they fear that people will produce charcoal and as a result risk starting wildfires. We don't counter this by storing timber.

The certificates you need to deal with timber are only valid for one month and they are unique for each district. This means you're only allowed to cut and process timber in one district per certificate and you need to be able to present this when transporting timber from one district to another.

The customers are furniture makers here in Kigali. The reason why we prefer to deal with them is because they are always available and ready to buy. We don't have contracts with them. We just bring our trucks to the market and offer whatever we brought. Depending on their needs they buy. There are also timber dealers located at the market place and they can contract you for a certain quantity of a certain species but these are generally short-term, non-continuous contracts.

We don't rely on communicating what we are bringing to our buyers but sometimes when they have a shortage they call us to see if we have it or are in the process of getting it. Then we can try to prioritise that but anytime we reach the market people will buy what we have. So it's rare that we produce anything to a specific order. Most of the time we just go out and cut whatever is there and bring it to the market and most often it doesn't take very long to sell.

The way we operate is that we look at the quality of the timber in the market. The people who buy wants to see good dimension. Instead of keeping it 5 in thickness we keep it 5,5. And if it is a small one, we'll keep the small size but we won't go below the standard. People will call for me even when I'm not prepared to sell. Actual size or even a bit bigger so that after they plane they will still have the proper dimension. And we don't charge extra for this additional size. I know this will benefit me more because when I reach the market my lorry will be offloaded first and I will save several days worth of rent for the lorry. Since the buyers at this particular market know that I carry good quality I also don't have to move between different markets looking for buyers. This has been our strategy from the beginning and this is known in the market. This reputation can be argued to be a good competitive advantage. I know of about fifty timber dealers but there are several others doing it. How much time it takes you to sell everything you bring on one lorry depends on whether you've kept to the standard dimensions and if your price is according to the average market price. It can take as little as 3 hours. This is largely due to the fact that there are timber dealers at the market who buy in bulk and then retail. So for example I usually sell the whole truckload to just one person.

The profit he's making from his business is not enough to both sustain him, his family and to afford purchasing a lorry. If there could be facilities like a bank loan or so on he would be able to continue his business and buy a lorry. (A matter of cash flow?)

Sometimes you may buy a woodlot but when you go to the district authorities they may say it's not ready to be harvested. For you to recover the money you've spent it will take long time and if you've given advances to people doing the processing you'll have to wait even further.

You'd think, considering demand seems to be very high, that there would be room for increases in price. We the timber dealers depend on the buyers. They are in the same market, it's their place, the parking is there and they're cooperative. They sit and meet and decide that every one of us should buy at a certain price. If anyone was to turn them down the instruction from the cooperative is that no one should buy from that person. Among timber dealers, some are from the east, someone's from the south and so on. We never meet, we don't know each other and we have nowhere to meet and to decide to oppose the price. The bargaining power isn't there so all we can do is to depend on these people. Sometimes they buy from us and then the next day tell their customers that timber is now scarce and proceed to raise the prices. When the timber dealer comes they may say that they have too much timber in stock and then proceed to lower their buying price. The retailers usually charge around 2800 from their customers but their prices are adjusted so that they always maintain their profit margin.

The reason why I don't sell on retail on this market myself is that in order to you have to be a member in the cooperative. In order to be a member you have to own the machinery to plane and so on plus pay membership fees and so on. They (the cooperative) have created a quite solid barrier and there's only one market and one cooperative in the whole of Kigali. The buyers however are located all over the city.

Demand is rising. One reason is that the government has decided to regulate what materials are allowed to use when constructing scaffolding. You are no longer allowed to use poles but have to use boards or metal poles.

Supply on the other hand is decreasing. There are government regulations to avoid deforestation. But there is also a decline in volume in the woodlots. To me there's not enough wood, we are almost at the zero but considering the reforestation plan I believe that in ten or

twelve years there will again be enough trees available to sustain this business. I am actually thinking of switching into another business. There's a possibility to import timber from The Democratic Republic of the Congo but then you have big issues with transportation.

Some examples of standard dimensions for pine:

400 x 8 x 16 (big standard)

400 x 5 x 16

400 x 3 x 20 (small standard)

I sell around 500 pieces of timber per month in average over the year.

Gonzague (Coordinator for the Adarwa association)

We have an association with 114 members and we are all located in the same marketplace. Some are carpenters, some are retailers and some are timber dealers. All together we are over 3000 people working here. An average wage for a person working a machine here is around 50 000 RWF per month. The purpose of forming the association was to defend our work, to get more negotiating power and to ensure profitability. We used to work separate from each other but at the same location and at one point we decided to come together and buy this piece of land where we now have our market. The association is now 19 years old. The plan now is to change from association to cooperative. The difference will be complete sharing of all cost and revenues. Before we started working together things were expensive and sometimes even impossible to get. Since we are now located in on spot the government has been able to provide facilities like power supply, something that would have been very costly if we were spread out and working separately. The government considers us almost as an industry and therefore also prioritise accordingly. There are other associations in the same business; one is actually just near here.

The timber dealers within the association today are free to either sell their produce to other members of the association or use it in their own businesses. Since all members are involved in carpentry we are most often able to avoid the conflict of interest between suppliers in the two different stages of the value chain. We don't have own trucks or lorries. Transportation is a service we have to purchase from outside the association.

Each member procures timber separately but average price levels are agreed jointly and the price is fairly low. In turn when someone from the outside comes and buys from one of our retailers the price is of course higher. We purchase standard dimensions of several different species; *Eucalyptus* spp., *Grevillea robusta*, *Pinus patula*, Cypress, possibly *Cupressus lusitanica* and also imports of from the Democratic Republic of the Congo traded under the name Mahogany but this one is very rare and expensive. One of the most common standard dimensions is 5 cm x 16 cm times 4 metres. Price is negotiated but average price for e.g. Eucalyptus is 2400 RWF per board, 35 000 RWF for Mahogany, 2600 RWF for pinus and 2200 RWF for Grevillea. Electricity is an example of an input that we buy together. The cost however is spread out on each user according to his or her consumption.

We have different machines to process timber into finished products.

Planer, saw, one for making it straight, one for cleaning, one for cutting in pieces.

There are situations when we allow credit or advances. Usually, a timber dealer has to increase his working capital, binding more of his own money into his business to pay all the expenses he has for trees, labour and transportation etc. before receiving any money from

buyers. When we are dealing with people who we have a long-term relationship with we sometimes allow them an advance that we simply deduct from the final payment. This way the dealer is able to better manage his cash flow.

There's a season when construction is generally higher (dry season). Then prices tend to go up and scarcity increases. We are aware of this situation and when it comes we try to build up stock. If one person within the association depletes his stock the agreement is that he or she can go to any other member of the association and borrow what he or she needs. Once the borrowed timber has been sold the two simply share the profit. We don't keep any statistics over how much comes in and how much goes out. One retailer can buy anything from one truck per week up to five trucks per week. In average I would say we get something like fifteen trucks of timber per day. We can't really say much about major trends in demand, all we know is that demand is sometimes up and sometimes down but it very much follows the trends in construction. As would be expected we mostly buy and stock in anticipation of customer order. If we were to stop bringing in timber within one week would have problems with low stocks. Furniture on the other hand is always produced on order since we don't have a showroom or store yet but we are planning to build a commercial centre here at the market starting January 2011. We don't do any processing, like planing, on the received timber before we have an order.

Our customers are builders, contractors and private owners of buildings and they are all from within Rwanda and not just from Kigali but from all over. We have 90 per cent of the market here in Rwanda. The amount of timber that customers buy varies from one board to great quantities. Builders and engineers from contracting firms are buying large amounts of processed timber. The processing is basically cutting pieces to order and they are usually requesting standard dimensions for different construction elements. *Eucalyptus* spp. and *Grevillea robusta* are used a lot in construction and are also highest in demand with *Eucalyptus* spp. being number one. *Pinus patula*, mahogany and [Musawe] are mainly used for furniture.

Trends in supply are visible through market price which has been increasing. This is most likely due to supply for timber being lower than the demand. Due to the scarcity of wood the government has regulated the use of natural forests on government land. This has made it more difficult to get the raw materials needed for our business but the situation isn't too bad. We don't perceive a shortage in supply so far. Also, the government has a tree planting policy that we feel will contribute to sustaining our business. Now we are buying from private forest landowners, we don't know whether we could buy from government land in the future. Our production is high and increasing. As for how we set our price we charge depending on the product, what processing has been done and what quantity the customer wants. For example our biggest product is scaffolding. Each piece goes for around 2090 RWF and we expect a profit of around 400-500 RWF. Another thing is waste products as wood chips, sawdust and other residue. This is sold as fuel wood to prisons, people burning bricks or private consumers using it for cooking.

We are trying to gain competitive advantages by investing in more advanced machinery to increase the quality of our processing. We see higher quality as our main competitive strategy but we don't really feel we have any serious competition within Rwanda. Some are importing expensive high quality timber from Dubai and those are a problem but as I said we are trying to compete by increasing our quality as well.

As long as we've been an association we've allowed new people to come and join us but since we started planning to form a cooperative we've stopped taking applications. We'll see whether we resume this after the cooperative has been formed.

We handle our customers and their payments in three different ways. One way is that when you place your order you pay everything in advance, a second way is that you only pay part of the sum in advance and a third way is that you pay everything on delivery. The second alternative is the most common practice.

The office for the sector authorities or representatives of the government is located right here. The government is very pleased with what we are doing and we are even working together. If we ever have a problem it's very easy to talk to them and they understand us very well. For example getting permits to construct new buildings here at the marketplace.

Bukoba

Ferdinand Katto (Forest landowner)

This is the sapwood and this is the heartwood. We observe the bark and notice when it changes colour and by this tell that the tree is mature. We've been selling timber for around ten years. I have around ten acres of land. If we don't have trees to sell we buy trees from others, process it and sell. We, my father and me, have this as our business.

We use chainsaw, handsaw, panga and axe for processing. The thing is handsaw takes a lot of manpower so we have shifted to using a chainsaw (Husqvarna 272). We use it to cut the trees down and to process them into boards. Now we can cut a lot of trees, around ten trees per day. From a twenty-five year old tree we are able to produce seventy boards with the dimension 1 inch x 8 inches x 8-10 feet. Sometimes we can use up two chains to process just one tree but we have a good relationship with our suppliers of materials related to the chainsaw. They can allow you credit though no more than 20 000 TSH. Whenever we cut we usually call in extra help, also we hire transportation. Sometimes we need an advance, especially for the big orders to pay for processing. On occasion we also rent our chainsaw to others.

There are a lot of customers for timber so it isn't difficult for us to sell. Dry season is the best time for our business. That's the time when the farmers are harvesting their crops and have some money. This is when we make the most money. 90 000 – 100 000 TSH profit per month. During low seasons we try to build some stock for the periods with higher demand.

When processing trees into boards without having a customer order you risk cutting into wrong dimensions. This risk however, isn't very big. Sometimes we sell timber in bigger sized pieces and then the customer goes and cuts it into smaller pieces himself. 200 pieces is an average sized order. There are big customers in the village where I live; they are carpenters. Actually most of our customers are here from the village but we also have a few customers from town (Bukoba). The price is around 500 TSH higher for the customers from town. Average prices are for *Maesopsis* (2 inches times 6 inches times 7 feet) 4500-5000 TSH, for *Eucalyptus* 6000 TSH and for *Pinus* (2 inches times 4 inches times 8 feet) 7000 TSH.

Three types of wood are in high demand, Eucalyptus is one but it's quite expensive. We grow Pine 75 %, *Maesopsis* 12,5% and Eucalyptus 12,5%. We have 140 trees intercropped around the farm and then we have separate woodlots. Next season we are preparing to plant 7000 seedlings. We are using a spacing of 2,5-3 meters.

Supply is generally lower than the demand so the need for advertisement is not really big. It's more a question of letting the timber dealers know you exist and then you can be sure that they'll contact you. For advertisement we rely on word of mouth promotion. In every village I have people, former customers and such, who spread the word about our business. I don't pay these people, instead many of them have perhaps gotten some timber for free. If someone comes and asks me for timber and we don't have it we'll just direct them to someone who we think has.

Me and my parents are the shareholders of the company. Our competitive strategy is to be faithful to our customers, good delivery reliability and to have good quality of the timber.

Fredson Mwangake (Forest manager)

Here in Kagera we have only one plantation. It is a government plantation. The purpose of establishing the plantation was to save our indigenous species. We are now in the second rotation, the first rotation ended in 1997.

The size of the plantation is five hundred hectares but other plantations are being established in the region, as much as 3000 additional hectares are being planted. This is an expansion area near the border of Uganda. There are stands of different ages within the plantation and five different site classes according to growth rate. The rotation period is twenty-five years and the average growth rate per year and hectare is roughly thirty-six cubic metres. We produce timber for construction here locally and we are not exporting. First thinning is at fourteen years and we typically remove around 150 m³, second thinning is at eighteen years this time it's 400 m³ and final harvesting at twenty-five years we remove 350 m³. We slash and prune before the first thinning. The diameter at breast height after twenty-five years varies from 25-40 centimetres. Skidding is done manually or with the help of animals. Processing takes place outside the stands. Loading and offloading is also manual work we don't have any heavy machinery for that. We sell standing trees to individual companies. They use mobile sawmills for processing and then deal their timber or sell it to timber dealers who in this case act as retailers selling to people working in construction or as carpenters. Construction is the biggest market segment at the moment. For furniture making people prefer our indigenous tree species but for construction they prefer the exotic coniferous species.

If you look at the market in general, the coniferous species are being traded between east African countries while our indigenous species are being traded all the way to Europe and even Asia.

Tanzania tree seed agency provides us with seed. They import seed from Nicaragua, Honduras and most lately Zimbabwe. In the lake zone the species that are performing well are *Pinus caribaea* and *Pinus tecunumanii* but further south and southwest they use other species of pine more suited for their climate. Seed from *Pinus caribaea* is very expensive, 400 USD per kilo compared to seeds from *Pinus patula* which is around twelve USD per kilo. The reason for the big difference in price is that for *Pinus patula* there are seed orchards within the country. Seeds are germinated in nurseries and the seedlings are then planted. We spot plant and we use a spacing of 3 times 3 metres. We don't really have a problem with pests but fire is a big issue. People surrounding us use fire to prepare their shambas and sometimes the fires run out of control.

At the moment we are mainly using casual labourers but we have a permanent staff of thirteen people that supervise silvicultural activities. There are going to be changes in the forest division, they are turning us into an agency and that will probably affect our organisation.

Our average monthly costs are around two million TSH. There aren't really any fixed costs so it depends very much on for example the relation between TSH and USD. When we buy equipment or other inputs we always collect quotations from different suppliers and then select the cheapest one according to our regulations. Since we sell trees on root the only cost we have associated with thinning is for marking which trees are allowed for harvesting.

There's no apparent uncertainty in supply, the uncertainty is in how much money will be allocated for our activities in next years budget.

We advertise when we have a mature stand. We make sure that the people who want to buy from us have registered businesses they are then able to make an application and those that fulfil our conditions are selected and allowed to purchase trees. There's no competition with price, the government decides how much we will charge per cubic metre and that's it. Price varies between diameter classes; a higher diameter class will generate a higher price per cubic metre.

In our first thinning the average diameter is 10-15 centimetres and the price per cubic metre for this class is 6000 TSH. In the second thinning it's 20 centimetres and that's 10 000 TSH. The average diameter at final harvest is 30 centimetres and the price for that class is 12 000 TSH per cubic metre. The highest class, from thirty-six centimetres and up is 19 000 TSH. We retain 10 000 TSH per cubic metre and the rest is sent to the government.

Demand is always high. According to our regulations we are to favour selling to locals businesses. We don't have any particular main customer. Since we quite alone in our position we don't really have any competition. This is somewhat of a community service provided by the government. There is no private equivalent to what we have here. You can find woodlots in sizes between half a hectare up to maybe ten hectares.

Onesmo Kamugisin (Transporter)

I have a company, Sonia Investment company LTD and we are provider of transportation service. We have trucks for fetching things in the villages and in town here we mainly use pickups. I have 3 trucks with carrying capacities of 10, 15 and 30 tons and 1 pickup. The main inputs that I need to procure are of course firstly fuel, then oil, labour, tires and general service on the vehicles. Fuel we can get here in Bukoba but many of the spare parts and such come from dealers in Dar es Salaam Dar es Salaam who in turn import them from for example Europe. Since fuel is our highest cost I have an agreement with one supplier saying that if I come to him every time he will reduce the price he's charging. The situation is similar when it comes to general service of the vehicles. For the other inputs I don't have a single main supplier because there is such uncertainty in supply. You can go to one shop and ask for the things you need and find it's not available and so you have to go somewhere else. You have to have several contacts. In general I maintain a good relationship with many of them, I can even go there and purchase on credit. The fact that there are many traders bringing in the different things means that I rarely have a difficulty finding what I need.

If the business generates a revenue of 3 000 000 TSH it generates costs of around 2 200 000 TSH. One truck we have is a Mistubishi Fuso with an engine capacity of 7000 cubic

centimetres and a carrying capacity of 10 tons. As an example, from Bukoba to Dar es Salaam it's around 1500 kilometres. The truck will consume around 405 litres of diesel going this distance one way. Somebody hiring a truck going from here to Dar es Salaam will pay 1 600 000 TSH. The cost for fuel alone for this trip will be around 750 000 TSH. Then you have to pay the driver his salary plus calculate the cost for the other inputs like new tires and service of the vehicle and so on, we can subtract another 200 000 TSH for that. In addition to his salary the driver also receives an allowance to cover his increased cost of living while he's away. This is a cost of around 160 000 TSH. Calculate all this and you'll see that I'm remaining with a profit of something like 490 000 TSH which is circa 30 per cent of the revenue. If you want to calculate the price for a shorter distance you can use this example and simply divide the numbers in relation to the distance.

Another example. From Dar es Salaam to Bukoba using the 30 tons semitrailer, it will consume 900 litres of diesel, again one way. The one hiring will pay 4,3 million TSH and our costs are around 1 500 000 TSH for the fuel and roughly 460 000 TSH for the driver, his allowance plus repairs and other inputs. You can see we remain with an even larger margin, over 50 per cent. This is because we've transported a bigger load and this pays you.

Another example. From Bukoba to Mutukula, a distance of roughly 80 kilometres, using the one-ton pickup it will consume around 13 litres of petrol, as usual going one way. The cost for fuel will be around 22 000 TSH and to hire this one you will have to pay 60 000 TSH.

When people want to transport things long distance they usually choose the big 30 tons truck. For example if we are fetching pine from Iringa we use the biggest truck and if we are just moving something in the region you can usually manage with the pickup. Sometimes you use a pickup to collect timber in the villages and collect it to one place and then use a big truck to transport it to the next location.

Most of our customers from here hires us to transport their goods from Bukoba and to somewhere else. Not many people here hire us to go somewhere and bring something back. We are mainly working with institutions like churches, schools and government, the ones that are moving bigger loads long distances but we also have smaller customers who just want to use the pickup to move for example smaller quantities of timber.

Many of the customers who come here want to set their own price and are not interested in calculating so that there's a profit for me. Out of five perhaps two will agree with my pricing. There is a lot of competition around. Even neighbouring countries have their trucks here. But when someone here hires a truck that's not from around he won't be able to place an order for something to be carried back. The way we try to compete is by offering our customers the opportunity to purchase space on the return voyage as well. This way they will only have to deal with one contact for their transporting needs and he is local.

Mr Mulukozi (Timber dealer)

I have been a timber dealer for eight years. Mainly my raw material comes from villages near here. I arrange for a transport and go out to buy. A lorry with a carrying capacity of three tons will cost somewhere between 300 000 TSH to 500 000 TSH depending on the distance and then a small truck is 50 000 TSH to 100 000 TSH. I don't rent transportation around here. There aren't actual companies, more like individuals who own or have access to a vehicle. Besides transportation I pay people to do the loading and offloading, the cost for this is around 40-50 TSH per piece. I buy timber from the entire Kagera region. Whenever you need to

transport timber in Kagera you have to have certain permits and I am the one responsible for that, not the driver of the transport. It's called something like permit for forest sales and it's demanded by the local government. The cost of the permit is 200 TSH per piece you are transporting. I'm trading somewhere around 2500-3000 pieces of timber per year and the cost for timber is 3000-3500 TSH per piece. The trees have already been processed into boards.

Everything is transported back to the shop. I have a shop including warehouse and workspace here in Bukoba for which I pay a rent of 45 000 TSH per month. In addition to this you have to be registered to work as a timber dealer and this costs me 205 000 TSH per year. After the timber has been taken here we process it into other dimensions if necessary, I plane, drill and so on and I have electric machinery to assist in those operations. For operating the machines I hire casual labourers. They come every working day, six days per week, but they don't have any long-term contract with me. Two workers cost around 80 000 TSH per month. The machines are available for purchase here in Bukoba but spare parts have to be ordered from Uganda. I spend around 200 000 TSH per year repairing the machines and electricity is around 120 000 TSH per year.

In addition to my timber dealing I also process other peoples timber as a service to those who lack the technical equipment. This renders additional revenues of 400 000 TSH per year.

A lot of customers, around 75 per cent just come here and find what they want from what we have in stock. If they need something that we don't have I'll send someone to the villages to bring back what is needed. This kind of deal is included in the remaining 25 per cent that is being produced on customer order. If we have to go to the forest for timber I have a lead-time of approximately one week. If business is good I can make as many as three trips to the forest per month but in average I make 18-20 trips per year. I usually have around 500 pieces of timber here in stock. The risk I take by stocking timber is that either rot or insects damage it. I would say that after two years in stock the timber has a high chance of already being ruined. Then I have to reduce price so that I can get rid of them fast. In average I believe I loose around 70 pieces of timber per year.

Competition is a big challenge. My competitive strategy is to provide timber of good quality compared to my competition. I provide what I believe is good and by doing so I believe I can get more customers. I set my price according to the costs I get when buying from the village. If I'm able to buy at low cost I will sell at low price. I advertise by going around to carpenters and schools and so on. I have normal customers I suppose but many of them keep coming back. Around 60 per cent are returning customers. I have some of them helping me to find more customers.

My customers are also my main source of market information and if I ever have the "wrong" price according to what they've seen elsewhere they will tell me. Demand is very seasonal. Last year it was a bit higher than this year. Competition has hardened.

The sell price is 4500-5000 TSH per piece. If I spread out the all the different costs per piece of timber they amount to somewhere around 500-1000 per piece. My profit is 3,5-4 million in profit excluding my own wages. From this I manage to save somewhere around 650 000 TSH per year and the rest pays for me and my family's sustenance after taxes have been paid, I pay around 500 000 TSH per year.

Gabriel Gadius and Ibrahim Afidhu (Carpenters)

Gadius started his business in 2007. He makes all type of furniture, sofas and beds and so on. The normal situation is that he produces on order, a customer comes to him and tells him what he wants and how, however frames for doors and windows have standard measurements so this is something he might work on in advance.

We are both carpenters and we rent a place for storage that costs 7000 TSH per month and we rent a store which costs 10 000 TSH per month but we take on separate jobs. Sometimes we also rent a different kind of saw.

The different inputs we use are timber, mosquito nets, different type of nails and of course tools; regular things such as a hammer, different saws, planers, a square, a clamp a measuring tape and so on. Gadius bought most of his tools when he started but World Vision, a Christian humanitarian organisation, provided him with some of them. He was able to find what he needed in Bukoba, it is available there and it wasn't very expensive. All in all it would have cost 350 000 TSH but he received 50 000 from World Vision. Sometimes you hire casual labourers especially when it's time for finishing a product. They sort the smoothening of the surface and the application of varnish. It's not very common, most of the work we do ourselves but in average it may be for perhaps one day per month.

The preferred species are *Podocarpus* spp. and *Maesopsis Eminii* and these are available around. We don't use pine, sometimes we might use *Eucalyptus* spp. Normally it's the same price for each of the three species. It's 3500 – 4000 per piece with the dimensions one inch by seven inches by eight feet. Timber is being bought from a place called Bunazi, approximately five kilometres from here. We don't have a main supplier but select whom we buy from based on availability, quality of the timber and of course price. We have a high season six months per year and then the wood consumption can go up to 150 pieces per month. During the rain season most people involve themselves in farming. For these six months business slows down. Sometimes if you miss an order you'll perhaps have to engage in some other activities, maybe on the shamba, or just wait around and see if you get a customer.

Customers come from different places, even from the villages up to 40 kilometres away or from Bunaz but the majority, approximately 75 per cent are from within a radius of 10 kilometres. Approximately 25 per cent of our production is done in anticipation of customer order and the remaining 75 per cent is being produced on order. Sometimes it can get difficult to sell the things we've done without order, it can remain in our store for up to 3 months. We have two main customers who are contractors; they contract nearly 60 per cent of what we produce. The relationships that we have with these two different contractors have been going on for three years now. We trust each other and so they normally provide us with an advance so that we're able to buy the timber we need for production. The products most demanded are doorframes and doors. The cost of making a door is 40 000 TSH and the selling price is at 50 000 TSH. It takes around two days for one person to make the door. We'll use *Eucalyptus* spp. for frames and *Maesopsis E.* for the actual door. There are many building houses around here. The time it takes for us to deliver an order is normally around one week but of course it depends on what the customer wants. We usually don't get information about what a customer will want in advance. They don't come and say, next month I am probably going to need this and this.

Competition is not very high, we are around seven carpenters in this town but we usually get the job. We are considered very trustworthy and that is a valuable competitive advantage. We

estimate that we are getting perhaps three out of four available jobs around here. The quality of the work we do, the fact that we deliver on time and that we don't over charge are also important factors.

The demand from customers is going up. The availability of timber is dropping and it's getting more and more expensive, this is the long-term trend. Since we normally depend on the indigenous species we don't benefit in the same way from the big plantations of conifers. And so we have to raise our prices but demand is still high. There are also seasonal variations over the year. During rain season when people are mostly working on their farms the availability of timber goes down. Fortunately this coincides with our low season. As timber grows more and more scarce we can even go ourselves to the people working the pit saws. In this way we go for the source and limit the competition or at least increase our chances of getting what we need. We pay a bit more than the timber dealers do, this way we usually get our timber. We pay an average of 4500 TSH per piece during low season. Because we want to be able to meet the orders on time we always have to look for timber first before accepting.

We don't see that we'll have to quit our businesses due to lack of timber. There will be timber only the price will go up. We've considered stocking up on timber during high season when price is lower but the problem is capital. We don't have enough capital to buy that kind of timber.

During high season our respective revenues go all the way up to 300 000 TSH per month and around one third or 100 000 TSH is kept as profit. During low season our revenues are in the level of 100 000 TSH per month and similarly 20 000 – 30 000 TSH is kept as profit each month. Whenever we talk about costs we usually don't include our own wages. Wages are subtracted from the profit. Out of 100 000 TSH I might take 70 000 TSH as wages. The rest of the money, 30 000 TSH I put into the other family business, a small store. It also makes money but the profit from the shop we use for family sustenance. We have some savings at home for emergencies.

Workshop Ntabubuko (Carpenters)

We are four people working here as partners. Our business is as carpenters and furniture makers. We decided to focus on this so we don't do any work in construction. For our business we use timber, varnish, glue, Masonite, different type of nails, tools and so on. Sometimes we buy glass and textiles too for special applications. If we need processing to be done for which we lack the equipment like for example planing, making grooves or decorative mouldings, there are several machines around and we send pieces of wood to them for processing and then we pay for the service. Additional processing like this is usually around 500 TSH per piece.

We get most of our timber from timber dealers in town. Sometimes we buy directly from people working the pit saws, the price is nearly the same. The pit sawyers arrange for transportation same as the timber dealers. The timber dealers we buy from don't have the equipment to do additional processing like planing. The price for timber is 3000-4000 TSH per piece. The species we prefer are *Podocarpus* spp., *Maesopsis Eminii* and *Eucalyptus* spp. We don't have main suppliers, we usually look around for a good price. The pit sawyers know what dimensions we are using so regardless whether we've given them an order they will produce material that's suitable for us. We use timber with the dimensions one inch by seven inches by ten feet and it's not very difficult to get the material we want.

We have fluctuations in our production depending on our customers. From June to October, that's the dry season, we experience high demand and the reason for this is because people make money during the harvest and they are then able to order furniture. During this season we can use as much as 500 pieces of timber per month with an average around 400 pieces. During the low season the consumption varies from 150-200 pieces per month. Everything we produce is made on order and we don't prepare standard elements either.

There is a sugar processing factory about 16 kilometres from here known as Kagera Sugar and many of the people working there come here to order furniture. Also people closer to the border, for example Mutukula, come here to buy. We don't really have any main customers like contractors or so. Customers normally come here to place their orders and when they do they always pay an advance.

Competition is not very high. There are maybe five other carpenters around here. We don't compete with price, actually we are probably a bit more expensive. The way we compete or work to maintain our position is by using good quality timber, doing good quality work and especially adding an attractive finish to our products. We also prioritise delivery on time. We don't engage in any real marketing activities, however we since we are located alongside the main road whoever passes here see what is going on.

To be allowed to have a carpentry business you have to have a permit. We pay 200 000 TSH per year for this. In addition we pay 50 000 TSH in rent for the plot where we keep our store. We have a long-term relationship with the landowner and that's the reason why the rent is so low.

The demand for furniture is rising. The reason for this is because this is a new district and many people who've received employment are moving in. During the high season revenues are approximately 1,5 million TSH per month and we make an average profit of 500 000 TSH per month. During low season revenues drop to around 700 000 TSH per month and our profit goes down to 300 000 TSH. This means we have a higher profit margin during the low season. The reason for this is probably due to the fact that during low season timber prices goes down. There is not a lot of money in circulation during that period and so the people working the pit saws are forced to sell their timber at low price. We don't have enough capital to stock timber otherwise it would have been an idea to stock during low season. We don't deposit part of our profit. Everything is used for our business and families.

Kisumu

John (Woodlot owner)

I got the idea to establish a woodlot from a study course I took in Nakuru towards Nairobi. That's where I first saw a woodlot. I now have several small woodlots planted with different species. I wanted to see which one would do best here. This lot that is planted with *Eucalyptus* spp. is five years old now. My vision is to have some money when I'm old and tired and to be able to provide for my family, pay for school fees and so on. I have already harvested around 20 trees. I've planted 150 but I want to plant 1000. What's been stopping me is that this certain species of *Eucalyptus* is having a disease at the moment called the eucalyptus chalcid (*Ophelimus eucalypti*), but I found another clone from south Africa that isn't affected by this that I want to plant instead. There are several reasons why we like the *Eucalyptus* species so much. One is that they grow fast, another that they grow straight and especially the fact that most species of *Eucalyptus* respond well to coppicing, which makes regeneration much easier. My plan is to leave these ones for another eight or ten years and then have them cut into

timber. You see many of them are already almost too big to use as poles. When you sell *Eucalyptus* spp. as poles you are paid according the diameter in breast height. Eight centimetres will grant you a price of 100 KSH, twelve centimetres is 200 KSH and twenty centimetres is 300 KSH.

The reason why chose to plant these particular plots is that I used this piece of land before but got nothing from it. Weather in this area is too dry. This area produced 10 kg of [sawgum(?)] worth 200 KSH. Trees here can grow with as much as 12-15 meters during the first four years. I get my information and assistance mainly from different NGO's like VI agroforestry; government is not doing well in our place. For example ICRAF has done a lot of research in this area so it's not so much trial-and-error. VI has given us seeds and we've established a nursery. We dug a pond to collect rainwater so that we can water the seedlings. Management isn't very difficult. You have to dig when you plant and for the first year it helps if you plant something like legumes that help keep competition from weeds down. During the rain season you weed maybe two or three times and then that's it. By the second year as you've seen the trees will be well above competition. By then you'll have to start pruning and mulching. We don't need any special kind of equipment to do this we just use our regular farm tools. By the end of the rotation period you might also try pollarding. Also next time we need to plant we'll be self-sufficient in seeds.

When time comes for processing the trees into timber we'll hire someone with a chainsaw who has the proper knowledge. These operators charge you six to ten KSH per feet of timber or 300 KSH per full tank of petrol consumed by the chainsaw. After processing we'll either sell the timber here or take it to market. One tree can generate around 3000 KSH if sold whole but if it's processed you'll get more, around 6000 KSH. The market is there, demand is high and my view of the future is that I'll be able to sell a lot of timber and have a lot of money. To know what price to charge I just go to the market myself and look around.

I have around six acres and that is a big farm, the average is one acre. It isn't easy to expand since one acre of land is around 100 000 KSH but the revenue from harvesting one acre of *Eucalyptus* spp. could exceed 3 000 000 KSH so given time and if you prioritise you definitely have the opportunity to expand.

Michael (Farmer in Madiany)

Another way of processing the wood is charcoal production. Instead of using the traditional method which has a low lever of efficiency we have two other ways of producing. One is using a modified old oil drum. Mainly we only use the branches because the timber is so valuable, branches that are cut off when pruning or after the final harvest. We chop the branches into even sizes and leave them to dry for some time; we remove the lid of the drum and fill it as much as possible. We put the lid back on, remove a small hatch, add some leaves to light the fire and then once it's been lit close hatch and let the process begin. Exhaust has only a small pipe through which it can come out and this makes the process function properly. The whole thing is finished in eight to ten hours. One batch gives you a volume equal to three quarters of a bag and one bag of charcoal gives you a revenue of 1 000 KSH.

Oil drums are readily available but the drum and all the work to adapt it costs some bit of money, you'll have to pay somewhere around 3 500 KSH, but there's an opportunity for several people to share it so you could easily share the cost between different families.

(Pit sawyers in Kisii)

Our business is processing trees. Either we buy trees from farmers or we are contracted by farmers owning trees to just provide the service of processing it. Since the deal depends on the willingness of the buyer and the willingness of the seller the price for a tree varies but it ranges between 3000-5000 KSH. After felling the tree, we leave it in place for a week before processing it into timber. The time it takes to process a tree depends on the quality and the diameter of the tree. To start, you always work in pairs. You start by cutting the tree into appropriate sized logs. A tree can produce up to five logs. What dimensions we choose depend on whether we've been contacted by for example a timber dealer with a specific request or if we're just producing on our own. There are standard dimensions such as six inches by one for example. If you have a log with a diameter of 40 centimetres it can take two days and you'll have produced 40-50 pieces of timber. For an entire tree in the same class, since the diameter decreases towards the top you'll be able to produce around 120-150 pieces of timber. The sell price for a board of average dimension will be priced around 150 KSH meaning one tree will produce a revenue between 18 000 – 22 500 KSH just for the timber. Besides timber the branches of the tree can be sold as firewood to farmers, the offcuts can be sold to less demanding customers and even the sawdust has its uses. For example saw dust can be used to light fires, it can be used as chicken litter and it can be used for mulching.

All in all revenues can sum up to around 30 000 KSH for a tree that cost you 5000 KSH. Besides the cost for the tree the tools we have are a saw and a file. We also have to buy food, each person might consume around 100 KSH per day. Other equipment we need to have to buy is a tape measure but this you only have to buy once, a file can last for two months and it's 150 KSH. If I deduct all the expenditures around the processing including our food and perhaps also transportation from here to where the timber dealer is I will remain with 3000-5000 KSH. Transportation is a big problem. To transport timber from the production site in to the market for each piece it might cost as much as 30 KSH. Also when transporting timber you have to pay a government tax which is around 2000 KSH for 150 pieces. Timber is carried from the forest down to the nearest road.

The practice of pit sawing is getting more and more uncommon in Kenya since the introduction of chainsaws around five or six years ago. However many of the practitioners fear the increased waste that comes with the use of chainsaws instead of traditional pit sawing. In Kenya the use of chainsaws is only prohibited in government forests. The new method for tree felling and processing is perceived as manageable and of course a lot quicker.

Robert (Chainsaw operator)

I do both felling and splitting. I don't charge by the hour, what matters is the size of the timber. "You can see that the operator is accurate in a manner that the timber is almost very straight." For payment we usually go by the length in feet. If you want me to cut for example six by one it will cost you 6 KSH per feet. Basically you can say the bigger dimensions you want the lower the price will be. It's another way to price time really.

An example, cutting a piece of timber that's six inches by one inch by nine feet took seven minutes when starting with a log that had been split and then cut perpendicular to the fresh surface on one side.

The spare parts I need for the chainsaw are not readily available and they are also quite expensive.

Moses (Transporter in Sondu)

I am employed as a driver. I rent a truck that I am responsible for. I decide what to charge but when transporting timber, before I decide how much to charge I have to make sure that the person commissioning the transportation has a permit for transporting the timber. The cost for a permit is around 700 KSH and then the process for getting it is long; it can take even two weeks. You can wait until the evening, around half past four or five p.m., when the police are not usually along the main roads and try transporting without permits. The police in Kenya and the corruption, so sometimes we have to give them something for them to allow us to transport timber, regardless whether you have a permit. If you don't give them anything they'll start examining your truck to see if they can find something, maybe your tires aren't good, maybe your vehicle hasn't been sprayed and so on. They know you'll be wasting a lot of money and a lot of time waiting around so you'd better just pay them something so you can move on. Usually, if it's a big truck, you'll have to pay them around 100 KSH and 50 KSH if it's a small one. But the first thing I'll do is to calculate the distance I am going to cover and second if the place is good or bad. You see here in Kenya, when you drive up in the hills, our roads are not good so I have to charge for tear and wear. Chabera to Kisumu, a distance of around 65 kilometres, the road is good so I would charge around 3 500 KSH for a pickup. The pickup can carry around one tonne. If I'm using a lorry it will depend on the size of the truck, if it's a seven-tonne truck or a ten-tonne truck. The seven-tonne truck is 7 000 KSH for the same distance and this is regardless whether it's full. I'm probably going to pay 2 500 for the fuel and be having like 4500 in profit. With timber, most of the people who want to transport timber are businessmen and if you overcharge them they'll get mad so we don't overcharge them. Normally we would charge 10 000 KSH for a trip from Chabera to Kisumu but we try to look for a fair price and so 7 000 KSH is what they pay and we let them know that we lower our price. These figures are for transportation only, loading and offloading excluded. Normal price for someone aiding you with that is five KSH per piece of timber.

We need our vehicles to be in good condition, especially if we are going to someplace interior. It's important to have good tires and also good boarding. A good truck is something like a Bedford or a Nissan UD. We have a seven-tonne UD and it's only supposed to carry seven tonnes but it has a strong engine so it can even manage eleven tonnes. Isuzu TX is also a good one but what we have noticed is that the new ones have a tendency to break faster than the older ones.

The price for a new seven-tonnes Nissan UD is around seven million KSH so what we do is that we usually go for used trucks. We buy them second-hand from the flour and sugar factories around; we recondition them and then start using them. A used truck is around 3-3,5 million KSH and a new engine is around 300 000 KSH. Another way to get hold of a vehicle is if you have a very good friend who can give you a loan. You then pay a deposit plus instalments during three years. If it's a seven million KSH loan, I'll pay 200 000 KSH every month for three years and then it's done. Two hundred thousand may sound a lot but with these big trucks you can make around 30 000 KSH per day. By the end of the day you can pay as much as 15 000 - 20 000 KSH in rent for the big truck but the sum is adapted to how much you've earned.

Besides our vehicles we also need people, casual labourers and drivers. When the timber is in a place where the vehicles cannot reach we hire people to help us carry the timber to the nearest road. They carry on their backs or on their heads. Using bicycles or motorbikes is not very popular even though they are around because of the increased risk that unseasoned timber will crack. Depending on the distance and weather conditions the cost for this service varies.

Sometimes it's as far as five or seven kilometres and you'll have to pay one or even two KSH per piece. This is the case sometimes. We also usually need help with loading and offloading. These people aren't paid well. Drivers should be paid 1 500 KSH per day but they are usually paid 1 000 KSH and this is for the big trucks. If you drive a pickup they'll pay you 500 KSH per day and then it's no allowance and no lunch.

Servicing the vehicles is a big cost due to the bad roads. Sometimes in the roads you have sharp rocks that can tear your tires. You can wear them out in as little time as two weeks, or they can last for two months depending on whether you travel locally on bad roads or regionally on asphalted roads. It's usually the rear ones that are worn the fastest. One tire is 45 000 KSH because we always go for the best. Fuel is of course the biggest but it doesn't affect my cash flow as much because I always refuel after I get the down payment from the customer.

For the main inputs we have a few special suppliers but we choose the cheapest ones. It's necessary to have good relations with them because sometimes you get a customer who isn't from around and then he can't give you your down-payment directly so you depend on the possibility to refuel on credit.

I have a few regular customers. Since this is a developing area many are building and so the stores need hardware. Around here they make a lot of bricks and for that they need firewood. When trees are processed into boards you usually get firewood as a by-product. So we transport firewood to the brick makers and then take their bricks somewhere else.

Duke (Transporter in Sondu)

I drive a four-tonnes canter. My uncle owns it and I'm hired as an employee. When it comes to customers I decide how much to charge. I decide by the distance, what I carry i.e. how much it weighs and how risky it is. Timber for example is risky. Say I'm loaded with 4000 feet. If you're found transporting timber and you don't have a permit from the forest district official and the police stop me they'll want to know the owner of the timber and then they ask both of us for money. Even if the owner has a permit, they know that if they take me to court the forest officers won't appear and so they'll win anyway. The reason the officer won't appear is because whenever he signs a permit he's supposed to come out and look at the site but he never does. The deal is done in the office. The police are smart because if you transport more valuable timber they will know to charge you more. So, when you negotiate price for transporting timber the price has to be high because I know the risk for getting arrested or harassed by the police.

Price example: From the interior places to here in Sondu, a distance of around 30 km with a load of 2 000 feet I can estimate it will take around 10 litres of diesel. That amount of diesel is around 1 000 KSH and let's assume I use 1 000 for police. My total price will then be 4 000 KSH. Out of that I'll pay my uncle 2000 and he'll give me wages to the amount of 500 KSH. However, if I don't have to use money to pay the police I'll keep it for myself and then I'll have made 1 500 KSH. In a week usually manage to have work five days out of seven. I can make around 40 000 KSH a month. It's not bad money. Sometimes we transport timber far, like 80 kilometres.

Joshua (Timber dealer)

When I meet with the farmers, we go into the forest and we negotiate a price for each individual tree and then we mark them. Cypress (*Cupressus lusitanica*) is very rare but many

people want it because it's durable and cheap and also it's good to use for beams when roofing. It's much easier to get a nail through this wood than for example *Eucalyptus* spp.

Joshua Nyandoro (Timber dealer in Sondu market)

I'm selling timber both for construction and for furniture making. I don't do any additional processing here, no planing and so on. When someone has bought something from me they must take it to for example my neighbour, Ken, who has a machine for planing, he charges around three KSH per feet. But I'm considering getting me a machine for planing sometime in the future.

I get my timber from villagers who after preparing the pieces bring them to me. They first come to me and let me know they have trees that they are going to harvest. I tell them that if they cut it into these certain dimensions I will be interested in buying. Length is always different. We negotiate price and the deal is settled. I don't go with them to the forest.

The farmers have a pretty good idea about the different price levels. They know that if they bring me a piece that is six inches by one inch or three inches by two inches in a certain length they will receive this amount. So prices are rather fixed except for when something is scarce. Then they will come and say that this commodity is very difficult to obtain and know we need to renegotiate price.

Table 1. Example of a price list (all prices are per feet and in KSH)

Species	Dimension (inches)	Buy	Sell
Eucalyptus spp.	6 x 1	12	16
	8 x 1	17	20
	10 x 1	18	25
	12 x 1	23	35
	3 x 2	16	
	4 x 2	18	
Grevillea	6 x 1	12	16
Cypress	6 x 1	14	
	3 x 2		20
	4 x 2		25
Marhamia L	6 x 1	14	

If you look at the different dimensions I'm selling the most common ones are the three by two and the four by two. It's not so strange when you think about it. These dimensions are both normally used for construction, especially for roofing. When you are building a roof you come and you buy many. The ten by one, twelve by one etc. are for furniture making and a person can come for one piece, two pieces or three pieces. The species that are most commonly sold are of course the ones used for roofing as well namely Blue gum (*Eucalyptus* spp. mainly *globulus*) and Cypress (*Cupressus lusitanica*). The Cypress is very expensive compared to Blue gum but it is also the one that is most popular because they are soft and they don't have the same tendency to curve when drying. As it turns out it is also very rarely found.

The curving tendency with Blue gum means I usually have to store it here longer because customers want to see it to dry so that they can see if it will curve or not. Then they take the pieces that they like the most and I remain with dead stock of rejects. Some of these pieces have been here for over ten years.

My suppliers generally bring very small volumes. Since people in general have little land and you have the rotation periods most of them just come once but some come back bringing a

little every time. Most of them bring very few pieces, some can bring perhaps 50 and then you have very few that can bring a three-ton lorry. I wouldn't pay more if a supplier told me he could bring me three tons every month.

I always manage to get what I need and I don't really perceive any uncertainty in supply. We buy in anticipation of customer orders. Every month I buy around 2000 pieces of timber. I think selling is sometimes slower than buying and I have a problem that if I buy a truckload of timber I get some good and some less good pieces. Then customers come and select only the good ones and I remain with too many bad ones.

I'm renting this place where I have my plot and I pay 4000 KSH per month. I also have to pay a yearly fee for my permit of around 3600 KSH.

In average sales appear to be constant. During the rain season transporting to and from the villages can get very difficult and we can even lack timber at times. This despite the fact that demand also decreases during this time. I would estimate my monthly revenues to around 80 000 KSH.

If I stopped buying now I think my stock could last me for a whole year. You see the problem we have here is that the town is so small and buyers are few and I just sell locally to small customers. If I had a truck I might have gone into Kisumu. A good thing here is that when you have sold to someone and reached an agreement it as if you have become friends and many customers come back to me. Some call me and ask if have what they need before coming.

As for competition I believe we are more than six timber dealers in this market alone. The way I try to compete is by using a good language when talking to customers, I may give some discount and also if someone comes and he's missing 50 KSH I'll allow him some credit if he's a regular.

Demand is going up. I notice this because when I started we were maybe two timber dealers in this market and now we are six and still, all are selling.

George (Timber dealer)

I'm not the owner of the business but I'm the manager. We sell timber, poles and round posts. We have plenty of different dimensions, for example: Six inches by one inch, eight by one, ten by one, twelve by one, two by two, three by two, four by two and three by three. Prices levels are set according to the dimensions of the timber. For example a six by one is 15 KSH per foot. If you want to come and buy just one foot of anything you can, it's no problem.

We have sawing equipment here but that is just for cutting timber in the right length for the customers. We don't do any additional processing.

We buy timber from afar, over in Nyamira district around 100 kilometres away. Around here there's no timber. The people we buy from are normally farmers who do a bit of timber dealing themselves. So they buy timber from other farmers and then sell to us. They arrange for transportation of the timber here by road since we don't have our own truck. We buy from around ten different timber dealers, spread out over the area but they are our main suppliers that we keep coming back to and they use the same price.

Table 20 Example of a price list (all prices are per feet, including transportation from Nyamira and in KSH)

Dimension (inches)	Buy	Sell
6 x 1	17	19
8 x 1	23	25
10 x 1	28	30
12 x 1	30	35
2 x 2	14	16
3 x 2	15	17
4 x 2	16	18
3 x 3	20	25
Round poles for roofing	80	100
Wall posts	100	120

We communicate with them through telephone. The way we share market information with our suppliers is by letting them know whenever we have certain needs, for example we really need a lot of six by ones at the moment. It's not like we make prognoses and try steering them in specific directions it's more of a day-to-day kind of communication. We haven't perceived any uncertainty in supply; the people are able to deliver what we want. Around fifty per cent of what we buy is bought in anticipation of customer order and stocked here whereas the remaining half is bought on order. We are increasing our stock each month. We want to have a big stock to keep customers coming; they are attracted by a big stock. We have 10 000 running feet in stock and we would like to have twice as much. We stock a lot of everything but six by one and four by two are the ones we sell most of. The four by two is commonly used is for roofing but also for beds and seats. As it is now we buy around 4000 feet per month. There are no standard lengths and we pay per feet. The lead-time from order to delivery from Nyamira is one week. We are sometimes allowed credit by our suppliers and whenever that's the case we always write down the agreement on a piece of paper that states when the amount is supposed to be paid.

Per month we manage to sell around 3 000 feet of timber and perhaps 1000 pieces of round poles. We sell both round poles that are used for roofing and wall posts. Our customers may come from as far away as fifty kilometres but the majority is being sold to carpenters who are living here. *Eucalyptus* spp. is most popular with our customers. The reason is probably that carpenters favour hardwood such as Blue gum.

As for competition there are four dealers around and the biggest one is right across the street. Since we carry the same assortment as our neighbours and the list prices are the same the way we try to compete is mainly by talking. We call it customer care. Trying to establish long-term relationships with our customers is a must and this can be done through making agreements that grant them a small discount in return for them buying all their timber from you. The customers are sometimes allowed credit. If credit is to be allowed an agreement is written down that states when the amount is supposed to be paid.

The development in the market is that demand is going up. Demand for timber is higher this year than it was last year. I believe the reason for this is that the population is increasing. Here the furniture-making segment is bigger than construction.

To summarise all costs and revenues:

We have 2 permanent staff including myself plus two casual labourers. The casual labourers work twelve hours per day and six days per week. They are paid daily and their wages are 150

KSH per person and day, which adds up to 7800 KSH for both. Wages for the permanent staff total 9000 KSH. We buy 4000 feet per month. Calculating with an average cost of around 20 KSH per feet this means a cost for timber around 80 000 KSH per month. We sell and buy around 1000 feet of round poles and they are bought at an average price of 90 KSH per piece. This means a cost for poles of around 90 000 KSH. We pay 2000 KSH per month in rent but then security is included. Permits to be a timber dealer is 2500 KSH per month. If you add all this up you'll see we end up with average costs around 191 300 KSH.

We sell around 3000 feet of timber at an average price of 23 making us almost 70 000 KSH and then we sell 1000 poles at an average price of 110 making us 110 000 KSH. The total is 180 000 KSH and on this you should have taxes being a certain percentage of the revenue. (Interviewers note: According to these numbers the business is being run at a loss of at least 11 300 KSH each month. Let's say he would buy 3000 feet instead of 4000, the profit would instead be 8700 KSH per month.)

The revenues according to George is 500 000 KSH and the profit should be around 30 000 KSH.

Atei Nyonjau (Carpenter)

I am a carpenter. I use all types of wood but the species that is highest in demand for me is *Eucalyptus* spp. and this is mainly because it's readily available. Second best is *Cupressus lusitanica*. The different indigenous hardwood species are unfortunately not available locally. Also when you put varnish on the Eucalyptus it glitters and is very beautiful.

I have different ways of obtaining the timber I need. Farmers sometimes bring it here themselves otherwise I go to the timber dealers in the local market. It also happens that I go out and buy a tree directly from a farmer. The first and last case are the least expensive ones and buying from the timber dealers is definitely most expensive. Even though buying the whole tree standing is the least expensive alternative the difference isn't that big and the disadvantage is that I don't have time to supervise the processing and make sure that the job gets done properly. Consequently I prefer buying from farmers coming to me directly.

Example of prices buying a timber with the dimensions six inches by one inch:

From a farmer coming to me with processed timber it's 10-11 KSH per feet.

From a timber dealer here at the local market it's 20 KSH per feet.

From a farmer buying a standing tree and taking the cost for processing it's 10 KSH per feet, 3 KSH for the wood, 5 KSH for processing with chainsaw and 2 KSH for miscellaneous expenditures e.g. transportation.

An *Eucalyptus* spp. tree with a diameter at breast height of 60 centimetres can give you as much as 300 pieces of timber. You should be prepared to pay around 10 000 KSH for such a tree. The price I pay for timber depends very much on the seller's situation. If he's eager to get money the price is lower. If I go to a timber dealer the prices have been increasing over time.

Rich people can take their money and buy a whole truck of timber and take it to Kisumu, for me I buy from simple pit sawyers and since their businesses are generally small I can't rely on just one supplier for the material I need. But since people know that I'm here they can bring even without me asking. I always manage to get what I need. However, if there's an urgent demand for my products I have to sell it to a higher price because I, in turn, might have to buy my timber from the more expensive timber dealers. Conversely, if you're willing to accept

waiting for maybe one month before coming to collect you furniture your price will most definitely be lower.

If demand is high my wood consumption of course goes up. For example if I make two beds per day I will use two times seven pieces of timber (six inches by one inch) and I work six days per week. This gives a total consumption of 364 pieces per month and this is if all work is done manually. If I had electric machinery I could do it much faster. However, this month I bought timber for around 6 000 KSH. I've had to go to some funerals so production hasn't been as high as it normally is. I bought around 32 pieces at 187 KSH per piece which means they would be around 5 metres long depending of course on the over dimensions.

Sometimes, if I don't have an order at the moment I can make something that's attracting and people will come by look at it and buy it. Making the furniture without order is quite economical to me because it means I can sell at cash and this gives me a lot of money at once to venture for another activity. When customers buy on order they come and pay bit by bit, which for me is a bit of an inconvenience. My customers are mainly from around here. On rare occasions people come and ask me to go with them to another place a bit further away where I can then stay for two or three days and finish my work and then return here. I've been as far as the neighbouring districts.

All of my products are getting sold. There's no uncertainty in demand really but that depends on the quality of my work. Customers are very many plus the number is increasing and my finished products don't stay for long. I can get as much as 20 000 KSH for a more advanced piece of furniture like a sideboard with fitted glass panes.

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Institutionen för skogens produkter
Department of Forest Products
Box 7008
SE-750 07 Uppsala, Sweden
Tfn. +46 (0) 18 67 10 00
Fax: +46 (0) 18 67 34 90
E-mail: sprod@slu.se