ECONOMIC ANALYSIS OF SESAME PRODUCTION AND MARKETING: A CASE STUDY OF SMALL-SCALE FARMERS IN SOUTH EASTERN TANZANIA

BY

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A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN AGRICULTURAL ECONOMICS OF SOKOINE UNIVERSITY OF AGRICULTURE MOROGORO, TANZANIA.

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ABSTRACT

The study was conducted to analyse the economics of sesame production and marketing for small-scale farmers of Southeastern Tanzania. The main objective of the study was to identify main factors influencing sesame production and marketing in Southeastern Tanzania and options to enhance its production. Structured questionnaire was used to collect information from sampled small-scale sesame farmers, buyers, agents, processors, exporters and retailers. Descriptive statistics, Regression analysis, Gross margin analysis and Gini coefficient were used for investigation. Results revealed that, farm size allocated to sesame, planting method and Total Variable Costs (TVC) incurred were significant ($P < 0.05$) and important factors in determining sesame yield at farm level. Cashew crop enterprise was the most profitable enterprise followed by pigeon peas and lastly sesame. The estimated Gini coefficient was 0.8, which implies unequal distribution of buyers' share in the study area. The analysis indicated that agents' share of export price was high (99%) followed by co-operative unions (98%), retailers (56%), companies (38%) and farmers (36%). These findings suggest the presence of inefficient market system in the study area. This study recommends that the government should encourage more buyers to buy sesame through reducing conditions for acquiring business license and taxes during registration. This could improve market efficiency through competition among the buyers. District councils should attempt to provide timely and adequate market information to market participants particularly farmers so as to improve market transparency. Lastly, the government particularly district councils should improve rural roads to reduce marketing costs.

DECLARATION

I, BAKARI RASHIDI KIDUNDA, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work and has never been submitted nor concurrently being submitted for a higher degree award in any other university.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS AND ACRONYMS

GDP	-	Gross Domestic Product
BOT	-	Bank Of Tanzania
FSR	-	Farming Systems Research
URT	-	United Republic of Tanzania
NARI	-	Naliendele Agricultural Research Institute
DRT	-	Director of Research and Training
MAFC	-	Ministry of Agriculture, Food security and Co-operatives
TRA	-	Tanzania Revenue Authority
TARO	-	Tanzania Agricultural Research Organization
MAC	-	Ministry of Agriculture and Co-operatives
DALDO	-	District Agricultural and Livestock Development Officer
TCCIA	-	Tanzania Chambers of Commerce, Industries and Agriculture
TARP II-SUA	-	Tanzania Agricultural Research Project Phase II – Sokoine University of Agriculture
FAO	-	Food and Agriculture Organisation

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Agriculture is an important sector in Tanzanian economy. It contributes more than 50% of the total Gross Domestic Product (GDP) and more than 60% of export earnings (BOT, 1997). It is also the major source of food supply and raw materials for industries. In the South eastern Tanzania the major crops grown are cashew, sesame, cassava, sorghum, maize, rice and groundnuts. Other crops include coconut, millet, pigeon peas, cowpeas, bambaranuts, soy bean and vegetables. The main livestock kept are goat, cattle, sheep and poultry (FSR, 1992). Sesame (*Sesamum indicum L.*) is one of the oilseed crops grown in the South eastern Tanzania others are groundnuts and sunflower. Sesame is a major dietary supplement and also a source of income particularly in areas where the major traditional cash crops do not perform well (Mponda, 1996).

Sesame is also the second important crop in terms of foreign exchange earnings in the South eastern Tanzania (Mtwara and Lindi regions and Tunduru district in Ruvuma region) which produce over 75% of the crop. Between 1980 and 1991 sesame was the leading export crop among the oilseeds in the country, followed by castor bean (*Ricinus communis*). In terms of total value, sesame, castor bean, sun flower (*Helianthus annuus*), and soy bean (*Glycine max*) accounted for over 90% of the value of exported oilseeds in that decade (Mponda, 1996).

Despite this economic importance, the production of sesame has neither increased nor stabilized over time. Sesame production particularly in the South eastern Tanzania has been below its maximum production potential (Mponda *et al.*, 2006). Among the reasons for such a low performance are low incomes of the farmers, poor farming methods and market infrastructures (communication, prices of inputs and output, market structure). Other factors include low price for oilseeds, high cost of inputs, weather variability and manifestation of pests and diseases (URT, 1997; Mponda, 1996).

In the South eastern Tanzania several research works on sesame particularly on breeding and management practices have been conducted at Naliendele Agricultural Research Institute (NARI). NARI is among the seven agricultural research institutes in the Country. The institute is under the Director of Research and Training (DRT) in the Ministry of Agriculture, Food Security and Co-operatives (MAFC). The institute is mandated to undertake research in crops (cashew, roots and tubers, sesame, groundnuts, cereals and regumes), soils, socio-economics and farming systems. Despite the technological development on sesame production at NARI, sesame productivity under farmers' condition in the South eastern Tanzania is still low (Mponda *et al.*, 2006).

There are several challenges for agricultural research in Tanzania. These challenges relate to promoting appropriate farming methods (input used, proper use of agronomic packages, improved seeds, soil fertility management as well as implementation of integrated pest management methods), infrastructure and market

related aspects. If these factors are addressed, the yield per unit area could be increased (Kashuliza *et al.*, 2002). Therefore this study is designed to investigate the socio-economic factors affecting sesame production and marketing in South eastern Tanzania.

1.2 Problem Statement

Several efforts have been made by the Ministry of Agriculture Food and Co-operatives to promote the production of sesame in Tanzania, particularly in the South eastern Tanzania through research and other market based initiatives (such as establishing farmer co-operatives, improving infrastructures (roads) and promoting product quality). Several researches on sesame breeding, pathology and agronomic aspects have been conducted at NARI. However, researchers have established that the average yield for sesame has been 500 to 700 kg per hectare under farmer's environment compared to current yield of 300 kg per hectare (Mponda *et al.*, 2006). Improved varieties of sesame have a potential of producing up to 1.5 tons per hectare under good management practices. Low productivity under farmers' condition might be attributed to low agricultural price, poor crop husbandry, incidences of diseases and insects and pests and poor market infrastructure such as lack of price premium for producing high quality sesame seeds.

The domestic requirement for sesame especially for industrial use (manufacturing cooking oil) has been increasing and higher than the local production (TRA, 2001; Mkamilo, 2004). Consequently Tanzania has been importing substantial amounts of cooking oil using her meager foreign currency. Thus identifying location-specific

factors that limit sesame production is important for the development of sesame sub-sector and agricultural sector as whole.

1.3 Justification for the Study

Sesame is one of the major oilseeds crops and is widely grown in Mtwara and Lindi regions and Tunduru districts and it accounts for over 75 % of the crops in Tanzania. Additionally, sesame is a major dietary supplement particularly in areas where other sources with similar nutritive value are rare. Sesame is the second major cash crop in South eastern Tanzania and is important source of farmers' income in areas where cashew can not perform well (Mponda, 1996; Mkamilo, 2004).

Over the past eight years, there has been an increased demand for sesame and particularly white coloured sesame seeds in both domestic and the World market for food and oil crushing industries (Mkamilo, 2004). Increased demand for sesame provides an opportunity for Tanzania to increase its production and exports. Given the high income elasticity of demand for edible oilseeds, the consumption in Tanzania has been forecasted to increase by almost 6% per annum (Kamwela, 1995). This growth is attributed to the growth in population (3%) and gross domestic product per capital (6%) http: //www.ciaworldfactbook/gdptanzania.htm. Overall data between 1998 and 2001 show that Tanzania was a net exporter of 11,652 metric tones worth US $ 6.5 millions of oilseeds and a net importer of 24,974 metric tones worth US $ 42.10 million of edible oil per annum (TRA, 2001). These trade statistics imply that if production of oilseeds could be increased a saving of foreign currency could be achieved in addition to other potential benefits of increased investments in

oil processing industry (e.g. increased employment and tax base) and employment and income to rural population and spill over effects such as growth in other sectors that are directly or indirectly linked to sesame sub-sector (Daudi, 2006: Mkamilo, 2004).

With regard to the study area, sesame productivity is about 300 kg per hectare while the potential yield for sesame production is about 1.5 tones per hectare. Several researches have been on physical, biological and agronomic aspects and little has been done on socio-economic factors influencing production and marketing of sesame (Mponda, 2006). Therefore this study is designed to investigate the socio-economic factors influencing production and marketing of sesame in South eastern Tanzania. Lessons from this study have the potential to shape future development agenda for smallholder farmers in the industry.

1.4 Objectives of the Study

1.4.1 Overall objective of the study

To identify main factors influencing sesame production and marketing in South eastern Tanzania and options to increase its production.

1.4.2 Specific objectives

i. To identify socio-economic factors influencing sesame yield at farm level.

ii. To assess relative profitability of sesame vis-à-vis major competing crops in the study area.

iii. To assess marketing efficiency of sesame in the study area.

1.5 Research Hypotheses

i. Household socio-economic factors have no significant effect on yield.

ii. The gross margin for sesame is relatively low compared to other competing crops in the study area.

iii. Markets for sesame are efficient (affirmative hypothesis).

1.6 Organization of the Study

This study is organized into five chapters including this introduction. Chapter two reviews relevant literature on theory of production, the concepts of agricultural marketing and marketing efficiency and methodologies that are commonly used in production and marketing studies. Chapter three presents the methodology of the study and it describes the study area, farming systems and sesame production, research design, types and sources of data required for the study, sampling procedures as well as sample size, data collection methods and analysis. Chapter four presents and discusses results. Finally, chapter five gives conclusions and recommendations drawn from the findings.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter reviews the agricultural sector and policies in Tanzania. the characteristics and ecology of sesame plant, the theory of production and concepts of agricultural marketing and marketing efficiency as well as sesame marketing in both local and international markets. The chapter also reviews methodologies that are often adopted in production and market analysis. Finally the chapter presents the conceptual framework for the study.

2.1 Overview of Agricultural Sector in Tanzania

Agriculture is the backbone of the Tanzanian economy. Apart from accounting for about half of the income and three quarter of merchandise export, agriculture is also a source of employment to about 80% of the population. The majority of producers are smallholder farmers with farm sizes ranging from about 0.9 to 3.0 ha (URT, 2004; Lazaro *et al.*, 2004). Sales of agricultural products accounts for about 70% of rural households' incomes (BOT, 2006).

Despite the agricultural potential of Tanzania, agricultural growth rate in the country has not been small and its contribution to the poverty reduction and industrial development has been minimal. For many cash crops the production growth rates has been lower than those reached in the 1980's (Sicilima, 2003). This poor performance has contributed to reduce the incomes of the majority of Tanzanians as well as the amount of food consumed (Nkwera, 1994).

Poor performance of agricultural sector in Tanzania has been attributed to several constraints. Some of the constraints facing agricultural sector include: low produce prices at the farm level compared to production costs; inadequate agro-processing facilities to add value and shelf life to farm produce; weak co-operative systems; absence of rural financial institutions to address farmers credit needs on favourable terms; fragmented and inefficient output market; low utilization of appropriate technologies; weak research-extension-farmer linkage; and constrained rural transportation infrastructure that render many producing areas inaccessible to input and output markets (Simkanga and Makongo, 1997; Sicilima, 2003; URT, 2001).

2.2 Agricultural Policy in Tanzania

According to the agricultural and livestock policy of 1997, the general goal is to improve the well being of the people whose principal occupation and way of life is based on agriculture. Most of these people are smallholders and livestock keepers, who do not produce surplus. Therefore the focus of this policy is to commercialize agriculture and to increase income levels.

There are nine objectives embodied in this general goal, some of these objectives are: to increase foreign exchange earnings for the nation by encouraging the production and increasing exportation of cash crops, livestock products, other agricultural surpluses, such as food crops, by-products and residues; to improve standards of living in the rural areas through increased income from agricultural and livestock production, processing and marketing; and to produce and supply raw

materials including industrial crops, livestock, by-products and residuals for local industries (URT, 1997).

Agriculture will continue to play a central role in Tanzanian economy. However, the government's ability to discharge this responsibility cannot be taken for granted. It must constantly review and analyse its performance with the view to identify and redress constraints that prevent it from making maximum contribution (URT, 1997).

2.3 The History of Sesame

Sesame (*Sesamum indicum L.)* has early origins in East Africa and in India (Nayar and Mehra, 1970). It is perhaps one of the oldest crops cultivated by man, having being grown in the near East and Africa for over 5,000 years for cooking and medicinal needs (Dudley *et al.*, 2000). The biggest producer is China (Table 1) although it is also grown in India, Korea, Russia, Turkey, Mexico, South America and several countries in Africa including Tanzania (http://www.faostat.fao.org).

Table 1. Major sesame producers during 2005 season

Country	Area harvested (in '000' acres)	Production (in '000' tons)	Rank
China	1633	800	1
India	4571	750	2
Myanmar	3385	606	3
Sudan	4201	331	4
Uganda	521	121	5
Nigeria	408	83	6
Pakistan	334	75	7
Ethiopia	230	72	8
Bangladesh	198	55	9
Central African Republic	104	47	10
Thailand	158	46	11
Tanzania, United Republic of	259	45	12
Egypt	74	41	13
Guatemala	138	39	14
Chad	235	39	15
Paraguay	168	37	16

Source: http://www.faostat.fao.org

Sesame (*Sesamum indicum L.)* is an important traditional crop in Tanzania. Its economic value exceeds that of most other crops, particularly in areas where marketing and transportation systems are efficient. When this study was conducted sesame and other oilseed crops were important source of income and foreign currency to Tanzanians.

2.4 Characteristics of Sesame Plant

Sesame is an annual plant which grows to the height of between 0.5 m and over 2 m depending on the variety. It has a large taproot and a dense surface mat of feeding roots. Most of the locally grown cultivars are tall, leafy and highly branched with

strong and well developed tap roots. Depending on variety, the colour of the plant may be dark green, light green or purple. The lower leaves are opposite, broad and palmately lobed whilst the upper leaves are alternately arranged, narrow or lanceolate. Flowers are produced in the leaf axils, each axil with 1 – 3 flowers depending on variety. Locally grown cultivars produce one flower per axil (TARO, 1987).

The fruits are erect capsules about 2.5 – 4.0 cm long and are normally four loculed but may also be six – or eight loculed depending on variety. There are dehiscent and indehiscent varieties. In dehiscent varieties, the capsules split from the top downwards for about two thirds of their length when they mature and shed seed. The seed are small, one thousand seeds weigh 2.0 – 4.0 g, and seed colour varies from white, black, grey brown to chocolate colour. Depending on variety the period from sowing to maturity is between 75 and 150 days. Most of the locally grown cultivars in Tanzania mature in 120 – 150 days (TARO, 1987).

2.5 Ecology of Sesame Plant

Sesame is also known as til, simsim or gingelly is an annual plant grown in tropical, sub tropical and warm temperature regions. It is cultivated almost exclusively by smallholder farmers as mechanical harvesting of the crop is difficult (Commonwealth oilseeds report, 1970). Sesame is sensitive to low temperatures and for this reason it is grown from sea level up to 1,500 metres above sea level and it does not perform well above this altitude.

Sesame is moderately drought resistant, especially the tall (highly branched) cultivars, because they have deep and more prolific root systems. About 400 – 500 mm of well distributed rainfall is required for successful sesame production. Moist conditions are needed during the early vegetative growth, but heavy or prolonged rains between sowing and four weeks after germination may cause severe damage to the young seedlings; sesame is very sensitive to water logging. It does best on fertile, light and well drained sandy soils where water is not a limiting factor (TARO, 1987).

2.6 Theory of Production

Production is the transformation of inputs into output (Henderson and Quandt, 1995). In most cases several inputs such as land, labour and capital are employed to produce an output. The equation that expresses the relationship between the quantities of productive factors used and the amount of product obtained is known as the production function (Heathfield, 1971). A production function describes a technical process that transforms inputs (resources) into output (commodities). Mathematician define a function as a rule for assigning to each value in one set of variables (the domain of the function) a single value in another set of variables (the range of the function) (Debertin, 1992). The general form of the production function is given as;

$Y_i = f(X_i)$..... .....(1)

Where Y_i is an output and X_i is an input.

The above function assumes that the production process can be accurately described by a function in which only one input or factors of production is used to produce an output. Few, if any, commodities are produced in this manner. Most of commodities

including agricultural commodities require several inputs. In this case the production function becomes;

$$Y = f(\chi_1, \chi_2, \chi_3 / \chi_4, \chi_5) \quad \text{.....(2)}$$

Where Y is output χ_1, χ_2 and χ_3 are the variable inputs and χ_4 and χ_5 are the fixed inputs. A variable input is an input that the farm manager can control while a fixed input is usually defined as an input which the farmer has no control over the amount available. Therefore from the production function above, the amount of output produced will mainly depend on the levels or quantities of variable inputs used in the production function (Debertin, 1992).

However, the demand for inputs within agricultural production process depend on a number of factors including; the price of output being produced, the price of the input, the price of substitute or complementary inputs that are also used in the production function and the technical coefficients or parameters of the production function itself, particularly production elasticities for each input. Also the quantity as well as the price of other inputs and the availability of income for the purchase of inputs may affect the demand for inputs (Debertin, 1992).

2.7 The Concept of Agricultural Marketing

Kohls and Uhl (1990) defined agricultural marketing as the performance of all business activities involved in the flow of goods and services from the point of initial agricultural production to the point of ultimate consumers. This definition imply that agricultural marketing is a system which involves interaction and decisions by various actors in pursuit of a number of specific activities, each following certain

economic principles. The key actors are producers and buyers (middlemen. processors and consumers), each playing a specific role in the system. The concept and scope of agricultural marketing is broad in the sense that it includes diverse buyers' and consumers' behaviour, pricing and product management systems. market communication, the structure of the market as well as channels of distribution that influence the efficiency of the marketing system (Hunt, 1991).

2.8 The Concept of Marketing Efficiency

Efficiency is capacity to achieve desired outcomes with minimum expenses of energy, time, money and other resources (Kydd and Scarborough, 1992). There are two types of efficiency namely technical and economic efficiency (Mazze, 1970). Technical efficiency is the achievement of a given output with the least combination of inputs of resources. While economic efficiency refers to conformity to individual choices and community wishes. Marketing is concerned with this later type of efficiency since the business or marketing is viewed as a means of satisfying consumers' needs. King and Blessler (1970) subdivided the efficiency into two dimensions i.e. productive and pricing efficiency. Productive efficiency encompances the extent to which firms in the industry make full use of their available resources and the extent to which firms or farms are organized to take full advantage of economies of scale. Pricing efficiency relates to what happens to prices, producers share and marketing margins.

The application of these two types of efficiency to marketing is often difficult because of the assumptions underlying their theoretical frame. However, both types

of efficiency are dependent on complete information about the rationality of the user, competition and the environment in which the business operate and information on costs of inputs. Different aspects are normally considered when measuring marketing efficiency. These include marketing intelligence, market channels, marketing margins, market concentration ratio, marketing costs, gross margins, market shares and producer's shares (Mazze, 1970). The market efficiency can also be analyzed using the structure, conduct, performance model (SCP – Model). Market structure refers to the organization characteristics of the market which determine the level of competition between buyers and sellers. The structure is assessed by looking at the market concentration ratio, market channel and market transparency. The conduct pertains to behaviour which participants follow in adopting a given market environment such as collusion in determining prices, operating in groups and promotion strategies. Market performance involves analysis of gross margins, producers share, interregional price correlations and marketing margins (Kydd and Scarborough, 1992). A high degree of marketing efficiency is important in order for a firm to survive in the competitive environment. The performance of marketing activities needs to be measured in order to develop an index of the firm's ability to operate successfully in a given market.

2.9 Agricultural Marketing in Tanzania

The marketing of agricultural products in many developing economies including Tanzania is a major determinant of development in generally and agricultural development in particular (Ashimogo *et al.*, 2003). Efficient markets can potentially contribute to the development process of crops or any other commodity. They can

provide a way to allocate resources optimally and may stimulate growth by promoting technological innovation (Ellis, 1982).

In Tanzanian economy, inefficient agricultural marketing system has been observed to be a major drawback in the development of agricultural sector (Mdoe *et al.*, 2001). This inefficiency is attributed to inadequate supply of credit and poor infrastructure (Kaldor, 2004). Other problems contributing to this inefficiency are low quality of produce, poor marketability of these products, lack of processing skills, lack of farmers groups and lack of rigorous marketing strategies.

2.10 Sesame Export Market

2.10.1 Major exporters of sesame

In 2004, there was 884 thousand tons of whole sesame seed exported by major producing countries. The major sesame exporters were Sudan, India, Ethiopia, Myanmar, China, Nigeria, Tanzania, Thailand and Paraguay (Table 2) (http://www.faostat.fao.org).

Table 2. Major exporters of sesame during 2004 season

Country	Exports (tons)	Imports (tons)
Sudan	209	0
India	173	2
Ethiopia	84	0
Myanmar	46	0
China	46	153
Nigeria	44	0
Tanzania	28	0
Thailand	25	13
Paraguay	25	0

Source: http://www.faostat.fao.org

2.10.2 Major importers of sesame

In 2004, there were 995 thousand tons of whole sesame seed imported by various countries in the World. The major importers were Japan, China, Republic of Korea, Turkey, United States of America, Syrian Arab Republic, Israel, Egypt, Mexico, Netherlands, Germany, Greece and Lebanon (Table 3). However, the World sesame import countries has been increasing over years. In the last 15 years the amount of sesame imported by various countries in the World has been reported to increase by 79% (http://www.faostat.fao.org). This situation provides an opportunity for increasing sesame production in Tanzania.

Table 3. Major importers of sesame during 2004 season

Country	Imports (tons)	Exports (tons)
Japan	171	0
China	153	46
Republic of Korea	88	0
Turkey	87	4
United States of America	47	3
Syrian Arab Republic	46	0
Israel	36	0
Egypt	35	4
Mexico	28	12
Netherlands	27	16
Germany	27	2
Greece	26	2
Lebanon	24	0

Source: http://www.faostat.fao.org

2.11 Review of Methodologies used in Similar Studies

2.11.1 Cobb-Douglass production function

Cobb-Douglass production function is a functional form used to estimate the relationship between inputs and output at the farm level (Debertin, 1992). This form of production function has been widely used in determining factors influencing crop output levels (Senkondo, 1988; Mwikila, 1992; Ngailo, 1993; Mkude, 2003). The Cobb-Douglas function is also used to estimate returns to scale (i.e. whether increasing, constant or diminishing returns). The major disadvantage of Cobb-Douglas production function is that it can not show both increasing and diminishing returns in a single response curve (Debertin, 1992; Mwenda, 1993).

In a generalized form of Cobb-Douglass production function it is assumed that output could be produced with two variable inputs (labour and capital). However, this function could be expanded to include more inputs. Therefore, the number of inputs used in a production process may vary from one commodity to another depending on the nature of the commodity. To estimate such a function inputs are normally transformed to logs of base 10 or natural logarithms and the parameters of the production function are estimated by least squares method (Debertin, 1992).

However, regression equations generated by ordinary least squares are associated with a number of problems depending on the type of data used and the nature and form of regression model employed in the analysis. The common problems encountered in regression analysis include multicolliniarity, heteroscedasticity and

autocorrelation. These problems make the ordinary least squares estimators unreliable (Gujarati, 1988).

Kallon (1970) used a Cobb-Douglass production function to investigate the socio-economic factors affecting rice production. The function was linearized to give a double log transformation for estimating parameters. Output prices, cash loans, family labour, level of education and availability of fertilizer were the significant variables in explaining why people engaged in tobacco production. Kimburi (1980) used this function to identify constraints to potato production and storage in Kenya. In this study the Cobb-Douglass production function was fitted to the data to examine the relationship between input and output and input coefficients were estimated to determine which variables were important in potato production and to identify the nature of return to scale. Results revealed that potatoes acreage, chemical fertilizer and sprayed chemicals were significant explanatory variables. In this study the Cobb-Douglass production function will be employed to identify factors influencing sesame production among small scale farmers in Southeastern Tanzania.

2.11.2 Marketing efficiency

According to Mazze (1970) efficiency is a measure signifying the number of successful marketing decisions made in a specified period. These decisions are normally evaluated on the basis of their returns on investment, profit potential and prospects of fulfilling desired objectives. Marketing efficiency can be measured by looking at the structure of the market and behaviour of the market participants

(buyers and sellers) that are jointly determined by factors such as market intelligence systems, pricing strategies and market barriers.

Raju and Bhatt (1981) conducted a study on efficiency of pricing and market operations for semi arid tropical crops in India. The study examined efficiency in pricing and operation of regulated markets for groundnuts and used producers' share, marketing margins and market structures to assess the efficiency. Results revealed that in all selected markets, the farmers' shares of consumer's price were high (73 to 79%) followed by the millers (5 to 8%), whole sale traders (1 to 4%) and retailers (1 to 4%) shares. Hence concluded that, most of the selected markets were operationally efficient. Mkude (2003) assessed the marketing efficiency of cashew nut in the Coast region of Tanzania using concentration ratio and found that the market was highly concentrated. According to market structure criteria suggested by Kohls and Uhls (1985) this market was strongly oligopolistic. According to Scarborough and Kydd (1992), the higher the concentration ratio the less competitive is the market therefore the greater the probability of collusion and artificial market barriers which serve to undermine market efficiency.

Mshote (2006) assessed marketing efficiency of the spice industry in Tanzania by looking at the three major components i.e. market structure, conduct and performance. The relationship between structure, conduct and performance arises from the fact that market structure influences behavioural characteristics of the market participants i.e. their numbers and shares can have influence on pricing aspects. Also artificial barriers to entry can prevent potential entrants thus increasing

the market shares of the dominant participants which in turn increases their market power and affects market performance and efficiency.

2.12 Conceptual Framework for the Study

The farming technology, socio-economic factors, land tenure systems and market efficiency affect agricultural development through their influence on resources allocation (Mwalukasa, 2003). These factors have been identified as essential element for increased agricultural production. Under normal circumstances farmers are working hard to increase their agricultural production for increased food security and income (Senkondo *et al.*, 1998). The level of production is determined by several factors including farm size, technology used, income and land tenure systems and market related aspects such as market structure which influences buyers' behaviour, market information, inputs and product prices and market infrastructures. These factors may be grouped into four major categories of socio-economic, technological, land tenure system and marketing factors (Fig. 1) and may have differential impacts on farmers' output and income levels.

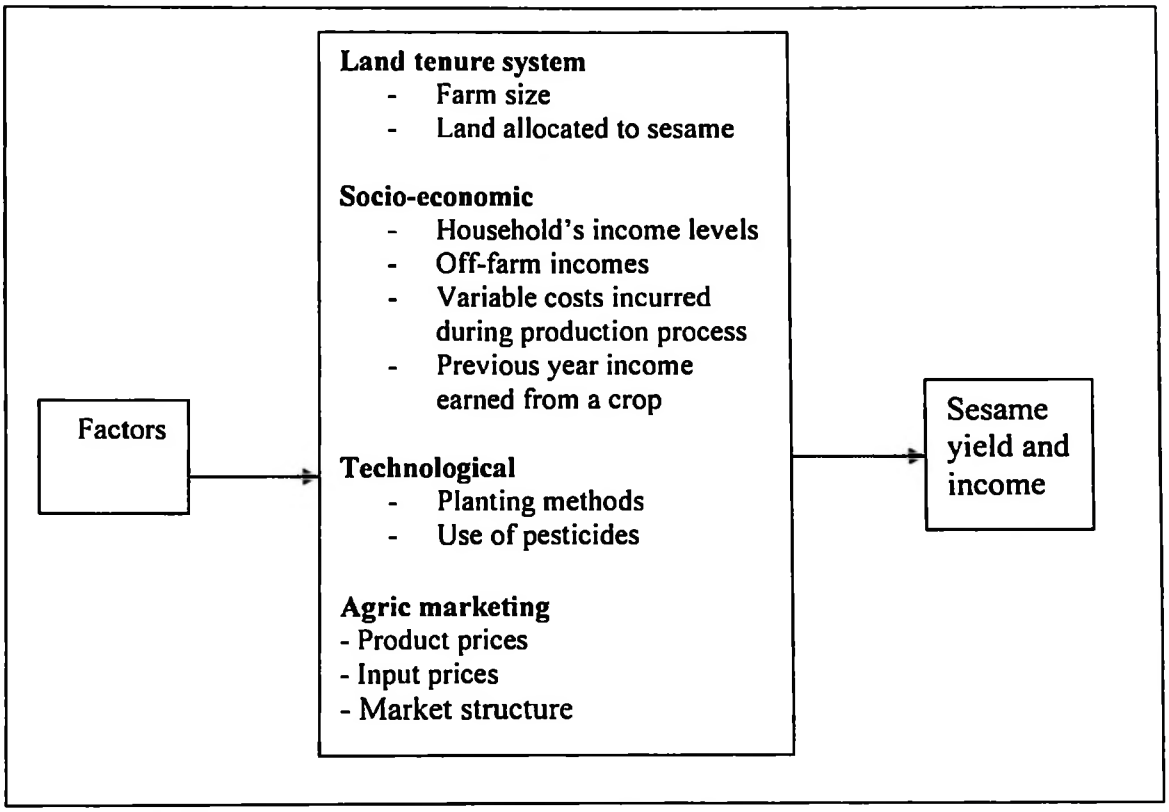

Figure 1: Factors affecting sesame output in Southeastern Tanzania.

CHAPTER THREE

METHODOLOGY

3.1 Overview

This chapter provides a brief description of the study area, farming systems and sesame production, research design, data and data collection methods as well as data analysis. This description is needed to understand better the study area and conceptualize properly the study and methodology.

3.2 Description of the Study Area

The South eastern Tanzania comprises of Mtwara and Lindi regions and Tunduru district in Ruvuma region (Fig. 2). The zone covers 103,478 km^2 where by 17,750 km^2 is covered by Mtwara, 66,950 km^2 by Lindi and the rest (18,778 km^2) by Tunduru district. More than two million people live in the zone. Mtwara region has more than 50% of this population. South eastern Tanzania has two main seasons: a humid and hotter wet season (November to May) and a cooler, less humid dry season (June to October). Mean annual rainfall ranges from about 800 mm in inland and central areas to 1200 mm in the hills and plateau near the coast. Soils are variable, ranging from deep, well drained, but not very fertile sandy soils of the sedimentary zones to deep, well drained, and somewhat more fertile red clay soils of Nachingwea and Masasi districts (FSR, 1992).

The most important crops grown are starchy staples (sorghum, maize, cassava, rice and millet), vegetable and oilseeds (groundnut, sesame, soybeans, sweet potato, onion and tobacco), leguminous food crops (pigeon peas, cowpeas, lablab, beans,

green grams, and bambaranuts), and tree crops (mainly cashews, coconuts, citrus and banana). Cashew is the first most important cash crops in the zone followed by sesame, cassava, maize, coconuts and groundnuts. The main livestock kept are cattle, goats, sheep and poultry (Lamboll, 1991).

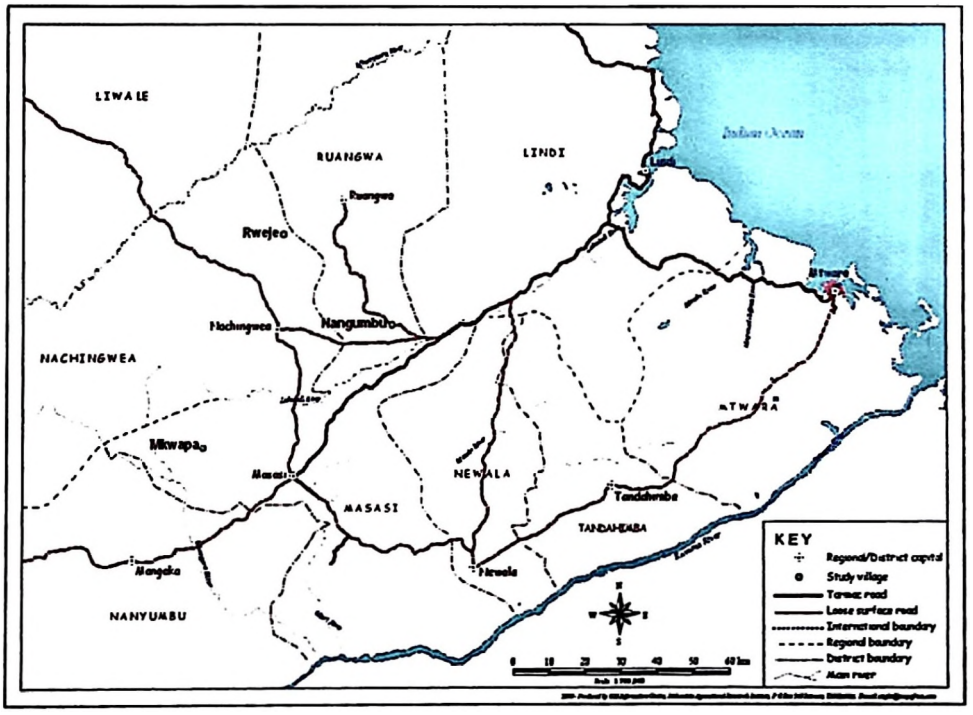

Figure 2: A map of South eastern Tanzania showing surveyed villages of Nanyumbu (Nanyumbu district), Mkwapa (Masasi district), Rweje (Nachingwea district) and Nangumbu in Ruangwa district.

3.3 Farming Systems and Sesame Production

South eastern Tanzania has been classified into 14 farming system zones. A farming system zone is defined as an area within which there is little variation in the existing or potential farming system. The factors taken into account when defining the zones

were land form, soil type and rainfall, population distribution and the relative importance of the major food and cash crops (FSR, 1992). The districts studied are in farming system zone 8. This zone 8 is the most important area for maize and sesame production. The zone is composed of West Lindi, Ruangwa district. East Nachingwea and North East Masasi and is bordered by the Lindi and the Makonde plateau in the east, by zone 9 to the South and zone 10 in the West and North. The zone is characterized by red clay soils particularly in the Central and Northern parts of the zone, and a fairly high population density relative to neighbouring parts of Masasi, Nachingwea and Lindi. The agricultural potential in zone 8 also seems high compared with most of other areas probably due to the combination of reasonable rainfall 900 to 1000 mm per year, fairly fertile soils, and the presence of valleys arising from the plateau (FSR, 1992).

3.4 Research Design

The study used cross sectional research design in which cross sectional data were collected and used for analysis. Cross sectional data is a type of one-dimension data set or refers to data collected by observing many subjects (such as individuals, firms, or countries/regions) at a time, or without regard to differences in time. Analysis of cross sectional data usually consists of comparing the differences among the subjects http://www.Google/cross-sectionaldata/wikipedia.htm. This design can be used for descriptive purposes and for determining the relationships between variables.

3.5 Types and Sources of Data

Secondary data and information used in this study were collected from various sources such as Sokoine National Agricultural Library (SNAL), Naliendele Agricultural Research Institute in Mtwara and other online and documented resources. Primary data were collected from randomly selected farmers, buyers and processors in the study area.

3.6 Sampling Procedures, Sample Size and Data Collection Methods

Purposive sampling and simple random sampling technique were used to draw samples for the study. Purposive sampling was used to select four districts for the survey. Four districts from zone 8 farming system of Mtwara and Lindi regions were selected. These districts include Masasi and Nanyumbu districts (Mtwara region), and Nachingwea, and Ruangwa districts in Lindi region. The survey was conducted in four villages selected from each of the districts. The districts and villages were selected based on their potential for sesame production as guided by DALDO's office in each respective district. Then random sampling procedure was used to draw respondents from the villages for interview. Thirty respondents were interviewed from each village and the total sample size was 120. In addition to these respondents, few sesame buyers and their agents, retailers, processors and cooperative unions' staff were also interviewed.

3.7 Development and Administration of Questionnaire

Different questionnaires were developed for collecting information from selected small-scale sesame farmers, buyers, agents, processors, exporters and retailers (Appendix 1 & 2). Pre-testing of a questionnaire was done to a few selected farmers.

3.8 Data Analysis

3.8.1 Descriptive statistics

Descriptive statistics such as means, standard deviation, graphs, frequency distributions and cross tabulations were used to describe the data. The information obtained from these statistics provided information to support other inferential statistics.

3.8.2 Regression analysis

In this study the regression analysis was used to test the hypothesis that, household socio-economic factors have no significant effect on yield. The analysis therefore quantified how much the independent variables influenced and related to the level of yield produced by the farmers. The variables for this analysis were sesame output (SESMO) which is the dependent variable and the independent variables were: Sesame farm size per household measured in terms of m^2 (FRSZ), Total Variable Cost (TVC), Off-farm income (OFFINC), Previous year income (PRINC) and Planting method (PLMTH) as a dummy variable which takes one for the row planting and zero for the broadcasting.

3.8.3 Theoretical Model and estimation method

The Cobb Douglas production function was used for estimation. This function has been widely used in determining factors influencing crop output level (Senkondo, 1988). The theoretical model is derived from the general Cobb-Douglas production function and is given as;

$$Y = A\Pi_i^{bi} e^{u} \quad \text{.....(3)}$$

Where Y is output level, Π_i represents explanatory variables, b_i are parameters to be estimated, A is a constant and u is an error term. Then the empirical model for estimation is expressed as;

$$SESMO = A_0(PRINC)^{\beta_1}(FRSZ)^{\beta_2}(OFFINC)^{\beta_3}(TVC)^{\beta_4}(D1)^{\beta_5}e^{\varepsilon_i} \quad \ldots\ldots(4)$$

Applying natural logarithm to equation (4) we get;

$$\ln(SESMO) = \ln A_0 + \beta_1 \ln(PRINC) + \beta_2 \ln(FRSZ) + \beta_3 \ln(OFFINC) + \beta_4 \ln(TVC) + \beta_5(D1) + \varepsilon_i \quad \ldots\ldots(5)$$

Where A_0 is a constant term, β_i are the parameters or regression coefficients and ε_i is the error term. It was expected that the quantity of sesame produced is positively related to all independent variables. Statistical Package for Social Science (SPSS) was used to estimate the relationship.

3.8.4 Market efficiency

The market efficiency of sesame was analysed by looking at the Gini coefficient, market channel, market conduct (pricing strategies, flow of market information and barriers to entry) and pricing efficiency (gross margin analysis and producers' share).

3.8.4.1 Gini coefficient

Gini coefficient was used to determine buyers' share distribution in the market. The number of buyers and buyers' share determined the structure of the market. According to Stuart and Ord (1994), Gini coefficient measures the degree of inequality of a variable in a distribution of its elements. The Gini coefficient ranges

between 0, where there is perfect equality and 1, where there is perfect inequality. In a Lorenz curve, a diagonal line shows an even distribution of elements of a variable. The calculation of Gini coefficient uses the gap between the diagonal and the actual curve, and may be calculated as the ratio of area between the diagonal and the Lorenz curve to the total area beneath the diagonal (Mayhew, 2004).

With regard to buyers' share distribution, Gini coefficient represents an overall measure of the cumulative buyer's shares against the share of buyers in the population. The lower the value of the Gini coefficient, the more equally buyers share is distributed and hence the competitive the market is. A higher value of the Gini coefficient indicates unequal share distribution among the buyers which implies that the market is dominated by few large firms.

According to Sen (1973), the calculation of Gini coefficient lies on the theory of relative mean difference. Therefore Gini coefficient is calculated as;

$$G = \frac{2}{n^2 u} \sum_{i=1}^{n} i(\chi_i - u) \quad \text{.....(6)}$$

Where G is the gini coefficient, n is the number of shares observed, u is the mean value of shares, i is the rank value and χ_i is an observed share value. The χ_i values are first placed in ascending order such that each χ_i has rank i.

3.8.4.2 Market channel

This part the study assesses the movement of product after harvesting to the point of consumption to determine the market channel for sesame. A market channel is a set

of practices or activities necessary to transfer the ownership of goods, and to move goods, from the point of production to the point of consumption (http://en.wikipedia.org/wiki/marketing channel). Market channel shows the distribution and categories of market participants in a given market.

3.8.4.3 Assessment of market conduct

The assessment of market conduct involved studying market transparency (access to marketing information), barriers to market entry, pricing strategies and terms of payment. Market transparency affects the intensity of competition: If the market participants do not have proper knowledge about market conditions, the intensity of competition might be low despite a large number of participants. Barriers to market entry reduce the number of potential competitors and therefore impede marketing efficiency (Mmasa, 2007).

3.8.4.4 Gross margin analysis

Gross margin analysis was used to assess the efficiency of the market by looking into profitability of sesame against the major competing crops in the study area. The study tried to assess the level of market efficiency by evaluating costs and prices particularly at producer level. Gross margin is the difference between the value of an enterprise's gross output and the variable cost of that production (Johnson, 1985). Gross margin analysis gives the starting point in the assessment of the enterprise profitability (Mutayoba, 2005). Therefore in this study, gross margins for different crops were calculated based on the following formula:

$$GM_i = TR_i - TVC_i \quad \text{.....(7)}$$

Where GM_i = Gross margin of a crop i, TR_i = Total Revenue from sale of the crop i (Tshs/ acre) and TVC_i = Total Variable Costs spent on production of crop i (Tshs/acre).

3.8.4.5 Producers' share of consumer prices

Producers' share of consumer prices is defined as the ratio of producer price to consumer price (retail price) or export price depending on the level of market chain. This share was also used to assess the market efficiency. This assessment was done by comparing the producers' share (farmers, Co-operative unions, agents, companies and retailers) along the marketing chain. According to Ghorbani (2008) and Mshote (2006), the producers' shares were calculated using the following formula:

$$PS = Pp/Exp = (1 - MM/Exp)x100 \quad (8)$$

Where; PS = Producers' share, Pp = Producers' price

Exp = Export price.

MM = Marketing margin of market participant i

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Overview

This chapter presents results and discussion of the data collected from the survey. The chapter is divided into nine major sections. These sections presents socio-economic characteristics of the respondents, overview of agricultural production in the study area, sesame production and management practices, profitability analysis of sesame against major competing crops, factors influencing sesame yield, problems facing sesame producers, marketing of sesame and institutional support to farmers. The contents of each section are discussed in sections 4.2 through 4.11.

4.2 Socio-economic Characteristics of Respondents

This section presents the socio-economic characteristics of the respondents. The major socio-economic characteristics discussed include age, household size, number of dependants, sex, marital status, education levels, occupation and farming experience.

4.2.1 Age of respondents, household size and number of dependants

Findings showed that, the age of respondents ranged between 18 and 80 years. The average age of the respondents was 45 years old (Table 4). Majority of the respondents (52%) were between 36 to 55 years, followed by 27% who were between 15 and 35, 19% between 56 and 75 and 2% between 76 and 85 years. However, it was reported that, most of the young and energetic people between 15 and 35 years of age were migrating to other towns' centers seeking for better lives

which resulted into shortage of labour in their households. The average household size was 5 people in which the dependency ratio was 54%.

Table 4. Socio-economic characteristics (N = 120)

Household characteristics	Mean	Standard deviation	Minimum	Maximum
Age of respondent (yrs)	45.1	13.5	18	80
Education level of respondent (yrs)	6.8	2.2	0	14
Household size	5.2	2.6	1	14
Number of dependants	2.8	1.9	0	11
Sesame farming experience (yrs)	13	11.2	2	66

4.2.2 Sex of the respondents

Out of 120 respondents interviewed 79% were male and 21% were female (Table 5). The over representation of men could be attributed to the fact that men were the head and main speakers of the households. In many cases females were hesitant to talk about family affairs in the presence of their husbands even when they were randomly selected for the interview.

Table 5. Sex of respondents

Sex of respondents	Surveyed villages									
	Mkwapa		Rweje		Nanyumbu		Nangumbu		Overall	
	Tally	%	Tally	%	Tally	%	Tally	%	Tally	%
Male	24	80	22	73	25	83	24	80	95	79
Female	6	20	8	27	5	17	6	20	25	21
Total	**30**	**100**	**30**	**100**	**30**	**100**	**30**	**100**	**120**	**100**

4.2.3 Marital status of respondents

The majority of respondents were married only 8% were single, 3% divorced and 2% widowed (Table 6). These figures (in %) show that most of the respondents interviewed were adults and elders.

Table 6. Marital status of respondents

Marital status	Surveyed villages									
	Mkwapa		Rweje		Nanyumbu		Nangumbu		Overall	
	Tally	%	Tally	%	Tally	%	Tally	%	Tally	%
Married	26	87	26	87	28	93	25	83	105	88
Divorced	1	3	0	0	2	7	1	4	4	3
Single	2	7	4	13	0	0	3	10	9	7
Widowed	1	3	0	0	0	0	1	3	2	2
Total	**30**	**100**	**30**	**100**	**30**	**100**	**30**	**100**	**120**	**100**

4.2.4 Education level of respondents

Results showed that 87% of the respondents had primary education, 5% had secondary education, 1% had tertiary education and 7% had no formal education (Table 7). The average was 6.8 years of schooling which implies that the majority of people in the study area had primary education. This average suggests that many farmers had modest education to adopt basic production technologies.

Table 7. Education levels of respondents

Education level	Surveyed villages									
	Mkwapa		Rweje		Nanyumbu		Nangumbu		Overall	
	Tally	%	Tally	%	Tally	%	Tally	%	Tally	%
No formal education	3	10	2	7	3	10	0	0	8	7
Primary	26	87	26	87	26	87	27	90	105	87
Secondary	1	3	2	6	1	3	2	7	6	5
Tertiary	0	0	0	0	0	0	1	3	1	1
Total	**30**	**100**	**30**	**100**	**30**	**100**	**30**	**100**	**120**	**100**

4.2.5 Occupation of respondents

The study found that, farming was the major occupation of people living in the study area. About (84%) of people interviewed were farmers (Table 8). This is attributed to the fact that majority of them had no or little formal education to qualify for white collar jobs, 5% were civil servant and farmer, these includes teachers of primary and secondary schools, village secretaries, village extension officers and rural medical officers. About 10% were farmers and businessmen/women. Those who were farmers, businessmen/women and civil servants constituted about 1% of the respondents. This implies that agriculture is the major economic activity of the people in the study area.

Table 8. Occupation of respondents

Occupation	Surveyed villages									
	Mkwapa		Rweje		Nanyumbu		Nangumbu		Overall	
	Tally	%	Tally	%	Tally	%	Tally	%	Tally	%
Farmer	25	83	23	77	25	83	25	83	101	84
Civil servant and farmer	1	3	2	7	1	3	2	7	6	5
Farmer and business	4	13	4	13	4	13	3	10	12	10
Farmer, business and civil servant	0	0	1	3	0	0	0	0	1	1
Total	**30**	**100**	**30**	**100**	**30**	**100**	**30**	**100**	**120**	**100**

4.2.6 Farming experience

Farming experience among the farmers varied from 2 to 66 years and the average was 13 years. About 6% of farmers had experience of 31 to 50 years, 60% between 2 and 10 years, 1% above 50 years and 33% had an experience of between 11 and 30 years. These findings suggest that, majority of the farmers had enough experience to carry out sesame production. However, some of the farmers (10%) reported to have abandoned sesame production to avoid losses from pest attack and take advantage of other crops with higher market value such as cashew, pigeon peas and groundnuts.

4.3 Crops grown and farm size

Crop production was the major economic activity of the people in the study area. The major crops grown were cashew, maize, rice, sorghum, cassava, groundnuts, cowpeas and pigeon peas, onions and tomatoes. Others included sweet potatoes, pumpkins pineapples, bambaranuts, banana, millet, lablab bean and buffalo bean (*Mucuna pruriens*). On average more land was allocated to cashew (3.5 ha), maize (3 ha) and sesame (2.4 ha), respectively, followed by cassava (2 ha), pigeon peas (1.8

ha) and groundnuts (1.3 ha) (Table 9). Other crops occupied about 17% of the total land. The allocation of land to crops was based on the importance of those crops to the household's income and food security. For instance cashew and maize were preferred because cashew is the major cash crop while maize is the major food crop in that study area.

Table 9. Crops grown and farm sizes (N = 120)

Crops grown	Farm size (ha[1])			
	Mean	Standard Deviation	Minimum	Maximum
Maize	3	2.3	1	15
Cassava	2	1.8	0	15
Sesame	2.4	1.6	0.5	10
Cashew	3.5	4.5	0	30
Groundnuts	1.3	2	0	15
Sorghum	1	1.3	0	10
Cow peas	0.9	2.3	0	15
Pigeon peas	1.8	2	0	15
Rice	0.3	0.6	0	5
Horticulture	0.3	1.4	0	15
Other crops	0.5	0.3	0.2	1

4.4 Overview of Agricultural Production in the Study Area

The study found that crop production was the most important economic activity in the study area followed by off-farm activities and livestock keeping (Fig. 3). On average, crop production contributed about 74% of the household's income per annum, followed by off-farm activities 16% and livestock keeping 10%. Livestock keeping had less contribution to the household's income because this activity was not

[1] ha = 10,000 m^2 of land

given priority as an economic activity as the climate in the area favoured the survival of pests and manifestation of livestock diseases. The other factors which discourage livestock development included drought, shortage of grazing areas and inadequate water for animal use.

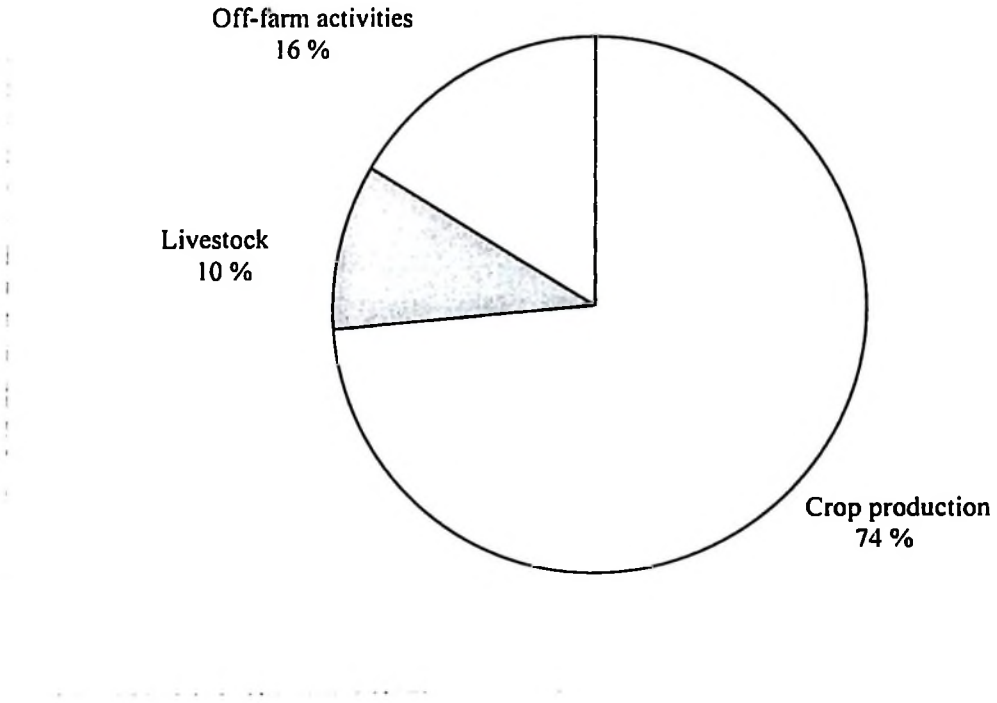

Figure 3: Relative contribution of economic activities to household annual income.

With respect to crop production results suggested that maize was the most important food crop followed by sorghum, cassava and rice, respectively. Cashew was the most important cash crop followed by sesame, pigeon peas and groundnuts.

4.5 Sesame Production and Management Practices

4.5.1 Farm sizes

Findings showed that, there was no further expansion of farm sizes by households for the period of about four years starting from 2004 to 2007 (Table 10). The average land allocated to sesame production was 2 ha^{1} per household per season in each year. However, the study found that pest infestation (27.5%), lack of capital (31.9%) and shortage of land (28.6%) were the major problems that constrained farmers to increase sesame acreage. Others problems include diseases, shortage of labour. drought and excessive rains.

Table 10. Households' sesame farm sizes for the past four years

Year	Farm size (ha)			
	Mean	Standard deviation	Minimum	Maximum
2004	2.10	1.5	1.0	10
2005	2.09	1.5	0.8	8
2006	2.09	1.5	0.5	10
2007	2.19	1.6	0.5	8

4.5.2 Land preparation

Land preparation for sesame production include cutting trees, bush clearing, burning and cultivation. Farmers perceived that sesame performed well when planted in new or virgin and burnt land. However, due to shortage of land in some places farmers are forced to use the same land for several years. About 20% of the farmers planted sesame in virgin land during 2008 season. The average cost of cutting trees and burning was 72470 Tshs per ha^{1}. In most cases cutting trees was done by family and hired labour, 46% of the respondents reported using family labour, 26% family and

hired labour, 27% only hired labour and 1% communal labour or "mkumi" in local language (Table 11).

Table 11. Type of labour used in land clearing

Type of labour	Surveyed villages									
	Mkwapa		Rweje		Nanyumbu		Nangumbu		Overall	
	Tally	%	Tally	%	Tally	%	Tally	%	Tally	%
Communal	1	4	0	0	0	0	0	0	1	1
Family	13	57	16	59	10	34	10	46	49	48
Hired	6	26	6	22	8	28	6	27	26	26
Family and hired	3	13	5	19	11	38	6	27	25	25
Total	**23**	**100**	**27**	**100**	**29**	**100**	**22**	**100**	**101**	**100**

The average cost for land cultivation was 27658.04 Tshs per ha[1]. Also land cultivation was mainly done using family labour (68%), communal labour (4%), hired labour (15%), and family labour and hired labour as reported by (13%) of the respondents (Table 12).

Table 12. Type of labour used in land cultivation

Type of labour	Surveyed villages									
	Mkwapa		Rweje		Nanyumbu		Nangumbu		Overall	
	Tally	%	Tally	%	Tally	%	Tally	%	Tally	%
Hired	2	9	5	17	5	17	5	19	17	15
Family	19	79	23	77	19	66	14	52	75	68
Family and hired	1	4	2	6	5	17	6	22	14	13
Communal	2	8	0	0	0	0	2	7	4	4
Total	**24**	**100**	**30**	**100**	**29**	**100**	**27**	**100**	**110**	**100**

4.5.3 Planting method

The study found that the majority of farmers were using broadcasting method. Only 35% of farmers were doing row planting (Table 13). Farmers preferred broadcasting to row planting because they perceived it as simple, time saving and not labour intensive. However, some of farmers acknowledged that row planting yielded more per unit area than broadcasting.

Table 13. Planting methods used by different households in the study area

Planting method	Surveyed villages									
	Mkwapa		Rweje		Nanyumbu		Nangumbu		Overall	
	Tally	%	Tally	%	Tally	%	Tally	%	Tally	%
Row planting	13	43	7	23	14	47	8	27	42	35
Broadcasting	17	57	23	77	16	53	22	73	78	65
Total	**30**	**100**	**30**	**100**	**30**	**100**	**30**	**100**	**120**	**100**

4.5.4 Type of sesame grown by farmers

The study found that 57% of the farmers were growing improved varieties and the rest were growing local varieties (Table 14). The improved varieties were obtained from Naliendele Agricultural Research Institute and others received these seeds from their neighbours. However, some of the farmers were using both improved and local varieties. Farmers retained local varieties due to their relative tolerance to pests and diseases when compared to improved varieties, inadequate supply of improved seeds and relatively high prices of improved varieties. About 58% of the farmers reported planting reserved seeds from previous season regardless of the variety of sesame and the rest purchased seeds from various sellers.

Table 14. Type of sesame grown by farmers

Type of sesame	Surveyed villages									
	Mkwapa		Rweje		Nanyumbu		Nangumbu		Overall	
	Tally	%	Tally	%	Tally	%	Tally	%	Tally	%
Local	13	43	13	43	15	50	11	37	52	43
Improved	17	57	17	57	15	50	19	63	68	57
Total	**30**	**100**	**30**	**100**	**30**	**100**	**30**	**100**	**120**	**100**

4.5.5 Weeding

On average farmers weeded sesame farms twice. About 62% of the farmers reported to have weeded their farms twice, 21% once and 17% thrice (Table 15). The frequency of weeding varied among the farmers due to various reasons. among the reasons mentioned included heavy work load during weeding period, nature or type of weeds and soil type. Results showed that, the average cost of weeding was 22675 Tshs per ha. About 11% of the farmers reported using hired labour in weeding activities. Majority of farmers were using family labour (65%) and others were using both family and hired labour (15%) and communal labour 9%.

Table 15. Weeding frequencies

Weeding	Surveyed villages									
	Mkwapa		Rweje		Nanyumbu		Nangumbu		Overall	
	Tally	%	Tally	%	Tally	%	Tally	%	Tally	%
Once	5	17	2	7	9	30	9	30	25	21
Twice	16	53	24	80	15	50	19	63	74	62
Thrice	9	30	4	13	6	20	2	7	21	17
Total	**30**	**100**	**30**	**100**	**30**	**100**	**30**	**100**	**120**	**100**

4.5.6 Pests and disease

The most important pests mentioned by farmers were flea beetle (*Alocypha bimaculata Jacob*), snails, grasshopper, ants, and rats. Flea beetle was reported to be more destructive pest compared to others. The important disease mentioned was wilting that is, drying of leaves and fruits before maturity. According to farmers. pests and diseases were identified to be the major and most important problem which contributed to reduce yield.

The study found that the majority of households were not using pesticides in their farms. Only 15% of households were using pesticides to control pests and diseases in their fields (Table 16). Majority of farmers (65%) indicated that high prices of pesticides, unavailability of pesticides and lack of knowledge, while others (35%) suggested unawareness as the major reasons for not using pesticides in their farms.

Table 16. Percentage of farmers who purchased pesticides for their farms

Whether farmers purchased pesticides	Surveyed villages									
	Mkwapa		Rweje		Nanyumbu		Nangumbu		Overall	
	Tally	%	Tally	%	Tally	%	Tally	%	Tally	%
Yes	6	20	0	0	7	23	5	17	18	15
No	24	80	30	100	23	77	25	83	102	85
Total	**30**	**100**	**30**	**100**	**30**	**100**	**30**	**100**	**120**	**100**

4.5.7 Harvesting, transportation and threshing

Harvesting and transportation of sesame were mainly done using family labour from the households (84%). Others reported to use exchange labour (5%), hired labour (6

%) and both family and hired labour (5%). The average cost of harvesting sesame was 22454 Tshs per ha^{1}. Transportation cost ranged from 500 to 1500 Tshs per bag depending on the weight and distance. Majority of farmers' preferred family labour during harvesting and transportation to other sources of labour because of theft. Farmers mentioned theft to be a common problem during harvesting. After harvesting sesame was dried and then threshed before marketing. About 87% of farmers reported to use family labour during threshing. Only 5% of the farmers used hired labour. Others used communal labour (4%) and both hired and family labour (4%).

4.6 Profitability of Sesame against the Major Competing Crops

Findings revealed that, cashew, sesame, pigeon peas and groundnuts were the competing cash crops in the households. Gross margin analysis was used to assess the profitability of sesame against the major competing crops in the study area. In this study two crop enterprises competing with sesame namely cashew and pigeon peas were studied. The choice of these crops was based on the fact that, farmers usually adjust to relative market opportunities facing different crop enterprises. The sensitivity is highest for annual crops, which can easily be substituted for each other depending on their profitability (Ellis, 1988). Theoretically the gross margin may provide insights into other important market characteristics. Results showed that cashew was the most profitable enterprise with a gross margin of Tanzanian shillings (Tshs) 46 164 per ha followed by pigeon peas with a gross margin of Tshs 33 838 and lastly sesame with a gross margin of Tshs 28 440 (Table 17). High prices of inputs particularly pesticides, low producer prices and incidence of pests and

diseases were the major reasons attributed to low profitability of sesame in the study area. According to Krugmar (2001), producer's behaviour is affected by change in producer prices and profitability, and also in terms of the response of agricultural output at the farm level.

With respect to labour requirement and returns, results revealed pigeon peas had the highest returns to labour of Tshs 940 per man-day followed by cashew with returns of Tshs 624 per man-day and lastly, sesame with returns of Tshs 459 per man-day. This implies that, sesame is more labour intensive than cashew and pigeon peas. This labour is particularly needed during land preparation, planting, thinning and harvesting. Thus sesame production was less lucrative compared to other competing crop enterprises.

Table17. Gross margins for sesame, cashew and pigeon peas based on 2007 market prices

Crop	Gross Margin (Tshs/ha)	Man-days	Return to labour (Tshs/Man-day)
Cashew	46164.06	74	623.84
Pigeon peas	33838.52	36	939.96
Sesame	28440.38	62	458.72

4.7 Factors Influencing Sesame Output

A multiple regression model was used to identify socio-economic factors influencing sesame output at farm level. The Variance influence factor (VIF) obtained from the collinearity diagnostics showed that there was no multicollinearity among the predictor variables (VIF < 10). The normal probability plot confirmed that

standardized residuals were approximately normal. The Durbin Watson statistic was 1.9 which suggested that there was no serial correlation. Results showed that the independent variables explained 68% of the total variation in sesame yield per ha^{1} in the study area. The corresponding measure for the adjusted R-Square was 0.638. The F- value was highly significant (F = 16.161) at 0.01 probability level (Table 18).

Table 18. Regression results for sesame farmers in Southeastern Tanzania

Variable	ß	SE ß	Beta	t	Sig. t
Constant	-1.546	1.961		-0.789	0.435
Ln(Princ)	0.337	0.329	0.108	1.023	0.313
Ln(frsz)	0.824	0.348	0.243	2.366	0.023**
Ln(offin)	0.073	0.095	0.083	0.768	0.447
Ln(tvc)	0.280	0.076	0.379	3.682	0.001**
D	0.720	0.257	0.345	2.805	0.008**

$R^2 = 0.68$; Adjusted $R^2 = 0.638$; Standard error = 0.632, ** = significant at 0.05

Dependent variable: Ln(sesmo); D = Dummy variable (planting method 1 = row, 0 = broadcasting).

Results revealed that, farm size allocated to sesame, planting method and TVC incurred were important factors in determining sesame output at household. The results indicated that the coefficients of the Total Variable Cost (TVC), sesame farm size cultivated and planting method were statistically significant at 0.05 probability level. The farm size allocated to sesame and the TVC incurred in production had positive effect on sesame output. This implies that when more farm size and TVC are allocated to sesame production more yield is realized. The coefficient of the dummy variable (planting method; 0 for broadcasting and 1 for row planting) was significant and showed a positive effect on sesame output. This implies that, row planting

increased sesame output per ha when compared to broadcasting method. Off-farm income and previous season income earned from sesame were not statistically significant (Table 18). Therefore sesame output per household could be increased if farmers could allocate more resources in sesame production in form of farm input and labour (e.g. through increased acreage and adoption of row planting).

4.8 Sesame Production Elasticities and their Implication

The regression coefficients are the estimated production elasticities in a natural logarithm linear model (Ngailo, 1993). Sesame yield per household showed more response to farm size with the production elasticity of 0.824 and followed by planting method with production elasticity of 0.720 and Total Variable Cost with production elasticity of 0.280. This implies that, one unit increase in farm size results into 0.824 units increase in sesame yield and also a unit increase in Total Variable Cost results into 0.28 units increase in sesame yield. Therefore Total Variable Cost. farm sizes and planting method are the important factors for increasing sesame production in Southeastern Tanzania. The sum of the production elasticities is 2.23 which is above 1.00. This implies that sesame production in the study area exhibited increasing return to scale.

4.9 Production Problems

Farmers' reported that pests (Aphids, ants, snails and rats) and diseases were the most serious constraints in their farms (Table 19). This was due to the fact that the majority of farmers (85%) were not using pesticides in their farms; this was attributed to high prices and unavailability of pesticides in rural areas. Other constraints reported were lack of capital, drought or excessive rains, lack of

knowledge on management practices, inadequate supply of improved varieties, theft during harvesting period, lack of equipments such as motorized blowers for spraying and shortage of labour.

Table 19. Production problems

Constraint (s)	1st Important (%)	2nd Important (%)	3rd Important (%)	Total (%)	Rank
Pests	75.0	10.5	5.4	90.9	1
Drought	0.8	2.6	4.3	7.7	10
High prices of pesticides and other inputs	4.2	17.5	24.7	46.4	3
Shortage of labour	0.0	0.9	7.5	8.4	9
Diseases	5.0	34.2	11.8	51.0	2
Excessive rain	0.0	0.9	4.3	5.2	12
Theft during harvesting	0.0	1.8	18.3	20.1	4
Snails and rats during maturity	0.8	2.6	2.2	5.6	11
Inadequate inputs (pesticides & improved varieties	5.0	9.6	5.4	20.0	5
Lack of equipments e.g. blowers for spraying	2.5	8.8	7.5	18.8	6
Lack of capital	1.7	7.0	2.2	10.9	8
Lack of knowledge on management practices	5.0	3.5	6.5	15.0	7
Total	**100.0**	**100.0**	**100.0**		

4.10 Sesame Marketing

4.10.1 The market structure for sesame in South eastern Tanzania

The market structure refers to the organization characteristics, which determine the relations of sellers in the market to each other, buyers to each other, sellers to buyers and sellers established in the market to other actual or potential supplies of goods

including potential participants that might enter the market (Ashimogo, 2006). In this study, market structure was assessed by looking at the Gini coefficient and the market channel. This part therefore provides the findings from this analysis.

4.10.1.1 Gini coefficient

Gini coefficient was used to determine the buyers' share distribution and market structure prevailing in the studied markets. The number of buyers and buyers share was used to determine the structure of the market. The Gini coefficient is an expression of the ratio of the area between the line of equality and the Lorenz curve (Kilima *et al.*, 2005). Gini coefficient represents an overall measure of the cumulative buyer's shares against the share of buyers in the population. The lower the value of the Gini coefficient, the more equally buyers' share are distributed. The higher the value of the Gini coefficient, the more unequal share distribution among the buyers (Sen, 1973). In Fig. 4, the diagonal line represents perfect equality, and the greater the deviations of the Lorenz curve from the diagonal line, the greater the inequality (Kilima *et al.*, 2005).

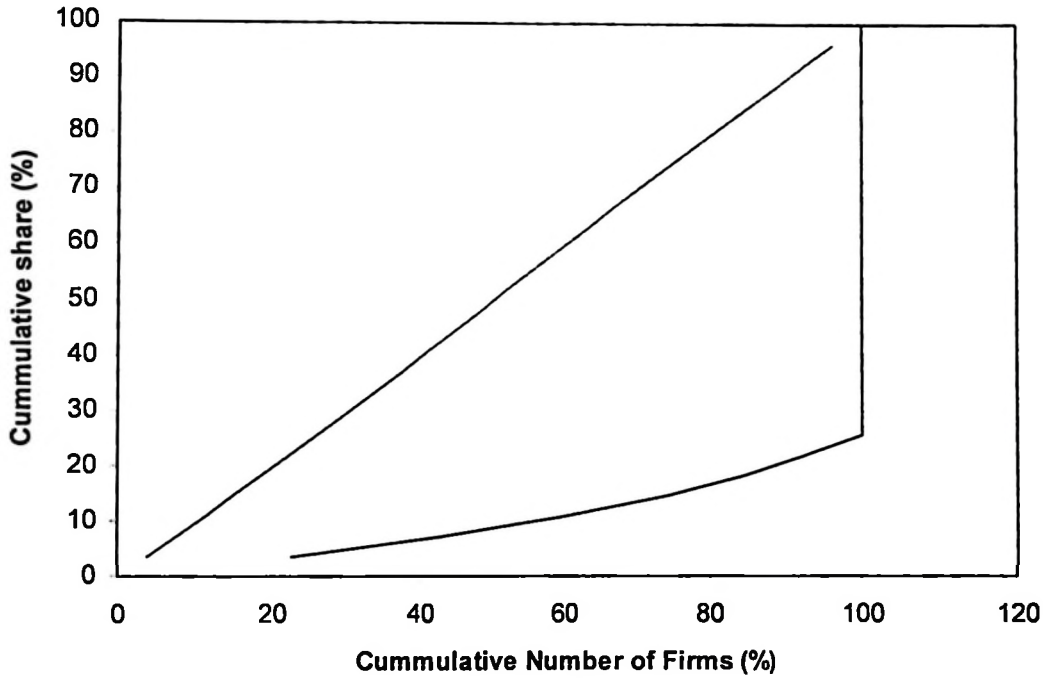

Figure 4: Graphical representation of Lorenz curve

The estimated Gini coefficient was 0.8 which implies unequal distribution of buyers' share in the study area. There were only seven large companies buying sesame in the Southeastern Tanzania with average tons ranging from 980 to 1980 tons per season. This situation might lead to collusion among buyers especially on price setting. The rest of buyers were agents, retailers and individual farmers with average ranging from 1 to 333 kilograms per season.

4.10.1.2 Market channel for sesame in South eastern Tanzania

The market channel for sesame was determined by studying the movement of product and functions performed after harvesting. It was found that farmers were selling their produce to co-operatives unions, agents, retailers and fellow farmers (Fig. 5). Co-operative union was the most important outlet of sesame marketing. The

co-operative unions bought (92%) of the produce followed by agents (7.5%), retailers and farmers (0.5%). The dominance of co-operatives is attributed to awareness of farmers about co-operatives being the common and reliable market centre for their cash crops. However, the co-operatives were given money by various companies to buy the produce on their behalf. The co-operatives were benefiting through tax charged from the buying companies (5% per kg sold). The agents also sold their product to companies depending on whether they were contracted to buy sesame for these companies. These companies exported the product to other countries such as India, China, Japan and Netherlands. Some of the companies like Mohamed Enterprises and OLAM (T) Ltd sold some of their product to internal oil processing industries like Mukwano oil processing industry located in Dar-es-salaam. The processed oil was sold within the country and some was exported to neighbouring countries.

These findings suggest that, the market channel for sesame is long enough to reduce the participant's shares, particularly at farmer's level. A long market channel normally leads to inefficient marketing system because it entails many intermediaries and transaction costs. Thus it widens the spread of margins across actors at different levels of the value chain thereby reducing producers' share of consumers' prices. Low farm get prices may discourage farmers to increase the production of sesame and other crops.

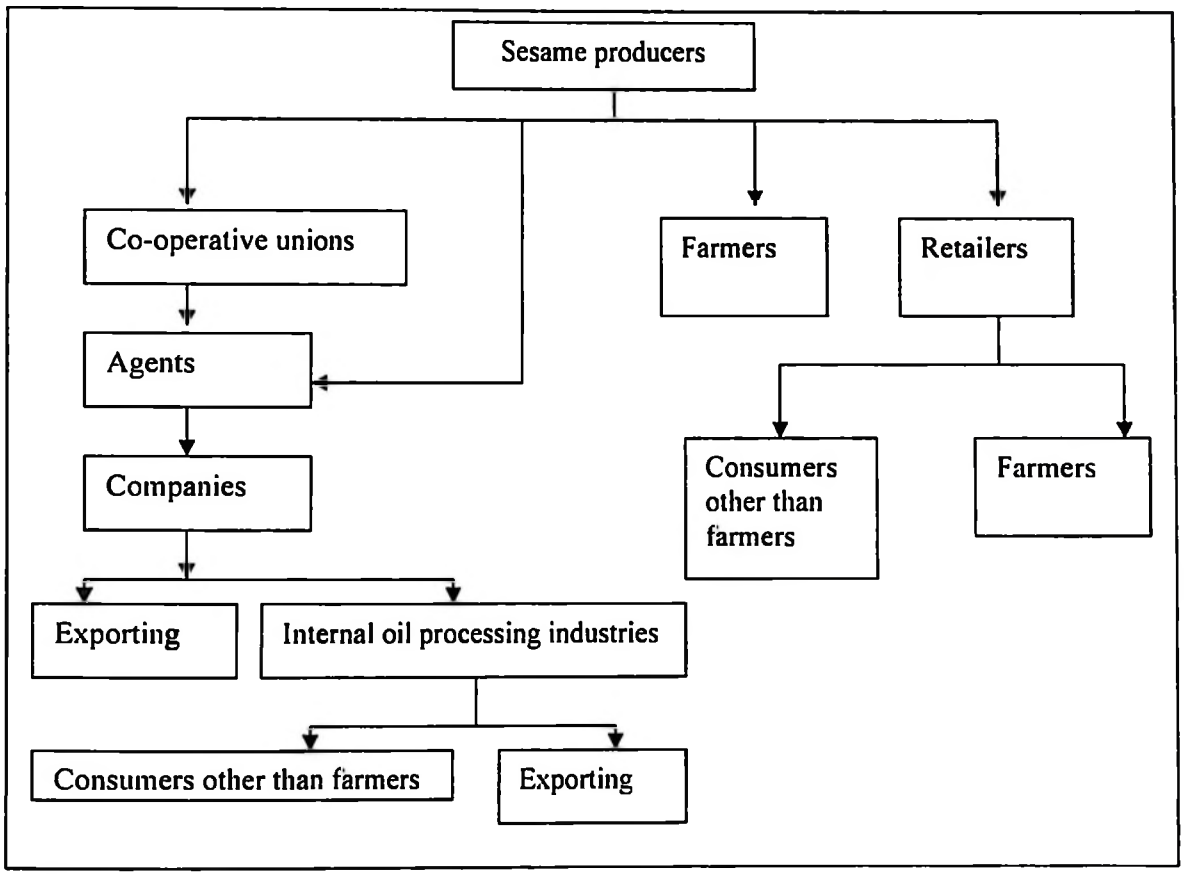

Figure 5: Market channel for sesame in Southeastern Tanzania

4.10.2 Market conduct

The assessment of market conduct involved studying market transparency (access of marketing information), barriers to market entry, pricing methods and terms of payment. Results revealed that 66% of the farmers had no information on supply and prices of sesame in other markets surrounding their district, and 95% had no market information on demand, supply and prices in other markets within the country. Only 4% of farmers were aware of market information from the World market. The major sources of market information for farmers were buyers and mass media particularly radio broadcasting. Other sources of information included neighbours and visitors.

However, buyers were well informed about prices in the world market than farmers. These findings indicate that there was poor market transparency in the sesame marketing system.

With regard to barriers to market entry, buyers reported that there were no artificial barriers to market entry. Probably, lack of capital, knowledge, experience and procedures for acquiring business license were the limiting factors to other entrepreneurs to join the business. However, all farmers reported to have sold the whole quantity of their produce in market places as intended. The mode of payment was mainly in terms of cash however but farmers claimed that prices were low. Prices were normally set by companies based on the indicative prices set by the government for each season. The nature of flow of market information among the market participants, barriers to market entry, pricing methods and terms of payment may also determine the efficiency of the marketing system (Gabagambi. 1998).

Also, it was found that, no grades were considered when buying the produce. Buyers bought mixed grades. Farmers reported that, sesame grading is difficult and also time consuming due to seed size. The important aspect considered was cleanliness of the produce; that means free from impurities such as sand, sticks and leaves.

4.10.3 Producers' share along the market channel

Shares are one of the important measures for determining performance of the marketing system. In this study the shares for farmers, co-operative unions, agents, retailers and companies were calculated. The findings revealed that, the agents'

shares of export price were high (99%) followed by co-operative unions (98%), retailers (56%), companies (38%) and farmers (36%). However, the market shares depend on the length of the market channel and the extent to which the product was stored. Also the presentation of the shares of the retail or export price could make more sense if the costs involved for each participant were well known.

4.10.4 Marketing problems faced by sesame farmers

Results revealed that low sesame prices was the most important problem in sesame marketing followed by delay or late buying and few buyers in the market (Table 20). It was reported that a delay in buying had a negative effect to farmers, in the sense that sesame lost weight as time went by due to over drying. Also the small number of buyers reduced competition to the extent that farmers were disadvantaged, especially when buyers tended to collude when setting prices.

Other problems include price fluctuations within the same season, farmers being price takers, high taxes and market fees, theft, lack of grades and premium prices which reduced farmers' income that could be earned from premium grades and also poor infrastructure particularly rural roads. Most of the roads connecting villages to district centers were rough and unsurfaced. These led to increased marketing costs in terms of time and money spent during transportation.

Table 20. Problems facing farmers during sesame marketing

Problem (s)	1st important (%)	2nd important (%)	3rd important (%)	Total (%)	Rank
Price fluctuations within the same season	11.7	18.6	13.7	44.0	3
Lack of grades	0.8	5.8	3.9	10.5	7
Low prices	54.2	15.1	17.6	86.9	1
Farmers being price takers	5.0	17.4	7.8	30.2	5
Delay/Late buying	12.5	24.4	17.6	54.5	2
Untrustful purchasing officers	3.3	4.7	2.0	10.0	8
Few buyers	2.5	7.0	25.5	35.0	4
High market fees	0.8	7.0	9.8	17.6	6
Theft	5.0	0.0	2.0	7.0	9
Total	**100.0**	**100.0**	**100.0**		

4.11 Farmers' Support to Sesame Production and Marketing

The findings revealed that only 17% of the farmers had accessed support from Naliendele Agricultural Research Institute. This support was mainly through provision of improved seeds and agronomic packages. About 30% of the farmers had access to extension services and they reported to have at least two to three visits by extension officers per season. Only 5.8% of the farmers had access to credit facilities for agricultural production. These farmers were mainly from villages of Nanyumbu (Nanyumbu district), Rweje (Nachingwea district) and Mkwapa (Masasi district). The challenge was to empower poor people in rural areas to access and exploit potentials of their resources. These findings suggest that, more support in terms of credit facilities, extension services and other services is needed if sesame productivity is to be increased in Southeastern Tanzania and the country in general.

CHAPTER FIVE

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

5.1 Overview

The overall objective of this study was to identify the major problems affecting sesame production in Southeastern Tanzania and options to minimize their effects. The specific objectives of the study were to identify socio-economic factors influencing sesame yield at farm level, to assess profitability of sesame vis-à-vis major competing crops and assessing the marketing efficiency of sesame in the study area.

5.2 Summary of Major findings

A Cobb-Douglas function was estimated to identify socio-economic factors influencing sesame production in the study area. Results showed that. farm size allocated to sesame, planting method and TVC incurred were important factors in determining sesame output at the household level. This implies that the more the farm size and TVC allocated to sesame production the more sesame is harvested. Also row planting increased sesame output per ha when compared to broadcasting method. Therefore sesame output per household could be increased if farmers could allocate more resources to sesame production, especially farm inputs and labour, increased acreage and adoption of appropriate planting method. Off-farm income and previous season income earned from sesame were not statistically significant.

Gross margin analysis was used to assess profitability of sesame vis-à-vis major competing crops in the study area. Results showed that, cashew was the most profitable enterprise with a gross margin of Tshs 46,164.06 per ha^{1} followed by

pigeon peas with a gross margin of Tshs 33,838.52 Tshs and lastly sesame with a gross margin of Tshs 28,440.38 (Table 16). High prices of inputs particularly pesticides, low producer prices and incidence of pests and diseases were the major reasons attributed to low profitability of sesame in the study area. These factors might have encouraged farmers to allocate more resources (land, pesticides, labour) to cashew and pigeon peas production.

The market efficiency of sesame in Southeastern Tanzania was analysed by looking at the market structure (Gini coefficient, market channel), market conduct (pricing strategies, flow of market information and barriers to market) and pricing efficiency (gross margins and producers' share). Results revealed that, the Gini coefficient was 0.8, which implies unequal distribution of buyers' share in the study area. The market channel for sesame was long enough to reduce the efficiency of the market particularly at farmer's level. This is supported by the fact that the longer the markets channel, the higher the transaction costs for a product that moves along this chain and in turns it affects farm get prices. Also it was found that, there was no market transparency among the market participants. About 66% of farmers had no information on supply and prices of sesame in district, and 95% of farmers had no market information on demand, supply and prices in other markets within the country. Only 4% of farmers reported to be aware of market information in the World market. All these factors indicate inefficient marketing system.

Also the findings revealed that, pests and diseases were the most important constraint in sesame production. Other constraints were high prices of pesticides, lack of

capital, unavailability of pesticides, drought or excessive rains, lack of knowledge on management practices, inadequate supply of improved varieties, theft during harvesting and lack of equipments such as motorized blowers for spraying.

Lastly, the study found that there were little institutional support to sesame production and marketing in general. Only 17% of the farmers had access to institutional support particularly in terms of credit facilities, extension services, supply of improved varieties and other inputs required for increased sesame productivity in Southeastern Tanzania.

5.3 Recommendations

Based on the findings of this study, the following recommendations are made.

Due to inadequate knowledge of farmers on sesame management practices, there is a need to improve the provision of extension services. This improvement could be achieved through increasing the number of extensions officers which has the potential to increase the access and frequency of extension services to farmers.

Increased efforts to disseminate improved sesame production technologies by agricultural stakeholders and extension officers are recommended, if increased sesame productivity is to be realized. In this dissemination endeavour the focus should be on improved varieties of sesame and pests and diseases control techniques.

The government should strengthen the Co-operative unions so that they can be able to improve the input delivery system by supplying adequate inputs, timely and cheaply to farmers.

In order to improve market efficiency for sesame, the government should encourage more buyers to buy sesame through reducing conditions for acquiring business license and reduced taxes during registrations. Increased number of buyers will lead to increased competition among the buyers and could improve market efficiency. Provision of timely and adequate market information to market participants particularly farmers is important for improving market transparency. This could be done by the government particularly district councils and other agricultural stakeholders like Tanzania Chambers of Commerce, Industries and Agriculture (TCCIA) through establishing more branches close to farmers, at least one sub-office in each ward. This will help farmers to access information within and outside their destination and hence make better decisions.

Lastly, the government particularly the district councils should ensure that, rural roads are well maintained and passable throughout the year so as to reduce marketing costs. Improved transportation will ensure that producers are connected to markets.

5.4 Limitations of the Study

During the survey some of the farmers were not able to provide accurate information. Failure to give informed responses was attributed to poor record keeping particularly on quantities harvested from their farms.

Also difficulties were experienced during literature search. Little research work has been done on sesame marketing and other economic aspects in general. Therefore it was difficult to access relevant materials for this study.

The findings of this study are mainly based on cross-sectional data. That means, the data were collected from a limited number farmers in selected villages of Southeastern Tanzania. Therefore conclusion drawn from this study can not be generalized for the whole country, because production environment differs from one location to another.

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APPENDICES

Appendix 1: Far mers' questionnaire on economic analysis of sesame production and marketing: The case study of small-scale farmers in the Southeastern Tanzania

Name of enumerator..... Date.....

Name of the respondent.....

Village..... Ward.....

District.....

A: Household characteristics

1. Age of respondent.....
2. Sex of respondent (i) Male (ii) Female
3. Education level (i) none (ii) Primary education (iii) Secondary education (iv) Diploma (v) Degree
4. Occupation (i) Civil servant and farmer (ii) Farmer (iii) Farmer and businessman (iv) Farmer, businessman and civil servant
5. Marital status (i) Married (ii) Divorced (iii) Single (iv) Widowed
6. Household size.....
7. Number of dependants.....
8. Sesame farming experience ..... (Yrs).

B. Overview of agricultural production

9. Rank the household economic activities in order of importance

(i) Crop farming [ ]

(ii) Livestock keeping [ ]

(iii) Fishing [ ]

(iv) Horticultural activities [ ]

(v) Off-farm activities [ ]

10. What are their contributions to the household's income per annum?

(i) Crop farming [.....Tshs]

(ii) Livestock keeping [.....Tshs]

(iii) Fishing [.....Tshs]

(iv) Horticultural activities [.....Tshs]

(v) Off-farm activities [.....Tshs]

11. Mention the first four (4) important food crops in order of importance.

(i).....

(ii).....

(iii).....

(iv).....

12. Mention the first four (4) important cash crops in order of importance.

(i).....

(ii).....

(iii).....

(iv).....

C. Sesame production and management practices

13. Land resource allocation to crops

Type of crop	**Land area allocated (hectare)**
i. Maize	
ii. Cassava	
iii. Sesame	
iv. Cashew	
v. Groundnuts	
vi. Sorghum	
vii. Cow peas	
viii. Pigeon peas	
ix. Rice	
x. Horticultural crops (tomatoes, onions	
xi. Other crops (specify)	

14. Land allocated to sesame for the past three years.

Years	2004	2005	2006	2007	Increasing, Decreasing, Constant.	Reasons for increase, decrease or constant.
Hectare						

15. What kind of planting method are you used to? (i) row planting (ii) broadcasting

16. What variety of sesame do you grow? (i) Local variety(s) (ii) improved varieties

17. How many times do you always weed your farm? (i) Once (ii) twice (iii) Thrice

18. Do you apply pesticides to your farm? Yes/ No

19. If yes, provide the following information

Name of pesticide	**Number of round applied**	**Amount applied**	**Cost used**	**Size of farm applied to.**
1..... 2..... 3.....				

20. What are the major problems in sesame production? Mention in order of Importance i.....

ii.....

iii.....

iv.....

21. What are your comments, suggestion, opinions for improving sesame production?

.....

.....

D. Gross margin analysis for sesame

22. What is the amount of income earned from selling sesame for the past two years?

Year	Amount harvested (kg)	Hectare cultivated	Average Price per kg	Income earned
2005				
2006				
2007				

23. What are the costs incurred in sesame production for the past three years

Activity	Cost/price per unit			Cost per Hectare			Remarks e.g. Type of labour used: family: exchange: Hired.
	2005	2006	2007	2005	2006	2007	
1. Land preparation							
a. Cutting trees (cost).....							
Number of labour.....							
No. of days used.....							
b. Removing tree roots &							

burning(cost).....							
Number of labour.....							
No. of days used.....							
c. Cultivation (cost).....							
Number of labour.....							
No. of days used.....							
2. Seed amount used per acre							Purchased.
.....(kg)							reserved
3. Planting (cost).....							
Number of labour.....							
No. of days.....							
4. Pesticides application							How many
a. Amount used (.....ltrs)							
b. Number of labour.....							
c. No. of days.....							
5. Weeding (cost).....							
Number of labour.....							
No. of days.....							
6. Thinning (cost).....							
Number of labour.....							
No. of days.....							
7. Fertilizer application							
a. Amount of fert. Used.....							
b. Number of Labour							
involved.....							
c. No. of days.....							
c. No. of days.....							
8.Harvesting (cost)....							
Number of labour.....							
No. of days.....							
9. Transportation (back home) Number							

of labour ..... No. of days.....							
10.Thrashing (cost)..... Number of labour ..... No. of days.....							
11.Transportation to the market (cost)..... Number of labour ..... No. of days.....							
12. Market fees.....							
13. Taxes							
14. Others (specify).....							

E. Sesame marketing

24. Where do you sell your produce? (i) In village (ii) Ward (ii) Division (iii) District

(iv) Region centers

25. To whom do you sell your produce? (i) Co-operatives (ii) Buying agents

(iii) Wholesalers (iv) Retailers (v) Farmers (How much specify).....

26. How do you get paid for your produce? (i) Cash (ii) In kind (iii) Credits

(iv) Others (specify)

27. Is there any qualities considered by buyers when buying the produce? Yes/No

28. If yes mention them.....

29. If no why?.....

30. Do you grade your product? Yes/No

31. If No why?.....

32. What is the distance to the selling place..... (km).

33. Is the market enough to sell the whole of your produce? Yes/No

34. If No why?.....

35. Who determine price of sesame? (i) Farmer (ii) Buyer (iii) Government

36. Why? Give reasons.....

.....

37. Do you have access to market information such as;

(i) Supply and prices in other markets? Yes/No

(ii) Demand in other places within the country? Yes/No

(iii) Demand and prices in the World market? Yes/No

38. If yes, how do you get market information?

(i) Through media (newspapers, radio, Tv) (ii) From buyers (iii) From government

(iv) From neighbours (v) Visit to other market centers

39. What are the major problems in sesame marketing? Mention in order of Importance i.....

ii.....

iii.....

iv.....

40. What are your comments, suggestion, opinions for improving sesame marketing?

.....

.....

F. Institutional support to sesame production

41. Do you have any institutional support to sesame production and marketing?

Yes/No

42. If yes, what are they? .....

43. Do you have access to extension services? (i) Yes/ No

44. If yes how is the frequency? (i) None (ii) once per season (iii) Twice per season

(iv) Thrice per season (iv) More than thrice per season

45. Do you have access to credits facilities? Yes/No

46. If yes from which organization? (i) CRDB (ii) NGO's (iii) CBO's (iv) Government

(v) Private companies (vi) Other financial institution (specify).

G. Gross margin analysis for the 1st competing crop.....(specify)

47. What is the amount of income earned from selling the crop for the past three years?

Year	**Amount harvested (kg)**	**Hectare cultivated**	**Average Price per kg**	**Income earned**
2005				
2006				
2007				

48. What are the costs incurred in ..... production for the past three years

Activity	Cost/price per unit			Cost per hectare			Remarks e.g. Type of labour used: family; exchange; Hired.
	2005	2006	2007	2005	2006	2007	
1. Land preparation							
a. Cutting trees (cost).....							
Number of labour.....							
No. of days used.....							
b. Removing tree roots & burning(cost).....							
Number of labour.....							
No. of days used.....							
c. Cultivation (cost).....							
Number of labour.....							
No. of days used.....							
2. Seed amount used per acre .....(kg)							
3. Planting (cost).....							
Number of labour.....							
No. of days.....							
4. Pesticides application							How many
a. Amount used (.....ltrs)							
b. Number of labour.....							
c. No. of days.....							
5. Weeding (cost).....							

Number of labour..... No. of days.....							
6. Thinning (cost)..... Number of labour..... No. of days.....							
7. Fertilizer application a. Amount of fert. Used..... b. Number of Labour involved..... c. No. of days..... c. No. of days.....							
8.Harvesting (cost).... Number of labour..... No. of days.....							
9. Transportation (back home) Number of labour ..... No. of days.....							
10.Thrashing (cost)..... Number of labour ..... No. of days.....							
11.Transportation to the market (cost)..... Number of labour ..... No. of days.....							
12. Market fees.....							
13. Taxes							
14. Others (specify).....							

H. Gross margin analysis for the 2nd competing crop.....(specify)

49. What is the amount of income earned from selling the crop for the past three years?

Year	Amount harvested (kg)	Hectare cultivated	Average Price per kg	Income earned
2005				
2006				
2007				

50. What are the costs incurred in ..... production for the past three years

Activity	Cost/price per unit			Cost per hectare			Remarks e.g. Type of labour used: family; exchange; Hired.
	2005	2006	2007	2005	2006	2007	
1. Land preparation							
a. Cutting trees (cost).....							
Number of labour.....							
No. of days used.....							
b. Removing tree roots &							

burning(cost)…….. Number of labour…….. No. of days used…….. c. Cultivation (cost)…… Number of labour…… No. of days used……							
2. Seed amount used per acre ……..(kg)							Purchased, reserved
3. Planting (cost)…… Number of labour…….. No. of days……..							
4. Pesticides application a. Amount used (……ltrs) b. Number of labour…… c. No. of days……..							How many
5. Weeding (cost)…… Number of labour…….. No. of days……..							
6. Thinning (cost)…… Number of labour…… No. of days……..							
7. Fertilizer application a. Amount of fert. Used…….							

b. Number of Labour involved..... c. No. of days..... c. No. of days.....							
8.Harvesting (cost).... Number of labour..... No. of days.....							
9. Transportation (back home) Number of labour ..... No. of days.....							
10.Thrashing (cost)..... Number of labour ..... No. of days.....							
11.Transportation to the market (cost)..... Number of labour ..... No. of days.....							
12. Market fees.....							
13. Taxes							
14. Others (specify).....							

THANK YOU VERY MUCH FOR YOUR CO-OPERATION

Appendix 2: A questionnaire for buyers, processors and retailers.

Name of enumerator..... Date.....

Village.....Ward..... Division.....

District.....Region.....

1. Name of the Buyer/Processor/Retailer.....
2. Do you buy sesame? Yes/No
3. How long have you been in this business?..... (yrs).
4. Which other crops do you buy?.....
5. Where are you used to buy sesame? (i) from villages (ii) Ward (iii) Division (iv) District centers (v) Region centers
6. From whom do you buy the produce? (i) Farmers (ii) Buying agents (iii) Wholesalers (iv) Retailers
7. How much did you buy during the following seasons?

Year	2005	2006	2007
Amount bought			

8. What qualities do you consider when buying sesame? (Specify).....

.....

9. What was the buying price of sesame per kg during the following seasons?

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Price/kg										

10. How well do you know about sesame prices prevailing at the markets? (i) Very well (ii) Not very well (iii) No idea
11. How do you get information on market prices? (i) Direct visit to the market (ii) cross check with other buyers (iii) Through media (iv) Others (specify)
12. Do you make any arrangement(s) on buying or selling prices with other buyers or sellers? Yes/No

13. Give reasons for your answer.....
14. Who determine prices when buying sesame?.....
15. Who determine prices when selling sesame?.....
16. Do you have any co-operation or association? Yes/No Explain.....
17. Where do you sell your product?..... (Specify location).
18. To whom do you sell your product? (i) Farmer (ii) Wholesalers (iii)
19. Exporting companies (iv) Abroad (v) Retailers
20. What qualities do you consider when selling your product?

    (Specify).....

    .....
21. What was the selling price of sesame per kg during the following seasons?

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Price/kg										

22. Do you have any barriers to market entry? Yes/No
23. Now, what are the barriers to market entry? (i) Capital (ii) Institutional (iii) Knowledge (iv) Experience

24. What problems have you experienced in sesame business?.....

.....

25. What are your suggestions, opinions or comments for improving sesame sub-sector development?.....

.....

THANK YOU FOR YOUR CO-OPERATION

Appendix 3: Gross margin analysis for sesame

Item	**Tshs**
Yield per ha (Average kg)	93.26
Average price per kg (Tshs)	613
Gross return per ha	**57,168.38**

(i) Labour requirement (Man-days)

Operation	*Man-days*
Land preparation	22
Planting	6
Weeding	15
Thinning	6
Harvesting	8
Thrashing & packing	5
Total	**62**

(ii) Physical input costs

Item	*Unit*	*Qty*	*Cost (Tshs)*	*Total (Tshs)*
Seed	kg	2	1,364	2,728
Karate (liquid)	ltr	1	20,000	20,000
Spraying	ha	1	5,000	5,000
Bags	bag	2	500	1,000
Total				**28,728**

Gross margin	28,440.38
Return to labour (Tshs/Man-day)	458.72

Appendix 4: Gross margin analysis for cashew

Item				**Tshs**
Yield per ha (Average kg)				216.47
Average price per kg (Tshs)				598
Gross return per ha				**129,449.06**
(i) Labour requirement (Man-days)				
Operation				*Man-days*
Weeding				7
Pruning				11
Harvesting & packing				56
Total				**74**
(ii) Physical input costs				
Item	*Unit*	*Qty*	*Cost (Tshs)*	*Total (Tshs)*
Sulphur (powder)	bag	2.5	22,514	56,285
Spraying	tree	60	50	3,000
Karate (liquid)	ltr	1	20,000	20,000
Spraying	tree	60	50	3,000
Bags	bag	2	500	1,000
Total				**83,285**
Gross margin				46164.06
Return to labour (Tshs/Man-day)				623.84

Note: 1 bag of Sulphur = 25 kg, 1 ha = 60 cashew trees.

Appendix 5: Gross margin analysis for pigeon peas

Item				**Tshs**
Yield per ha (Average kg)				104.12
Average price per kg (Tshs)				346
Gross return per ha				**36,025.52**
(i) Labour requirement (Man-days)				
Operation				*Man-days*
Land preparation				9
Planting				3
Weeding				11
Thinning				3
Harvesting				8
Thrashing & packing				2
Total				**36**
(ii) Physical input costs				
Item	*Unit*	*Qty*	*Cost (Tshs)*	*Total (Tshs)*
Seed	kg	3	529	1,587
Bags	bag	2	300	600
Total				**2,187**
Gross margin				33838.52
Return to labour (Tshs/Man-day)				939.96