

**ANALYSIS OF FINGER MILLET PROFITABILITY AND MARKETING  
CHAIN IN CENTRAL ZONE OF TANZANIA: A CASE OF SINGIDA  
RURAL DISTRICT**

**BY**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN  
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## ABSTRACT

The need to achieve a profitable crop production as well as systematic marketing chains in the study area is a precondition for the development of the agricultural sector. It is against this background that the study sought to analyse the profitability and marketing chains of finger millet in Singida Rural District and Singida town, as well as Dodoma, and Dar es salaam markets. The specific objectives of the study were to provide an overview about the finger millet value chain from production to consumption, to identify marketing channels in the study area, to measure profit margins at different stages along finger millet market channels, to examine the factors influencing households finger millet supply to the markets and to identify major constraints affecting finger millet supply to market. The study used a sample size of 120 respondents. The study undertook multistage, purposive and random sampling approaches. Primary and secondary data were collected. The collected data were analysed using the Statistical Package for Social Sciences (SPSS). Binary logistic and multiple linear regression models, gross margin and t-test techniques were applied to analyse data for each objective and hypotheses respectively. The major findings of the study showed clearly that wholesaling (76.526Tshs) and processing (42 500Tshs) are the two effective ways of generating profits based on selling prices. Selling price ( $P<0.01$ ), land size ( $P<0.01$ ) and gender of the respondents ( $P<0.01$ ) were among the major social-economic factors influencing the profit levels of farmers in the study area. Weather changes, poor storage facilities and limited access to market information were also the significant factors constraining finger millet production and the profitability. It was concluded that wholesaling and processing activities are the two profitable levels along finger millet market

channels. It was recommended that there is a need to improve crop husbandry practices in order to meet market quality standards for better market prices. There is also need to strengthen forward, horizontal and backward coordination along the finger millet value chain in order to reduce problems associated with market inefficiencies.

**DECLARATION**

I, **Alfred John Rukelegwa**, do hereby declare to Senate of Sokoine University of Agriculture, that this dissertation is my own original work and that it has neither been submitted nor being concurrently submitted for degree award in any other institution.

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**DEDICATION**

I dedicate this work to my father John Rukelegwa living in memory. I also dedicate it to my beloved Mother Mary Rukelegwa, who had played a major role in nursing and educating me, GLORY BE TO GOD.

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**LIST OF ABBREVIATIONS**

DML	-	District Main Library
FAO	-	Food and Agriculture Organization
GDP	-	Gross Domestic Product
GMA	-	Gross Margin Analysis
HOPE	-	Harnessing Opportunity for Poverty Eradication
ICRISAT	-	International Crop Research Institute for Semi-Arid Tropical
MAFS	-	Ministry of Agriculture and Food Security
NGOs	-	Non-Governmental Organizations
SADC	-	Southern Africa Developing Countries
SNAL	-	Sokoine National Agricultural Library
SSA	-	Sub Saharan Africa
SPSS	-	Statistical Package for Social Sciences
SUA	-	Sokoine University of Agriculture
TSHS	-	Tanzanian Shillings
URT	-	The united Republic of Tanzania
WTO		World Trade Organization

## **CHAPTER ONE**

### **1.0 INTRODUCTION**

This chapter is split into six sections namely; the background information of the study in section one, problem statement and justification in section two, general and specific objectives in section three, research hypotheses in section four, organisation of the dissertation is in section five while limitation of the study is in section six.

### **1.1 Background of the Study**

Agriculture plays an important role in the development of the Tanzanian economy as it has huge impact on the overall economic growth, households' income generation and food security (Morris *et al.*, 2005). In the agricultural sector, crop production (food and cash crops) account for about 75% of real agricultural GDP. Food crops take up two third (65.1%) of real agricultural GDP. According to Juana and Mabugu (2005), the sector offers income and employment to about 70% of the population, it produces 60% of the raw materials required by the industrial sector and it is the largest export earning sector contributing an average of 45% of the total exports annually.

Many areas in Tanzania are dry lands. Crop production in dry lands faces specific constraints and finger millet is well adapted to dry lands and can improve the livelihood of farmers in these areas. Finger millet has been noted as staple food grain in many semi-arid areas of Tanzania because of its good adaptability to difficult environments and yield record (Dicko *et al.*, 2005). Finger millet is generally described as the most drought-tolerant cereal grain crop that requires little input

during growth. With increasing world populations and decreasing water supplies finger millet becomes more important for future human use (Taylor *et al.*, 2006). Finger millet (*Eleusine coracana* (L.) Gaertn.) is a cereal crop that belongs to the family “Gramineae” and genus “Chlorideae”. It has excellent storability rate which is a ideal for food security and management. Finger millet provides carbohydrates and is an excellent dietary source of *methionine* (Holt, 2000).

In Africa, finger millet is grown in the sub Saharan zone especially in the semi-arid areas. The semi-arid areas are characterized by unpredictable weather, limited and erratic rainfall and poor soil nutrient (Maqbool *et al.*, 2001; Sharma and Ortiz, 2000). There is an urgent need to focus on improving finger millet to meet the needs of smallholder farmers and poor consumers in the developing countries of the semi-arid tropics. This can be done through introducing new finger millet varieties that are adaptable to the environment (Sharma *et al.*, 2002). According to FAO (2008), large parts of SADC are semi-arid, with erratic rainfall and poor soil nutrients and finger millet was found to be an important crop in these driest regions where rural farm households have limited production capacity and lowest incomes. Finger millet being drought tolerant has a strong adaptive advantage and lower risk of failure than other cereals in such environments.

### **1.3 Problem Statement and Justification**

Farmers can benefit from finger millet production in two ways. They can use it for home consumption and also as a cash crop. In general, commercialization of agricultural produce is the main driving force for economic development of rural

areas. While an increasing proportion of the population living in urban centers and rising level of income require more organized channels for distributing agricultural products, the performance of agricultural markets (both input and output markets) in Tanzania is weak. This has been recognized in various studies as a major obstacle to growth in the agricultural sector and the overall economy (Ellis, 1982; Temu, 1984).

Elina (2005) also explained that in Tanzania the performance of agricultural marketing systems is constrained by many factors such as insufficient physical infrastructure, and lack of knowledge in market orientation and business skills. This leads to difficulties in managing and obtaining loans, and a weak institutional framework that is unable to support the formation of strong traders and producer associations and other representative bodies to enhance capacity building and to bargain for fairer terms of trade. The lack of market information and the weak legal framework leads to difficulties in negotiating trade agreements. Moreover, poor quality of agricultural produce and lack of market facilities contribute to the poor performance of the agricultural marketing sector in Tanzania.

The flow of agricultural produce from the producer to the consumer involves a long chain of intermediaries who without creating additional value merely keep on stretching the chain. Dawit (2005) further pointed out the involvement of these superfluous intermediaries has constrained the development of the sector and has deprived the farmers of equitable returns.

Improving marketing facilities for agricultural crops in general and for the finger millet sub-sector in particular enables farmers to plan their production more accurately and in line with market demand, to sell their harvests at the most profitable times, to decide which markets to send their produce to and negotiate on a more even footing with traders. Besides, proper finger millet marketing systems contribute to increased production and market efficiency (AMP, 2005).

Despite the significance of finger millet in the livelihood of many farmers and being an income generating option for many people in the study area, the crop has not been given much attention. A few studies which have studied finger millet greatly focused on the production aspects. Adequate information on the whole value chain and profitability of finger millet to better understand the specific constraints is still missing. It is against this background that the study was undertaken to fill in these gaps.

## **1.4 Objectives of the Study**

### **1.4.1 General objective**

The overall objective of the study was to analyse the value chain of finger millet, with a specific focus on the marketing aspects in the study area.

### **1.4.2 Specific objectives**

The specific objectives of the study were;

- (i) To provide an overview about the the finger millet value chain from production to consumption,

- (ii) To identify marketing channels in the study area,
- (iii) To measure profit margins at different stages along finger millet market channels,
- (iv) To examine the factors influencing households finger millet supply to the markets,
- (v) To identify major constraints affecting finger millet supply to market.

### **1.5 Research Hypotheses**

- (i) There is a significant difference in the profit margin between actors along the finger millet value chain in the study area.
- (ii) Social economic factors such as, years of schooling, land size, household size, access to market information, gender and selling price have a significant influence on farmers' the profit margin in the study area.

### **1.6 Organization of the Dissertation**

This dissertation is chronologically organized in five chapters. Chapter one presents the introduction, whereas chapter two covers the literature review of the study correlated with profitability and marketing chain of finger millet aspects whereas chapter three entails the methods and approaches used in the study chapter four presents major the results and discussion of the study. Chapter five presents summary, conclusions and recommendations of the findings of the study.

### **1.7 Limitations of the Study**

The researcher experienced challenges in communication since the study area is composed of different ethnic groups speaking different languages and yet the researcher was well conversant with a few of them. Although Kiswahili is used as a national language, most individuals commonly emphasized points under discussion in their mother tongue. This necessitated the researcher to look for translators which in turn resulted into great costs in data collection as well as data analysis. The reason of the researcher using Kiswahili language in the study area was because it is the only language that simplifies verbal data collected compared to local languages.

Despite the efforts made by introducing the researcher to the concerned people in the field still some people were not fully convinced. The researcher perceived it as a serious challenge in data collection. The researcher tried to overcome this problem through bureaucratic introduction to local leaders first justifying with an empirical evidence of introductory letter from the university and later the researcher was being introduced to the respondents by local leaders. This removed biasness among the respondents in the field.

## CHAPTER TWO

### 3.0 LITERATURE REVIEW

This chapter presents the literature review relevant to the subject matter of the theme under study. The chapter commences with definitions and concepts. The subsequent sections present a detailed review of theories and approaches of the study.

#### 3.1 The Concept of Profitability

Profitability is determined through gross margin analysis technique. Gross margin is the difference between the gross income and total variable costs of a crop grown. Variable costs include those associated with operations and marketing. Gross margins do not include overhead costs such as rates, electricity, insurance, living costs and interest that must be met regardless of whether or not a crop is grown. For this reason, gross margins are not a measure of the profit of a particular enterprise. When estimating whole farm profit it is necessary to consider these overhead costs in addition to enterprise gross margins (Gabagambi, 1998)

According to Dilawar *et al.* (2005), profitability is defined as the difference between the final price being paid by the customer and the total costs incurred with the production and delivery of the product/service normally expressed in percentage or monetary terms. Within the whole value system, there is only a certain value of profit margin available. According to Porter (2001), margin spreads across the actors that is suppliers, producers, distributors, customers, along the value chain system depend on the structure of the value chain or system, each member of the system will use its market position and negotiating power to get a higher proportion of this margin.

Economic theory highlight that profit level is an indication of productive and locative efficiencies of the business firm and that returns are calculated based on estimated or actual costs and selling price per unit of sale and volume of product sold (Scott, 1995).

Profit margin has been used by several studies in Tanzania. For example by Mbiha (2008) in his study to analyze the dairy value chain in Dar Es Salaam milk shed in order to provide information for improving linkages between actors and efficiency in the value chain. Others are Paschal (2006) who analyzed the supply chain for green beans in Kilimanjaro and Arusha Tanzania, Mgaya (2008) who conducted a value chain study on rice marketing in Kilosa district aimed to investigate the profitability and efficiency of rice marketing and Philip (2001) who studied the economics of the medium scale sugarcane producers in Morogoro region.

### **3.1.1 Factors influencing profitability**

The measurement of profitability remains an important area of research both in developing and developed countries. Analysis goes a long way to determine the profitability of an enterprise. Moreover agricultural growth is linked to profit (Abdulai and Huffman, 2000). The relationship between profit and socio economic characteristics has not been well studied in Tanzania. An understanding of this relationship could provide policy makers information to design programmes that can contribute to measures needed for improving profitability levels along the finger millet value chain. In all farming activities, human physical energy is required. The level of active involvement by individuals in their farms to a large extent determines

their production output levels. The age of the farmer is an important factor in agriculture because it may affect the level of efficiency at the farm level (Nganga *et al.*, 2010). Influencing profit efficiency also is the farmer education level. This is because efficiency in agriculture production, that is, in terms of quality and quantity, speed of new technology adoption and rationalizing of input, may boost the output hence increasing the volume of sales as well as profit margin. Education represents human capital and it is hypothesized to have a positive impact on efficiency (Lockheed *et al.*, 1980).

Nganga *et al.*, (2010) in their study found that the level of education measured in year's age of farmer, experience measured in years and farm size have a significant effect on the profit inefficiency. The negative and significant coefficient of education variable indicates that higher education reduces profit inefficiency. A negative and significant coefficient of farm size and experience was also found and indicates that farmers who have more experience and farm size tend to exhibit higher levels of profit efficiency. However, completely in line with a priori expectation, a positive and statistically significant relationship was found between age of the farmer and profit inefficiency.

Education matters to agricultural productivity and profitability (Wilson *et al.*, 1998). Rahman (2002) showed that farmers who have more years in the enterprise achieved higher levels of profit. Access to extension services is a conduit for the diffusion of new technologies to the farmer by providing training; hence, it is expected to reduce inefficiency.

### **3.1.2 The value chain concept**

Conditions for international trade have changed tremendously over the past decade and are still changing as reflected in agreements on trade as signed in the WTO or between individual countries. As the market expands it becomes profitable to employ workers and to allow each of them to specialize (Kaplinski and Morris, 2001). Along with the world trade, approaches about how to analyse the changes and new theories on what the determining factors for the development of international, regional and national trade and production sharing are coming up. In this context the rise of different approaches of analyzing distribution systems to enhance markets in developing countries can be observed (Gereffi *et al.*, 2003).

The value chain approach has been a very useful analytical tool for taking a more objective look at the organizations of markets. It allows for examining the consequence of empowering one group (the producer) and identifying how to link them to other market players (Schipmann, 2006). It enables analysis of the implication of who does what, at which stage in the chain, and what this means for risk, capital needed and margins. It can help to identify with whom to form partnership in the chain (Ingram, 2009). The approach offers a rationale and a practical approach for identifying constraints to industry growth and competitiveness (FIAS, 2007). In order to increase value, the value chain needs to meet consumer demand. To meet consumer demand is not enough; the actors in the value chain need to meet consumer demand better than actors outside of the value chain: the value chain actors have to be competitive (Goletti, 2004).

The territorial structure is understood as the geographic concentration or dispersion of production and marketing (Stamm, 2004) and with that gives an overview of the location of the single stages of a value chain. In national value chains all stages take place in the same country but in international chain not only the single stages, but also even the activities within one stage can be widespread around the world (Schipmann, 2006). To know the territorial structure is important for assessing the benefits for individual countries integrated in the chain. Besides that it allows an analysis about why some countries are integrated and others are not.

The economic structure is closely related to the technical structure. It can be defined as the “tangible (raw materials, intermediate goods) and intangible (knowledge) flows linked together in the process of value creation” (Stamm, 2004; Schipmann, 2006). The economic structure gives mainly an overview about four aspects i.e the amount and quality of a good that is needed from one stage of the chain to fulfill the requirements of the following stage, the value that is created on each stage, the profit distribution in a chain and the information flow between the single stages of a chain.

The value chain approach considers trade relations as being part of a series of networks of producers, processors, retailers, exporters, and service providers, whereby knowledge and relationships are developed to gain access to markets and suppliers (Golletti, 2005). The governance structure is thus the authority and power relationships which determine how financial materials and human resources are distributed within the trade relations of a chain (Gereffi, 1994). Given that definition the governance structure coordinates a value chain and concretely determines what is

to be produced, how, when, how much and often also to which price, (Roduner, 2004).

### **3.1.3 Value chain approach and its use in Tanzania.**

A value chain is a tool to analyse a subsector. Within the value chain analysis, the research can set the focus on different aspects. A study by Kabuje (2008) on analysis of the value chain for hides and skins in Dodoma and Arusha regions of Tanzania used the value chain approach to examine how the chain is organized, coordinated and functioned including linkages between the key actors in the value chain. The value chain analysis study of rice marketing in Kilosa district, Morogoro region also applied the value chain approach to examine the organizational structures and interaction of rice traders along the value chain (Mgaya, 2008). Value chain approach thus considers trade relations as being part of a series of networks of producers, processors, retailers, exporters, and service providers, whereby knowledge and relationships are developed to gain access to markets and suppliers (Golleti, 2005). There is no “correct” way to conduct a value chain analysis; rather, the approach taken fundamentally rests upon the research question that is being answered (Kaplinsky and Morris, 2001).

The value chain approach has been a very useful analytical tool for taking a more objective look at an organizations position in a market. It allows for examining the consequence of empowering one group (the producer) and identifying how to link them to importers and consumers (Schipmann, 2006). It enables analysis of the implication of who does what, at which stage in the chain, and what this means for

risk, capital needed and margins. It can help to identify with whom to form partnership in the chain (Ingram, 2009). The approach offers a rationale and a practical approach for using value chain analysis as an empirical tool in identifying constraints to industry growth and competitiveness (FIAS, 2007). In order to increase value, the value chain needs to meet consumer demand. To meet consumer demand is not enough; the actors in the value chain need to meet consumer demand better than actors outside of the value chain: the value chain actors have to be competitive (Goletti, 2004).

Coordination implies a set of two or more actors (example, network) who perform tasks (example, collaborative value creation) in order to achieve goals. Coordination of the value chain is the act of making all stakeholders involved in the value chain in a well organized way. Coordination means managing the dependencies between activities and is therefore a core aspect of inter-organizational value creation. The variety of inter-organizational business models leads to a broad variety of coordination tasks (Riemer *et al.*, 2004).

Linkages among commercial stakeholders (farmers, traders and processors) may exist, but are characterized by lack of trust, are weak, and do not result in effective actions to increase value added, improve competitiveness, and maintain competitiveness through continuous innovation (Schipmann, 2006). In most developing countries, market linkages between farmers and retailers or processors are extensive and complex. For a particular product to reach to consumers it usually has to pass through many different hands. On the way it is packed, unpacked, graded,

sorted, handled and transported many times. This has significant consequences not only for the quality of the product when it reaches the consumer, but also for the efficient organization of the agricultural marketing system (Goletti, 2005).

### **3.1.4 Coordination of actors along the value chain**

Coordination implies a set of two or more actors (example, network) who perform tasks (example, collaborative value creation) in order to achieve goals. Coordination of the value chain is the act of making all stakeholders involved in the value chain in a well organized way. Coordination means managing the dependencies between activities and is therefore a core aspect of inter-organizational value creation. The variety of inter-organizational business models leads to a broad variety of coordination tasks (Riemer *et al.*, 2004).

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### **3.2 The Theory of Market Structures and Marketing Channels**

Market refers to a situation where by producers and consumers exchange the commodity at mutually agreed prices (Eskola, 2005). Market can also be a place where producers and consumers emerge to sell and buy commodities. Market participants may also engage in moving, storing, grading and processing the commodity in expectation of improving its value to consumers.

Scarborough and Kydd (1992) defined market structure as the organizational characteristics of a market that influence the nature of competition and pricing mechanism within the market itself. Markets may be defined based on their structural characteristics. They may be perfectly competitive, monopolistic or oligopolistic (Pomeroy and Trinidad, 1995). The good organization of market structure is measured through the degree of concentration, market transparency, free barriers to market entry and product differentiation (Schmidt, 1979).

Marketing channels are defined as the series of steps through which a commodity passes from one point to another (Timmer *et al.*, 1983). They further explained that a marketing channel is defined as a set of independent organizations involved in the process of making a product or service available for consumption. Commonly, marketing channel analysis reveals connection between price and other marketing services performed by actors. Market participants (producers, wholesalers, retailers, consumers and other actors exist in channel arrangements to perform marketing functions that contribute to product flow (Eskola, 2005).

## **CHAPTER THREE**

### **3.0 RESEARCH METHODOLOGY**

This chapter presents a description of the study area and justification of its selection, research design, sample size, sampling procedure, data sources and types, data collection methods and tools, and data analysis and processing techniques.

#### **3.1 Description of the Study Area**

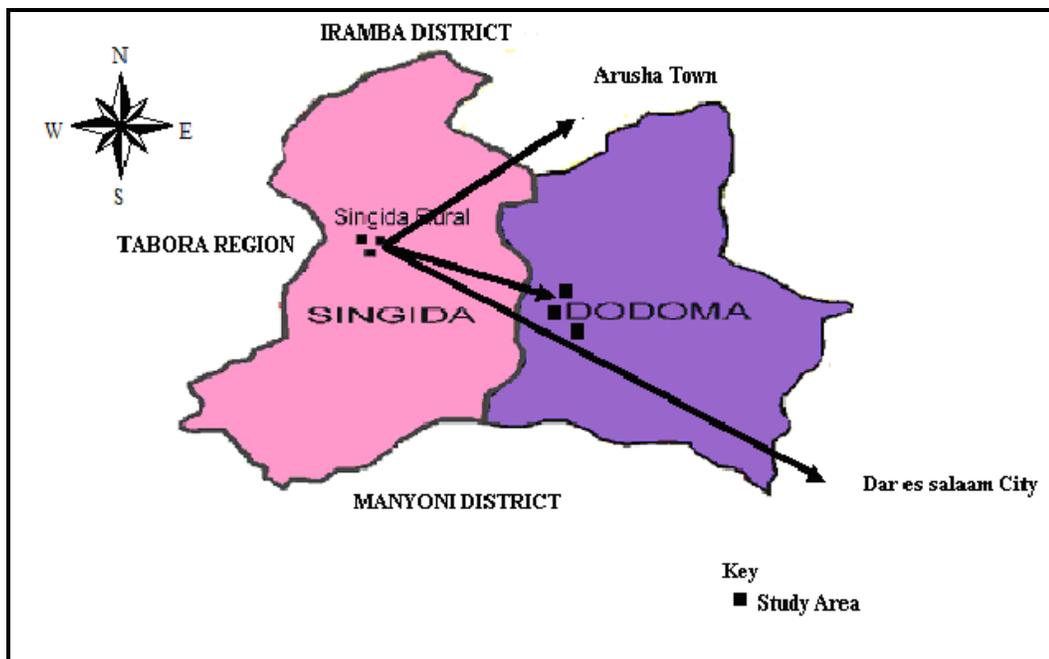
Tanzania has two major finger millet producing areas namely; southern highlands and central zone dry lands. Finger millet is extensively grown in central zone dry lands and southern highlands of Tanzania. The finger millet produce from central zone is commonly sold to towns of Singida, Dodoma, Arusha, Mwanza, Kigoma and Bukoba while finger millet from southern highlands is sold to Dar es salaam, Ruvuma, Mbeya and Rukwa regions.

This study was conducted in Singida Rural District in Central zone of Tanzania. The zone is comprised of Dodoma and Singida regions both of which are in the semi-arid zone. Singida Rural District borders with Singida urban district to the east, Iramba district to the north, Tabora region to the west and Manyoni district to the south west (Fig 1).

The areas selected for the study were chosen by target sampling. Singida Rural District was selected as a representative of a dry land finger millet producing area. Singida town, Dodoma town and Kibaigwa grain market located at 50 km away from

Dodoma town along Morogoro-Dodoma Highway were selected as representatives of market areas of finger millet with easy access by road network.

Finally, Dar es Salaam was included in the study as the main market area in the country representing the large scale national trade with easy access by road and rail. Dar es Salaam is also the most affluent area in the country that imports most of its agricultural products from other regions in the country. Dar es Salaam market is the main destination of agricultural production in Tanzania and it also serves consumers in other regions. Dar es Salaam being a main city offers wage employment for many people that insures sustainable purchasing power of its customers and makes it an attractive market for all agricultural producers.



**Figure 1: Map of the study area**

### **3.2.1 Topography, climate and vegetation**

Singida Rural District has a semi climatic condition and has two seasons; the dry season which is the longest season from April to November and the rainy season from December to March. The average rainfall is between 600mm-700mm per annum while the minimum average temperature is between 15<sup>0</sup>C-30<sup>0</sup>C. The land area is part of the highland central plateau (along Mtinko and Longero division) and the remainder of the district is composed of lowlands and plains in the south. The vegetation of the Central Zone can be categorized into four groups: bush land, woodland, wooded grassland, and grassland. Topographically, the zone is characterized by plains with scattered inselbergs, ridges, or rows of hills.

### **3.2.3 Human population**

Singida Rural District is estimated to have a population of 429 498 people of whom 220 498 (51.3%) are females and 209 000 (48.7%) are males and the average family size is 5.1 (URT, 2003)

### **3.2.4 Land area**

Singida Rural District has an area of 56 167 square kilometres of which 55 282 km<sup>2</sup> is used for agriculture, 373 km<sup>2</sup> is for grazing land, 373 km<sup>2</sup> is forests and shrubs and 50 km<sup>2</sup> is covered with water in the form of lakes, dams and rivers. The remaining 89 km<sup>2</sup> is for mining land (URT, 2003).

### **3.2. 5 Economic activities**

The major economic activities in the district are farming and livestock keeping. Other activities include fishing, beekeeping, small-scale mining, small business, cottage industry, and lumbering. The district grows food crops such as maize, sorghum, millets, paddy, beans, cassava and sweet potatoes. Cash crops include sunflower, groundnuts, finger millet, yellow peas, coriander, simsim, onions, cotton, and other newly introduced crops like pigeon peas and cashew nuts. Small-scale farmers account for 40% of the economic activities, pastoralism 20%, agro-pastoralism 30% and mixed farming 10% (URT, 2003).

### **3.3 Research Design**

A cross sectional research design was adopted for the study. Data was collected from the field at a single point in time. The data was collected for descriptive purposes and to determine the relationship between variables under study. The design was adopted because of its advantages in relation to budget costs as explained by Kothari (2006) who argued that collecting data at single point in time from the field saves money for researchers and its convenient in terms of time resource.

#### **3.3.1 Study population and sample size**

The targeted population of the study centred on finger millet producers, processors, traders and consumers in the selected study areas. The study area was targeted because it had people with relevant information concerning the problem under study. The sample size from which data were collected involved 120 respondents. The sample size was limited to 120 the respondents due to budget constraints. The sample

size was sub divided into three sub samples i.e producers, traders and processors of finger millet.

### 3.3.2 Sampling procedure

Multistage, purposive and random sampling techniques were applied in the selected study areas. Singida Rural District consists of 4 constituencies and out of 4 constituencies, 1 constituency of Makyungu was purposively selected for the study. In Makyungu constituency, 9 villages of Ntutu, Ntewa, Mungaa, Unyahumpi Kimbwi, Itumbi, Unyangongo, Nkhambi and Nkiku were purposively selected. In the study areas, 5 finger millet markets of Singida town, , Dodoma Kabaigwa grain market, Kariakoo city main market and Tandika were chosen. Other selections were as follows both in Singida Rural District and outside the district in Table 1.

**Table 1: Sampling procedure in the selected study areas**

<b>Location of Resp'ts</b>	<b>Location of Int'w</b>	<b>Kind of Resp'ts</b>	<b>No. of Resp'ts</b>	
Singida Rural	At farm gate	Producers	.00	77
Ntutu	Village market	Retailers	.00	4
Mungaa	Village mill	Processors	.00	2
All 9 villages	9 villages	Rural assemblers		10
Singida town market	Retail market	Urban retailers	.00	2
	Wholesale market	Urban wholesalers	1	
	Wholesale stores	Urban wholesalers	2	3
	Urban mills	Processors	.00	4
Dodoma town market	Retail market	Urban retailers	.00	2
	Wholesale market	Urban wholesalers	2	
	Wholesale stores	Urban wholesalers	2	4
	Urban mills	Processors	.00	2
Kibaigwa grain market	Retail market	Urban retailers		1
	Wholesale market	Urban wholesalers		1
Dar es salaam city	Retail market	Urban retailers	.00	2
Kariakoo market	Wholesale market	Urban wholesalers	2	
Tandika mkt	Wholesale stores	Urban wholesalers	2	4
	Urban mills	Processors	.00	2
<b>Total</b>				<b>120</b>

### **3.3.3 Data sources**

Secondary information to suit the study objectives was obtained from text books, journals and research papers. Documented literature about the study area such as map extracts, population, climate, vegetation and economic activities literature was collected. The potential sourced materials were found in the university library of Sokoine University of Agriculture (SNAL) and District Main Libraries (DML) in the study area and additional information was obtained from the internet.

Primary data were specifically collected from households producing finger millet as well as traders of the crop and processors along the marketing channel in the study area. More primary data was obtained from key informants (market managers, agriculture officials) within the vicinity of the study area.

### **3.3.4 Data collection methods and instruments**

Data were collected from traders at different markets in the study areas in order to pin down the common characteristics of the market participants. Survey questionnaires were used at Mungaa and Ntutu markets in Singida rural , Singida town market, Dodoma town market, Kibaigwa market, Tandika and Kariakoo city markets in Dar es Salaam.

The questionnaire covered questions related to prices, quantities, sources of products, quality and main constraints faced by the traders. The survey questions were clearly understood, even though some variables were measured with error as the respondents were unable to determine their daily profit share of own production and sometimes

even age with accuracy. Effort was made to target all groups of traders present at each market and to interview all subgroups of buyers (young/old, male/female, rich/poor).

Structured questionnaires were used to collect primary data from producers, traders and processors. Questionnaires were given to only literate farmers to write answers in the provided space. The researcher also made individual interviews with farmers, traders and processors particularly those who could not read and write. The researcher asked the respondents questions in a face-to-face situation and answers were noted down on paper.

Besides questionnaires, key informant interviews with relevant individuals, such as the managers of the markets surveyed and government agriculture officials were conducted at markets of Singida, Dodoma and Dar Es Salaam. The key informant interview schedule was used to collect information from key informants. Key informants were used to gather in depth information on issues pertaining to theme under discussion. Key informants are people with specialised great depth of knowledge on matters under study as explained by Katani (1999). For this study, the key informants were the marketing and agricultural officers.

### **3.3.5 Data analysis techniques**

Both qualitative and quantitative techniques were used to analyse the data. For precise data analysis, computer-based statistical package programs excel and SPSS were used. Descriptive statistics was analysed and described by using content

descriptive technique. Descriptive summary statistics such as frequency and percentage distribution were used particularly for characteristics of the respondents.

Different quantitative processing techniques were employed to analyse data as per the study objectives and hypotheses. Quantitative analytical methods employed included Binary logistic and Multiple regression models, Gross margin and t-test methods to analyse objectives and hypotheses respectively in order to capture meaningful information.

### **3.3.6 Methods of analysis**

The overview about the finger millet value chain from production to consumption was analysed by using flow charts and content descriptive techniques. Content descriptive technique focused on textual information given by key informants under the guide of charts. The results of the analysis were discussed in line with “key words of the key informants in the context”. According to Kimberley (2002), the researcher uses highest percentage of the key words from key informants to discuss the results of analysis.

Market channels and market structures in the study area were analysed by using content descriptive approach. The information concerning finger millet was given by both producers and traders. The information was obtained by using focus group discussion methods in the field.

The supply of finger millet to the market was examined by using binary logistic regression model. This model was adopted due to the fact that the dependent variable was a dummy variable. The dependent variable was a dummy, which is 0 if the farmer did not sell finger millet and 1 otherwise. The regressors of the model were; the age of the respondents, sex of the household head, family size, educational level of the respondents, distance from the market, market price, quantity produced, the total land size, labour, and market information. Through binary logistic regression model, maximum likelihood procedure was employed to estimate the probability of market supply. The model was specified as in (1).

$$\text{Logit}(Y_1) = \ln \left[ \frac{P(Y_1 = 1)}{1 - P(Y = 1)} \right] = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_k X_k + \varepsilon^i \dots \dots \dots (1)$$

Where;

$P(Y_1 = 1)$  is the probability of supplying the product to the market and  
 $1 - P(Y = 1)$  is the probability of not supplying the product to market of the  $i^{\text{th}}$   
 observation.

$Y_1 = (1 \text{ if involved in selling finger millet and } 0 \text{ if otherwise});$

$\alpha = \text{constant coefficient};$

$X_1 - X_k = \text{variables}$

$\beta_1 - \beta_k = \text{parameters}$

$e_i = \text{disturbance term.}$

The study adopted a gross margin analysis approach to measure the profitability level of finger millet of different actors in the study area. Expenses were estimated based on the costs incurred. The net profit of finger millet was calculated by considering

gross revenue generated less variable costs incurred. The profit level of finger millet was based on the producers, traders and processors and thus Gross Margin Analysis (GMA) technique was adopted. The gross margin analysis was applied to establish the profitability of the finger millet in the study area. Conceptually, gross margin is the difference between the total revenue and the total variable costs of production and reflects the returns to factors of production (Johnsen, 2003; Phiri, 1991). The gross margin formula was stated as follows in (2).

$$\text{Gross profit} = V - C = PQ - \sum^n p_i q_i \dots\dots\dots(2)$$

Where

$\Sigma$  = Summation sign

V = Value of production

C = the total cost of production

P = Price of the produce

Q = Total production

$p_i$  = Price of input i

$q_i$  = Quantity of input i

The constraints affecting the supply of finger millet to the market were estimated by using frequency and percentage distribution together with content descriptive technique. Content descriptive technique focused on textual information given by key informants and the respondents as well.

T-test was applied to test the significance of mean profit margin difference that exists between one actor to another along the finger millet value chain. The sample of each actor was treated as a population. The null hypothesis was stated as;  $H_o : \mu_1 = \mu_2$ : that there was no significant difference in mean profit margin between two actors and  $H_a : \mu_1 \neq \mu_2$ : that there was significant difference in mean profit margin between two actors along the value chain of finger millet. Where;  $\mu_1$  is the mean profit margin of actor 1 and  $\mu_2$  is the mean profit margin of actor 2. Since the sample size was grouped into sub samples, t statistic was calculated.

A binary multiple regression model was adopted to establish the level of significance of social-economic factors towards farmers' the profit margin. Null hypothesis was stated as;  $H_o$ : that social economic factors such as years of schooling, land size, household size, access to market information, gender and selling price do not have significant influence on farmers' profit margin whereas alternative hypothesis was  $H_a$ : that social-economic factors such as, years of schooling, land size, household size, access to market information, gender and selling price have significant influence on farmers' profit margin in the study area. The results of regression analysis were discussed in line with "key words of the key informants in the context" as recommended by Kimberley (2002).

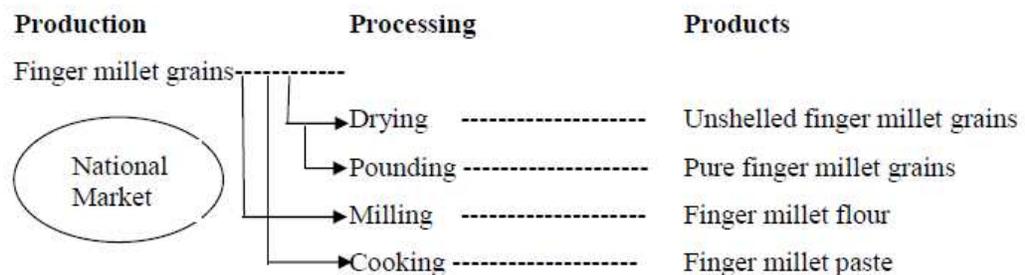
## CHAPTER FOUR

### 4.0 RESULTS AND DISCUSSION

This chapter presents the results and discussion on the data collected from the field. The chapter starts with an overview of finger millet sub sector and market structure in Tanzania followed by detailed information about study objectives and hypotheses.

#### 4.1 The Structure of the Finger Millet Value Chain in Tanzania

Finger millet is a very common cereal used in everyday local dishes of Tanzania rural areas. In views of respondents, finger millet is commonly used as staple food crop in dry lands of Tanzania and at times it is exchanged with maize for those farmers in none dry lands of Tanzania. In the area of study, finger millet consumption is rising higher due to increasing population and income generated from it. In the study area, there were different finger millet products for which different marketing channels exist as shown in Figure 2.



**Figure 2: Marketing channels and flow of finger millet products**

According to the views of different key informants, in some regions finger millet is sold in form of unshelled grains whereas in other regions demand is higher for pure finger millet grains i.e after pounding activity. Other common products are finger millet flour and finger millet paste. The market demand for the two grain products of

finger millet is much higher than that for flour. The finger millet flour is commonly used and preferred by the households in the study area. Finger millet paste is a fourth product and its demand is high at household level.

Findings indicated that primary production, processing and utilization in Singida Rural district and Tanzania as a whole is characterized by predominance of traditional practices that entail planting of farmers' home-saved seeds, harvesting of mature panicles using thumb knives, open sun drying on bare ground, rocks, or mats; threshing by beating dried panicles with sticks, winnowing using flat trays and dehulling using mortar and pestle; and narrow utilization base of value-added products in the form of thin or thick porridge and alcoholic beverages.

The raw finger millet grain is purchased in the market but not directly consumed as food thus requires further processing as the next step. The next step is that finger millet grain is milled into finger millet flour.

The second stage is trading. The process of trading is of two categories where finger millet can be sold to buyers in grain or flour form. It can be transported to the places of demand depending on availing current market prices. Trading can be done directly by the producers, processors or traders themselves. Trading is done in rural trading centre shops, rural markets and milling stores as urban markets, shops, milling stores and supermarkets.

The third stage is finger millet grain milling. Finger millet is harvested, dried and threshed into unshelled grains. These unshelled grains are further dried and pounded into shelled finger millet grains. The shelled grains are taken to milling machines where they are milled into finger millet flour. Milling of finger millet grains is more pronounced in towns and urban centres as opposed to rural areas due to income status. To some small extent a few households still use traditional method of grinding finger millet grains into using grinding stones however this method is quite laborious.

The fourth stage is consumption of the final product. The finger millet flour is cooked and transformed into either finger millet paste or porridge at household level as food. Even though the consumer does neither participate in the production process nor add value to the product, he is part of the chain because he influences the purchasing power of the whole process.

#### **4.2 The Market of Finger Millet in the Study Area**

In the study area, the majority of small scale finger millet producers are consuming their produce within the households. However, to great extent most of the producers sell their surplus either to the village markets, trading centre/town markets or to city markets depending on the quantity of produce and producer's access to the market. In the study area, three types of markets were identified. These included; the local village markets, regional markets and national markets.

The local village markets are small and cater for a limited number of near-by households. The markets are informal and emerge at cross-roads or rural trading centres with small concentrations of households to facilitate the exchange of products among local farmers using money as a means of exchange. The traders at the village markets are rural assemblers with well-established small sources of income. The access to the local market is easy but the supply at the market is very limited and fluctuates according to the seasons thus these local markets cannot be reliable. Local traders are most often women or young men from the same area who collect the products from local producers and sell them to their established circle of customers on retail basis. Even though larger markets would be accessible to these traders, social benefits at the local market outweigh the modest economic benefit of engaging with the regional market.

Regional markets are located in the town centers of the region providing a variety of food crop products and other items. These markets were found in towns of Singida, Dodoma and Dar es Salaam and are often the largest markets available to the consumers and offer what village markets do not supply. The supply at the market is more reliable than at the local village markets even though temporary shortage of goods may arise during the year. The producers may come to the markets to sell their products but most often the trade is run by professional traders who collect the products from the local farmers (either at the farm gate or at the village market).

The national market collects products from all regions to be sold mostly in Dar es Salaam city. The market is large and operates by large scale actors working with

smaller, medium and large scale trade facilitators. The market can be characterised by a large number of small scale producers and local traders. However, according to traders' views in discussion at Tandika and Kariakoo markets in Dar es Salaam, it was noticed that most traders in Dar es Salaam do not commonly trade finger millet from central zone because of its poor quality. They argued that finger millet from central zone has small sized grains and is of traditional variety instead they prefer finger millet from southern highland zone that is from Songea, Mbeya, Sumbawanga and Iringa because of its large sized grains.

Alternatively, most processors of Dar es Salaam also prefer finger millet from southern highlands because it has less sand and stones as compared to that of central zone which has a lot of sand and stones. It is estimated that an average of 10 to 20kg weight loss per bag after cleaning for finger millet from central zone as compared to that from southern highlands which is having about 5 to 10kg weight loss per bag.

#### **4.3 Value Chain and Marketing Channels of Finger Millet in the Study Area**

At farm gate level, producers sell their unshelled finger millet grains directly to rural assemblers in the village and rural trading centre markets. Finger millet grains are packed in sacks by assemblers and sold to wholesalers at urban markets and stores. In the study area, small village markets were identified operating at least once a week where unshelled finger millet grains were commonly sold from nearby farms. Some rural trading centre markets act as assembling points for unshelled finger millet grains from the surrounding areas.

At rural trading centre markets, large quintiles of finger millet grains (unshelled and shelled) are sold to wholesalers. These markets are always dominated by both retailers and wholesalers from bigger urban markets. Rural trading centre markets are of retailing and wholesaling basis. Dried finger millet unshelled grains are retailed in form of tins and small baskets while shelled finger millet grains are purchased in large quantities i.e tins or sacks.

In large urban markets, finger millet products are sold on daily basis or several days of the week in stores, shops and markets. The products are both grains and flour in retail and wholesale manner. Wholesalers from several towns come to buy finger millet.

Supermarkets were identified in towns at different sizes i.e small, medium and big sized supermarkets. Supermarkets are commonly found in towns, urban centres and cities. Most of the times, finger millet sold in supermarket is packed millet flour in different kilograms. Finger millet flour from supermarkets and shops are transformed into finger millet paste or porridge at household level as food to the final consumer.

#### **4.4 Territorial Market Structures and the Flow of Finger Millet Products**

Finger millet in Tanzania is extensively grown in two areas, which are the southern highlands and central zone. Finger millet from central zone is less preferred as compared to one from southern highlands of Tanzania. On average, Singida Rural produces 4360.7kg/season and 1548.7kg/season are traded off within the district whereas a balance of 2812kg/season is taken to Dar es Salaam markets.

In the views of traders at Tandika and Kariakoo markets in Dar es Salaam city, the finger millet from central zone is red color and small in size and a traditional variety. It also contains a lot of sand and stones that make it of low quality whereas the one from southern highlands is free from stones and sand, it is also red colored, but with large size seeds. It is because of this reason why the finger millet produced from central zone is commonly sold to towns of Singida, Dodoma, Arusha, Mwanza, Kigoma and Bukoba while finger millet from southern highlands is sold to Dar es Salaam, Iringa, Ruvuma, Mbeya and Rukwa regions. Southern highlands zone comprising of Iringa, Mbeya, Rukwa and Ruvuma regions. Traders from central zone are challenged by stiff competition from traders from southern highlands.

#### **4.5 Actors of the Finger Millet Value Chain**

The socio-economic characteristics of actors in the study area are important in relation to the theme under study. The selected data covering age, level of education and sources of income were analyzed in relation to the profitability and value chain of finger millet.

##### **4.5.1 Age structure, educational level and occupation of producers**

Results in Table 2 reveal that there was normal age distribution in the sample with the highest percentage (36.3%) for the age group of 29-39, 20.8% of producers belong to the age group of 18-28 years whereas the lowest percentage (11.7%) of producers was lying an age bracket of 51-61 years old. The highest percentages for age groups of 29-39 and 18-28 could imply an aspect of rational decision making of producers towards agricultural production. This finding matches with earlier findings

of Singh *et al.* (2003) who contended that age has a significant effect on experience, wealth and decision making and affects how one works thus influencing individual productivity.

Results further indicate that 37.7% of the producers had primary school education, 22.1% of producers had attained informal education while 40.3% of producers had attained ordinary and advanced secondary school education.

**Table 2: Results age, education and occupation of producers**

Social-economic characteristics	Frequency and percentage distribution	
	Frequency	Percent
<b>Age group</b>		
18-28	16	20.8
29-39	28	36.3
40-50	14	18.2
51-61	9	11.7
Above 61	12	15.6
<b>Total</b>	<b>77</b>	<b>100.0</b>
<b>Education</b>		
Informal education	17	22.1
Primary education	29	37.7
O level (S1-S4)	16	20.8
A level (S5-S6)	15	19.5
<b>Total</b>	<b>77</b>	<b>100.0</b>
<b>Occupation</b>		
Farming	35	45.5
Business	27	35.1
Government employment	15	19.5
<b>Total</b>	<b>77</b>	<b>100.0</b>

*Source: Field data*

The results of educational level of farmers technically reflect producers/farmers' ability to improve their farms because they are able to adopt new farming techniques though there was still an element of informal education.

The main occupations of producers identified were; farming, business and government employment. Out of 77 producers interviewed, 45.5% of producers in the study area entirely depends farming as their main source of income while 35.1% and 19.5% of producers depend on business and government jobs respectively as source of income. This implies that producers had other sources of income along with farming.

#### **4.5.2 Age structure, educational level and occupation of rural assemblers**

Results in Table 3 show that age was normally distributed among the rural assemblers in the study area. It was indicated that 40% of rural assemblers had age group of 40-50 years and lowest percent of 10% of rural assemblers lying in the age group of 18-28 years. The lowest percentage for age group of 18-28 could mean that the young do not prefer participating in retailing business compared to older people in the same business.

Results also reveal that 40% of the rural assemblers had advanced secondary school education and the lowest educational level attained by rural assemblers was informal education (10%), 30% of rural assemblers had ordinary school education and only 20% of them represented primary school education.

**Table 3: Results age, education and occupation of rural assemblers**

Social-economic characteristics	Frequency and percentage distribution	
	Frequency	Percent
<b>Age group</b>		
18-28	1	10
29-39	3	30
40-50	4	40
51-61	2	20
<b>Total</b>	<b>10</b>	<b>100</b>
<b>Education</b>		
Informal education	1	10
Primary education	2	20
O level (S1-S4)	3	30
A level (S5-S6)	4	40
<b>Total</b>	<b>10</b>	<b>100</b>
<b>Occupation</b>		
Farming	4	40
Business	6	60
<b>Total</b>	<b>10</b>	<b>100</b>

*Source: Field data*

The main sources of income for rural assemblers identified were; farming and business. Out of 10 rural assemblers interviewed, 60% of them in the study area entirely depends business as their main source of income while 40% of them depend on farming. However, in the views of rural assemblers, they reported that much as they largely depend on this kind of business as source of income, they do not enjoy the nature of the business clinging on the argument that it takes long for one to develop.

#### **4.5.3 Age structure, educational level and occupation of rural processors**

Results in Table 4 indicate that 50% of rural processors had age group of 51-61 years, 25% of rural processors in age groups of 29-39 and 40-50 years. Results also

show that 25% of them had primary school education and 75% of rural processors had secondary school education.

**Table 4: Results age, education and occupation of rural processors**

Social-economic characteristics	Frequency and percentage distribution	
	Frequency	Percent
<b>Age group</b>		
29-39	1	25
40-50	1	25
51-61	2	50
<b>Total</b>	<b>4</b>	<b>100</b>
<b>Education</b>		
Primary education	1	25
O level (S1-S4)	3	75
<b>Total</b>	<b>4</b>	<b>100</b>
<b>Occupation</b>		
Farming	1	25
Business	3	75
<b>Total</b>	<b>4</b>	<b>100</b>

*Source: Field data*

The main sources of income for rural processors identified were also farming and business. Out of 4 rural processors interviewed, 25% of rural processors in the study area entirely depends farming as their main source of income while 75% of them depend on business. In the views of rural processors, they reported that they largely depend on these two sources because they supplement each other and they help to generate more profits.

#### **4.5.4 Age structure, educational level and occupation of wholesalers**

Results in Table 5 indicate that 62% of wholesalers had age group of 51-61 years, followed by 38% of wholesalers lying in age group of 29-39 years and lowest

percent of 15% of wholesalers lying in the age group of 18-28 years. The highest percentage for age group of 51-61 could imply rational decision making and experience in wholesaling business compared age group of 18-28 that commonly entails youth.

Results also indicate that 46% of the wholesalers had ordinary school education and informal education was 23%, 31% of wholesalers had primary school education and 38% of wholesalers represented advanced school education. This level of education could reflect aspect of knowledge acquired.

**Table 5: Results age, education and occupation of wholesalers**

Social-economic characteristics	Frequency and percentage distribution	
	Frequency	Percent
<b>Age group</b>		
18-28	2	15
29-39	5	38
40-50	3	23
51-61	8	62
<b>Total</b>	<b>13</b>	<b>100</b>
<b>Education</b>		
Informal education	3	23
Primary education	4	31
O level (S1-S4)	6	46
A level (S5-S6)	5	38
<b>Total</b>	<b>13</b>	<b>100</b>
<b>Occupation</b>		
Farming	5	38
Business	3	23
Government employment	10	77
<b>Total</b>	<b>13</b>	<b>100</b>

*Source: Field data*

The main sources of income for rural processors identified were also farming and business. Out of 13 wholesalers interviewed, 38% of wholesalers in the study area entirely depends farming as their main source of income while 23% of them depend on business and 77% of wholesalers had government jobs. In the views of wholesalers, that they get money from jobs and invest in business in order to supplement on their income levels.

#### 4.5.5 Age structure, educational level and occupation of urban processors

Results in Table 6 indicate that 50% of urban processors had age group of 51-61 years, followed by 33% of urban processors lying in age group of 40-50 years and lowest percent of 17% of urban processors lying in the age groups of 29-39 years. The lowest percentages for age groups of 29-39 could mean inadequate experience in processing the product hence low participation as compared age group of 51-61.

**Table 6: Results age, education and occupation of urban processors**

Social-economic characteristics	Frequency and percentage distribution	
	Frequency	Percent
<b>Age group</b>		
29-39	1	17
40-50	2	33
51-61	3	50
<b>Total</b>	<b>6</b>	<b>100</b>
<b>Education</b>		
Primary education	1	17
O level	2	33
A level	3	50
<b>Total</b>	<b>6</b>	<b>100</b>
<b>Occupation</b>		
Farming	1	17
Business	3	50
Government employment	2	33
<b>Total</b>	<b>6</b>	<b>100</b>

*Source: Field data*

Results also indicate that 50% of the urban processors had advanced school education and 17% of urban processors had primary school education whereas ordinary school education was 33%. This level of education was very important in a sense that it could influence technological adoption because agricultural development requires abroad educational base in order to prosper.

#### 4.5.6 Age structure, educational and occupation of rural and urban retailers

Results in Table 7 indicate that 60% and 40% of rural and urban retailers respectively had age group of 40-50 years, followed by 80% of them for both channels lying in age group of 29-39 years.

**Table 7: Results age, education and occupation of rural and urban retailers**

Social-economic characteristics	Rural retailers		Urban retailers	
	Frequency	Percent	Frequency	Percent
<b>Age group</b>				
29-39	2	40	2	40
40-50	3	60	2	40
51-61		0	1	20
<b>Total</b>	<b>5</b>	<b>100</b>	<b>5</b>	<b>100</b>
<b>Education</b>				
Primary education	2	40	1	20
O level (S1-S4)	3	60	4	80
<b>Total</b>	<b>5</b>	<b>100</b>	<b>5</b>	<b>100</b>
<b>Occupation</b>				
Farming	2	40	1	20
Business	3	60	4	80
<b>Total</b>	<b>5</b>	<b>100</b>	<b>5</b>	<b>100</b>

*Source: Field data*

Results further indicate that 60% and 80% of the rural and urban retailers respectively had ordinary school education whereas 40% for rural retailers and 20%

for urban retailers represent primary education. On the other hand, 60% of rural retailers largely depend on business with 80% of them depending on business under urban channel and 40% of them is presenting farming and 20% for urban retailers. This level of education was very important in a sense that it could influence their rate of adoption in the trading process.

#### **4.6 Economic Assessment of Finger Millet Value Chain and Profitability**

##### **4.6.1 Mapping of value chain and marketing channels of finger millet**

The finger millet value chain from production to consumption was mapped diagrammatically by using content descriptive approach (Fig. 3). The value chains identified in the study area comprised of four main levels (i.e production, trading, processing and consumption). The identified levels were categorized into two main channels namely; rural and urban. The channels were further sub divided into sub channels (i.e finger millet grain trading and finger millet flour trading). The first level which was production consisted of the producers/farmers of the finger millet in grain form. At this level, finger millet is harvested, threshed, separated from husks and then packed in bags or baskets. Producers at this level, decide either to sell all to their produce (shelled or unshelled grains) or retain some for home use. The results at this level indicate that, the average farm gate selling prices were at 350 and 370Tshs/kg/farmer for unshelled and shelled finger millet grains respectively and the average produce (unshelled or shelled grains) sold to rural assemblers and wholesalers varied significantly. It was 550kg/season/farmer to rural assemblers and 998.7kg/farmer for wholesalers.

The disparities in the average farm gate prices and quantities sold to different actors in the value chain mapping of finger millet were dependent upon the nature (quality) of finger millet offered to buyers. It is however noted during the study survey, wholesalers were offering higher prices than rural assemblers because wholesalers were interested in buying shelled finger millet grains while rural assemblers were purchasing unshelled finger millet grains.

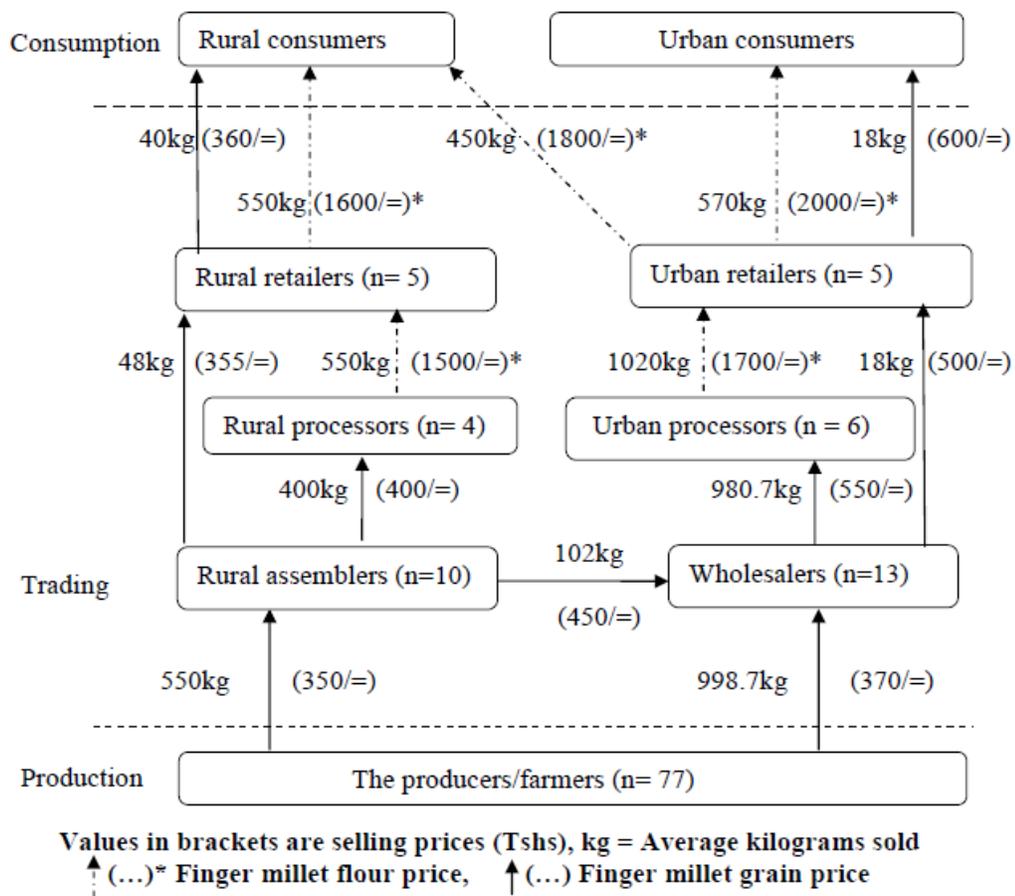


Figure 3: Finger millet value chain in the study area

The second level which was trading consisted of two categories of traders (i.e rural assemblers and urban wholesalers) of finger millet grains. At this level, both traders undergo different activities such as re-grading, re-packing, threading and transporting

in order to add on value to the product. The results indicate that rural assemblers sell at 400 and 355Tsh/kg of shelled and unshelled finger millet grains to rural processors and rural retailers under rural channel respectively. They further sell at 450Tsh/kg to wholesalers under urban channel. Rural assemblers sell average amount of 400, 102 and 48kg of shelled and unshelled finger millet grains/season to rural processors, urban wholesalers and rural retailers respectively. The findings reveal that rural assemblers find it more profitable to sell their shelled finger millet grains directly to rural processors and urban wholesalers because of a wider range of profit margin received. However, urban processors prefer purchasing shelled finger millet grains from urban wholesalers because of high quantities of finger millet sold which in turn reduce average purchasing cost in short run.

On the other hand, wholesalers sell at an average price of 550Tsh/kg to urban processors. At this level, wholesalers sell average quantity of 980.7kg/season to urban processors. Wholesalers always undergo a series of activities to add value to finger millet grains in order to fetch high price. They prefer grading, packing and threading to other activities such as standardising in the chain. The price margin was wider between wholesalers and urban processors because of several activities involved.

The third level was processing. At this level, processors mill finger millet grains into finger millet flour under both rural and urban channels. Results empirically indicate that after milling finger millet grains, the weight (kg) of finger millet flour is much higher than finger millet grains before milling. Rural processors sell finger millet

flour at an average price of 1500Tsh/kg to rural retailers. Rural processors sell an average amount of finger millet flour of 550kg to rural retailers thus giving a gross margin of 1100Tsh/kg of flour under rural channel. On the other hand, urban processors sell finger millet flour at average prices of 1700Tshs/kg to urban retailers with a gross margin of 1150Tsh/kg of flour under urban channel. However, the amount of finger millet flour from urban processors was 1020kg after milling.

Rural retailers sell finger millet flour at 1600Tsh/kg to rural consumers under rural channel thus giving a gross margin of 100Tsh/kg of flour. They sell an average amount of 550kg of finger millet flour to rural consumer. On the other hand, urban retailers sell finger millet flour at 1800 and 2000Tsh/kg to rural and urban consumers respectively with a gross margin of 100 and 300Tsh/kg. They sell average amount of 450kg to rural consumers and 570kg to urban consumers. Consumers transform flour into food as end product of their choice. However, those consumers who purchase finger millet grains under rural channel do not consume them directly as food instead they under manual grinding due to high costs of modern milling.

#### **4.6.2 Examination of factors influencing farmers supply of finger millet to the markets**

The results of binary logistic regression analysis showed the overall statistical significance ( $P < 0.01$ ). The model having a dummy regresand (1= farmers who sell finger millet were 58 and 0 = farmers who do not were 19). The model summary statistic value was 18.856 at -2 log likelihood. This indicates how best the model predicts the correlation between regresand and regressors. The Cox & Snell  $R^2$  was

0.707 whereas Nagelkerke  $R^2$  was 0.943 which implies that the model predicted correctly at 94.3% of the variables entered with only 5.7% representing variables that were not entered. This finding is also supported by earlier the findings by Kothari (2006) who indicated that the smaller the statistic value, the better the model results.

The results of regression analysis were summarized in Table 8.

**Table 8: The results of logistic regression analysis**

Variables	B	S.E	Wald	Sig	Exp(B)
Age (X <sub>1</sub> )	-0.045 <sup>***</sup>	0.721	0.004	0.000	0.956
Sex (X <sub>2</sub> )	10.346 <sup>*</sup>	4.117	6.314	0.062	0.003
Household size (X <sub>3</sub> )	-0.032 <sup>*</sup>	0.012	6.900	0.085	0.969
Educational level (X <sub>4</sub> )	0.391 <sup>***</sup>	0.138	8.070	0.000	0.676
Farm gate price (X <sub>5</sub> )	1.273 <sup>**</sup>	0.764	2.774	0.052	3.571
Distance to market (X <sub>6</sub> )	-2.254 <sup>***</sup>	0.021	2.269	0.000	0.724
Quantity produced (X <sub>7</sub> )	0.306 <sup>*</sup>	4.377	14.653	0.023	0.347
Market information (X <sub>8</sub> )	-0.052 <sup>*</sup>	0.692	3.333	0.12	0.816

-2 log likelihood = 18.856<sup>a</sup>, Cox & Snell R Square = 0.707, Nagelkerke R Square = 0.943<sup>\*\*\*</sup> Significance at 1%, <sup>\*\*</sup> Significance at 5%, <sup>\*</sup> Significance at 10%

The coefficient of age (years) of the respondents was -0.045. The results of regression analysis show further that age was negatively related to finger millet supply to the market but was statistically significant ( $P < 0.01$ ). The negative log odds of -0.045 which in other words is converted into odd ratio of 0.956 (Exp B) imply that farmers at young age could actively participate in marketing process but without selling finger millet as compared to farmers at an old age thus a reason justifying why the dependent variable is the dummy. Ideally, young farmers are more active and innovative to participate in agricultural activities and marketing inclusive. However, the old farmers play a vital role in decision making about marketing issues as opposed to young farmers.

The regression coefficient for sex of the respondents was 10.346. Sex of the respondents was a dummy variable (1 = man, 0 = woman). The results indicate that sex was positively related to finger millet supply to the market and was statistically significant ( $P < 0.1$ ). The positive log odd of 10.346 with odd ratio of 0.003 (Exp B) indicates a positive relationship between finger millet supply to the market and sex of the respondents. This implies that gender balance in agricultural activities has a strong influence towards the production and surplus for sale depends on what has been produced. Therefore, the more production means the more the surpluses for sale. Conversely when production is less, there will also be less surplus for sale.

The results show a regression coefficient of -0.032 for household size. The negative coefficient indicates that family size was adversely related to the supply of finger millet to the market and was statistically significant ( $P < 0.1$ ). This negativity of household size could be attributed by the fact that the larger household size consumes a lot of the produce and would not have surplus for sale to the market.

Educational level (years) had a regression coefficient of 0.391 which reveals a positive correlation to finger millet supply to the market. The variable was statistically significant ( $P < 0.01$ ). Having a positive coefficient implies that the increase in qualifications, would also increase the supply of finger millet to the market. This finding could be explained by the fact that education is a very important economic factor than any other economic factors which also determines how one technically performs an activity.

The results show a regression coefficient of 1.273 for farm gate price. It was positively correlated to finger millet supply and was statistically significant ( $P < 0.05$ ). This implies that an increase in the farm gate price of produce leads to an increase in the supply of it. Ideally, one would expect that the higher availing farm gate price, the greater the supply of finger millet to buyers. High selling price is one of the driving forces of the supply of finger millet to buyers. Therefore, most the producers would prefer supplying large quantities of produce at higher current price than to any other prices lower than the one prevailing in the market.

The results also indicate a coefficient of 2.254 for the distance (km) to the village market/trading centre and this was positively related to the supply of finger millet to the village market and was statistically significant ( $P < 0.01$ ). This implies that the shorter in distance to market, the higher the supply of finger millet to the market. In the views of respondents, the village is very big and buyers are concerned in some distant trading centres. Those who are near by the trading centres are far better than those far away. The implication of close proximity to the market to producers enables them to incur less transport costs. Ideally, the longer distances to the market do not favour the sellers and buyers in the trading process and to a great extent leads to a wider the profit margin between the producers and other actors along the finger millet value chain.

The coefficient of quantity (kg) produced was 0.306. The results further indicate that quantity produced by the farmer was positively related to the supply of finger millet to the market but was statistically significant ( $P < 0.1$ ). The positive log odds of 0.306

which in other words is converted into odd ratio of 0.642 (Exp B). This implies that an increase in the amount of produce a farmer produces also results into an increase in finger millet supply to the market. The economic interpretation of this is that the larger the amount of a product produced greatly determines the surplus for sale to the market. Therefore, the lesser the quantity produced, the lesser the surplus for sale while holding other factors which influence constant supply.

The results reveal a coefficient of -0.052 for market information. The market information was a dummy variable (1 = access market information, 0 = otherwise). The negative coefficient indicates that market information was adversely correlated to the supply of finger millet to the market with a weak statistical significance ( $P < 0.1$ ). This negativity of the coefficient could be attributed to insufficient means of availing information to market participants in different localities of the crop production. Poor market information to participants in the market defeats the concept of marketing efficiency.

### **4.6.3 Profit Margins at Different Stages along Finger Millet Value Chain**

#### **4.6.3.1 The profit margin at production level**

The results of gross margin analysis revealed an average produce of 1548.7kg (550 and 998.7kg) whereas the selling farm gate prices were 350 and 370Tsh/kg (i.e. 360Tsh/kg on average) to rural assemblers and wholesalers respectively. The total gross margin of finger millet per producer/farmer at farm level was 557 532Tsh/season. The total costs incurred during production were 270 000Tshs and the net profit margin was 287 532Tsh/season as shown in Table 9.

The implication of low profit margins earned by producers/farmers could be accredited to relatively small quantities of output or poor access to market information especially on demand and supply to urban areas thus selling their produce at low farm gate prices. High farmers' opportunity cost of production can not be distributed over smaller quantities of finger millet produced thus giving a low profit margin to farmers. Ideally, increasing revenue is one of the immediate objectives of small holder farmers. For the purposes of comparative analysis along the finger millet value chain actors, gross margin technique was used as an indicator of farm profitability given different resource uses. This was done with the aim of standardizing the margins given that different the producers had different farm sizes for production.

**Table 9: The results of the profit margin of finger millet at farm level (77)**

<b>Variables</b>	<b>Amount</b>
<b>Revenue</b>	<b>Tshs and/or kg/season</b>
Average produce (kg/season)	1 548.7
Average farm gate (Tshs/kg)	360.0
<b>Total GM/season</b>	<b>557 532</b>
<b>Production costs</b>	
Sowing*	65 000
Weeding	70 000
Harvesting	35 000
Handhoe	12 000
Threshing	36 000
Winnowing	40 000
Packing bags	12 000
<b>The total costs</b>	<b>270 000</b>
<b>Profit margin</b>	<b>287 532</b>
<b>Total GM/TVC/season</b>	<b>1.2</b>
<b>Net profit/gross margin*100</b>	<b>51.6</b>
<b>Profit margin/average produce</b>	<b>185.7</b>

*Source: Field data*

\*Note: In the study area, seeds for sowing are not purchased they are instead reserved at every end of harvesting season for next sowing season

It was however noted, that the total average gross margins per producer/farmer could not necessarily reflect a genuine production performance at farm level. It was therefore important to consider the total gross margin in relation to the total costs in order to measure production efficiency of the farm. Production efficiency was estimated using the total gross margin/ the total cost ratio procedure. The ratio was 1.2 at farm level and was considerably taken as production efficient given the level of variable inputs applied in farm improvements. On the other hand, profit efficiency on return to total capital invested by farmer was measured by net profit/gross margin \* 100 approach. The ratio was 51.6 implying that the total capital invested by the farmer was well managed to generate profits. Economically, the bigger the ratio, the better profit efficiency of the firm.

It was further noted that the general profit margin per farmer/season may not necessarily reflect genuine profit efficiency/kg/farmer. It was therefore, important to consider general profit margin/average produce per farmer in order to establish profit margin /kg/ farmer. Results indicated that profit margin/kg/farmer at farm gate was 185.7Tshs. This implies that producers still get profit from their produce though they are always overexploited by traders.

#### **4.6.3.2 The profit margin at wholesaling level**

The results in Table 10 indicate that at this level, wholesalers sell an average quantity of finger millet of 980.70kg to urban processors at an average selling price of 550Tsh/kg. The wholesaler gets an average gross profit margin of 539 385Tshs. During the wholesaling process, some costs are incurred. The wholesaler incurs an

average total cost of 462 859Tshs with the net the profit margin was 76 526Tshs per wholesaler.

**Table 10: The results of the profit margin at wholesaling level**

<b>Variables</b>	<b>Amount</b>
<b>Revenue</b>	<b>Tshs and/or kg/season</b>
Quantity of finger millet bought in kg/season	980.70
Average purchasing price /kg/season	370.00
Average selling price per kg/season	550.00
<b>Total GM/season</b>	<b>539 385</b>
<b>Variable costs/wholesaler/season</b>	
Cost of purchasing finger millet	362 859
Transport costs	20 000
Market tax	35 000
Storage	24 000
Labour	21 000
<b>The total variable costs</b>	<b>462 859</b>
<b>Net margin</b>	<b>76 526</b>
<b>Total GM/TVC/season</b>	<b>0.2</b>
<b>Net margin/gross margin*100</b>	<b>14.2</b>
<b>Profit margin/average produce</b>	<b>78.0</b>

*Source: Field data*

The findings further reveal that large quantities of finger millet are handled at this level as opposed to other levels. The implication of this could be explained by the concept of the economies of larger scale operation. This is when wholesalers sell large quantities of finger millet at an affordable price to customers but giving higher profit margin in a long run. This finding justifies that the producer's average cost per the unit decreases as the scale of output is increased. This is commonly applicable in a long run where there is reduction in the unit of cost as size and usage levels of other inputs increase. The GM/TVC ratio was 0.2 for operational efficiency of wholesaling process and profit efficiency on return to total capital invested by wholesaler was 14.2 implying that total capital invested by the wholesaler was well

managed to generate profits. The profit margin of wholesaler was 78Tsh/kg.

#### 4.6.3.3 The profit margin at assembling level

The results in Table 11 show that at this level, rural assemblers purchase an average quantity of finger millet of 550kg from the producers at an average purchasing price of 350Tshs per kilogram. The assemblers sell at an average price of 400Tshs/kg to rural processors thus giving an average gross the profit margin of 220 000Tshs. They further sell finger millet grains at 355Tsh/kg to rural retailers with an average quantity of 48kg. Some costs are incurred during assembling process and the assembler pays an average the total cost of 211 500Tshs whereas the net the profit margin was 8 500Tshs.

**Table 11: The results of the profit margin at assembling level**

<b>Variables</b>	<b>Amount</b>
<b>Revenue</b>	<b>Tshs and/or kg/season</b>
Quantity of finger millet bought in kg/season	550.00
Average purchasing price per kg/season	350.00
Average selling price per kg/season	400.00
<b>Total GM/season</b>	<b>220 000</b>
<b>Variable costs/retailer /season</b>	
Cost of purchasing finger millet	192 500
Transport costs	6 000
Storage	5 000
Labour	8 000
<b>The total variable costs</b>	<b>211 500</b>
<b>Net margin</b>	<b>8 500</b>
<b>Total GM/TVC/season</b>	<b>0.04</b>
<b>Net profit/gross margin*100</b>	<b>3.9</b>
<b>Profit margin/average produce</b>	<b>15.5</b>

*Source: Field data*

The findings reveal low net profit margin at this level. Ideally, assembling is not profit efficient to retailers due to the fact that the average cost per the unit increases

as the scale of output also increases. It is against this fact that in the long run there will be an increase in the unit of cost because of the economies of small scale operation. It was also noticed during the study survey that assemblers preferred purchasing and selling in small volumes to large volumes. This finding was clearly justified by an average amount of finger millet sold to rural processors as compared to the amount sold to urban consumers.

The GM/TVC ratio was 0.04 for operational efficiency of assembling process and profit efficiency on return to total capital invested by rural assembler was 3.9 implying that the total capital invested by rural assembler was well managed to generate profits. The profit margin of rural assembler was 15.5Tsh/kg reflecting stable performance.

#### **4.6.3.4 The profit margins at processing levels**

The results in Table 12 indicate that finger millet is processed by two categorical actors (i.e rural and urban processors). At these levels, finger millet grains are ground and made into finger millet flour. However, each actor at this level purchases at different price per kilogram. The rural processors purchase at an average price of 400Tshs/kg from rural assemblers and sell to rural retailers at an average price of 1500Tshs/kg of flour thus giving a gross margin of 1100Tsh/kg.

On the other hand, urban processors purchase at an average price of 550Tshs/kg from wholesalers and sell at an average price of 1700Tsh/kg of flour to urban retailers. Both rural and urban processors incur similar types of costs during processing but

with varying cost value attached (i.e 230 500 Tshs and 619 000Tshs for rural and urban processors respectively). The average the total gross margins were 825 000Tshs for rural processors and 1 734 000Tshs were for urban processors. The net the profit margin was 594 500Tshs for rural processors and 1 115 000Tshs for urban processors.

**Table 12: The results of the profit margins at processors level**

<b>Variables</b>	<b>Rural processors</b>	<b>Urban processors</b>
<b>Revenue</b>	<b>Tshs and/or kg</b>	<b>Tshs and/or kg</b>
Quantity of finger millet bought (kg)	550.00	1020.00
Average purchasing price kg/season	400.00	550.00
Average selling price kg/season	1500.00	1700.00
<b>Total gross margins/season</b>	<b>825 000</b>	<b>1 734 000</b>
<b>Variable costs/retailer /season</b>		
Cost of purchasing finger millet	220 000	561 000
Grinding costs	6 000	38 000
Packing materials	4 500	20 000
<b>Total variable costs/season</b>	<b>230 500</b>	<b>619 000</b>
<b>Net margin</b>	<b>594 500</b>	<b>1 115 000</b>
<b>Total GM/TVC/season</b>	<b>3.6</b>	<b>2.8</b>
<b>Net profit/gross margin*100</b>	<b>72.1</b>	<b>64.3</b>
<b>Profit margin/average produce</b>	<b>1081</b>	<b>1093</b>

*Source: Field data*

The findings reveal that this level was more the profitable for urban processors than for rural processors. The implication of the existing disparities between the net margins of the actors in the chain could be explained by the concept of the economies of scale whereby one actor operates on small scale basis while the other operates on large scale. Therefore, the actors enjoy cost advantages differently.

The GM/TVC ratios were 3.6 and 2.8 for operational efficiency, profit efficiencies on return to total capital invested by rural and urban processors were 72.1 and 64.3

implying that total capital invested was fairly managed to generate profits and profit margins were 1081 and 1093Tsh/kg for rural and urban processors respectively.

#### 4.6.3.5 The profit margins at retailing levels

The results in Table 13 indicate that finger millet is sold in two categorical forms (i.e flour and grains) to consumers under rural and urban channels. At these levels, finger millet grains are sold to consumers at the same price of farm gate. However, little quantities of millet grains (i.e 40kg at 360Tsh/g) are sold off to rural consumers. Results further indicate that rural retailers sell finger millet flour at 1600Tsh/kg to rural consumers. They sell an average amount of 550kg/ season to consumers. On the other hand, urban retailers sell finger millet flour at 1800 and 2000Tsh/kg to rural and urban consumers respectively. They sell average amount of finger millet flour of 450kg to rural consumers and 570kg to urban consumers/season.

**Table 13: The results of the profit margins at retailing levels**

<b>Variables</b>	<b>Rural retailers</b>	<b>Urban retailers</b>
<b>Revenue</b>	<b>Tshs and/or kg</b>	<b>Tshs and/or kg</b>
Quantity of finger millet bought (kg)	550.00	570
Average purchasing price kg/season	1500	1 700
Average selling price kg/season	1 600	2 000
<b>Total gross margins/season</b>	<b>880 000</b>	<b>1140 000</b>
<b>Variable costs/retailer /season</b>		
Cost of purchasing finger millet	825 000	969 000
Transporting costs	1 500	30 000
Packing materials	2 000	25 000
<b>Total variable costs/season</b>	<b>828 500</b>	<b>1 001 500</b>
<b>Net margin</b>	<b>51 500</b>	<b>138 500</b>
<b>Total GM/TVC/season</b>	<b>1.2</b>	<b>0.1</b>
<b>Net profit/gross margin*100</b>	<b>5.9</b>	<b>0.1</b>
<b>Profit margin/average produce</b>	<b>94.0</b>	<b>243.0</b>

*Source: Field data*

The GM/TVC ratios were 1.2 and 0.1 for operational efficiency, profit efficiencies on return to total capital invested by rural and urban consumers were 5.9 and 0.1 implying that the total capital invested was fairly managed to generate profits and the profit margins were 94 and 243Tsh/kg for rural and urban consumers respectively. Findings reveal that it is more profitable for urban retailers as opposed to rural retailers in the study area.

#### **4.6.3.5 The profit margins per two actors along finger millet value chain**

The results of paired t-test analysis revealed that profit margins/kg of finger millet significantly varied from one actor to another along the chain in Table 14. The results indicate profit margin difference of 4Tsh/kg of finger millet grains between producers and wholesalers and it was statistically significant ( $P < 0.01$ ). The profit margin difference of producers and rural assemblers was 1.4Tsh/kg and it was statistically significant ( $P < 0.1$ ).

The profit margin difference of rural processors and rural assemblers was 269Tsh/kg and it was statistically significant ( $P < 0.01$ ). The profit margin difference of urban processors and wholesalers was 116Tsh/kg and it was statistically significant ( $P < 0.05$ ). Rural retailers and processors had profit margin difference of 251.5Tsh/kg and it was significant ( $P < 0.05$ ). The results were summarised in Table 14.

**Table 14: The results of t-test analysis**

Actors	n	P.Mgn/kg	Mean	df	Sig.	Mean Dif	95% CI of the Dif	
							Lower	Upper
Producers	77	185.7	2.4026	76	.213	3.5974	-2.3826	7.1878
Wholesalers	13	78	6.0000	12	.000		-7.0729	19.0729
Producers	77	185.7	2.4026	76	0.102	1.4026	-2.3826	7.1878
Rural assemblers	15	15.5	1.0000	14	0.161		-1.1448	3.1448
Rural assemblers	15	15.5	1.00000	14	.331	269.25	-1.1448	3.1448
Rural processors	4	1081	270.2500	3	.000		-589.806	1130.306
Whole salers	13	78	5.2000	12	.112	116.2	-5.9529	16.3529
Urban Processors	9	1081	121.444	8	.0051		-158.606	401.4958
Rural Processors	4	1081	270.2500	3	.0047	251.45	-589.80	1130.3061
Rural retailers	5	94	18.80000	4	.345		-33.39	70.9972
Urban processors	9	1093	121.4444	8	.102	72.8	-158.6069	401.4958
Urban retailers	5	243	48.60000	4	.213		-86.3352	183.5352

\*\*\* Significance at 1%, \*\* Significance at 5%, \* Significance at 10%

The first null hypothesis that there is significant difference in profit margin between one actor to another along the finger millet value chain in the study area was statistically approved. It was therefore established that actors along the finger millet value chain obtained different profit margins/kg.

#### 4.6.4.6 Socio-economic factors influencing farmers' profit margin

Socio-economic factors influencing the profit margin of farmers were analyzed by multiple regression model under SPSS computer program. Of the 77 farmers interviewed, only 58 farmers who sell finger millet were interviewed on factors affecting their margins. The results indicate that the model was statistically significant ( $P < 0.01$ ) and the adjusted  $R^2$  value was 0.945 which implies good specification of model variables. The highest percentage (94.5%) explains great variation of factors estimated in the model with only 5.5% presenting variables that were not included in it. The results show that 5 out of 6 variables were correlated and were found to be significant at different levels. The results indicate further that some variables in the model had positive coefficients while others had negative coefficients. Some variables indicate positive and strong significance levels whereas others reveal negative relationship and levels of significance. The results of regression analysis were summarized in Table 15.

**Table 15: Regression results of factors affecting finger millet the profitability**

Variables	Unstd Coef		Std Coef	t	Sig.
	B	Std. Error	Beta		
Educational level	-0.142	0.082	-0.129*	-1.735	0.085
Selling price	0.134	0.023	0.450***	5.928	0.000
Land size	-8.340	0.473	6.254***	-0.373	0.002
Gender	8.477E-02	0.021	0.306***	4.085	0.000
Household size	-1.502E-02	0.021	-0.052	-0.724	0.470
Market information	7.866E-02	4.377	14.653***	3.347	0.001

R Square = .950, Adjusted R Square = .945 \*\*\* Significant at 1%, \*\* Significant at 5%,

\* Significant at 10%

The regression coefficient of selling price was 0.45. A positive coefficient of selling price implies that an increase in selling price leads to increased profit margin of

farmers. The selling price was statistically significant ( $P < 0.01$ ). Ideally, when farmers sell at higher prices, more profit is fetched from the products being sold.

The results of analysis indicate that gender had a positive coefficient of 0.306. The positive coefficient of gender of the respondents implies positive influence of profit margin of the producers and which was statistically significant ( $P < 0.01$ ). Gender is the dummy variable (1= man, 0= woman). Out of 58 respondents, women were 40 while men were 18 in the interview session. The implication of gender towards the profit concept could be explained by aspects of labour provision in agricultural production because gender balance in agricultural activities plays a key role. Commonly, women take the highest percentage in agricultural produce than men. Therefore, combined efforts in the production could reflect high produce for sale and in return, more the profit can be generated.

The regression coefficient of market information was 14.653 and this was statistically significant ( $P < 0.01$ ). Having a positive coefficient implies that an increase in access to market information results into an increase in the profit margin of the producers/farmers in the study area. Literary, when the producers readily access current market information about market forces in terms of demand and supply, they can be determined how much to supply to the market and at what price. This in turn leads to more profit than would have been the case otherwise.

The coefficient of land size was 6.254. The positive coefficient of land size implies that it was positively correlated to the profit of the producers and was statistically significant ( $P < 0.01$ ). In other words, the positive coefficient for land size could be

explained by the fact that, increase in land acreage would allow increase in production. This is because most farmers have inadequate pieces of land for agriculture and this is one of the limitations of agricultural produce in the study area.

The results of regression analysis indicate that education level of the respondents had negative coefficient of -0.129. The level of education was negatively related to the profit margin of the producers and showed a weak statistical significance ( $P < 0.1$ ). Having a weak significance of the parameter attached to education could be attributed to the reason that in some parts of the study area there were the producers/farmers with no education background but were consistently producing high quantities of finger millet. They were also fetching a lot of money from buyers thus making high the profits. Therefore, farmers can still generate more the profit without necessarily attaining a high level of education. However, education determines how one performs a particular work.

The second null hypothesis which stated that social-economic factors such as, years of schooling, land size, access to market information, gender and selling price do not have significant influence on farmers' the profit margin in the study area was statistically approved.

#### **4.7 Constraints Affecting Finger Millet Supply to Market**

Different challenges were identified in the study area and the results of analysis were summarised in Table 16. Of the 77 farmers interviewed, 36% of the respondents reported on challenges of weather changes, 19% cited poor storage facilities, 14% of

the respondents indicated lack of market information and 30% indicated poor quality of the produce.

On the other hand, out of 43 traders interviewed, 47% of traders reportedly complained about the problem of poor quality of produce, 37% for inadequate storage facilities and 16% of traders reported lack of government support.

**Table 16: The results of constraints affecting finger millet supply to market**

<b>Challenges</b>	<b>Frequency</b>	<b>Percent</b>
<b>Farmers</b>		
Weather changes	28	36
Poor storage facilities	15	19
Poor quality of the produce	23	30
Lack of market information	11	14
<b>Total</b>	<b>77</b>	<b>100</b>
<b>Traders</b>		
Poor quality of the produce	20	47
Inadequate storage facilities	16	37
Lack of government support	7	16
<b>The total</b>	<b>43</b>	<b>100.0</b>

*Source: Field data*

Having the highest percentage of respondents citing weather changes could be attributed to the reason that some parts of the study area experience rapid climate variation (rainfall, temperature, humidity). Ideally, rapid climate changes in volume low levels of rainfall and high temperatures. In the view of the respondents interviewed an increasing aridity and the frequency of droughts due to fluctuations in climate have led to reduced crop yields. The implication is that reduced crop produce has multiplier adverse effects on crop sales which in turn affect the profitability level of the farmers in general.

The findings further indicated that poor storage facilities were a challenge. The respondents reported that they were constrained in terms of packing materials such as bags and stores. Lack of these facilities would result into poor quality of the produce which in turn results into poor prices hence negatively affecting the profit levels of the producers. Quality is very a important factor for price determination. During rainy seasons, farmers need polythene materials for drying and covering the harvested crops and these materials are always expensive.

Most of the farmers and traders in rural areas have limited access to market information. An increase in access to market information results into an increase in the profit margin of the producers/farmers in a sense that current market information about market forces in terms of demand and supply will be known. In the view of the respondents, lack of access to information on how much to supply to the market and at what price result into them to being over exploited due to producer ignorance about the current price.

## **CHAPTER FIVE**

### **5.0 CONCLUSIONS AND RECOMMENDATIONS**

This chapter presents general conclusions in section 5.2 and recommendations based on the findings are presented in section 5.3.

#### **5.1 Conclusions**

Basically, in view of the objectives and the findings of this study, a number of conclusions was drawn. The present study shows clearly that wholesaling and processing are the two effective ways of generating the profits as prices at these two stages were relative higher because value addition was reflected in terms of re-grading, re-packaging and threading.

In relation to socio-economic factors influencing the profit levels of farmers, selling price, land size and gender of the respondents were considered as the most significant factors influencing the profitability of finger millet production in the study area. Weather changes, poor storage facilities and limited access to market information were also the major factors constraining finger milled production and the profitability level of the farmers in general.

#### **5.2 Recommendations**

Based on the major findings of the study, the following are the recommendations drawn towards finger millet the profitability and value chain:

### **5.2.1 Strengthening the existing price and market information system**

Generally, commercial farmers are capable of sourcing price and buyer information from different sources whereas poor farmers rely on other farmers and government extension staff for the same information. Therefore, there is a great need to make information available to farmers at the right time and place. In response to this challenge, it is good to develop an integrated agricultural marketing information system that will be linked to information center, and to government's program.

### **5.2.2 Intervention to increase production and productivity of finger millet**

The quantity of finger millet produced at the farm level affects supply to the market. In addition, farmers are working under limited plots of land without using improved technologies and agricultural inputs. Finger millet in the study area used little inputs (like improved seeds, pesticides and insecticides). Hence, increasing production and productivity of finger millet the unit area of land is a better alternative to increase marketable supply of the millet.

### **5.2.3 Facilitating extension services**

The findings of the study indicate that the government does not do much in the provision of extension service to improve market participation of finger millet. Farmers have to link production with marketing and there is a need to enlighten farmers into producing on the basis of market signals, consumer preferences and to direct on the advice on the proper methods of handling, storing, transporting, and above all improving quality of finger millet.

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## APPENDICES

### Appendix 1: Farmers questionnaire

#### Title: Analysis of Finger Millet Profitability and Marketing Chain in Central Zone of Tanzania: A Case of Singida Rural District

#### A. Respondents particulars

2. Name of interviewer .....
3. District .....
4. Division .....
5. Ward .....
6. Village .....

#### B. Household demographic information

	Response	Codes	
1.1 Gender of farmer		1. Female	2. Male
1.2 Age of farmer (years)			
1.3 Education level of respondent		1. none 2. 1-3 years 3. 4-8 years	4. Secondary 5. Post-secondary 6. Adult education
1.4 Main occupation of household		1. Farming 2. salaried off-farm	3. Self-employed non-farm 4. Other, specify.....
1.5 Is the respondent the household head?		1. Yes	2. No
1.6 If no to Q 1.5 what is the occupation of respondent?		1. Farming 2. Salaried off-farm	3. Self-employed non-farm 4. Other, specify.....
1.7 do you own land		1 yes	2 No
1.8 out of the land you own, how many acres do you use for crops production.			
1.9. Out these how many are used for finger millet			
2.0. do you own a house where you can store your harvest		1. yes	2. No
2.0 Walling material of residential house		1. Brick 2. Stone	3. Earth 4. Other, specify.....
1.10 Roofing material of residential house		1. Grass thatch 2. Iron sheet	3. Other, specify.....

#### C. Finger millet production and utilization for 2009/2010 seasons

Total production (kgs)	Quantity sold (kgs)	Quantity consumed (kgs)	Quantity preserved for seed (Kgs)



- b) Once in a week.  
 c) Monthly: specify number of times in a month ..... Times.  
 d) Once during harvest

11. Is the information you get on price of finger millet grain accurate?

- a). Yes [ ] b) No [ ]

**E. Different marketing channels and pricing for finger millet produced during 2009-2010 cropping season**

Were buyers readily available? (see codes)	Who did you sell to?	What quantities did you sell to each buyer? (kg)	What was the price? (Tshs per kg)	What was the distance to buyer? ( see codes)
	1. Consumer			
	2. Broker/middlemen			
	3. Rural trader/shopkeeper			
	4. Urban grain trader			
	5. Other specify.....			
1. Yes 2. No	5. Other specify .....			1. Farm gate 2. Less than 3 km 3. 3-5 km 4. > 5 km

**G. Major finger millet seed sources and quantities used in 2009-2010 cropping season**

Main source of seed in 2009-2010 (See codes)	Quantity of seed acquired from the source (in kgs)	If outside farm source was it purchased? (codes)	If purchased, price per kg (Tshs)
1. Own saved seed 2. Neighbour 3. Grain trader 4. Relative 5. Other, specify.....		1. Yes 2. No	

**I. Credit scheme**

1. Are you aware of any financial services?

- a). Yes [ ] b) No [ ]

If yes mention them.....

9.1 Do you belong to any credit scheme or group?

- a) Yes [ ] b) No [ ]

9.2 If yes, mention the name of the financial service you belong

Name.....Type .....

9.3 I did you borrowed last season?

a) Yes [ ]

b) No [ ]

If yes; fill in the following table

Name of the organization you borrowed	Amount	Use

**Household sources of income**

1. Do you have other source of income?

a) Yes [ ]

b) [ ]

2. If yes fill the table below

	Amount	Use

***THANK YOU FOR YOUR COOPERATION***

## Appendix 2: Questionnaire for traders along the chain of finger millet

### Section A: The finger millet business

1. Name of the business owner \_\_\_\_\_
2. Mode of ownership of the business
  - a) Individual    b) group        c) state/cooperative    d) others specify \_\_\_\_\_
3. Name of business \_\_\_\_\_
- 4 Date of interview \_\_\_\_\_
5. Location (market/village) \_\_\_\_\_

### Section B. Characteristics of the respondent

Name of respondent	Sex Code A	Education (highest level attained in years) Code B	Position in the business Code C	Years of experience in trading	Years of experience in finger millet trading	Type of trader Code D
	<b>Code A</b> 0 Male 1 Female	<b>Code B</b> 0 None (illiterate) 1 Basic ( can write and read) 2 Lower primary (1-4) 3 Upper primary (5-7) 4 Secondary (9-12) 5 High education (13 -14) 6 College 7 Vocational training 8 Not applicable 9 Other, specify	<b>Code C</b> 1 Owner manger 2 Hired manger 3 Other(specify)...			<b>Code D</b> 1 Wachuuzi (rural assembler) 2 Middleman 3 Urban wholesaler 4 Urban retailer 5 Exporter 6Other, specify.....

11. What is the operation mode of your business?    0 Part time                      1 Full time

12. Number of permanent employees (in full time equiv./year) \_\_\_\_\_;

13. Total amount spent on salaries per month (Tsh) \_\_\_\_
14. Licensed business enterprise?    1 Yes            0 No
15. How did you obtain start-up capital?  
 a) Own saving from other activities    b) informal money lenders    c) bank loan    d) others, specify \_\_\_\_\_
16. How much capital did you use to start your enterprise?  
 a) Below Tsh. 100,000                      b) between Tsh. 100,000-500,000  
 c) Between Tsh 500,000-1,000,000    d) above Tsh 1,000,000
17. Please, fill the table below as it pertains to your grain business starting with finger millet (2009/10 cropping season)

Crop	Amount purchased (indicate if kg or mt)

18. Number of your established buying points within the district  
 .....
19. Number of your established buying points outside the district  
 .....
20. Number of your established selling points within the district  
 .....
21. Number of your established selling points outside the district.....
22. How many traders on this market deal with finger millet? \_\_\_\_\_
23. What is your market share (%) for finger millet on this market? \_\_\_\_\_
24. Which finger millet products besides grain are available on this market?

**Section C: Business assets owned by the trader**

Assets	For assets owned		Asset rented		Asset used for other enterprises besides finger millet (1=Yes; 0=No)
	No	Assets (in its current state)	Monthly rental value	No	
Office					
Warehouse/store					
Telephone (land line)					
Telephone (mob)					
Weighing scale					
TV					
Radio					
Truck					
Bicycle					
Other:					

2. Kindly indicate your yearly costs in Birr per item

a) Internet charges      b) Newspaper      c)

Advertisement \_\_\_\_\_

**Section D: Agri-business support services**

1. Do you have access to the following information from different service providers?

(Fill the table below)

<i>Information aspect</i>	<i>Access information (1=Yes; 0=No)</i>	<i>If yes, from whom</i>	<i>Satisfied with the information (1=Yes; 0=No)</i>
Farmers' production costs			
Good storage practices			
Grading and labeling			
Domestic market			
Prices			
Quality standards			

7. Is there any other type of information you wish you had access to?

---



---

8. Did you ever get any training on finger millet trading?      1 Yes      2  
No

9. If yes in above question what kind of training did you get?

a) Training on processing      b) grading and quality assurance      c) both 1 and 2

d) Others specify.....

10. How did you get trained?

a) Formal training      b) informal training

11. Did you access any credit last year for your finger millet?

a) Yes

b) No

12. If **Yes** in Q11 above, please fill the table below

Source of credit <b>Code A</b>	Purpose used	Amount borrowed (Tsh)	Interest rate (% per year)	Paid back (1=Yes; 0=No; 2=Partially)

**Code A**

- a). Commercial banks      d). Other, specify.....  
 b).Rural microfinance  
 c). SACCOS

13. If No in Q 11 above, why did you not borrow?

**SECTION E: Quality and Purchase**

1. Traits that you consider as important for quality of the grains (Rank 1 = most important)

Quality characteristics	Ranking	Quality characteristics	Ranking
Grain color		Processing quality for specific purpose	
Grain size		Taste	
Uniformity in color/size		Place of origin	
Insect damage		Storage quality	
Storage pest		Pure variety	
% of foreign matter (purity)		Others (specify)	
Moisture content			
Smell			

2. When buying finger millet in bags, how much kg are in one bag?

\_\_\_\_\_



6. What are the major problems of getting supplied with the best sorghum/finger millet quality?

.....  
 .....

8. In which month is the most supply and in which month is the least supply of finger millet?

.....  
 .....

9. What price in Tsh/kg do you pay in month with most supply and in month with least supply?

.....  
 .....

10. For what price in Tsh/kg do you sell the crops in month with most and with least supply?

.....  
 .....

11. What are your major problems in purchasing finger millet?

.....  
 .....

12. What are possible solutions to overcome these problems?

.....  
 .....

**Section F. Post harvest handling, storage packaging and cleaning of finger millet**

**Do you do any post-buying activities other than transport, cleaning?**

Post harvest activities for finger millet <b>Code A</b>	If storage,,for how long? <b>(months)</b>	If storage, method of storage <b>Code B</b>
<b>Code A</b> 0 None 1 Cleaning 2 Grading 3 Repacking 4 Storage	<b>Code B:</b> 1=Packed in bags without any treatment 2=Chemical treatment 3=Regulating temperature/humidity 4=Others (specify),.....	

5. Dehulling 6 Milling 7 Other, specify,.....	
---	--

**Section G: Selling**

1. How many kg of finger millet are in a bag that you are selling?

\_\_\_\_\_

3. Do you think your buyers are satisfied with the quality you provide them? Kindly give reasons for your answer.

1 Yes, \_\_\_\_\_

0 No, \_\_\_\_\_

4. What has been the trend of finger millet quality required by your customers?

Kindly give reasons for your answer.

a) Increasing                      b) Constant                      c) Decreasing

Reason:

\_\_\_\_\_

5. What are your major problems in supplying the quality standards demanded by your

customers.....

**Section H: Challenges**

1. Which are the most serious problems in your enterprises?

(a) Problem related to the government policy

(i) Very high tax rate

(ii) Difficult in obtaining licenses

(iii) Unnecessary by laws formulated by local government

(iv) Illegal importation of processing parts

(v) Lack of government effort to support processors

(vi) Others, specify \_\_\_\_\_

(b) Problems related to marketing system

- (i) lack of sales promotions and advertisement
- (ii) lack of market
- (iii) unprofitable compared to other activities
- (iv) other, specify \_\_\_\_\_

(c) Personal problem

- (i) Insufficient working capital
- (ii) Lack of business knowledge
- (iii) Other, specify \_\_\_\_\_

2. Please suggest solutions for the above problems:

- (i) Government policy problems

\_\_\_\_\_  
\_\_\_\_\_

- (ii) Personal problems

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- (iii) Marketing system

problems \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Section I: Trends in the finger millet business transactions**

1. Has your finger millet business increased (grown), decreased or remained constant over time? (Tick appropriately) *Increased* \_\_\_\_\_

*Decreased* \_\_\_\_\_ *Constant* \_\_\_\_\_

2. Please give reasons for your above answer. \_\_\_\_\_  
\_\_\_\_\_

3. How do you expect your finger millet business to develop in the coming three years?

(Tick appropriately) *Increased* \_\_\_\_\_ *Decreased* \_\_\_\_\_ *Constant* \_\_\_\_\_

4. Please give reasons for your answer above

---

5. Please, fill the table below concerning your average annual purchases in different seasons as determined by the weather conditions.

<b>Season</b>	<b>Average annual purchase in metric ton</b>
Good weather conditions	
Average weather conditions	
Bad weather conditions	

***THANKS VERY MUCH FOR YOUR COOPERATION***

**Appendix 3: Questionnaire for Finger Millet Processors**

**Finger Millet Processing in Tanzania**

**Section A: Background Information**

1.0 Name of the company .....

1.1 Name of the respondent (optional)  
.....

1.2 Title of the respondent  
.....

1.3 Contacts:  
Town/City .....  
Market .....  
District.....  
Cell.....E-mail: .....

1.4 Licensed business enterprise                      1 Yes                      0 No

1.5 No. of permanent employees \_\_\_\_\_

1.6 No. of temporary employee's \_\_\_\_\_

Weeks per year and person working in the business \_\_\_\_\_

1.7 No. of family members working permanently in the business \_\_\_\_\_

**Section B: Company profile**

2.0 Briefly explain the role of your [company/your business in the grain sector  
(e.g. miller, miller and trader of flour, etc.)  
.....  
.....  
.....

2.1 For how many years have you been in the grain processing sector?  
.....

2.2 How many of these have been in finger millet processing? .....

2.3 Did you get any support when establishing your business?



**Section C: Information about the milling business**

3.1 Who are your major customers for the milling service for finger millet? (e.g. farmers, urban consumers, restaurants, etc.)

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 .....  
 .....

3.2 From which areas do your customers come from (nearby villages, this city, etc.)

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

3.3 How much do customers have to pay for milling one kg of grain from the following crops and how is the grain – flour ration (e.g. 1 kg grain equals 0.75 kg flour). Kindly add crops that are important for your business, but missing in the list.

<b>Crop</b>	<b>Price for milling one kg in TSh</b>	<b>Milling ratio</b>	<b>Crop</b>	<b>Price for milling one kg in TSh</b>	<b>Milling ratio</b>
Finger millet			Rice		
Sorghum					
Maize					
Wheat					

3.4 Did the quantity of finger millet that you process decrease/increase or remain constant in the last 5 years? Kindly give reasons for your answer.

.....  
 .....

3.5 Do you expect a decrease/increase or stable quantity of finger millet that you process in the next 3 years? Kindly give reasons for your answer.

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.....  
.....

3.5 What do you see as the barriers to a vibrant sorghum and finger millet sub-sector?

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**Section C: Procurement of finger millet**

3.1 Who are your major suppliers for finger millet (e.g. brokers, farmers, farmer groups, etc.)? Kindly start with the most important one and provide number of suppliers where possible.

.....  
.....

3.2 Where (which villages/towns, etc.) does your raw material come from (if possible provide information the % share of produce coming from that village/town, etc.)?

Village/town	% share of product

3.3 Did your demand for the crops decrease/increase or was it constant in the last 5 years? Kindly give reasons for your answer.

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.....

3.4 If you buy in bags, how many kg finger millet are in one bag? \_\_\_\_\_

3.5 Kindly describe briefly your business model with your major suppliers (e.g. contract, informal arrangement, spot market transaction, etc.).

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.....  
.....

3.6 Have you ever tried contracting farmers directly for supply? If yes, kindly share your experiences (kind of contract, how did it work, do you still contract farmers, etc.)

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.....  
.....

3.7 What are the quality criteria for your suppliers (e.g. colour, purity, etc.)?

.....  
.....

3.8 Are you satisfied with the quality that your suppliers deliver? Kindly explain your answer.

.....  
.....

3.9 Do you have different grades for the crops? If yes, kindly provide names and specifications for the grades.

.....  
.....

3.10 In case you have different grades do you pay different prices per grade? If yes, kindly provide prices per grade and bag.

.....  
.....

3.11 In case you do not have different grades:

a) What is your price per bag? .....

b) Would you be willing to pay a price premium for especially good quality? If yes, kindly describe which price premium you would pay for which quality upgrade (e.g. 10% price increase for pure variety).

.....  
.....

3.12 In which month is the most supply and in which month is the least supply of finger millet?

.....

3.13 What price do you pay in month with most supply and in month with least supply per bag?

Most supply: .....

Least supply.....

3.14 What are your major procurement challenges?

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

3.15 What could be solutions to overcome your procurement challenges?

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

3.14 Do you plan to decrease/increase or have the same demand for finger millet over the next three years? Kindly give reasons for your answer.

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

**Section D: Processing**

4.1 Which types of finger millet flour do you produce? (e.g. pure, mixed with in case of mixed kindly provide the ration, e.g. 50% finger millet and 50% maize). Kindly start with your most important flour.

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.....

4.2 Kindly describe your processing procedure for finger millet (e.g. milling at the own mill or at milling shop; packing – how, where, etc.)

.....  
.....

43. Kindly list the costs in Tsh/bag of 100 kg finger millet grain that occur in during processing (e.g. Transport, Storage, Cleaning, Milling, etc.)

Loading cost	Transport cost	Off-loading cost	Handling and processing cost							
			Cleaning costs	Cleaning loss per bag of 100 kg grain	Warehouse costs/rent storage room	Storage loss per bag of 100 kg grain	Milling costs	Packaging costs	Other costs, specify	Other costs, specify

43b. What are your major challenges in processing finger millet?

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4.3 What solutions/recommendations do you propose?

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**Section E: Output markets for sorghum and finger millet**

5.1 Who are the major buyers of your finger millet products? Kindly start with the most important one.

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5.2 Where do you sell your finger millet products?

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.....

.....

5.3 Do your buyers have any quality requirements? If yes, kindly explain which.

.....  
.....

5.4 Kindly describe briefly your business model with your buyers, if any (e.g. written contract, informal arrangements, spot market transaction, etc.).

.....  
.....

5.5 What are your selling prices per kg for your three most important finger millet products?

- 1) .....
- 2) .....
- 3) .....

5.6 Is there enough demand for all your finger millet products? Why?

.....  
.....

5.7 Do you know any other processors for finger millet flour? Please name them.

.....  
.....

5.8 What was the change of market demand for your finger millet products in the last five years (increase/decrease/stay constant)?

.....  
.....

5.9 How do you see the future market demand for your finger millet products (increase/decrease/stay constant)?

.....  
.....

5.10 Which major challenges do you face in the marketing of your finger millet

products?

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.....  
.....

5.11 What solutions/recommendations do you propose to overcome the challenges?

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**Section F: Market information systems for sorghum and finger millet**

6.1 What kind of information do you look for? (e.g. potential markets, prices, etc.)

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.....

6.2 What are your main sources of information? Kindly give answers according to the information you are looking for. E.g. price information: daily newspaper.)

.....  
.....

6.3 What other type of market information do you wish you had access to?

.....  
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6.4 What kind of support should the government give to the finger millet sub-sector?

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.....

6.5 How could research institutions support the finger millet sub-sector?

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.....

6.6 What do you see as the barriers to a vibrant finger millet sub-sector?

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**THANK YOU,**