

**ECONOMIC ANALYSIS OF ORGANIC FARMING IN TANZANIA: A
CASE STUDY OF SMALLHOLDER COFFEE PRODUCTION IN MULEBA
DISTRICT.**

BY

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
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ABSTRACT

This study analysed the economics of small holder organic farmers in Muleba district. Specifically the study was conducted to identify the costs associated with organic and conventional coffee production, to assess profitability of the two farming system and to determine the effect of premium price in compensation of yield in organic coffee. The study also addressed the coffee organic standard demanded by importers. Multistage, purposive and simple random sampling procedures were employed for the selection of 100 respondents among which 50 farmers were organic coffee producers and 50 farmers were conventional coffee producers. The results showed that there was no statistically significant difference in costs associated with production of organic coffee and conventional coffee, especially as it was observed in labour costs and fixed costs. However there was statistically significant difference in average variable costs of the two farming system which was attributed by high marketing costs for organic coffee of about 58% higher than that of conventional coffee. Farm enterprise budget indicated that profit obtained from hulled conventional coffee exceeded those obtained from hulled organic coffee. Organic conversion in Muleba district was associated with increases rather than reductions in yield which relates to the low input characteristics of conventional farming in the district. With the premium price of 1 800 Tsh/kg offered to organic farmers and increase in yield, organic farmers were expected to be profitable, but due to high total variable costs observed organic farmers obtained less profit. From these findings it is recommended that deliberate efforts should be made to assist farmers to access training and extension services in order for them to

correctly appraise their investments. If this is done and they are enabled to access credits and farm implements loans it will help them to realise higher net returns.

DECLARATION

I, Beatrice Bachwenkizi, do hereby declare to the senate of Sokoine University of Agriculture that this dissertation is my own original work and that it has not been submitted for a degree award at any other university.

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Date

The above declaration is confirmed

Prof. Mbiha, E.
(Supervisor)

Date

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LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	-	Acquired Immune Deficiency Syndrome
ARDI	-	Agricultural Research and Development Institute
BACAS	-	Bureau for Agricultural Consultancy and Advisory Service
EPOPA	-	Export Promotion of Organic Products from Africa
GDP	-	Gross Domestic Product
HIV	-	Human Immune Virus
ICO	-	International Coffee Organization
IFOAM	-	International Federation of Organic Agricultural Movements
IMO	-	Institute for Marketecology
ISO	-	International Organization for standardization
MT	-	Metric Tons
NBS	-	National Bureau of Statistics
NGO	-	Non Governmental Organizations
UNCTAD	-	United Nations Conference on Trade and Development
UNEP	-	United Nations Environment Programme
URT	-	United Republic of Tanzania

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Organic agriculture is a holistic production management system whose primary goal is to optimize the health and productivity of interdependent communities of soil, life, plants, animals and people (Codex Alimentarius, 2001). Similarly, the International Federation of Organic Agriculture Movements (IFOAM) defines it as a whole system approach based upon sustainable ecosystem, safe food, good nutrition, animal welfare and social justice. Organic production therefore is more than a system of production that includes or excludes certain input (IFOAM, 2002). In this study organic agriculture refers to agriculture that meets organic production standards and is subject to organic inspection, certification and labeling. Conversely, the term conventional farming is referred to as a system which employs a full range of pre- and post-plant management practices, synthetic fertilizers and pesticides.

Standards serve as a basic guide for organic producers in designing, managing and operating their farms or processing units (UNCTAD, 2004). Initial organic production requires that there is a conversion period or time that a farm has to use organic production methods before it can be certified, usually 2-3 years (EPOPA, 2006). Certification and labeling are an intrinsic part of organic production and particularly important when producing for commercial market. Labeling and certification can take place according to local, national and international standard (Codex Alimentarius, 2001).

In developed countries organic farming is driven by market forces and policy interventions with regard to regulations on food safety and standards. As incomes and education of population increase consumers tend to become more health conscious thus creating a market niche for organically grown agricultural produce (Calo et al., 2005). Demand for organic produce is higher in income countries while labour intensive organic production is undertaken in developing countries where farm labour is cheaper (UNEP-UNCTAD, 2006). As elsewhere in Africa organic farming is a new trend in Tanzania but gradually gaining momentum. Tanzania is estimated to have 991 organic farms with a total of 5 155 ha. Uganda has 28 200 farms with a total of 122 000 ha. IMO and Naturland are the major certification bodies of organic farming in Tanzania (EPOPA, 2004).

Among the more prominent organic products is coffee. Coffee is grown almost entirely in the developing world, mostly by small scale producers. Since 1989, coffee has suffered of depressed prices with producers often receiving less for their beans than it cost to produce them. The decline in world market prices of conventional coffee export has led to exporters to seek non-traditional market niches that are ready to pay more for quality. The price premiums in these niche markets may offer a way out of the price decline crisis (Calo et al., 2005).

Coffee is Tanzania's largest export crop. It contributes approximately \$115 million to export earnings, and provides employment to some 400 000 families. It is often intercropped with food crops such as banana and maize. About 95% of coffee is grown by smallholders on average holdings of 1-2 hectares, and 5% is grown on

estates. Only a quarter of smallholders use purchased inputs. Arabica and Robusta are types of coffee grown in Tanzania. Arabica is grown in Arusha and Kilimanjaro regions of the north and Mbeya and Ruvuma regions of the south. Robusta is produced in Kagera region (BACAS, 2005).

Coffee farming dependency in Kagera region is very much pronounced whereby 202 370 households depend on coffee as their major source of income. EPOPA (2004) reported that, typical land holdings are very small in the region. On average a household has 2.4 acres of land, of which 1.6 is cultivated. Two local rural cooperative societies Ibwera in Bukoba rural district and Kachwezi in Muleba district produce organic coffee for export through Kagera Cooperative Union under EPOPA programme support.

Motivation behind organic farming is the premium price paid by consumers, which is transmitted back to growers by companies marketing organic products. Price premium are important incentives for many farmers to shift to certified organic production (UNCTAD, 2004). According to EPOPA (2004) certified organic produce fetches a premium price, which is 15-40% higher than that of conventional crops. In general, price premiums to organic producers should compensate for lower net returns to farming influenced by a management system that tries to minimize environmental costs.

1.2 Problem Statement and Justification

In Kagera region coffee has been the most important and traditional cash crop. Coffee serves as the source of income for about 70 000 families, more than a third of the families in Kagera depend on the crop for existence (NBS, 2003). In the last 5 years, the current prices of coffee in Kagera have been dropped from US\$ 0.30 to the current US\$ 0.09 per kilogram (Kaiza et al., 1999). This is equivalent to 322% drop in price. Figure 1 evidently shows that there was declined trend of conventional coffee prices compared to organic coffee prices in Kagera region. Prices do fluctuate depending on the supply and demand in the world market. Reasons given for fluctuations of prices in the world market are overproduction caused by improvements in coffee processing, cultivating technologies and the entry of new coffee producing countries in the global market (Mhando, 2005).

Although Kagera is a major coffee producing area, farmers have had problems making a living from coffee production due to low volumes, low and fluctuating market prices. The low remuneration has discouraged young people from being involved in producing it (Wietheger, 2005). In order to improve and receive the economic worth of coffee; farmers' alternative approaches like organic farming may be inevitable.

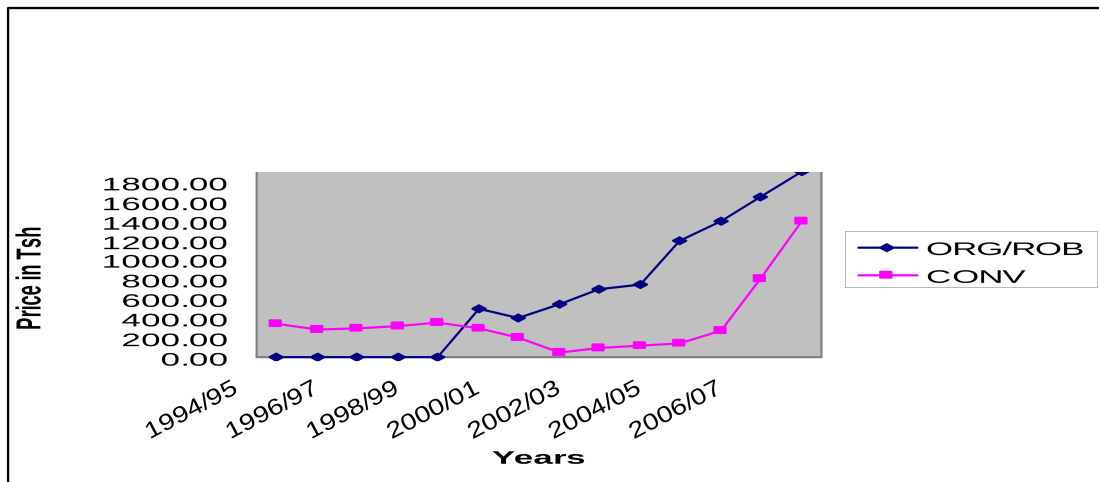


Figure 1: Price trend of conventional and organic coffee in Kagera region from 1994/95-2006/07

Source: Tanzania Coffee Board (2007).

Efforts to diversify and/or switch to alternate crops and enterprise have been observed not only in coffee but also in a range of cropping systems in the country. In realization of this trend and the resulting impact on agricultural livelihoods, there has been a number of facilitating interventions to improve farmers' income. In Kagera region a notable intervention is that of Export Promotion of Organic Product from Africa (EPOPA) which in collaboration with KCU has played a big role in developing production of organic coffee. Organic products realize higher prices than products from the conventional system. This premium price is the main incentive to farmers apart from the overall goal of promoting sustainable agriculture.

Organic coffee production is useful for crop diversification and rural poverty reduction. Many studies have been done to provide better understanding of organic coffee sub-sector. Study done by Gibbon et al. (2007) focus on the economics of certified organic farming in tropical Africa while Lyngbacaek et al. (2001)

concentrated on productivity and profitability of organic versus conventional coffee in Costa Rica, they found out that organic farmers generated significant higher net income relative to conventional farmers. However, no detailed data on costs were provided by the studies. In Tanzania many studies have addressed only conventional coffee production and marketing. For example Temu (1999) addressed the coffee market under liberalization in northern Tanzania where as a study carried out by Mhando (2005) looked at the coping strategies with the changes of coffee marketing system after economic liberalization in Mbinga. They found out that farmers tried various strategies such as expansion of fields, diversification of income sources, and utilization of coffee income for other activities and minimization of agro-chemicals to cope with policy changes within the context of their natural and social environment, while making the best use of their experiences with the market economy. Oversupply keeps prices stagnant while the prices of inputs keep rising.

Also BACAS (2007) in Kagera addressed the coffee marketing system, and found out that there was a smuggling of Kagera coffee into Uganda which was attributed by higher prices offered by Ugandans, timely payment and no quality consideration. It is assumed that the existence of organic premium prices lead to higher profitability. However none of these studies have documented the comparative profitability of organic and conventional systems in Tanzania. This study aims to document comparative costs and profitability of the two systems.

1.3 Objectives

1.3.1 General objectives

The overall objective of this study is to assess the economics of organic coffee production in Muleba district.

1.3.2 Specific objectives

- i. To identify costs associated with production and marketing of organic coffee.
- ii. To assess the profitability of organic coffee by determining the cost and return to farmers.
- iii. To determine the effect of premium price in compensation of low yield in organic coffee.
- iv. To identify coffee organic standards demanded by importers and their effect on coffee production.

1.4 Hypotheses

Organic farming system is characterized by several industry and trade policy conditions, in form of standards, certification and accreditation (UNCTAD, 2004; Envirocare, 2006). The required organic standards in production, marketing, labelling, inspection, certification (third party) and multiple accreditation requirements have implicit and explicit costs in time and money born by a farmer. Based on this aspect, it is hypothesized that:-

- i. The cost associated with production and marketing of organic coffee farming is higher than with conventional coffee farming.
- ii. Organic coffee are more profitable than conventional coffee
- iii. Organic coffee price premium do not compensate for reduced yield.

1.5 Organization of the Dissertation

This dissertation is organized into five chapters including this introduction. Chapter two is a review of relevant literature. Chapter three describes the theory and methodological framework. Chapter four gives the major findings and discussion of the study. Finally chapter five evaluates and presents the economic implications of organic coffee production of smallholder farmers and summarizes concluding remarks and recommendations.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Overview

Most farmers in Tanzania practice low input agriculture, otherwise known as traditional farming. A number of interventions to introduce the use of industrial fertilizers, pesticides and hybrid seeds have been made. Government also uses subsidies to speed up early adoption of the use of these agricultural inputs. The use of these inputs leads to rapid production response. However, with the passage of time, productivity usually declines due to among other things, overuse of these agricultural inputs (UNCTAD, 2004). This has been well documented in a wide range of green revolution literature in Asia. In the case of Tanzania the use of industrial fertilizers and pesticides did not reach saturation points. Reduction in use of these inputs however slowed due to rising prices after trade liberalisation (UNEP-UNCTAD, 2006).

Major objectives of organic agriculture include improving soil fertility, quality and enhancing biodiversity on the farm, in both time and space. These aims are integrated with the farmer's primary objective of operating a viable farm. Organic agriculture offers opportunities to adopt appropriate and sustainable approaches to farming (IFOAM, 2006).

Certified organic produces in Tanzania include the following: honey, pineapple, coffee, cashew nuts, turmeric, cocoa, ginger, tea, cotton, and spices. These products

have been certified as organic by external certifiers such as IMO, Ecocert, KRAV, Soil Association and bioinspecta (Envirocare, 2006).

NGOs and crop exporters are advocating farmers to adopt organic farming practices. Some of the organizations promoting organic farming in Tanzania include Mbozi Agricultural Development programme (ADP), Isangati Trust Fund in Mbeya, Dodoma based Participatory Ecological Land use Management (PELUM), Kilimanjaro Agriculture Training Centre (KATC), Inades Tanzania, Sunnhemp seed bank, Tanzania Organic Foundation (TOFO), Envirocare, Board of External Trade (BET), Tanzania Chamber of Commerce, Industry and Agriculture (TCCIA), Tanzania Association of Women Leaders in Agriculture and Environment (TAWLAE), Tancert, and Tanzania Organic Agriculture Movement (TOAM). Other promoters are Society of organic farming in Tanzania, Kilimo Hai Tanzania (KIHATA), Tanzania farmers groups network and Uluguru Mountains Agricultural Development Project (UMADEP) (Envirocare, 2006).

2.2 Organic Standard, Certification and Accreditation

2.2.1 Organic standards

Standards play a key role in promoting the growth of organic agriculture. Standards serve as a basic guide for organic producers in designing, managing and operating their farms or processing units. Important international standards and guidelines, as well as national standards, includes IFOAM Basic Standards, Codex Alimentarius Guidelines, European Union organic standards and United States organic standards. According to IFOAM, the basic standards reflect the current state of organic

production and processing methods. Similarly, the Codex Alimentarius Commission considers its guidelines as a first step into official international harmonization of the requirements for organic products in terms of production and marketing standards, inspection arrangements and labeling requirement (UNCTAD, 2004).

IFOAM Basic Standards (IBS) are developed by the IFOAM Standards Committee (SC) in close cooperation and consultation with the IFOAM member organizations and other interested parties. Basic standards have been developed for example for crop production, animal husbandry, aquaculture production, food processing and handling, processing of textiles and forest management, including non-timber forest products (IFOAM, 2006).

The Codex Alimentarius Commission has developed guidelines for the production, processing, labeling and marketing of organically produced goods. These Codex guidelines apply to plant products, livestock products, handling, storage, transportation, processing and packaging of items (Codex Alimentarius, 2001).

The European Union Council Regulation No. 2092/91 on organic production and labeling entered into force on 22 July 1991. The Regulation covers the production, processing, labeling and inspection of agricultural products and foodstuffs from organic agricultural production. Recently it was amended (Regulation No. 1804/1999) to harmonize the rules for organic production of the main species of animals (e.g. their origin, feed, veterinary care and environment) and also to harmonize the labeling and inspection standards (UNCTAD, 2004).

In the United States, the Organic Foods Production Act (OFPA) of 1990 required the United States Department of Agriculture (USDA) to develop national standards for organically produced agricultural products and to establish an organic certification programme, based on recommendations of the National Organic Standards Board (NOSB) (IFOAM, 2006).

In Tanzania the NGO PELUM plays part in developing a simple standard for the local Tanzania market and a standard for the export market production sector. There is also the Tancert Organic standard, which is intended for the export market. Tancert Organic standard is similar to the Uganda Organic standard and they are both based on the IFOAM Basic standard (UNEP-UNCTAD, 2006).

2.2.2 Organic certification

The certificate is a written guarantee by an independent certification agency that the production process or the product complies with certain standards established by certain organizations or countries (EPOPA, 2006). These certification standards can focus on environmental issues such as soil conservation, water protection, pesticides use or waste management or on social issues such as producer income, worker's rights, occupational health and safety. Complying with these standards can contribute to the protection of local resources, improve the health of workers, and provide other benefit for producers, consumers and farming communities (IFOAM, 2006).

There are two ways of assuring consumers that the foods they are purchasing are organically produced, and these are the producer's personal guarantee (that does not involve certification), and the other is third- party certification, a system by which conformity to applicable standards is determined and confirmed by a third- party or an independent body. These check whether farms have produced according to organic principles, as defined in a specific set of standards. Certification for organic agriculture primarily refers to a production system or production method. In other words, it is the process that is certified and not the product (IFOAM, 2002).

Basic requirements for certification of organic products can be summarized as follow at least one full inspection per year, full implementation of the relevant standards, conversion period to be followed, no parallel production, sustainable production system, identification of product flow and audit procedure and clear management responsibilities (Bächi, 2001).

A certification programme is carried out by agencies that could be private companies, NGOs, government or farmer-based organizations, or multiparty associations. In Tanzania organic certification has taken place since the mid-1990s. Currently there are four foreign organizations offering certification in the country and these are IMO, EcoCert, Bio Inspecta and the Soil Association. Also Tancert as a local certification organization certifies production according to the Tancert Organic standard (UNCTAD, 2004).

2.2.3 Accreditation

National accreditation is sufficient for the domestic market but international accreditation is necessary for certifiers whose clients want to access foreign markets. The IFOAM Accreditation Programme provides for accreditation of certifiers on the basis of the IFOAM Basic Standards and the IFOAM Criteria for Accreditation. The programme was developed in accordance with ISO guidelines for conformity assessment (IFOAM, 2005).

Differing standards for organic production and multiple accreditation requirements for certifiers have resulted in barriers to trade and duplicate costs for organic farmers, processors, and certifiers. Duplicate certifications have become necessary because different governments are requiring imported products to be accredited through their national systems. Establishing bilateral mutual recognition agreements is one way to reduce this problem. However, so far governments have established no such agreements (Vaupel, 2001).

2.3 Contract Farming in Organic Production

Eaton and Shepherd (2001) defines contract farming as an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forward agreement, frequently at predetermined prices. The contract- based nature of organic farming in tropical Africa produces a series of potentially confounding variable to the study of relative profitability. There are two separate types of contract, one between agencies providing financial and other types of support and an exporter. The second type is between exporter and a group of

smallholder producers. This requires farmers to follow organic farming methods and promises to organize and pay for certification and farmer training in organic farming methods and to purchase organic produce at a premium. It may also promise that farmers will be supplied on credit with specified (organic) inputs, and/ or it may require farmer's conformity to quality criteria over and above basic organic requirements before premiums are triggered (Gibbon et al., 2007).

In Muleba district KCU in collaboration with EPOPA project have contracted farmers to produce organic coffee for export. EPOPA project has registered 3 500 farmers in both Ibwera and Kachwezi primary society as project participants. EPOPA is providing technical support to farmers interested in supplying high quality organic coffee to KCU (Ng'homa and Ndege, 2002).

2.4 The Economics of Organic Farming

Discussion on the economics of organic agriculture has normally focused on the trade off between declining yields and increased labour requirements and savings on expenditure of synthetic inputs and gains from premium price. The study done by (Henning et al., 1991; Lampkin, 1994; Padel and Zerger, 1994; Padel and Lampkin, 1994a; Nieberg and Offerman, 2003) finds lower yields in a range of 15-60%, depending on crop and country, increased commitments of labour in a range between 20-100% and lower non labour costs in a range between 50-60% per hectare as well as higher unit prices averaging around 33%. A common conclusion drawn from these studies is that price premiums and lower variable costs compensate for reduced

yields to give similar gross farm margins, which when combined with similar fixed costs result in similar net farm incomes.

In tropical countries few studies of economic aspects of organic farming have been published and those studies mostly reported farm-level data on prices, yields and on net income. No detailed data on costs were provided by any of the studies. In the study of coffee in Mexico (Bray et al., 2002; Van der Vossen, 2005), coffee in Costa Rica (Lyngbacaek et al., 2001) and coffee in Nicaragua (Bacon, 2005) they both found out that premium prices were ranging between 19% and 50% over conventional price. In the studies involving comparisons between organic and apparently high synthetic input based conventional coffee production in Costa Rica and Mexico, Lyngbacaek et al. (2001) and Van de Vossen, (2005) find out that organic farmer's yields were respectively 22% and 43% lower than conventional ones. Only Bray et al. (2002) described organic yields of 15% higher than conventional ones. Data on net income was reported by both authors whereby organic farmer's net income was 44% lower than conventional ones.

Organic conversion in tropical Africa is associated with increases rather than reduction in yield. The absence of yield loss relates to the low-input characteristics of conventional farming on the continent. Thus a few costs are likely to be higher in Africa than in developed countries (Gibbon et al., 2007). Organic farming in tropical Africa is more likely to be of greater relative profitability than that in developed countries. Components of conversion cost relating to a number of conversion-related shocks should disappear, since conversion requirement are reduced, while the price

premium should remain. Certification and training costs may not seem prohibitive in absolute terms, but in the tropical African context of generally small average farm size and very low average income, they may present huge barriers to entry (Gibbon et al., 2007).

2.5 Organic Coffee Production

Organic coffee is experiencing the most rapid growth, estimated at 12-20% per year, leading to a doubling of the market every 5 to 6 years. Projections for 2007 indicates continued growth likely into double digits but much more than in 2006 (Giovannuci and Villalobos, 2007). Estimates suggested that demand was still outstripping supply of certified organic coffee. In part, this was due to the spectacular growth in the world retail market for organic foods, as consumers placed increasing value on the protection of health and environment (Giovannucci and Koekoek, 2003).

The global production of organic coffee for export for 2 000 was estimated to be about 12 000 tones, and for 2001, about 30 000 tones. Roughly 50% of the world supply of organic coffee is produced by small farmers' organizations which are members of Fair Trade Labeling Organization (FLO). The other half of the world production is supplied by small farmers' organizations which are not FLO registered and by private small, medium and large-scale farmers not belonging to Fair Trade programme (ICO, 2004). Mexico is the largest exporter of organic coffee. Each year, more than 100 000 kilogramme sacks of organic beans are produced on 15 000 hectares. Nearly all of this production comes from 11 590 producers organized in cooperatives (Bray et al., 2002). About 4% of all coffee producers and 2% of all

coffee land area is involved in organic production. Brazil, Vietnam, Colombia, Cote d'Ivoire, and Mexico are the five major producing countries for organic Robusta coffee in 1999/2000; In Africa countries producing organic coffee are Ethiopia, Kenya, Madagascar, Burundi, Tanzania, Rwanda, Togo, and Uganda. The potential sales for organic coffee represents a small fraction, globally about 0.5% of all coffee produced thus, regarded only as niche market product (ICO, 2005).

2.5.1 Organic coffee: Agro ecological context

Coffee originates from the subtropical forest eco-system of the Ethiopian high lands, where it grows under the shade of a variety of trees in rain region. The coffee plant belongs to the family of rubiaceae, economically the most important coffee varieties are coffee Arabica called Arabica and coffee canephora called Robusta. In comparisons with Arabica, 30% higher yields are gained from Robusta; although the price is around 30% lower (IFOAM, 2002).

Traditional coffee cultivation, which is practiced by small and medium sized farms, re-creates coffee original growing condition of organic coffee. Coffee plants prefer well-drained and airy soils. They can grow in shallow ground, due to their network of surface roots. The ideal temperature range for arabica coffee plants lies between 18°C and 24° C. At higher temperatures, bud formation and growth are stimulated, but the greater proliferation of pests increases the risk of infection, and quality sinks. Coffee plants are susceptible to frost, temperatures below 10° C inhibit growth. Robusta plants can withstand higher temperatures, and are more resistant against

infection the ideal amount of rainfall lies between 1 500 mm and 1 900 mm. Irregular rainfall causes uneven blossoms and fruit maturity (Geier, 2001).

Among the major agronomic practices include the use of shade trees (e.g. Albizia, Accacia, Cordia, Sesbania), use of Coffee Berry Disease (CBD) resistant selections (Van der Graaff, 1978), mulching, intercropping with other staple food and cash crops, green manuring (e.g. Desmodium, Crotalaria), hand weeding, and composting with coffee husks /pulps. The use of coffee husks/ pulps as compost to improve the soil nutrient status of coffee has been positively reported (Chane, 1999). Regular hand-picking of red cherries, washing or sun-drying of green beans are harvesting and processing methods which may increase the quality and quantity of coffee beans. Shading trees is important because it creates large amount of organic material and humus, reductions of weeds and protection of plant against too much sun. An agro forestry system which is permanently covered with mulching material provides an ideal protection against soil erosion (IFOAM, 2006).

2.6 Market for Organic Coffee

North America and Europe are the largest markets for organic coffee. In both continents, organic coffee – unlike the conventional coffee industry has experienced notable growth in recent years. Globally, about 0.5% of all coffee produced is sold as organic. In Europe, where organic food has a market share of 2-3%, organic coffee accounts for 0.5% of total coffee sales. Market share is highest in Switzerland (more than 1%) due to the generally high interest of consumers in organic food and due to the fact that the two main supermarkets chains both sell organic coffee

(Bacon, 2005). In the United States, certified organic coffee accounts for 3-5% of the market share.

2.6.1 Prices of organic coffee

Organic coffee is indexed to global market prices and receives a premium of US\$10-50/lb above the prevailing conventional coffee price. The variation in the premium relates primarily to quality characteristics. The premium for organic coffee is market-based in two different ways. First, it is a premium above the market price for conventional coffee. When prices are low the premium stays the same, so the organic price falls with the market. It rises with the market as well. Second, the premium is market-based in that the size of the premium is determined by supply and demand in the market for such coffee. To the extent that demand for certified organic coffee outstrips supply, the premium will rise. If supply catches up to demand growth, the premium will fall (Kilcher et al., 2002). For conventional green Arabica coffee beans, the world market price at the beginning of 2002 was about 45–50 US cents per pound Free On Board (FOB). For the Robusta coffee the world market price is about 30–35 US cents per pound FOB. The organic price-mechanism is generally a premium of around 20–40% on the commodity market value. The premium is even higher if the market price falls below the cost of production (Bacon, 2005).

In Table 4 an overview is given of prices set for Fair Trade/organic coffee. The minimum fair trade price is the minimum floor price, below which the coffee can not be bought (FLO sees this as the minimum price necessary to cover costs of

production). For fair trade plus organic coffee a standard extra premium is paid. For arabica the New York contract is the basis of calculation of the prices while for robusta the London contract is the basis of calculation of the prices. Over these prices there shall be a fixed premium of 5 US cents per pound. For certified organic coffee, an additional premium of 15 US cents per pound of green coffee is provided. In general premiums paid for organic coffee increase as the world market price decreases. The minimum prices for Fair Trade organic coffee as it was found in January 2002 were as follows: Washed Arabica organic: 141 US cents per pound FOB port of origin. None washed Robusta organic: 121 US cents per pound FOB port of origin. (Ponte, 2004; Bacon, 2005).

Table 1: Fair Trade and organic FOB price for coffee beans in US cents per pound (lb) January 2002

	Conventional price {commodity market}	Organic price commodity market plus 20-50%}	Fair trade price {fix price}	Organic fair trade price {fix price}
Arabica coffee	45-50	70-95	120-126	135-141
beans Robusta coffee	30-35	60-70	106-110	121-125
beans				

Source: FLO-International, FiBL

2.7 Coffee Production Trend in Tanzania

Tanzania's production of coffee is currently about 48 000 tons, or about 0.7% of the world's output of 7.02 million tons per year. For the past 15 years coffee production in Tanzania showed varying trends. Coffee production moderately declined from the

early 1990 to 1998 after which it gradually increased until 2003. Coffee area expanded significantly during the 1970s and 1980s when prices were more favourable but declined thereafter. From 1980/81 to 1998/99 coffee sales (equivalent to total output) declined from 61 514 tons to 47 050 tons (BACAS, 2005). Coffee output declined from a nine-season pre-1994-95 average of 50 918 tons of a five season post-1994/95 average of 45 065 tons, a 13% decline (Appendix 3). Yields also declined over a long term from 377 in 1972-73 to 401 in 1991-92 to 234 in 1998-99. The Tanzania Coffee Board estimates the current area of production in the country to be 250 000 ha compared to the area suitable for coffee production, which are 650 000 ha. Analysis of coffee production by type (Arabica or Robusta) is also presented in Appendix 2. Production of both Arabica and Robusta coffee was lowest in 1993/94. From 1993/94 production of Robusta picked up substantially and continued to date. Production trend for Arabica was not as steady as that of robusta (Baffes, 2003). Tanzanian coffee yields relative to the rest of the world have gradually declined over the 1990s and early 2000s. With this trend expanding the country's market share will require improvements both in productivity and quality.

Production of robusta and arabica coffee under organic condition is a new approach in Tanzania. Kilimanjaro Native Cooperative Union (KNCU) and Kagera Cooperative Union (KCU) are the cooperatives which participate in the EPOPA project, and they have contracted small holder farmers to produce organic coffee for export. The area under certified organic arabica coffee in Kilimanjaro is about 812 ha and 204 ha in conversion. There are about 1 193 smallholder farmers involved in organic arabica coffee production in Kilimanjaro region and 334 are in conversion.

In 2005 organic arabica coffee achieve yield of 0.72 metric tones. The area under certified organic coffee in Kagera region is about 1 525 ha. There are about 3 500 small holder farmers in Kagera region involved in organic coffee production. Kagera produces robusta coffee. 430 metric tones of organic robusta coffee have been produced in 2005 (UNEP-UNCTAD, 2006).

Table 2: Organic production by certified farmers

Firm	Farmers	Coffee output in MT
Biolands	16 000	NA
KCU	3 500	470
KNCU	5 000	400
PCI	500	400

Source: Envirocare (2006) basic data on certified organic production and Export in Tanzania 2003.

2.8 Marketing of Organic Products

There is an increasing demand in foreign markets of various organic products. The limitations so far have been production of small amounts, and inconsistent supply. The small quantities sold in the local markets are from uncertified farmers, and are to a large extent as ordinary products (not labeled organic). Some products that are naturally produced are sold locally at higher prices (50-100%) than products produced conventionally, e.g. local chicken eggs etc. To a large extent Organic Agriculture production is a market-oriented business and privately driven. To confirm orders the interested buyers sign contracts with growers. About 100% of the certified organic products produced are exported to countries like Germany UK and USA. It is estimated that more than 2 000 MT of organic products are exported

from Tanzania annually (Envirocare, 2006). According to Envirocare certified farmers sell their produce for up to 50% of the premium price. For example coffee that is sold in fair trade attains a premium of up to 50%. However generally there is a significant difference between farm gate prices and selling prices at the export market, and the prices offered for export is higher than in the local market.

Price fluctuation often occurs in conventional crops like coffee and cashew nuts. When this happen to organic agriculture, farmers adapt to the price changes by selling to alternative buyers even if they are to sell as conventional products. The cooperative unions also would react by buying the product at market price. Normally the cooperatives unions buy products at an average price, and then a second payment is made to farmers after the sale of the products (IFOAM, 2006).

2.8.1 The local market for organic products

There is increasing awareness of organic produce in Tanzania. Demand has consequently been increasing steadily. This is in part due to the ravages of HIV/AIDS. Tanzanians are becoming more health-conscious and increasing awareness of the benefits of organic produce which has led to a demand for commodities such as organic brown rice, organic legumes, honey and others. Local supermarkets such as shoprite and Imalaseko are keen to meet this demand (UNEP-UNACTAD, 2006). A weekly box supply system is being trialled in cities such as Dodoma and Dar es Salaam, whereby a week's worth of organic produce is supplied to household at a time. In addition there is great interest in organic toiletries such as soap, shampoo and various skin creams with small scale manufacturers operating

both in the local and export markets. Consumers are also interested in purchasing organic eggs and other poultry products due to their better taste and people's fear of eating animals which have been intensively raised (Envirocare, 2006).

2.8.2 Export strategy and market penetration

The Organic Agriculture sector's export target markets are: The Netherlands, United Arab Emirates and United Kingdom. Strategies have already been determined so as to enhance Tanzanians' entry and positions on these markets. Since 1996 the EPOPA programme has assisted about five projects to penetrate the export market by providing assistance to groups and individuals with the certification process and market identification. Some of these projects have concerned the production of cocoa in Kyela, instant coffee in Kagera and pineapple from Njombe (UNEP-UNCTAD, 2006). Operators also participate in both local and International trade fairs as a way to identify new customers and raise awareness of the value of organic produce for consumer health and prosperity. The organic products will be produced in conformance to the market, health and safety standard and meeting basic requirements with respect to code of practice-Good Agricultural Practice (EURO GAP), Hazard Analysis Critical Control Point system (HACCP) and Minimum Residues level (MRLs) (Envirocare, 2006).

2.9 Constraints to Organic Agriculture and Trade

Enumerating some limiting factors that hindered the development of organic agriculture in the country, EPOPA (2004) listed them as high cost of certification, incapable farmers and extension workers, little support for organic development

from the Government, lack of organic/natural pesticides for disease and pest control, high transportation costs, insufficient supply of organic products (too little is produced), lack of quality control facilities, lack of credit facilities, lack of markets particularly the local market, charge imposed on crops increase farmers burden and organic agriculture is labour intensive .

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Description of the Study Area

3.1.1 Location

Muleba district is one of seven districts in Kagera region situated in the North-West of Tanzania (1-1 25'S; 31 30'-2 E).The district covers a total area of 10 739km² of which 7 295km² is under water. It is bordered in the North and north west by Bukoba rural, in the East by lake Victoria, in the west by Karagwe and in the south by Biharamulo district. Other district that make-up Kagera region is Ngara, Chato and Misenyi.

3.1.2 Climate and topography

The district gets enough rains for most of the year in two seasons, between October and November and between March and May. Rainfall is between 1 400-2 000 mm a year. The highland belt gets between 1 000-1 400 mm of rain a year while the zone gets between 600-1 000 mm of rain a year. Average temperature is 20°C with minimum and maximum extremes of 15°C and 28°C respectively. The soils are rich in yellow red sandy clay with low available nutrient (Mutayoba, 2005).

3.1.3 Human population

According to the population census of 2002 (United Republic of Tanzania) Muleba district has a population of 386 328 with the average household size of 4.9. More than 80% of the total population lives in rural areas.

3.1.4 Farming system

Farming system is mainly rain fed and dominated by banana plantain intercropped with coffee, maize and beans. Some cassava is also part of the farming system. Recently farmers have gone into pineapple growing so as to increase their income. The majority of the farms have less than 2 ha. Banana and beans are both important as food and as a source of cash income. Coffee was the only commercial crop with external market but due to the price drop in the world market the crop is now being given less attention by farmers. Livestock keeping is also of very little significance with few instances of zero grazing of dairy cattle.

3.1.5 Economic activities

Agricultural production is the most important economic activity contributing about 50% to the region's Gross Domestic Product. It is estimated that about 90% of the region's population derives its livelihood from agricultural production. Agriculture is carried out mostly under smallholder farming, as there is very little commercial farming. Other economic activities include fishing in Lake Victoria, clay brick making, pit sawing and carpentry.

3.2 Sampling Technique

3.2.1 Study population

The study population included organic and conventional coffee growers residing in Ijumbi ward in Muleba district. The total population size of the study was 100 smallholder farmers 50 involved in organic coffee and 50 involved in conventional coffee. Although the sample was limited to 100 (due to time and budget constraint), it was large enough to allow for statistical analysis.

3.2.2 Sampling procedure

A sample of 100 smallholder farmers was selected by application of multistage, purposive and simple random selection technique. First stage involved a selection of one division from a total of five in the district. The second stage required the selection of one ward from a total of 31 which was purposively chosen. The Ijumbi ward was selected because it is the only ward in Muleba district involved in organic coffee project under contract scheme. The ward consists of five villages namely Ijumbi, Rubaho, Ruhija, Ibare and Nshambya. Three villages of Ijumbi, Rubaho and Ruhija were involved in organic coffee project, while the remaining two villages of Ibare and Nshambya were involved in conventional coffee production.

Third stage involved the actual selection of organic coffee scheme members where simple random selection was used to obtain 20 farmers from Ijumbi village, 15 farmers from Rubaho and 15 farmers from Ruhija making a total of 50 smallholder farmers from the list of registered organic coffee farmers. All of them were members of Kachwezi organic coffee primary cooperative society. Also 50 small holder farmers involved in conventional coffee were randomly selected. 25 farmers from Ibare and 25 farmers from Nshambya village. These villages were also found in Ijumbi ward and they were chosen purposively to match the range of agro-ecological conditions represented in the sampling frames for organic farmers. A sample was chosen from each of two villages such that n/N was at least equal to or greater than 5% of the total number of households (Boyd et al., 1981). The table below summarizes the selection of respondents from each village.

Table 3: Number of farmers sampled in each village

Organic farmers			Conventional farmers	
Ward	Village name	Number of farmers	Village name	Number of farmers
Ijumbi	Ijumbi	20	Ibare	25
	Rubaho	15	Nshambya	25
	Ruhija	15		
Total		50		50

3.3 Data Collection

3.3.1 Primary data collection

Primary data for this study were collected through formal surveys. This involved personal interviews using a pre-tested questionnaire. The data collected included socio-economic, input distribution, crop outputs, crop marketing and profitability.

3.3.2 Secondary data collection

Secondary data were extracted from reports and other documentary materials from the relevant institutions and organization such as EPOPA, ARDI-Maruku, KCU, Tanzania Coffee Board, Internet and Sokoine University of Agricultural Library (SNAL).

3.4 Data Analysis

A substantial part of analysis is based on descriptive statistics to describe the responses, characteristics and trend of some of the data and information. Responses from the interview were coded, summarized and entered into a computer. The data

were analyzed using Statistical Package for Social Sciences (SPSS) computer package. An independent T- test was employed to test the differences in yield between organic and conventional coffee. Farm profitability was determined based on financial return. Financial return was analyzed using farm enterprise framework.

3.5 Description of Analytical Technique

3.5.1 Farm enterprise budget

The budgeting process generates a set of plans which describe the probable economic and operational consequences of the alternatives considered. Enterprise budgets are calculated on a per unit basis, such as an acre of land or head of livestock, for one year or one production period. It also helps to estimate per unit gross income, costs, net income, and break-even figures on an annual basis for crop and livestock enterprises (Billy et al., 2000).

According to Doye (2001) a detailed description of farm budget enterprise should include a production goal, the production techniques to be employed, the land resource required and even capital and labour requirements. It should include all costs and all returns associated with the defined enterprise. All variable and fixed costs, both cash and non-cash items. The returns from products produced for sale plus those that are produced for use in another enterprise (grazing) should be included in an enterprise budget. Variable costs are those costs that increase or decrease as output changes, while fixed costs do not change as output is changed (Cramer et al., 2001). Common examples of variable cost in crop production include seed, fertilizers and pesticides. The most important fixed costs in agricultural

production are owned land, family labour, farm building, machinery and implements.

Mathematical expression for budgeting:

$$NI = GI - (TVC + TFC)$$

Where:

NI = Net Income (Profit) TVC = Total Variable Cost

GI = Gross Income/Total receipts TFC = Total Fixed Cost

3.5.2 Uses of farm enterprise budget

The information contained in the enterprise budgets can be used by agricultural producers, extension specialists, financial institutions, governmental agencies, and other advisers making decisions in the food and fibre industry (Billy et al., 2000).

Budgets are used to:-

- Itemize the receipts (income) received for an enterprise;
- List the inputs and production practices required by an enterprise;
- Evaluate the efficiency of farm enterprises;
- Estimate benefits and costs for major changes in production practices;
- Provide the basis for a total farm plan;
- Support applications for credit;
- Inform non farmers of the costs incurred in producing food and fibre crops;

3.5.3 Weakness and shortcomings of budgeting

Farm enterprise budget has the following shortcomings:-

- It assumes that yield and prices are known before production, i.e. it ignores risk and uncertainty;
- It assumes linearity in relationship between variables i.e. it ignores diminishing returns;
- It ignores complimentary and supplementary relationships among enterprises;
- It is not an optimizing technique such as linear programming (LP);
- It is time consuming;

3.6 Limitations of Data

- a) Using cross-section data limits observation over time. This makes it difficult for the study to account for changes due to time difference.
- b) The small sample size may affect the representative ness of the population parameters. However, the sample was large enough to allow for statistical analysis.
- c) Prices and costs involved have been limited by the availability of household data at village level where coffee production and marketing take place.
- d) A case study approach as used by this study limits observation to only one location. Hence the conclusion reached may not hold for other similar farming activity.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents results and discussion for the data obtained from the formal survey. The results are divided into two sections. The first section presents descriptive statistics showing characteristics of sampled coffee growers. This is followed by results and discussion of farm budget enterprise in which cost and profits of organic and conventional coffee were identified and compared.

4.2 Sample Profile

4.2.1 Gender of the respondents

The gender of the respondents from both villages involved in organic coffee project and conventional coffee were observed (Table 4). Of the 50 respondents of organic coffee 68% were male and 32% were females .While of the 50 respondents of conventional coffee about 84% were male and 16% were female. The difference observed in female may be due to the fact that organic coffee project had adopted a policy of promoting women and employing them in various operations. Also in conventional coffee there was higher percentage of male than in organic project this can be explained by the fact that in Tanzania and Muleba district in particular men still control most resources of the family.

Table 4: Gender of the respondents

Organic coffee					Conventional coffee		
Villages name							
Item	Ijumbi	Rubaho	Ruhija		Nshambya	Ibare	
Gender	Frequency	Frequency	Frequency	Total	Frequency	Frequency	Total
Male	11 (22%)	12 (24%)	11 (22%)	34 (68%)	21 (42%)	21 (42%)	42(84%)
Female	9 (18%)	3 (6%)	4 (8%)	16 (32%)	4 (8%)	4 (8%)	8(16%)
Total	20 (40%)	15 (30%)	15 (30)	50 (100%)	25 (50%)	25 (50%)	50(100%)

4.2.2 Age of the respondents

The age of respondents from organic coffee villages and conventional coffee villages was arbitrary categorized into three groups; youth, middle age and old age. Youth group comprised of respondents whose age was below 35 years, middle age was above 35 but below 59 years, and old age comprised respondents who were 60 years and above (Table 5). This classification was based on the fact that in Tanzania people below 36 years are socially considered young men and those above 59 years are too old to work effectively in the farm.

Table 5 shows that about 22% of the organic coffee farmers were in age of less than 35 while about 20% of the conventional coffee respondents were in age of less than 35. The percentage from this age group were almost the same, however the difference observed may be due to the fact that organic coffee pays a premium price while in conventional coffee pays low price, the premium price offered by organic coffee may probably attract more youth to join the organic coffee enterprise. The percentage of youth involving in both organic coffee project and conventional coffee

were low compared to other groups which indicate a potential labour problem haunting the coffee sector in Muleba district. Many youth do not engage in farm activities they migrate to urban areas or engage in off-farm activities.

Table 5: Age of respondents

Organic coffee				Conventional coffee			
Village name							
Item	Ijumbi	Rubaho	Ruhija		Nshambya	Ibare	
Age	Frequency	Frequency	Frequency	Total	Frequency	Frequency	Total
< 35	3 (6%)	3 (6%)	5 (10%)	11(22%)	4 (8%)	6 (12%)	10(20%)
36- 59	8 (16%)	7 (14%)	9 (18%)	24(48%)	15 (30%)	13 (26%)	28(56%)
> 59	9 (18%)	5 (10%)	1 (2%)	15(30%)	6 (12%)	6 (12%)	12(24%)
Total	20 (40%)	15 (30%)	15 (30%)	50(100%)	25 (50%)	25 (50%)	50(100%)

4.2.3 Marital status

A stable family may concentrate more on production than unstable one and thus may influence efficiency in production. Married couples are likely to be more productive than single one due to labour reinforcement in accomplishing both farm and no-farm activities; hence the former are more likely to do better in coffee production. Results in table 6 indicate that about 78% of the organic coffee respondents were married while about 94% of the conventional coffee respondents were also married. The difference observed in marital status between organic and conventional coffee may be due to the fact that organic project had included 18% of widowed women as compared to 6% of conventional coffee. In case of labour reinforcement the difference observed between the married couples of organic coffee and conventional coffee indicates that conventional farmers are more likely to be more productive hence performing better in coffee production than in organic coffee farmers.

Table 6: Marital status of respondents

Organic coffee					Conventional coffee		
Village name							
	Ijumbi	Rubaho	Ruhija		Nshambya	Ibare	
Marital status	Frequency	Frequency	Frequency	Total	Frequency	Frequency	Total
Monogamy	9 (18%)	14 (28%)	12 (24%)	35(70%)	21 (42%)	24 (48%)	45(90%)
Polygamy	3 (6%)	0 (0%)	1 (2%)	4(8%)	2 (4%)	0 (0%)	2(4%)
Single	1 (2%)	0 (0%)	1 (2%)	2(4%)	1 (2%)	0 (0%)	1(2%)
Widowed	7 (14%)	1 (2%)	1 (2%)	9(18%)	2 (4%)	1 (2%)	3(6%)
Total	20 (40%)	15 (30%)	15 (30%)	50(100%)	25 (50%)	25 (50%)	50(100%)

4.2.4 Level of education

Table 7 presents the frequency and percentages of sample coffee growers against their education level. As can be noted in the table, the education of the respondents was found to be generally low. About 4 % and 8 % of organic and conventional farmers respectively had not attained any formal education, and only 2 % of the respondents for organic coffee farmers were in college category. The majority of organic coffee growers, 82% had primary education and 12% had secondary education whereby about 82% and 10% respectively were in conventional coffee. Literacy level is expected to increase farmer's ability to obtain, understand, analyse and apply the newly introduced technologies. Therefore farmers in organic coffee are more likely to produce efficiently because most of them are educated than in conventional coffee. However it is important that the illiterate group be given special attention when information is being disseminated so that they can be in a position to adopt a new set of farming practices.

Table 7: Education level of respondents

Organic coffee					Conventional coffee		
Village name							
	Ijumbi	Rubaho	Ruhija		Nshambya	Ibare	
Education level	Frequency	Frequency	Frequency	Total	Frequency	Frequency	Total
None	2 (4%)	0 (0%)	0 (0%)	2(4%)	1 (2%)	3 (6%)	4(8%)
Primary	14 (28%)	14 (28%)	13 (26%)	41(82%)	21 (42%)	20 (40)	41(82%)
Secondary	3 (6%)	1 (2%)	2 (4%)	6(12%)	3 (6%)	2 (4%)	5(10%)
school							
College	1 (2%)	0 (0%)	0 (0%)	1(2%)	0 (0%)	0 (0%)	0(0%)
Total	20 (40%)	15 (30%)	15 (30%)	50(100%)	25 (50%)	25 (50%)	50(100%)

4.2.5 Employment status

The employment status of an individual affects his/her income and thus directly or indirectly his/her productivity. Table 8 show that about 98% of the respondents in organic and about 96% of the respondents in conventional coffee were farmers. Also about 2% of both organic farmers and conventional farmers were permanent employees. 2% own business or provision of food services in conventional coffee while there were no farmers in organic coffee involved in provision of food services. Farmers in conventional coffee engage in off-farm activities so as to increase their income because conventional coffee pays low.

Table 8: Employment status of respondents

Organic coffee				Conventional coffee			
Vllage names							
	Ijumbi	Rubaho	Ruhija		Nshambya	Ibare	
Employment	Frequency	Frequency	Frequency	Total	Frequency	Frequency	Total

Farmer	19 (38%)	15 (30%)	15 (30%)	49(98%)	24 (48%)	24 (48%)	48(96%)
Permanent wage employee	1 (2%)	0 (0%)	0 (0%)	1(2%)	1 (2%)	0 (0%)	1(2%)
Provision of food services	0 (0%)	0 (0%)	0 (0%)	0(0%)	0 (0%)	1 (2%)	1(2%)
Total	20 (40%)	15 (30%)	15 (30%)	50(100%)	25 (50%)	25 (50%)	50(100%)

4.2.6 Livestock keeping

Livestock keeping is an important strategy employed to support crop cultivation in the study area. Livestock also provide manure which is used to replenish the soil fertility and to supplement the use of chemical fertilizers. According to Philip (2001) males mainly owned livestock such as cattle, goats and pigs and women owned small livestock like chicken. Results from the survey shows that about 26% of the organic coffee farmers owned cattle, 48% owned goats and 56% owned chicken (Table 9). While about 50% of the conventional coffee farmers owned cattle, 58% owned goat and 38% owned chicken. The results show that conventional coffee farmers seem to have owned more livestock than organic coffee. This indicates that organic farmers are more likely to incur more costs on paying for manure, which may be used to supplement the use of chemical fertilizers.

Table 9: Livestock keeping

Organic coffee			Conventional coffee	
Village name				
Ijumbi	Rubaho	Ruhija	Nshambya	Ibare

Ownership of livestock	Frequency	Frequency	Frequency	Total	Frequency	Frequency	Total
Own cattle	3 (6%)	6 (12%)	4 (8%)	13(26%)	11 (22%)	14 (28%)	25(50%)
Do not own cattle	17 (34%)	9 (18%)	11 (22%)	37(74%)	8 (16%)	17 (34%)	25(50%)
Total	20 (40%)	15 (30%)	15 (30%)	50(100%)	19 (38%)	31 (62%)	50(100%)
Own goat	8 (16%)	11 (22%)	5 (10%)	24(48%)	18 (36%)	11 (22%)	29(58%)
Do not own goat	12 (24%)	4 (8%)	10 (20%)	26(52%)	7 (14%)	14(28%)	21 (42%)
Total	20 (40%)	15 (30%)	15 (30%)	50(100%)	25 (50%)	25 (50%)	50(100%)
Own chicken	15 (30%)	4 (8%)	9 (18%)	28(56%)	11 (22%)	8 (16%)	19(38%)
Do not own chicken	5 (10%)	11 (22%)	6 (12%)	22(44%)	14 (28%)	17 (34%)	31(62%)
Total	20 (40%)	15 (30%)	15 (30%)	50(100%)	25 (50%)	25 (50%)	50(100%)

4.2.7 Number of coffee trees owned by respondents

Results in Table 10 show the distribution of number of productive coffee trees owned by the respondents. About 60% of the organic coffee growers owned less than 400 coffee trees while in conventional coffee growers about 82% owned less than 400 coffee trees of the productive age each. Acreage wise this can be equated to 0.4 ha per household when assuming that planting was done at the recommended spacing. According to Ng'homa and Ndege (2002) 400 coffee trees are planted in one acre which is equivalent to 1 000 coffee trees per hectare. Also the results show that about 6% of organic coffee growers owned more than 1 600 coffee trees while 2% of conventional coffee farmers owned more than 1 600 coffee trees of the productive age each. Organic coffee farmers have many coffee trees of productive age compared to conventional farmers because of replanting of seedlings of clonal coffee, which produce first harvest earlier than normal seedlings.

Table10: Number of coffee plant owned by the respondents

Organic coffee				Conventional coffee			
Village name							
	Ijumbi	Rubaho	Ruhija		Nshambya	Ibare	
	Frequency	Frequency	Frequency	Total	Frequency	Frequency	Total
10-400	11 (22%)	9 (18%)	10 (20%)	30(60%)	21 (42%)	20 (40%)	41(82%)
401-800	6 (12%)	3 (6%)	1 (2%)	10(20%)	2 (4%)	1 (2%)	3(6%)
801-1 200	2 (4%)	1(2%)	2 (4%)	5(10%)	1 (2%)	2 (4%)	3(6%)
1 201-1 600	0 (0%)	1 (2%)	1 (2%)	2(4%)	1 (2%)	1 (2%)	2(4%)
1 601-2 200	1 (2%)	1 (2%)	1 (2%)	3(6%)	0 (0%)	1 (2%)	1(2%)
Total	20 (40%)	15 (30%)	15 (30%)	50(100%)	25 (50%)	25 (50%)	50(100%)

4.3 Farm Size and Mode of Land Acquisition

The average total land owned by the family for the 2005/2006 season from the sample coffee growers were 2.4 acres. Table 11 shows that about 74% of organic coffee growers owned less than 3 acres of land cultivated with coffee. And 26% owned more than 3 acres of land cultivated with coffee. While 56% of conventional coffee growers owned less than 3 acres and 44% owned more than 3 acres. Conventional farmers had somewhat larger farms, larger area under cash crop which may contribute to higher volumes. In other hand the results show that only minority of the organic farmers (24%) got land through purchasing while 76% of the farmers got land through inheritance. In conventional coffee farmers about 88% got land through inheritance and 12% obtained it through purchasing. The higher percent of farmers obtained land through inheritance due to the fact that in the study area parents provide part of their land to their sons as part of inheritance.

Table 11: Farm size and mode of land acquisition

Organic coffee					Conventional coffee		
Village name							
	Ijumbi	Rubaho	Ruhija		Nshambya	Ibare	
	Frequency	Frequency	Frequency	Total	Frequency	Frequency	Total
1-3	17 (34%)	13 (26%)	7 (14%)	37(74%)	12 (24%)	16 (32%)	28(56%)
acreaage							
4-6	1 (2%)	2 (4%)	6 (12%)	9(18%)	10 (20%)	6 (12%)	16(32%)
acreaage							
7-9	1 (2%)	0 (0%)	2 (4%)	3(6%)	2 (4%)	3 (6%)	5(10%)
acreaage							
Above 9	1 (2%)	0 (0%)	0 (0%)	1(2%)	1 (2%)	0 (0%)	1(2%)
Total	20 (40%)	15 (30%)	15 (30%)	50(100%)	25 (50%)	25 (50%)	50(100%)
Inherited	16 (32%)	13 (26%)	9 (18%)	38(76%)	22 (44%)	22 (44%)	44(88%)
Bought	4 (8%)	2 (4%)	6 (12%)	12(24%)	3 (6%)	3 (6%)	6(12%)
Total	20 (40%)	15 (30%)	15 (30%)	50(100%)	25 (50%)	25 (50%)	50(100%)

4.4 Coffee Management Practices

Organic coffee management practices includes mulching, frequent weeding, use of soil fertilization and conservation practices such as organic manure, application of bio-pesticides (botanicals) to treat plant health problems, soil bands, terracing, contouring and tree belts/wind breakers. Use of improved/ resistant varieties, regular pruning, frequent harvesting and drying of harvested coffee. They also included performing some of these activities with special equipment rather than by hand or with bush knife also known as panga (Gibbon et al., 2007). Similarly conventional coffee management practices includes mulching, weeding use of soil fertilization and conservation practices such as inorganic manure, organic manure, application of inorganic chemicals to treat plant health problem, soil band, terracing, contouring, use of tree belts/wind breakers coffee management. Use of improved/ resistant varieties, regular pruning, frequent harvesting and drying of harvested coffee.

Results from the survey show that about 68% of interviewed organic coffee respondents used organic seed in their farms while 96% of farmers used organic manure. Further results indicate that those who used botanicals¹ represent 9% of the respondent while those who applied soil conservation practices² were 65% (Table 12). In conventional farmers about 100% do not use organic seed, 76% also used organic manure and about 24% do not use organic manure, this does not mean that they are using inorganic manure but they are using mulch and composite. Conventional farmers reported that the use of inorganic manure normally destroyed the banana tree hence conventional coffee farmers in Muleba district are organically by default.

Table12: Coffee management practices

Practices	Organic coffee		Conventional coffee	
	Frequency	Percent	Frequency	Percent
Use of organic seed	34	68.0	0	0.0

¹ Botanicals are natural pesticides for disease and pest control such as neem, red pepper, clay, wood ash, gelatin etc.

² Soil conservation practices are such as terracing, soil bands, contouring, tree belts or wind breakers.

Not using organic seed	16	32.0	50	100.0
Total	50	100.0	50	100.0
Used organic manure	48	96.0	38	76.0
Not using organic manure	2	4.0	12	24.0
Total	50	100.0	50	100.0
Used botanicals	9	18.0	0	0.0
Not using botanicals	41	82.0	50	100.0
Total	50	100.0	50	100.0

4.5 Organic Coffee Production Levels at Kachwezi and Ibwera Primary

Cooperative Societies for the Period 1999-2003

The production level from 1999 to 2003 show that more than 50% of the household have annual organic coffee production yield of between 60 and 300 kg, and between 20 and 30% produce 301 to 600 kg of unhulled coffee annually (Table 13). Very few farmers produced above 600 kg of unhulled coffee. Note that a range of 1 750-5 260 kg of unhulled coffee is the production standard of an organic coffee production (Ng'homa and Ndege, 2002). The table below indicate that household production levels between 1999 to 2003 were quite low. Although production levels were low, there was an increase in yield of about 31.3% of organic coffee from an average yield of 350 kg/ha before conversion to an average yield of 510 kg/ha after conversion while there was also an increase of about 16.8% of conventional coffee from an average yield of 350 kg/ha to an average yield of 421 kg/ha in 2006. The data provided by KCU shows that in Muleba district in the year 1992 and 1993, the coffee yield were about 265 kg/ha, while in 1994 the yield were about 264 kg/ha. From 1995 to 1998 the yield were about 350 kg/ha with the exceptional of 1997

when the coffee yield were about 343 kg/ha. The survey shows that in the season of 2005/2006 the average yield of conventional coffee were 421 kg/ha. The low yield observed was mainly due to low coffee productivity and few coffee trees per household.

Table13: Classification of household by organic coffee production levels at Ibwera and Kachwezi primary cooperative societies for the period 1999-2003

Production levels(unhulled bags/ households)	Percent of Respondent Farmers					
	1999	2000	2001	2002	2003	Mean
Kilogram						
60-300	53.6	46.6	55.0	54.2	34.6	48.8
301-600	23.2	30.1	23.9	24.3	32.7	26.8
601-900	5.4	2.7	7.3	4.2	7.2	5.4
901-1 800	7.1	12.3	7.3	8.3	13.1	9.6
1 801-3 000	8.9	6.8	5.5	9.0	9.2	7.9
3 001-6 000	1.8	1.4	0.9	0	3.3	1.5

According to the results obtained from the survey (Table 14) about 38% of organic coffee farmers produced unhulled coffee in the range of 60-300 kg and 62% produced above 300 kg while in conventional coffee farmers about 52% of the respondents produced coffee in the range of 60-300 kg and 48% produced above 300kg of unhulled coffee. A possible explanation for the differences in yield may be more effective farm management technique in organic farmers than in conventional farmers.

Table14: Coffee production level at Kachwezi

Yield in kg/ha	Organic coffee		Conventional Coffee	
	Frequency	Percent	Frequency	Percent
60-300	19	38.0	26	52.0
301-600	20	40.0	14	28.0
601-900	5	10.0	4	8.0
901-1 800	5	10.0	6	12.0
Above 1 800	1	2.0	0	0.0
Total	50	100.0	50	100.0

4.6 Coffee Marketing Channel

Coffee procurement procedure in Muleba district depends very much on buyers. KCU was the only buyer of organic coffee in Muleba district and thus monopolising the market. Contracted organic farmers were supposed to sell their coffee in Kachwezi primary cooperative society otherwise they could not be paid a premium price. Farmers who sell through cooperatives society normally transport their coffee to the primary cooperatives society and meet the transport cost. In conventional coffee, farmers have two options to dispose off his or her coffee. He or she can sell through the cooperative society, or local private coffee traders or Ugandan private traders. Those who purchase from the producers sell their coffee through the Moshi Auction market and then export market or sell directly to the export market. Coffee purchased from the farmers is processed and stored temporally in local area warehouse awaiting collection by the buyers at the auction in Moshi ready for exporting to International market. Larger scale producers after processing his/her coffee can export if have export licence. The results in Table 15 shows that about 96% of organic coffee farmers sold their coffee in Kachwezi organic coffee primary

cooperative society and only 4% sold their coffee to private buyers. Farmers selling their coffee to primary cooperative society are paid cash in hand and get a premium price for their crop. Those who sold their coffee to private buyers, they sell it in conventional price and buyers comes to their homestead thus avoiding transportation cost. In conventional coffee about 72% sold their coffee in primary cooperative society and 28% sold their coffee to private buyers. Farmers in conventional coffee are not paid cash in hand that's why some of the conventional farmers decided to sell their coffee to private buyers as they are paid cash in hand.

Table15: Coffee farmers selling place

Selling place	Organic coffee		Conventional coffee	
	Frequency	Percent	Frequency	Percent
Primary cooperative society	48	96.0	36	72.0
Private buyers	2	4.0	14	28.0
Total	50	100.0	50	100.0

4.7 Problems Facing Small scale Farmers in Organic Coffee Production

Respondents mentioned various factors that constrain their organic coffee production. Many farmers mentioned more than one problem (Table 16). The major problem pointed out by the majority of respondents is that of, lack of inputs such as organic manure, organic or natural pesticides for disease and pest control (22%), Organic coffee production is labour intensive (22%), lack of credit facilities (20%) high cost of buying mulch (12%), higher production cost and low price of organic coffee (10%). As far as marketing is concerned majority of the farmers are still not satisfied with prices offered by organic coffee buyers because of the labour intensive

involved in organic coffee production. There was only one potential buyers of organic coffee in Muleba district in 2005/2006 season namely Kachwezi organic coffee cooperative society which had been contracted by KCU. Thus with one buyer marketing of organic coffee could be characterized by a monopolistic behaviour. Other problems reported by the respondents were lack of pruning/stumping equipment (8%), lack of quality facilities (4%) and theft (2%).

Table16: Problem encountered by farmers in organic coffee production

Problem	Frequency	Percent
Lack of input such as organic manure, natural pesticides for disease control	11	22.0
Organic coffee production is labour intensive	11	22.0
Lack of credit facilities	10	20.0
High cost of buying mulch	6	12.0
Higher production cost and low price of organic coffee	5	10.0
Lack of pruning/stumping equipment	4	8.0
Lack of quality control facilities	2	4.0
Theft	1	2.0
Total	50	100.0

Intervention is important to farmers in order to enhance their coffee cropping activities. Some aspects such as credit access facilitation, credit management, technical skills training e.g. agronomy, processing, business management skills, facilitation to access more land and market linkage and information may be useful to

farmers. Results from the survey (Table 17) present the results which shows that about 88% of the respondents mentioned credit access facilitation as the most important aspect, 76% mentioned credit management, 82% mentioned technical skills training e.g. agronomy or processing, 47% mentioned business management skills, 80% mentioned market linkage and information, and 68% mentioned facilitation to access more land as their most important aspects to enhance their coffee cropping activities.

Table17: Aspects for Intervention

Intervention	Most Important		Important		Moderate Important		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Credit access facilitation	88	88.0	4	4.0	8	8.0	100	100
Credit	76	76.0	14	14.0	10	10.0	100	100

management								
Technical	82	82.0	14	14.0	4	4.0	100	100
skills								
training								
Business	47	47.0	29	29.0	24	24.0	100	100
management								
skills								
Market	80	80.0	16	16.0	4	4.0	100	100
linkage and								
information								
Facilitation	68	68.0	21	21.0	11	11.0	100	100
to access								
more land								

4.8 Availability of Support Services

4.8.1 Credit services

Credit service to small scale farmers is needed for them to be able to purchase inputs and pay for additional labour requirement that are associated with hulling, sorting and grading activities. According to Philip (2001) currently access to formal rural finance facilities is limited in Tanzania. Even the few existing one rarely do extend services for purely agricultural enterprises. There are more organizations which are willing to support non agricultural micro enterprise than agricultural activities. Almost the 100 interviewed coffee farmers in Muleba district had no access to credit facilities (Table 18).

Table18: Credit services to respondents

Credit services	Frequency	Percent
Access to credit services	0	0.0

Had no access to credit services	100	100.0
Total	100	100.0

4.8.2 Extension services

Extension services are important as far as productivity of agricultural enterprises is concerned. Provision of extension services such as giving advices to farmers on soil conservation practices, pest and disease control, coffee management practices, post-harvest handling and processing activities may increase agricultural productivity and quality. Survey results indicate that about 98% of the organic farmers interviewed had access to extension services and 2% had no access to extension service (Table 19). However among those who had access to extension services about 58% were visited in the range of one to three times by an extension officer, 36% were visited in the range of four to six time while 4% were visited by an extension field officer in more than six times in the season of 2005-06. This can be attributed to the fact that organic farmers were found in organic coffee project which had extension worker committed and motivated to work compared to those employed in the Government. The problem of difficulties in accessing extension services seems to be more serious in the case of conventional coffee than in organic coffee. Almost 100% of the coffee conventional farmers had no access to extension services, the inefficiency of the extension services can be attributed to the shortage of necessary infrastructure, competent field staff, funding and poor research –extension-farmer linkages that has also been reported in URT, 1999.

Table19: Access to extension services by the Respondents

	Organic Farmers		Conventional Farmers	
Extension services	Frequency	Percent	Frequency	Percent
Access to extension services	49	98.0	0	0.0
Had no access to extension services	1	2.0	50	100.0
Total	50	100.0	50	100.0
Visited one to three times	29	58.0	0	0.0
Visited four to six times	18	36.0	0	0.0
Visited more than six times	2	4.0	0	0.0
Had not visited	1	2.0	0	0.0
Total	50	100.0	0	0.0

4.8.3 Training services

Production of Robusta coffee under organic condition is a new farming approach in Muleba district although uses of inorganic fertilizers and pesticides are minimal. Introduction of organic coffee farming by the EPOPA project at Ibwera and Kachwezi primary cooperative societies required that farmers get trained on production of Robusta coffee under organic condition. Results from Table 20 shows that about 44% of organic farmers were trained and 56% had not obtained any training about organic farming. Among 44% of farmers trained, 6% were trained about pests and disease control and 38% obtained the general training.

Training is aimed to improve farmer's knowledge on handling of their coffee, as well as improved organic coffee management practices. From the information obtained from the survey training given to farmers had contributed to increased

organic coffee production. About 90% of the organic farmers interviewed said there was increased organic coffee production in the past five years. Among them 36% said the increase of organic coffee production was due to increased training/extension services, however 26% said the increase was due to improved agronomic services, and 30% of the respondent mentioned reliable market outlets as the cause of increased organic coffee production. This reveals that intervening in provision of training to farmers on better management and post harvest procedures will probably increases the organic coffee production, quality which fetches high price and hence increase income to coffee farmer.

Table 20: Access to training services by the respondent

Training services	Percent	Frequency
Obtained training	22	44.0
Had no training	28	56.0
Total	50	100.0
Obtained general training	19	38.0

Pests and Diseases control	3	6.0
Had not obtain any training	28	56.0
Total	50	100.0
Increased coffee organic farming	45	90.0
Decreased coffee organic farming	5	10.0
Total	50	100.0
Increase training/extension services	18	36.0
Improve agronomic service	13	26.0
More reliable market outlet	15	30.0
Other reason such as premium price	4	8.0
More readily of available of inputs	0	0.0
Total	50	100.0

4.8.4 Record keeping

Record keeping is writing down all transactions involved in a particular activity that can be expressed in money (Zegeye et al., 2000). To run a farming business well, the farmer must know what money has been received, how much money is spent and most important how it is spent. Variation in the cost of production depends on the inputs and labour that are used to produce a particular crop. Keeping records of these activities and inputs helps determine the cost of production of current produce and estimate the cost of future enterprises. Keeping records can improve the standard of farm management. The farmer can compare the records with general standards. The records provide farmers with valuable information that helps them plan, budget and prepare a business, and it can be used as a tool in decision making.

It is therefore important that the farmer continuously keeps records of all farm activities (Zegeye et al., 2002).

Results from the survey shows that about 96% of the respondents keep record of their farm and among them 83% keeps records of the receipts for crop sales, 13% keep records of cost and prices of coffee in a given season and 4% did not keep any records (Table 21). Following these results there is a need to emphasize farmers to keep records especially those involved with farming activities, inputs used, labour used, price and production yield of the crop in the given season, so as to run a farming business well.

Table 21: Record keeping of the respondents

Record keeping	Frequency	Percent
Keeping records	96	96.0
Did not keep records	4	4.0
Total	100	100.0
Records on cost and prices	13	13.0
Records on receipt for crop sales	83	83.0
Did not keep any records	4	4.0
Total	100	100.0

4.9 Costs Associated with Production and Marketing of Organic and Conventional Coffee

4.9.1 Availability and cost of important equipment

In order to produce organic coffee according to recommendations, investments need to be made to purchase some essential equipment. Important equipment required by

organic coffee farmers at Kachwezi primary society were mats for drying harvested cherries, gunny bags for harvesting and storage of both hulled and unhulled coffee cherries, pruning saws, pruning scateurs, sieves and hulling machines. It was reported by the farmers through discussion that poor coffee quality was mainly attributed to inadequate mats for drying harvested cherries, lack of gunny bags for harvesting, and storage of both hulled and unhulled coffee cherries. The cost of farm equipment were adjusted by dividing investment cost incurred in the year in which information was gathered by the number of years that the investment is likely to be utilized in order to allow for depreciation .

4.9.2 Labour cost

Table 22 presents the results which indicated that production of organic coffee is more labour intensive than the conventional coffee. About 6% of the organic farmers used between Tsh 371 000 and Tsh 440 000 for the labour cost while none of the conventional farmers were found in this category. The highest labour cost can reach up to Tsh 430 000 per farm while the highest labour costs under conventional coffee production were found to be 350 000 only. Higher organic farmer labour costs were related to the added activities of sorting, hulling, transport from the homestead to the hulling place and grading. These results imply that price for the organic produce need to be accordingly higher to attract more farmers to change from producing conventional coffee to organic coffee production. Although labour cost was higher in organic coffee t- test results presented in table 23 shows that there was no statistical significance between labour cost involved in organic coffee and conventional coffee ($P < 0.05$).

Table 22: Labour cost

Labour cost in Tsh	Organic Coffee		Conventional Coffee	
	Frequency	Percent	Frequency	Percent
20 000-90 000	25	50.0	31	62.0
91 000-160 000	11	22.0	9	18.0
161 000-230 000	9	18.0	5	10.0
231 000-300 000	1	2.0	3	6.0
301 000-370 000	1	2.0	2	4.0
371 000-470 000	3	6.0	0	0.0
Total	50	100.0	50	100.0

4.9.3 Fixed cost

Fixed farm cost were considered in terms of cost of farm equipment, other fixed cost such as interest rate on farm related loans were not considered because farmers had not obtained farm related loans, also cost of land were not considered as in Muleba district the system of renting out and renting in land for coffee production is not practiced. The cost of farm equipment were adjusted by dividing investment cost incurred in the year in which information was gathered by the number of years that the investment is likely to be utilized in order to allow for depreciation. A T-test result shows that there was no statistical difference between fixed cost of organic coffee and conventional coffee $P > 0.05$ (Table 22). With their mean difference of Tsh 3 540 and 2 400 respectively. The average fixed costs of both conventional and organic coffee were in narrow range of 0.7% to 1.1% respectively of average gross farm income, reflecting uniformly low levels of current investment.

4.9.4 Variable cost of organic coffee and conventional coffee

Farm variable costs were considered in terms of hired labour, family labour valued at the market price, seasonal inputs and marketing cost. The results in Table 23 show that total variable cost in organic were higher than conventional ones and in most cases total variable costs were dominated by marketing cost. Organic farmer marketing cost were systematically higher than conventional ones, and the results from t-tests showed that there was statistically difference in average variable costs of organic coffee and conventional coffee $p < 0.05$.

Table 23: Summary of the t-test results

Item	Organic coffee	Conventional coffee	Difference	Significance
Average labour cost (Tsh)	135 780	133 214	2 566	ns
Average fixed cost (Tsh)	3 540	2 400	1 140	ns
Average variable cost (Tsh)	590 500	251 700	338 800	*
Average yield in kg/ha	510	420	90	*
Average net income in Tsh	319 650	335 220	-15 570	ns

Key: ns=not significant, *= $P < 0.05$

4.9.5 Organic coffee and conventional coffee farm budget analysis

For conventional and organic coffee farms, enterprise budgets were prepared and analysed. The budget was based on the average production cost and return per hectare for 2005/2006 production season. Family labour was evaluated at their market equivalent values. The estimation of average cost for variable inputs such as

seedling, manure, botanicals mulch, coffee management practiced, and transport was based on prices as reported by farmers. The price of coffee varied widely with coffee quality (Appendix 3).

Table 24 shows the results for farm budget enterprise of organic and conventional coffee. The results indicated that there was differences in net income obtained from organic coffee and conventional coffee. Conventional hulled coffee farmers obtained a net income of Tsh 335 220 while organic hulled coffee farmers obtained a net income of 319 650. The results indicate that hulled conventional coffee farmers got relatively higher profit than hulled organic coffee farmers. With the premium price of 1 800 Tsh/kg given to organic farmers and an increase in coffee yield of about 31.3% organic farmers were expected to be profitable than conventional coffee farmers whose yield also increased by about 16.8% while receiving the price of 1 400 Tsh/kg. Due to higher variable costs for organic coffee of about two times higher than that of conventional coffee, organic farmers were found to be less profitable. However, the difference in profit of organic hulled coffee and conventional hulled coffee was not statistically significant $p>0.05$ (Table 20). Despite of the low profit obtained by organic coffee farmers which was associated with high production costs, the premium price offered still attracts farmers to engage in organic coffee production. This was confirmed by conventional coffee farmers who blamed the KCU of not involving them in the organic coffee project. Farmers did not consider much on the costs incurred in production and marketing of organic coffee as most of the production activities was carried out by family labour. Also farmers do not keep records on costs of production which it may be difficult for them to evaluate if they are getting loss or profit. Most of the farmers keep records

on receipt for crop sale. From this study it is advised that farmers should keep on producing conventional coffee which is not labour intensive, otherwise the premium price of organic coffee should be increased so as to compensate for the high production costs. It is worth underlining that in contrast to the experience in developed countries organic conversion in tropical Africa is associated with increases rather than reductions in yield, which relates to the low input characteristics of conventional farming on the continent. With the price premium given to organic coffee in Africa and particularly in Muleba district farmers are more likely to earn more money than in developed countries.

Table 24: Farm enterprise budget for organic and conventional coffee

Item	Organic coffee		Conventional coffee	
	Clean coffee	Unhulled cherries	Clean coffee	
Gross average yield kg/ha	510		370	421
Average price per kg		1 800	630	1 400
Total revenue	918 000		233 100	589 400
Total variable cost	594 900		220 280	251 780
Total fixed cost		3 450	2400	2 400
Net Income		319 650	10 420	335 220

4.9.6 Organic standard

Standards play a key role in promoting the growth of organic agriculture. Organic coffee farmers had to meet the product standard before organic premium price were paid (UNCTAD, 2004). Harvest and post harvest techniques generally considered to be critical for attaining a given level of product quality. In case of harvesting only

ripe fruits should be harvested. Care is always taken to provide adequate drying places for the coffee beans.

Organic farmers in Muleba district dry their coffee beans on drying mats and on racks. Coffee beans should be stored in a well protected place against rain which may encourage the growth of the fungi. Before the raw coffee is traded on the world market it is graded according to established criteria. The coffee is mechanically sorted by sieving it to obtain beans of the same size. In order that the quality requirements are upheld equipment, working, drying surface, preparing and storage rooms are clean. Generally there are quality characteristics with minimum and maximum values for raw coffee that are required by importers of organic coffee. These include packaging and storage. In order to be exported to Europe, the raw coffee is usually packed in sacks in units of 48 kg or 60 kg. The sacks must display detail of the following: name and address of the manufacture/packer and country of origin, description of the product and its quality class, year harvested, net weight number, destination with the trader's/importer's address and visible indication of the organic source of the product. Storing both organic and conventional products together in the same warehouse are avoided. Cup quality should be of aromatic clean, and free from foreign tastes and smell. Bean shape of homogenous and water content of maximum of 13%. However the standard required by importers of organic coffee as it have been observed, are not far from the standard required by the buyers of organic coffee in Muleba district. According to the results presented in Table 25 the standard required by the buyers of organic coffee Kachwezi organic coffee primary society mentioned by farmers were moisture content of the coffee bean

below 10%, coffee had to be well dried, clean coffee, appearance larger bean size, clean storage and packing material.

Table 25: Organic standard required by buyers of organic coffee

Standard required	Frequency	Percent
Moisture content below 10%	15	30.0
Clean coffee	13	26.0
Clean storage and packing material	9	18.0
Larger bean size	13	26.0
Total	50	100.0

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The general objective of this study was to assess the economics of organic coffee production in Muleba district. It aimed at identifying costs associated with production and marketing of organic coffee, assessing the profitability of organic coffee by determining the cost and return to farmers and determining the effect of premium price in compensation of yield in organic coffee. It also aimed at identifying the coffee organic standard demanded by importers and their effect on coffee production.

5.2 Summary of Major Findings

The study found that coffee growers in Muleba district have household characteristics common to most rural household settings elsewhere in Tanzania. Organic coffee is an alternative approach to coffee farmers for improving and receiving the economic worth. Organic farmers are more likely to earn more income due to the fact of premium price given. Farmers are faced with some problems in their production activities. Lack of inputs such as organic manure, organic or natural pesticides for disease and pest control, lack of credit facilities, high cost of buying mulch, higher production cost and low price of organic coffee. As far as marketing is concerned majority of the farmers are still not satisfied with prices offered by organic coffee buyers because of the labour intensive involved in organic coffee production. Other problems reported by the respondents were lack of pruning/stumping equipment, and lack of quality facilities.

In terms of resources, land is acquired free by the majority of farmers through inheritance and in terms of labour the family is still the major source in organic coffee production.

Farm enterprises budget indicated that hulled conventional coffee farmers obtained relatively higher profit than hulled organic coffee farmers. Mean while there was no difference between the profit obtained from hulled conventional coffee and hulled organic coffee as it was proved by the results of t-test. The less profit obtained in organic coffee was contributed by higher production costs involved in production.

5.3 Conclusions

Organic farmers' cost structure in Muleba district reflected that expenditure in fixed costs represented remarkably low shares of organic coffee gross income and in most cases also of conventional farmers. Overall expenditure on variable cost was higher than fixed cost for organic farmers and this were characterized by rising expenditure in costs incurred on post-harvest handling and processing activities required to meet the higher quality standards of the organic exporter. The study found out that although there were differences in fixed costs, and labour cost of the two farming system, their differences were not statistically significant. However there was statistically significant difference in average variable costs of organic coffee and conventional coffee which was attributed by high marketing costs for organic coffee of about 58% higher than that of conventional coffee. Production and marketing of organic coffee is promoted mainly by KCU and EPOPA, but their production and marketing arrangement do not provide incentives to organic coffee growers in terms

of input such as organic manure, botanicals, post-harvest handling and processing in general. Due to high production costs observed, which leads to less profit in organic coffee production, the study advises farmers to keep on producing conventional coffee which is not labour intensive, otherwise the premium price of organic coffee should be increased so as to compensate for the high productions cost. The study also found out that there was increase in yield of both organic and conventional coffee in Muleba district with the former increased by 31.3% and the later by 16.8%. This was in contrary to developed countries where the experience shows that organic conversion were associated with reduction rather than increased in coffee yield. Some problems have been noted from the study, which faced organic coffee growers in Muleba district. These problems may prevent the realization of potential income gains by organic coffee growers. Intervention such as credit access facilitation, credit management, technical skill training, business management skills, market linkage and information are necessary aspects in enhancing coffee cropping activities.

5.4 Recommendations

Based on the study findings, the following recommendations aimed at improving organic coffee production are made:

(i) For the Government and KCU

- **Development/improvement of training and extension services**

Farmers need to access training and extension services in order for them to correctly appraise their investments. Technical skills training such as agronomy, post-

harvesting handling and processing is an important component in rationalizing production and marketing of the crop. Increase in yield per hectare can be achieved through improved growing techniques. Inadequate knowledge of organic techniques by farmers can be developed with further training and exposure. Therefore field officers and trainers should be motivated to work hard so that they can provide farmers with adequate and quality extension services.

ii) For KCU

▪ Reliable market of organic coffee

These include reliable prices of organic coffee. According to farmers' views the price offered in the season 2005/2006 of 1 800 Tsh for one kilogram of hulled organic coffee was inadequate when compared to the production cost. It was suggested to increase the price; increase of price will encourage farmers to invest more on their coffee fields and by doing so the production and quality of coffee will be improved.

iii) For Financial Institutions and KCU

▪ Improvement in input and equipment supply to farmers

Farmers need to be assisted in obtaining input and farm equipments. This can be effected through provision of loans which will be paid back during selling of their produce. Also it is recommended that a farmer agricultural bank be established in order to solve the problem of credit for farmers and processors. This could be achieved through the government facilitating SACCOS related to agricultural activities to mobilise resources and form an agricultural bank. Farmers also

suggested to be given loan in form of livestock's such as cattle, pigs or goats. This will help them to obtain not only manure but also to earn income through selling of their products hence be in a better position to pay for labour involved in organic coffee production activities.

- **Provision of motivation to best producers**

Farmers who produce best quality coffee should be announced to the rest of farmers and being given a bonus by KCU such as a certificate of best quality coffee producer, or given the subsidized farm implements as an incentive. Limited incentives among farmers to work hard and produce high quality coffee resulted in decreased quality of coffee which on the other hand decreased the prices and income of coffee farmers. The incentives given to farmers will create competition among farmers and by doing so coffee production in terms of quantity and quality will be improved.

iv) Development of better research and development facilities

In order to function properly a farmer service centre has to be constantly aware of the farmers' problems and predict what kind of research services is most beneficial to them. To improve organic coffee enterprise in Muleba district stakeholders such as ARI-Maruku, Sokoine University of Agriculture (SUA), EPOPA have to conduct more research on agronomic and sustainability of organic coffee production. In order to fill the gap of the farmers, extension services have to rely on profound research and expertise. When the farmers are not technically supported, they tend to lose their

interest in diversification of their conventional farming practices to organic farming practices.

v) Areas for further research

In order to enrich the findings of this study further work is necessary especially on factors contributing to differences in organic and conventional coffee yield as well as differences between organic and conventional farmers in rates of adoption of farming practices.

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APPENDICES

Appendix 1: Farmers' questionnaire for Economic analysis of smallholder organic farmers in Tanzania. A case study of coffee production in Muleba district.

Item	Response
Date of Interview	
Name of Interviewer	
District	
Name of village	
Name of respondent	
Coffee farming practices: 1-Organic; 2- Conventional	
Variety of coffee grown	
The name of the scheme if any	
Questionnaire Number (Numbered during data entry)	

A: Identification

In addition to coffee what other four major crops do you grow?

Crop	Banana	cassava	beans	maize
Production system ^a				
Rank ^b				
^a : 1=Organic 2=Conventional				
^b :1=Most important 2= Moderately important 3=Least important				

B: Household Identification Variables

Respondent	Gender	Age	Marital Status	Highest	Can	Main	If
1=	1= Male	(yrs)	1= Married to	education	you	occupation	working
Household	2=		one wife	attained	1=	1=crop	in coffee
Head	Female		2=Married to	1= none,	read	farming	1=Yes
2=Spouse			more than one	2= primary	2=	2=Livestock	2=No
			wife	3=sec-O	write	keeping	

			3= Single	level,	3=	3=fishing	
			4= Divorced	4= sec-A-	both	4=beekeeping	
			5= Widowed	level	read	5=employee	
				5= college	&	6=food	
				6=	write	service	
				university		7=shop	
				7= others		8=other	
						business	

9. Total number of people permanently living in household (including non-family relatives).....

10. Total number of people in household above 6 years old (including non-family relatives).....

11. How many of the people in the household (above) are engaged in:

Formal employment (e.g teacher).....

Small scale non-farm activities (e.g. fishing).....

C: Overview of Household Resources

Resources	Unit	Quantity	Estimated value/price
Land resources			
-Total land	Hectares		
-Cultivated land	Hectares		
-Land under coffee	Hectares		
-Area cultivated with CSC			
Cultivated plots(all crops)	Number		
Fallow land	Hectare		
Plots for coffee	Number		
Distance to nearest coffee plot	Km		
from homestead	Walking		

	time (min)		
Distance to furthest coffee plot from homestead	Km		
	Walking		
	time (min)		
Number and age of trees or plants	No		
	years		
Livestock resources			
-Cattle	Number		
-Sheep	Number		
-Goats	Number		
-Donkeys	Number		
-Pigs	Number		
-Chicken	Number		
Other assets	Number		
-Radio	Number		
-Bicycle	Number		
-Ox-plough	Number		
-sprayer	Number		
-crop storage facility	Number		
-Iron sheet roofed house	Number		
Grass thatched house	Number		
Other assets (specify)		

D: Income and Expenditure

Income source/expenditure item	Unit of measure	Unit price(Tsh)	Amount sold	Annual Income (Tsh)
Crop sale (main crops)-(For crops sold piecemeal record each transaction in a separate row)				
Estimated income from coffee				
Crop-sub total				
Livestock/livestock products sales (Name livestock/product sold)				

Livestock-sub total				
OTHER NON-FARM SOURCES OF INCOME				
Local brew				
Casual labour				
Formal employment				
Fishing				
Charcoal making				
Shop/carpentry/tailorin g/food				
Other(Specify)				
Non-farm-subtotal				
TOTAL INCOME				
FOOD EXPENDITURE RECORDS				
Weekly expenditure on food (sh)				
During coffee harvesting time				
During non-coffee selling time				
Last week				

**Average income from and expenditure on renting-out and renting-in land for
coffee production during 2001/2002 and 2005/2006**

Year/cropping season	Total land rented(acres)	Renting status	For area rented out state	For trees rented in state
		1=Rented- out 2=Rented- in	Total amount received(Tsh)	Total amount paid (Tsh)
2005/06				
2004/05				
2003/04				
2002/03				
2001/02				

Fixed costs (during 2005/2006)

Interest on farm-related loans

Provide information on interest paid during September 2005 and August 2006 on loans related to land or farm investments such as equipment and inputs

Receiving of loan(s) 1=Yes 2=No	If yes, type of loan (months)	Duration of loan (months)	Amount/value of loan (Tsh)	Interest paid ^a (Tsh)
^a If loan and interest were provided/paid in kind fill in the approximate equivalent values				

Purchase of farm implements

Provide information on purchase of farm implements during September 2005 and August 2006

Machinery/equipment/tools	Number	Unit price (Tsh)	Total cost (Tsh)	Useful life (Years)
Sprayer				
Hand hoe				
Scissors				
Machete/bush knives				
Solo/ULV/knapsack sprayer				
Oxen				
Ox-drawn plough/equipment				
Others (Specify)				

E: Agronomic Practices and Extension Services

If coffee is grown in more than one plot indicate the size and location of biggest plot

Distance from homestead (km)	Size (Hectares)	Tenure 1=Inherited; 2=Bought; 3=Borrowed, 4=Leased (Indicate sh./year), 5=Provided by government 6=Present 7=Other tenure (specify)
------------------------------	-----------------	--

What type of cropping system do you apply in the coffee farms/plots?

1=pure stand cropping 2=mixed/intercropping 3= both pure and intercropping

4=Rotation/Fallow (Duration to next coffee crop.....Years)

If you intercropped coffee with other crops mention proportion of all intercropped land:

1=a quarter (or less) 2= about a half 3=about three-quarters 4=All coffee land

What/which three main crops did you intercrop/rotate coffee with?

	Crop(s)	Proportion of coffee	Rotation/Fallow	No of years

Explain your agronomic practices below

Practices	1=Yes 2=No	Units	Quantity	Area applied (ha)
Area under coffee that is not attended/				
Planted improved/dressed/resistant varieties				
Use of organic seeds/planting materials				
Used organic manure				
Used inorganic manure				
Used botanicals(e.g				

pyrethrum,neem)				
Used inorganic chemicals(e.g Karate)				
Applied irrigation water				
Used alternative farm power (Tractor/animals)				
Used trap crops for controlling insect pests				
Soil conservation practices				
Terracing				
Soil bands				
Contouring				
Tree belts/wind breakers				
Ridging				
Others (specify)				

Extension services and membership to local schemes

How many times were you visited by an extension worker during 2005/2006?.....

During 2005/2006 were you a member in any farming

cooperatives/association/schemes related to coffee? 1=Yes 2=No

If Yes what was the entry fee.....Tshs

The annual membership fee.....Tshs

F: Entrepreneurship Orientation & Perceptions

Question	Answer
Do you keep records of your farm? 1= Yes 2= No	
What types of records do you keep 1= cost and prices 2=major agronomic practices 3= use of labour and inputs 4=sales 5=credit use 6=receipts for crop sales	
Who keeps the records 1=self 2= farm manager 3= other people (specify)	
How often do you update your records 1= daily 2=weekly 3=monthly	

4=during every transaction	
What is your source of planting material? 1=coffee development centre 2=own farm seeds 3=Not applicable	
How do you keep records 1=in writing 2=in the head	
Does anyone in the household have a bank account 1=Yes 2=No	
Do you perform any processing of your coffee? 1=Yes 2=No	
Have you ever (or any member of the household) received training on organic farming? 1=Yes 2=No	
If yes when 1=This year 2= Last year 3= More than a year	
If yes for how long did the course last (days/weeks)=.....(delete what is inapplicable	
If yes what type of training did you get? 1=pests and disease control 2=general training (containing all topics)	
Did you deal with any of the following institutions last cropping season? 1=Yes 2=No	
i)Tanzania Board of coffee	
ii) Primary cooperative	
iii) Input trust fund	
iv) EPOPA	

Given opportunity which aspect would you need intervention to enhance your coffee cropping activities

Aspect	Most important	Important	Moderately important
Credit access facilitation			
Credit management			
Technical skills training e.g agronomy,processing,etc specify)			
Bussiness management skills			
Market linkage and information			
Facilitation to access more			

land			
Others (specify)			

In your opinion has organic farming in coffee increased or decreased in the past five years

1= Increased 2= decreased 3=remained the same

Give reasons for your answer above

1=Increased training/extension services

2=more readily available of inputs

3=More care/ improved agronomic services

4=More reliable market outlets/reliable market outlets

5=other reason (specify)

G: Coffee Production costs (Labour use)

Activity	Family labour			Hired Labour			
	No.of people	Hours per /day	No of days	No.of people	Hours per day	No.of days	Total payment (sh.)
Weeding							
Mulching							
Pruning							
Pest control							
Fertilizer/manure application							
Harvesting							
Drying							
Other labour costs							
Including labour for transport							

H: Coffee Input costs, Production and prices and Revenue per hectare

For all coffee plots indicate the amount of input used

Input/Parameter	Local unit	Standard (SI) Unit	Quantity	Price/unit (Tsh.)	Cost/hecta re
Inputs & services					
Seeds					
Fertilizers					
Chemicals(e.g. Tri fluralin)					
Botanicals(e.g. Neem)					
Sprayer rental					
Spraying fuel					
Other input/services					
Production, Prices & Revenue					
Total production (all plots)					
Total production- Grade 1					
Price for grade 1					
Total production- Grade 2					
Price for grade 2					
By-product value (if any)					
Total revenue					

I: Marketing costs (during September 2005 and August 2006)

Where do you sell your coffee? 1=Cooperative society 2=Private buyer 3= other
(specify)

How far is the coffee selling place?.....km
.....(walking minutes)

Provide information on various costs incurred in the process of assembling,
transporting and selling the biggest consignment of coffee during September 2005
and August 2006

Amount sold last /biggest consignment.....kg		
Marketing cost item	Total cost (Tshs)	Comment (s)
Sacks/bags		
Sorting/grading		
Dehulling		
Handling (bagging,loading & offloading)		
Transport		
Commissions to brokers		
Telephones		
Taxes/cooperative society/village levies		
Personal trips		
Storage		
Inputs trust Fund (pass book)		
Other marketing costs(specify)		

J: Supplementing questions

What are the key factors influencing profitability of coffee production? List them
below

.....

What are standards required/imposed to you by buyers of organic products? List
them below

.....

.What are the risks involved with organic coffee production? List them below

.....

What are the problems facing smallholder farmers involved in organic coffee production?

.....

THANK YOU FOR YOUR COOPERATION.

Appendix 2: Coffee Production Trends 1989-2003

Years	Arabica	Robusta	Coffee production (MT)
1989/90	n.a	n.a	53,420
1990/91	n.a	n.a	46,210
1991/92	n.a	n.a	56,030
1992/93	44, 229	15, 475	59,574

1993/94	25, 708	8, 443	34,151
1994/95	26, 483	15, 488	41,971
1995/96	40, 547	11, 943	52,490
1996/97	30, 752	12, 816	43,568
1997/98	21, 447	16, 555	38,002
1998/99	31, 674	14, 996	46,600
1999/00	34, 431	13, 380	47,900
2000/01	n.a	n.a	58,240
2001/02	n.a	n.a	36,200
2002/03	n.a	n.a	50,000

Source: Tanzania Authorities & FAO

n.a data not available.

**Appendix 3: Cost benefit analysis for both organic and conventional coffee using
farm budget analysis**

			Organic coffee	Conventional coffee	
Item			Hulled coffee	Unhulled cherries	Hulled coffee
Gross	average	yield	510	370	421
(kg/Ha)					
Average price per kg			1800	630	1400
Gross income			918,00	233,100	589,400

Input requirement and cost

Labour cost

Weeding	55000	37500	37500
Mulching	13800	12000	12000
Pruning	25000	15000	15000
Manure application	42500	9500	9500
Harvesting	70000	45000	45000
Drying	25000	18700	18700
Sub total	231,300	137,700	137,700

Marketing cost

Sorting/grading	25500	0	15000
Hulling	50000	0	16000
Transport	10500	6800	6800
Bags	19300	7700	7700
Drying Mats	17000	5000	5000
Sub total	122,300	19500	50500

Input cost

Mulch	80000	25000	25000
Seedling	9800	3500	3500
Manure	150000	35000	3500
Botanicals	1500	0	0
Sub total	241,300	63580	63580
Total Variable cost	594,900	220,280	251,780

(Tsh/Ha)

Fixed cost

Land rent	0	0	0
Interest	0	0	0

Cost of equipment

Hand hoe	1700	1600	1600
Bush knife (panga)	700	500	500
Pruning secateur	550	0	0
Pruning saw	500	300	300
Total Fixed Cost (Tsh/ha)	3400	2400	2400
Returns above variable	323,100	12,820	337,620

cost			
Total cost (variable	598,350	222,680	254,180
&fixed cost)			
Net Income	319,650	10,420	335,220
