

**ECONOMIC IMPACT OF CONTRACT FARMING ON INCOME OF
SMALLHOLDER FARMERS: CASE STUDY OF PAPRIKA CONTRACT
FARMING IN MBOZI DISTRICT-TANZANIA**

BY

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ABSTRACT

This study provides empirical evidence on economic impact of contract farming on the income of smallholder farmers of non traditional crops. Specifically it analyses the requirements for farmers' participation, factors that determine income and effect of paprika contract farming on household income and identifies constraints and prospects of contract farming. A cross section research design was adopted and a purposeful sampling procedure was used to select villages and wards and a total of 150 farmers were selected randomly for interview. Using probit model, results show that access to credit, livestock ownership, marital status and access to extension services increase the probability of farmers' participation in contract farming at ($p < 0.05$). Leadership, distance from the village office, household size and ownership of irrigated land were found to have negative effect while land ownership, household family labour, education level, and gender were found to have positive effect on participation but not significant. The results confirm the hypothesis that households with large endowment tend to participate in contract farming. Using Heckman model and OLS estimation, the results also show that contract farming increased the average income of smallholder farmers by TAS. 108 815 per annum per household and is significant at ($p < 0.05$). Results further show that cost of transport and production costs had a negative effect on income from paprika farming and is significant at ($p < 0.05$). These results clearly show that contract farming has the potential of raising smallholder farmers' income. The study however recommends provision of inputs subsidy, provision of extension services, creating a strong legal framework protecting both farmers and contracting firms as important issues in order for smallholder farmers to participate and benefit from contract farming. The study also recommends to the government and NGOs to support formation of stronger farmers' organizations in order to improve their bargaining power.

DECLARATION

I, Siwingwa Adam Kephas, do hereby declare to the Senate of Sokoine University of Agriculture, that this dissertation is my original work and that it has neither been submitted nor being concurrently submitted for degree award in any other institution.

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Date

The above declaration is confirmed

Prof. M.E. Mlambiti
(Supervisor)

Date

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DEDICATION

This work is dedicated to my wife Mrs. Flora Siwingwa, my two daughters; Suzanne, Bathsheba and my son Kephass who have been so supportive during my entire study. To me they have been my source of inspiration.

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ABBREVIATIONS

AAAE	-	African Association for Agricultural Economics
ADP	-	Actions for Development Programs
AREN	-	Agricultural Research and Extension Network
ESRF	-	Economic and Social Research Foundation
FAO	-	Food and Agriculture Organization
FARMESA	-	Farm Research Management for Eastern and Southern Africa
HBS	-	Households Budget Survey
IFPRI	-	International Food Policy Research Institute
IIRR	-	International Institute for Rural Reconstruction
ILRI	-	International Livestock Research Institute
KIT	-	Royal Tropical Institute
LIMDEP	-	Limited Dependent Variable Modelling
LTD	-	Limited
MAFC	-	Ministry of Agriculture and Food Security and Cooperatives
MKUKUTA	-	Mkakati wa Kukuza Uchumi na Kuondoa Umaskini Tanzania
MLE	-	Maximum Likelihood Estimation
MSc.	-	Masters of Science
NBS	-	National Bureau of Statistics
NEPAD	-	New Partnership for African Development
NGO	-	Non Governmental Organization
NIE	-	New Institutional Economics
NSGRP	-	National Strategy for Growth and Reduction of Poverty
ODI	-	Overseas Development Institute

OECD	-	Organization of European and Caribbean Development
OLS	-	Ordinary Least Squares
PHDR	-	Poverty and Human Development Report
SNAL	-	Sokoine National Agricultural Library
SPSS	-	Statistical Package for Social Scientists
TCE	-	Transaction Cost Economies
TAS	-	Tanzanian Shillings
TSL	-	Tanzania Spices Limited
UN	-	United Nations
URT	-	United Republic of Tanzania
US	-	United States
USAID	-	United States Agency for International Development
USD	-	United States Dollar
WB	-	World Bank
WDR	-	World Development Report

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

An emerging vision of agriculture for development redefines the role of producers, the private sector, and the state in improving its performance and hence its contribution in reducing rural poverty (WDR, 2008). Agricultural production in most developing countries is carried out mainly by smallholders, who often remain the most efficient producers, in particular when supported by their organizations (Minot and Hill, 2007).

The private sector drives the organization of value chains that bring the market to smallholders and commercial farms (Setboonsarng, 2008). The state through enhanced capacity and new forms of governance corrects market failures, regulates competition, and engages strategically in public-private partnerships to promote competitiveness in the agribusiness sector and supports the greater inclusion of smallholders and rural workers (Kydd, 2002; Eaton and Shepherd, 2001). This applies also to marketing and distribution of agricultural products (Minot and Roy, 2007).

According to Kirsten and Sartorius (2002), the reasons for these dramatic changes include among others modern advances in technology in producing products with certain specification and new selling methods which emphasize on brands image based on consistent quality. On the consumers' side due to rising incomes, consumers are becoming increasingly discriminative in their tastes especially on the timing of production, marketing and maintenance of the required quality of products (Eaton &

Shepherd, 2001). Hence a need to search for ways of improving coordination of production, processing and distribution in Agriculture (Eaton and Shepherd, 2001; Minot and Roy, 2007; WDR, 2008).

The role of contract farming in improving smallholder farmers' welfare has been a subject of interest over the recent years (Jabber *et al.*, 2007; Warning and Key, 2002; Warning and Hoo, 2000). Contract farming has often been looked upon as a system that could integrate smallholder producers in rapidly developing mainstream markets, participate in new high value markets and thus stabilize farmers' income (Minot and Hill, 2007; WDR, 2008).

Several empirical studies on gains in physical productivity, reduction in costs per unit of output, gains in net returns per unit of input and reduction in uncertainty of quality of output have been done in several parts of the world (Miyata *et al.*, 2007; Dileep *et al.*, 2002 and Simmons *et al.*, 2005). Other studies provide more direct evidence in the form of income or gross margin comparisons (BIRTHAL *et al.*, 2005; Kumar and Kumar, 2008 and Simons *et al.*, 2005). All studies show that gross margins for contract farmers were significantly higher than that of independent farmers.

Despite the fact that contract farming is playing an increasingly important role in many developing countries, the growth in contract farming has sparked controversy over its social and economic impact in households (Singh, 2000; Minot and Roy, 2007). Studies indicate that although contract farming raise significantly the household income of small holder farmers but it has been found to contribute towards exploitation of smallholder farmers and propagating rural inequality as contracting

companies tend to favour medium and large growers (Ramaswami *et al.*, 2005; BIRTHAL *et al.*, 2005; Key and Runsten, 1999; Porter and Howard, 1997).

This study addresses three key questions that are related to the above arguments; First, does smallholder farmers have the ability to participate in contract farming? Second, are marketing related costs major determining factors for income from paprika contract farming? Thirdly is there a significant difference in household income between farmers who participated in contract farming and those who did not participate?. The first question is based on the assumption that if smallholder farmers are not able to participate in contract schemes then analysing their benefits from participating in contract farming would not be valid.

1.2 Background to Paprika Contract Farming in Mbozi

1.2.1 Intervention need assessment

Paprika contract farming was one of the projects under the access to markets program, a program which was implemented by Actions for Development Program (ADP) Mbozi a development NGO which operates in Mbozi district. The access to markets program started in 2004 following the findings of a baseline survey conducted by ADP Mbozi in 2003.

The survey results indicate that the district production of major food crops is relatively good and it is very much endowed with arable land suitable for agriculture. However most of the households experience low income from agriculture and hence have high poverty levels (ADP Mbozi, 2003). For example, the income levels of nearly 52% of the households in Mbozi do not exceed TAS. 95 000 per annum. This

is an income of less than 0.25 USD per day which is well below the UN poverty limit of 1USD per day. While 27% of the respondents reported income levels of between TAS. 95 000 per annum and TAS. 200 000 per annum, only 13% of the respondents reported having income in excess of TAS. 200 000 per annum (ADP Mbozi, 2003). ADP Mbozi (2003) observed that lack of markets was among the major problems hindering agricultural production, a problem which was mentioned by 68% of respondents while farmers in particular mentioned low producers prices, poor market information and poor infrastructure as major constraints that hinder them from increasing agriculture production leading to low income and hence poverty.

1.2.2 History of paprika farming in Mbozi

Paprika contract farming was introduced in Tanzania in 2000 by a Spanish company called EVESA which is a major producer and processor of spices (USAID, 2005). The company established a subsidiary company called Tanzania Spices Limited (TSL) to increase supplies of raw Paprika to their EVESA factory. Tanzania's Iringa and Ruvuma regions were chosen as sites to establish Paprika as a cash crop for smallholder farmers (USAID, 2005). To start, Tanzania Spices Limited aimed at the two regions to produce 2000 tons of Paprika a year. But while there was motivation among farmers in the region for a genuine cash crop, progress was slow (ibid). Farmers were unsure of the market, and Tanzania Spices Limited had limited resources in its small local office to spend on training farmers in production. By 2003 Iringa and Ruvuma had produced less than 200 tons of paprika (ibid).

In Mbozi farmers started growing paprika in 2004 after collaborative effort between ADP Mbozi and Tanzania Spices LTD which aimed at increasing the volume of

supply of the crop to the company (TSL, 2004). ADP Mbozi (2003) linked farmers to the contracting company in the same year with the total initial number of farmers involved in paprika farming being about 500 farmers (TSL, 2004). Following the satisfaction by the company that the number of farmers registered could provide the required minimum volume of the produce, farmers and Tanzania Spices Limited entered the first contract to produce and market paprika in 2003 (TSL, 2005).

1.2.3 Contract modalities

A contract was formulated which among other issues stipulated on standard issues (colour of ripe paprika fruit, grading, drying and packaging) (ADP Mbozi, 2003). Contracts were then signed between farmers represented by respective different groups and the company. According to Eaton and Shepard (2001), this contract arrangement is equivalent to centralized model of contract farming. During the sales each group of farmers organized themselves for quality inspection of the product before bringing it to markets (ADP, 2003). A 5% reduction in the premium price is done to groups which do not adhere to stated quality of drying to the required moisture content and the required paprika brick red colour. Therefore farmers within the group were very careful to avoid the reduction by ensuring that each member meets the required quality standards (TSL, 2004). Other specification in the contract included the need to sell all paprika to the company (ibid).

The role of ADP Mbozi in the contract was to supervise farmers and offer trainings to farmers on group management while the company provided seeds on credit though some farmers bought seeds directly. The company also offered extension services to

farmers and to government extension staff and other staff from ADP Mbozi in order to help in field monitoring (ADP Mbozi, 2005).

1.3 Problem Statement and Justification

Over the past decade, the agricultural sector in Tanzania has maintained a modest, but steady growth rate of about 3% per year (URT, 2006b). Although this exceeds the population as well as the labour force growth rate it has not had real positive impact on the economic position of the majority of the people especially in rural areas (URT, 2007; PHDR, 2007). Poverty has remained as a major issue of concern for many rural Tanzanians and hence the call for structural changes to make agriculture a modern, commercial oriented and profitable sector (Nyambo and Verschoor, 2005; Amani, 2005; NSGRP, 2006).

The Tanzania government through the National Strategy for Growth and Reduction of Poverty program (NSGRP) categorically emphasizes the adoption of contract farming as a way of integrating small scale farmers into agricultural marketing so as to improve farmers' incomes and hence contributing in alleviation of rural poverty (URT, 2008; URT, 2003; NSGRP, 2005). Studies however, indicate that Tanzania remains to be one of the countries in sub Saharan Africa whereby farming contracts arrangements are very few and as a result it loses a lot in export markets especially in high value crops which can only be better produced and marketed under contractual arrangements due to seasonality and high requirements for quality standards (Nyambo and Verschoor, 2005). According to the Tanzania national agriculture census of 2002/2003 and other studies, only 25% of the farmers in the country are engaged in outgrowers' schemes, most of who are involved in production of

plantation crops such as sugar cane, tea, coffee, cotton and tobacco (NBS, 2005 and PHDR, 2005).

Although the government of Tanzania supports contract farming, few studies have been done on the potentials of contract farming for non traditional crops arrangements in contributing to the increasing incomes of smallholder farmers and hence contributing towards alleviation of rural poverty (Nyambo and Verschoor, 2005). Moreover, of the few studies on contract farming which have been done in the country, most of them focused mainly on the performance of contract farming by comparing gross margins under the situation with and without contract arrangements (Mbwana, 2007; Ishiu, 2007). But under conditions where various farm activities compete for limited household labour and other resources, improvements in income from more intensified crops/livestock production under contract, may lead to spill-over benefit on other economic activities and sometimes it may lead to negative effects due to substitution of land and labour hence a need for measuring the impact using household income rather than gross margins (Minot *et al.*, 2007; Minot and Roy, 2007).

Therefore this study tries to determine the contribution of contract farming of non-traditional crops on household income so that the results can help in informing key agricultural stakeholders in the country to formulate appropriate policies on contract farming which can have benefits to smallholder farmers and the agriculture sector as whole and hence contributing towards rural poverty alleviation.

1.4 Research Objectives and Hypotheses

1.4.1 Overall objective of the research

The Overall objective of the research was to assess the economic impact of contract farming on the income of small holder farmers growing non traditional crops.

1.4.2 Specific objectives

Specific objectives in this research were:-

- (1) To analyze the requirements for farmers participation in contract farming.
- (2) To analyze factors that determines income in contract farming
- (3) To analyze the effect of contract farming on income of smallholder farmers
- (4) To identify constraints and prospects for contract farming of non traditional crops

1.4.3 Research hypotheses

This study is based on the following hypotheses:-

- Farmers with more social and economic endowments tend to participate in contract farming than farmers with fewer endowments.
- Farmers who participate in contract farming earn higher total household incomes than those who do not participate
- Contract farmers who are close to the market earn more income than contract farmers who are far from the market

1.4.4 Research questions

- What is the economic status of the farmers who participated in paprika contract farming?

- o What is the difference in economic levels between contract and non contract farmers?
- o Is there any difference in incomes earned by contract farmers close to the market and those away from the market?

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Contract Farming and Agricultural Development

2.1.1 The meaning of contract farming

Contract farming can be defined as an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forward agreements, frequently at predetermined prices (Eaton & Shepherd, 2001; Singh, 2002). Baumann (2000), defined contract farming as a system whereby a central processing or exporting unit purchases the harvests of independent farmers and the terms of the purchase are arranged in advance through contracts. According to Baumann the terms of the contract vary and usually specify how much produce the contractor will buy and what price they will pay for it.

Eaton and shepherd (2001) also provide a varied definition of contract farming by categorizing contracts basing on the intensity of the contractual arrangement according to the depth and complexity of the provisions of services in each of the following three areas:

Market provision: The contractor and a farmer agree to terms and conditions for the future sale and purchase of a crop or livestock product;

Resource provision: Apart from the marketing arrangements the contractor may agrees to supply selected inputs, including on occasions land preparation and technical advice; *Management specifications:* The farmer agrees to follow recommended production methods, inputs regimes, and cultivation and harvesting specifications.

Furthermore, Baumann (2000) argues that contracting is fundamentally a way of allocating risk between producer and contractor. The farmer normally takes the risk of production and the contractor takes the risk of marketing. Eaton and Shepherd (2001) conclude that with effective management, contract farming can be a means to develop markets and to bring about the transfer of technical skills in a way that is profitable for both the contractors and farmers.

2.1.2 Contract farming types and variations

Contract farming can be structured in a variety of ways depending on the crop, the objectives and resources of the contracting firm and the experience of the farmers (Baumann, 2000). Eaton and Shepherd (2001), broadly categorize contract farming arrangements into five models:

1. *The centralized model.*
2. *The nucleus estate model.*
3. *The multipartite model.*
4. *The informal model.*
5. *The intermediary model.*

2.1.2.1 The centralized model

According to Eaton and Shepherd (2001), these models would differ in the type of contractor, the type of product, the intensity of vertical coordination between farmer and contractor and the number of key stakeholders involved. The centralized model can be considered as the classical contract farming model where a processor or packer buys produce from a large number of smallholder farmers (Baumann, 2000). In this model there is strict vertical coordination, which means that quality is tightly

controlled and quantity is determined at the beginning of the growing season. Most of the products traded under this model require a high degree of processing, such as sugar cane, tea, coffee, milk, poultry, and vegetables for the canning industry (Key and Runsten, 1999).

2.1.2.2 The nucleus estate model

Eaton and Shepherd (2001), define the nucleus estate model as a variation of the centralized model where the contractor not only sources from independent farmers but also has its own production facilities such as plantation. This model is mainly used for perennial crops, but there are examples of applications of this model in other crops. Furthermore Eaton and Shepherd (2001) argue that nucleus estates have often been used in connection with resettlement or transmigration schemes for oil palm and other crops. Other examples of the nucleus estate concept with other products include the operation of dairy nucleus estates, with the central estate being primarily used for the rearing of “parent stock” in livestock enterprises (Bijman, 2008; Baumann, 2008).

2.1.2.3 The multipartite model

The multipartite model usually involves many types of agencies; it is an intermediary model where middlemen are involved between the company and the farmer (Eaton and Shepherd, 2001). Multipartite contract farming may have separate organizations responsible for credit provision, production, management, and processing and marketing. Multipartite structures are common in China where government departments as well as township committees have set up joint ventures with domestic and foreign investors to establish a processing unit and to enter a contract farming arrangement with local farmers (Bijman, 2008). However as D’ Silva *et al.* (2009), point out, when the joint venture has sufficient discretion to control its transactions

with the farmers, vertical coordination will be intense but given the involvement of a public partner in the joint venture, the farmer-contractor relationship may be affected by the political interests of this partner.

2.1.2.4 The informal model

Eaton and Shepherd (2001), describe the informal model as characterized by individual entrepreneurs or small companies contracting informally with farmers on a seasonal basis, particularly for crops such as fresh fruits and vegetables. Crops usually require only a minimal amount of processing, such as sorting, grading and packaging. They further emphasize that the success of the informal initiative depends on the availability of supporting services, which, in most cases, are likely to be provided by government agencies.

D'Silva *et al.* (2009) provides a common example of the informal model where the sponsor, after purchasing the crop, simply grades and packages it for resale to the retail trade. Supermarkets frequently purchase fresh produce through individual developers and, in some cases, directly from farmers. Financial investment by such developers is usually minimal. Eaton and Shepherd (2001) assert that this is the most temporary and speculative of all contract farming models, with high risk of default by both the contracting company and the farmer. Nevertheless, in many developing countries such developers are long established and in numerous cases they have proved an alternative to the corporate or state agency approach.

2.1.2.5 The intermediary model

This model is characterized by having at least three parties to the contract farming arrangement (Eaton and Shepherd, 2001). A processor or major trader formally contracts with a collector (or middlemen) who then informally contracts with a

number of farmers. This model, which can be considered as a combination of the centralized and informal models, is common practice throughout Southeast Asia (Baumann, 2000). As there is no direct link between contractor and farmers, this model has several disadvantages for vertical coordination and for providing proper incentives (Eaton and Shepherd, 2001).

2.3 Advantages and Problems of Contract Farming

Apart from improving the welfare of farmers through increased income and employment contract farming have been found to have an impact on the improvement of agricultural production (Vavra, 2009; Setboonsarng, 2008). According to Eaton and Shepherd (2001), the major advantage of a contractual agreement for farmers is that the sponsor will normally undertake to purchase all produce grown, within specified quality and quantity. Contracts also provide farmers with access to a wide range of managerial, technical and extension services that otherwise may be unavailable. Moreover according to Key and Runsten (1999), farmers can use the contract agreement as collateral to arrange credit with a commercial bank in order to fund inputs (Setboonsarng, 2008).

Nevertheless, several studies have also found a number of disadvantages for both participants and non participants in contract farming in the rural community. Singh (2002), provides a detailed study of problems of contract farming in Indian Punjab. Together with other studies like Porter and Howard (1997), they found that contract farming can result in winners and losers at the community level where the winners are contractors and their suppliers while the losers are people who do not receive new income but must pay higher prices for food or for farm inputs. Furthermore it has

been reported that contract farming's shifts farm production to cash crops affect the production of basic food crops and hence threatening food security (Porter and Howard, 1997; Bijman, 2008).

Baumann (2000), however argues that most of the problems which are incurred under contract are a consequence of the dependency nature of the contract, and manipulation on both sides, rather than the terms which are written into the contract. The relative dependencies of the contractor and outgrowers are extremely important in deciding how contracts are administered (Masuku *et al.*, 2003).

The contract usually safeguards the contractor from such accidents by specifying levels of production, deducting costs in advance and supplying credit. Another problem is that another contracting company may move into the area and take advantage of the investment the pioneer company has injected into technical know-how and infrastructure development to offer outgrowers a better deal (Bijman, 2008). Companies can also face problems from farmers' manipulation of the product, for example, adding stones to add weight, or damaging the produce as revenge (Masuku *et al.*, 2003).

2.4 The Theoretical Concept of Contract Farming

In the literature of contract farming, the dominant theoretical framework is transaction cost economics (TCE), following the seminal works of Coase (1937) and Williamson (1985) and expounded on by the proponents of the New Institutional Economics (NIE) school, which extends economic theory by giving recognition on the role of institutions in economic activities (Kherallah and Kirsten, 2001). The work

of Williamson on the economics of organization and contracts follows Coase's line of thinking. Williamson has combined the concepts of bounded rationality and opportunistic behavior (which manifests itself as adverse selection, moral hazard, cheating, shirking, and other forms of strategic behavior) to explain contractual choice and the ownership structure of firms (Kherallah and Kirsten, 2001; Pingali *et al.*, 2008).

In Williamson's framework, a trade-off has to be made between the costs of coordination and hierarchy within an organization, and the costs of transacting and forming contracts in the market (Kherallah and Kirsten, 2001). This trade-off will depend on the magnitude of transaction costs. Coase, (1937) underlines the important role of transaction costs in the organization of firms and other contracts. He argues that firms emerge to economize on the transaction costs of market exchange and that the "boundary" of a firm or the extent of vertical integration will depend on the magnitude of these transaction costs (Williamson, 1985). Unlike the traditional neoclassical economic theory, TCE assert that economic agents are rationally bounded (there is incompleteness and asymmetry of information and tend to be opportunistic) (Key and Runsten, 1999, Pingali *et al.*, 2008; Catelo and Costales, 2008). Under these conditions market transactions are fraught with hazards and measures undertaken by economic agents aim to reduce the transaction costs (Swain, 2008; Pingali *et al.*, 2008).

Kherallah and Kirsten (2001), argue that the NIE provides a useful theoretical framework for explaining the existence of and theoretical rationale for contract farming, as many of the problems of market failure and missing markets are typically

caused by asymmetric information and a range of other factors that impact on transaction costs. They assert that the underlying advantage is that NIE acknowledges the important role of institutions, but argues that one can analyze institutions within the framework of neoclassical economics. In other words, under NIE, some of the unrealistic assumptions of neo-classical economics (such as perfect information, zero transaction costs, full rationality) are relaxed, but the assumption of self-seeking individuals attempting to maximize an objective function subject to constraints still holds (Pingali *et al.*, 2008; Catelo and Costales, 2009).

Thus the major focus of TCE is on the costs of doing business and at the heart of the problem is the costs of monitoring and enforcing of contracts which are determined by the extent of imperfect information involved in making a transaction (Kherallah and Kirsten, 2001). Therefore the ease or difficulty of contracting, and the level and nature of transaction influenced by the extent of imperfect information involved in making a transaction will determine which types of contract to be made (Kherallah and Kirsten 2001; Key and Runsten,1999, Pingali *et al.*, 2008).

2.5 Recent Trend in Industrialization of Agriculture- the Need for Vertical

Integration

Contract farming is becoming an increasingly important aspect of agribusiness, whether the products are purchased by multinationals, smaller companies, government agencies, farmer cooperatives or individual entrepreneurs (Eaton and Shepherd, 2001; Kirsten and Sartorius, 2002). In expanding their operations, agribusiness has a number of options for organizing access to the inputs it requires (Vavra, 2009; Minot and Roy, 2007). One option is to source products from the open

market. This is the usual arrangement with staples such as cereals and standard livestock products (Pingali *et al.*, 2008). Simmons *et al.* (2005) argues that using the open market is more difficult especially when non-traditional or specialized products are involved.

Furthermore food processors and exporters of non-traditional crops usually face tight quality requirements and often need products in a timely fashion (Vavra, 2009; Kirsten and Sartorius, 2002). These requirements reflect technical aspects of preserving, packaging, freezing, and transporting non-traditional products and, also, meeting consumer requirements for uniformity (Simmons *et al.*, 2005; Eaton and Shepherd, 2001).

Ensuring quality and a timely supply through open markets may involve significant transaction costs. Farmers may have limited knowledge of quality requirements and, even if motivated through higher market prices, may be unable to meet standards due to technical limitations (bounded rationality) (Pingali *et al.*, 2008). Firms and farmers may also be reluctant to invest in the necessary technology and information without a guaranteed market (asset specificity) (Kirsten and Sartorius, 2002). Finally, firms may find it costly to coordinate the timing of activities of different farmers. Key (1997) argues that the decision by an agribusiness firm to undertake expansion through contract farming reflects the view that the total production and transactions costs of contracting are less than the costs associated with alternatives such as open market operations or vertical integration through plantations. Although contract farming also incurs transaction costs for agribusiness firms, example through costs of contracts monitoring and enforcement, Simmons *et al.* (2004), asserts that contract farming

may have high transaction costs for firms yet still represent the “best bet” for expansion of the firm when compared to alternatives because it offers the highest net benefit to the firm relative to other options.

2.6 Contract Farming as a Response to Imperfect Market

In many developing countries, markets for credit, inputs, labour, technology, information and insurance are always missing or inadequate in the sense that transaction costs of accessing them on a small scale are very high (Swain, 2008; Simmons *et al.*, 2005).

2.6.1 Imperfect capital (credit) market

Access to credit and the structure of the credit market is important in contract farming. Simmons *et al.* (2005) argue that this is because most of the contracts involve production and marketing of non traditional crops which are costly in terms of inputs requirements during planting and harvesting. As Swain (2008), points out, when it comes to smallholder farmers there are always constraints related to availability of information on credit sources, and even if they have information they lack resources and even if sometimes they access the loan, they fail to repay due to uncertainty in agricultural production. Contract farming enables agribusiness firms to provide credit to smallholder farmers as they have the ability to monitor the credit than banks (Key and Runsten, 1999; Swain, 2008).

Simmons, (2005), further argues that agribusiness firms have several strategic advantages over banks and traditional lenders in borrowing that can be conferred on smallholders through contracts. They have many ways of recovering loan, including

deducting directly from the sale of crops before the farmers receive payments. The contract confers lending advantages on the agribusiness firm through monitoring of input use, control over crop management decisions that might jeopardize repayment, specification of how cash advances are to be repaid, and control over the output market for specialized crops (Warning and Key, 2005; Key and Runsten, 1999).

The ability to use mechanisms to ensure repayment allows firms to extend credit to smallholders who often are unable to obtain credit otherwise or can only do so at high rates of interest (Warning and Key, 2005). The low transaction costs and minimal costs of monitoring and enforcement increase incentive for agribusiness firms to vertically integrate with smallholder farmers and finance production instead getting the products from the spot markets (Key and Runsten, 1999; Eaton and shepherd, 2001).

2.6.2 Imperfect family labour markets

Household labour in rural areas serves as one of the major important factors of production (Ellis, 2000; Warren, 2002). Warning and Key (2005) argue that when markets for factors of production which are controlled by the household such as land, labour, and managerial skills are missing or imperfect, farmers will tend to compensate by trading in markets that do exist. Therefore households with larger endowment of family labour will attempt to compensate for the missing markets through renting in more land or producing labour intensive crops than would households with less labour endowment (Warren, 2002).

Likewise households with large family labour and are unable to rent in more land due to imperfect land markets, they would under employ their family labour (Warren,

2002). Hence when there are imperfect markets firms have the incentive to contract with households with underutilized and non tradable factors of production such as family labour and land (Swain, 2009; Warning and Key, 2005). Therefore, for labour intensive crops firms will have more incentive to contract with households with small land but with large family labour while whenever the agribusiness firm is engaged in production of land intensive crop, it would see the incentive to contract with larger land but smaller family labour as more machines would be employed than people (Warning and Key, 2005).

2.6.3 Imperfect markets in factors of production

Several studies indicate that input markets are often missing or not functioning properly because of weak markets structure as well as inadequate infrastructures (Key and Runsten, 1999; Warning and Key 2005; Swain, 2009). This creates a situation whereby low demand for inputs provides no incentives for trading companies to develop distribution networks affecting inputs availability and uses. Warning and Key (2005), argue that the situation is even large in developing countries where specialized production methodology does not exist. Normally agribusiness firms take advantage of the existing situation by intervening through provision of specialized inputs for the production of the crop under contract (Swain, 2008). These firms may later develop monopolistic control of these specialized inputs by restricting use to farmers whom they have contracts. In this arrangement farmers have direct contact with input supplies and they are able to access inputs without any transaction costs which may not be available in spot markets (Swain, 2008; Key and Runsten, 1999 and Key, 1997).

2.6.4 Imperfect products markets

According to Warning and Key (2005), many of the agribusiness firms operating under contract farming are engaged in production and marketing of non traditional crops. Most of these crops have missing local markets hence information on quantity and quality requirements are not available to farmers. Swain (2009) argues that when buyers and sellers in the markets are both informed on the quality and quantity requirements then both parties would perform their activities efficiently. However if the information about quality and quantity are costly to obtain firms may not get required quantity and quality of products for their processing requirements using the spot markets (Warning and Key, 2005). The imperfect product markets create an incentive for agribusiness firms to produce the crop themselves or produce under contract farming (Catelo and Costales, 2008; Vavra, 2009).

2.6.5 Contract bargaining and enforcement transaction costs

The choice of whether a smallholder farmer would accept a contract or not depends on whether the contract will provide him with a greater satisfaction than the alternative option available (Warning and Key, 2005; Key, 1997). Agribusiness firms develop monopolistic behavior by keeping the profits just above the point where small holder farmers would go to the alternative option (Masuku *et al.*, 2003).

Warning and Key (2005) further argue that when firms compete for the farmers who would supply them with the products, farmers will try to get the best package of the contract as more firms will be competing to contracts and reservation for farmers would be very high and the firms will have less bargaining power. In this situation contracts will be less profitable. Therefore the profitability of firms depends on the

bargaining power of farmers; the weaker is the bargaining power the more profitable is the contracts to the firms as bargaining and enforcement costs are greatly reduced (Eaton and Shepherd, 2001; Masuku *et al.*, 2003; Vavra, 2009).

Just like in choice of entering the contracts, the utility those farmers receive by abiding to the contracts should be greater than the alternative (Warning and Key, 2005). The contract may require a farmer to sell their crops only to the firm, repay debts or apply certain inputs in a particular manner prescribed by the firm, to ensure that farmers abide by the rules, the firm reward for the good behavior or punish bad behaviours by taking legal actions (Eaton and Shepherd, 2001). Firms with monopsonistic behavior will tend to enforce contracts than when there are many firms in the market (Warning and Key, 2005).

2.7 Empirical Evidence of the Role of Contract Farming in Increasing

Smallholder Farmers' Income

Several empirical case studies in Asia and Africa have been done to assess the impact of contract farming on income (Birthal *et al.*, 2005; Warning and Key, 2005). Recent studies such as Miyata *et al.* (2007) in their study on contract farming in Shandong Province, China, using survey data collected from 162 apple and green onion farmers and interviews with four contracting firms in 2005 provide a detailed account of income variability between farmers in contract and independent farmers. A significant difference in income, with contract farmers having more than independent farmers after controlling for household labour availability, education, farm size, and other characteristics was reported.

Birthal *et al.* (2008) on the other hand, found that the gross margins for contract dairy farmers in India were almost double those of independent dairy farmers, largely because contract growers had lower production and marketing costs. They also found that vegetable contract farmers received prices that were eight percent higher than those received by non-contract growers. Wubalem and Fufa (2007) analyzed the gains from contract farming for participating farmers and non participating farmers in bread wheat marketing chain through contract farming in Ethiopia. They found that farmers who were under contract had positive and significantly higher gross margins than farmers who did not participate.

Warning and Key (2002) studied contract farming in peanut production in Senegal. NOVASEN, a private company, contracted 32,000 growers and produced approximately 40,000 tons of peanuts annually. The authors found that farmers increased their income substantially by participating in the contract farming program (compared to non-participating farmers). Interestingly, Warning and Key (2002) found that the contract farming programme did not favour larger or wealthier growers. Simmons *et al.* (2005), investigated the impact of contract farming in poultry, maize seed, and rice seed in Indonesia and found that contracts positively affected welfare.

In Tanzania, in her study titled 'Comparative analysis of contract modalities in Tanzania: case study of Mtibwa sugar cane contract scheme in Morogoro region and Tobacco contract in Tabora region, Ishiu (2007) found that contract farming increased income of farmers significantly in both situations.

2.8 Agricultural Development Strategies and Poverty Reduction in Tanzania

Agriculture is central to poverty reduction in Tanzania, however its growth averaged only 4.7% from 2000-06 which is not sufficient to meet MKUKUTA's ambitious goals for reducing poverty (PHDR, 2007). According to the World Bank, URT, (2000) agriculture has to grow by at least 11 per cent in order for the sector to significantly contribute to economic growth and poverty reduction at satisfactory levels.

The agriculture sector in Tanzania is almost entirely driven by smallholder farmers characterized by the use of hand tools, and reliance upon traditional rain-fed cropping methods and animal husbandry (Amani, 2005). Since poverty is predominantly a rural phenomenon, and agriculture is a major economic activity for rural population, it follows that success in poverty reduction depends critically on the performance of the agriculture sector (PHDR, 2007; URT, 2000 and Amani, 2005).

According to poverty and human development report (2007), modernization and commercialization of the agricultural sector will have to be given priority if the sector is to raise productivity and contribute more to growth. Moreover, Amani (2005) argues that the government must increase her investments in agriculture and technology development and dissemination with the aim of expanding market opportunities. Improving the competitiveness of Tanzania's agricultural products in international, regional, and domestic markets is the key to expanding market opportunities with the potential lying in diversification of traditional crops to higher value crops and increasing private sector role in commercial agribusiness (Nyambo and Verschoor, 2005; PHDR, 2007).

2.9 An Overview of Contract Farming of Non- traditional Crops in Tanzania

Contract farming has been in existence for many years as a means of organizing the commercial agricultural production of both large-scale and small-scale farmers (Eaton and Shepherd, 2001; Warning and Key, 2002). Contracting is a significant and growing part of U.S. agriculture (Key, 2005). In 2001, 36% of the total value of agricultural production was produced under contract (MacDonald & Korb, 2006b).

In many parts of Africa, contract farming has proved effective in integrating smallholder farmers into commercial agriculture (NEPAD, 2007). However according to Nyambo and Verschoor (2005), contract farming of non traditional crops in Tanzania is less widespread than in other East African countries because the country export of non traditional crops is still relatively limited.

Generally inadequate information exists in Tanzania concerning contract farming of non traditional crops, few studies for example a study done by Mbwana (2007), which provide an institutional study of contract farming of sunflower between farmers in Manyara region and FAIDA MALI in Arusha has been done in the country. However chances are that there could be many of such arrangements especially in vegetable sectors whereby farmers supply vegetables to supermarkets but they are not researched (Nyambo and Verschoor, 2005).

2.10 Paprika Contract Production and Marketing

2.10.1 Paprika production

Paprika is a sweet pepper of the plants *capsicum annuum* that come from the genus *capsicum*, belonging to the family of Solanaceae (Derera, 2000; MAFC, 2005). This

family includes also tomato and potato. Paprika is used mainly as a natural primary ingredient to replace food colouring and artificial flavouring (Derera, 2000). In addition to its unbeatable qualities as a primary material in the food, cosmetic and textile industries, paprika is highly valued by the pharmaceutical industry for its Vitamin C and minerals (Eshbaugh, 1993).

The cultivation of paprika in Tanzania is still in its infancy state, it is estimated that 657.46 tonnes of dry paprika were produced in the country in 2003, while globally the production of dry paprika is estimated at some 90-100million kg of which 40-60% is traded internationally (MAFC, 2005).

The paprika production in Mbozi has been showing rising and decreasing trend over the last four years, According to the survey results conducted by ADP Mbozi and Tanzania Spices in 2004/05 production of paprika farming in Mbozi reached a total of 683.2 tonnes. In 2005/06 there were 308.8 tonnes, while in 2006/07 there were 462.4 tonnes, in 2007/08 a total of 527.2 tonnes. The declined production in 2005/06 was caused by the company Tanzania Spices LTD which decided to sub contract a local company based in Mbozi called Lima which could not perform well due to its bad relation with farmers (ADP Mbozi, 2005). Being an export crop, paprika is very profitable to smallholder farmers, According to the gross margin analysis done by ADP Mbozi in 2005 as Table 2 below shows, paprika had a higher gross margin 59.3% compared to other annual crops which are grown in the district and which most of the farmers depends to get income (ADP Mbozi, 2005) and (see Appendix 1).

Generally a farmer would get a gross income of TAS. 403 000 by cultivating 1 acre (0.4ha) of land compared to farmers who cultivated maize in the same area of land

whereby the income is only TAS. 36 500 (ADP Mbozi, 2005). Mathania (2008), in her study on analysis of production and marketing potential for paprika as an alternative crop to tobacco in Urambo district, Tabora region found that paprika had higher gross margin than tobacco Though cross margin is not a good measure of profits as it neglects the fixed costs, however it shows the farmers percentage of the revenue which is profit (KIT and IIRR, 2008).

2.10.2 Paprika marketing

After harvesting paprika is dried using drying mats and then it is graded and packed into bags of 100kg in some villages like Igale, farmers are organized into a marketing group and the functions of grading is done by the group. Farmers sell their paprika at a price of TAS. 850/kg when farmers decide to sell the crop in Mbozi. However when they transfer to the factory in Iringa they get a price of TAS. 1000/Kg (ADP Mbozi, 2005).

2.11 Conceptual Framework of the Impact of Contract Farming on Income

The impact of a contract-farming scheme on the distribution of income depends on who participates in the scheme and the benefits they receive from participation. We can model a contract-farming scheme as a principal-agent game in which a firm (the principal) works with a grower (the agent) to produce a crop (Warning and Hoo 2000). The firm chooses growers with whom it would like to contract and sets the contract terms. The growers, in turn, choose whether to participate (Key, 1997).

The combination of these choices describes the selection process for the contract farming scheme and the benefits participants will get depends on the terms of the

contract and their own characteristics (Key, 2005). Simmons *et al.* (2005) further assert that, contracts will vary depending on the production and transaction costs associated with production of the commodity under local conditions. While the firm initiates the contract, the design of the contract will be done considering the production and economic situation of local farmers (Key and Runsten, 1999).

The design will seek to minimize costs but ensure an adequate level of participation by farmers with desirable characteristics, such as access to irrigation, management ability, etc (Minot and Roy, 2007). The characteristics of smallholders that participate, however, is likely to be a combination of traits deemed desirable by the firm and the characteristics that reflect a desire to participate in a contract (Minot and Roy, 2007). Whether selection of participants depends more on firm criteria or self-selection depends on the commodity and local conditions. Similarly, the benefits of contracting to these participants depend on these factors (Warning and Key, 2005; Simmons *et al.*, 2005).

However, other studies like Minot and Roy (2007) assert that in some cases, substantial overlap in the factors influencing the selection process and the factors influencing the process through which benefits occurs may be observed. Therefore agribusiness firms and smallholder farmers will choose to contract with one another based on the gains they expect to obtain from the contract (Vavra, 2009). Moreover, the transactions costs and information costs in the market environment in which production takes place jointly influence both processes (Minot and Roy, 2007; Simmons *et al.*, 2005; Warning and Ho, 2000).

2.12 Concerns Surrounding Promotion of Contract Farming

Contract farming has a number of benefits to farmers however, as Swain (2008) put it, it is by no means a panacea to agricultural commercialization and poverty reduction in developing countries. Several concerns have been raised regarding the desirability of contract farming from a poverty and equity point of view, foremost of which involves the opportunistic nature and sustainability of such arrangements (Ramaswami *et al.*, 2005; Pingali *et al.*, 2008; Singh, 2002).

2.12.1 Opportunistic behaviours

Opportunistic behaviours occur when each opponent take advantage of each other in the relationship (Masuku *et al.*, 2003). Opportunistic behaviour includes practices such as cheating and other forms of strategic behavior which aim to maximize profit (Pingali *et al.*, 2008). According to Masuku *et al.* (2003), opportunistic behaviours are very detrimental in contract farming relations when they are allowed to occur. In order to avoid such behaviours Eaton and Shepherd (2001) recommend that contract parties including farmers should be clear to the obligations signed in the contracts. Furthermore, Masuku *et al.* (2003) in their study of sugar cane contract scheme in Swaziland found that trust, cooperation, relationship benefits, commitment are determinant factors in the success of contractual relationships.

2.12.2 Monopsony control

Contract farming as a development tool has been criticized for the exploitative effects of monopsony control, whereby farmers are tied to one purchaser (Key and Runsten, 1999). Due to poor bargaining power which is reduced due to coerced contractor practices of many contracting firms and poor farmers' organizations, smallholder

farmers are pushed to accept unfavorable contracts with little benefits since the firms generally possess more information, resources, and organizational ability than smallholder farmers (Catelo and Costales, 2008). Their strong bargaining position enables them to potentially extract significant rents from smallholders' farmers leaving them only marginally better off (Eaton and Shepherd, 2001).

Many studies reveal that farmers have found themselves vulnerable (Porter and Howard, 1997). Key and Runsten (1999) in particular argue that once farmers invest in new crops and production to adhere to contractual requirements, financial and time constraints render them unable to easily switch to other types of crops (for example, tree crops take a long time to establish and grow) lacking alternatives, as a result farmers become dependent upon buyers, and firms are then able to put more self-serving contract terms.

In addition, the transition from subsistence farming to cash crop production has the potential to render households vulnerable to food shortages and nutritional loss (Bijman, 2008). Many contract farming arrangements are based on monocropping of a crop, causing farmers to become reliant on income from the sale cash crop. If the firm does not live up to its contractual obligations, farming households may thus be vulnerable, since they no longer grow a variety of edible crops and lack the funds to purchase food (Ramaswami *et al.*, 2008).

2.12.3 Insufficient contract enforcement mechanism

Many developing countries lack the laws and ensuing legal framework to support contractual agreements (Eaton and Shepherd, 2001). Agreements themselves may not

be easily enforceable or legally binding. Opportunism on the part of both parties can result. In most developing countries contract farming arrangements are operated in accordance to traditional values and norms rather than legal agreements (Warning and Key, 2005). In the absence of legally binding contracts, firms can suffer from the effects of side selling of outputs to the other buyer who is not in the contract but has offered a better price (Eaton and Shepherd, 2001).

Contract default by farmers often increases with a rise in the number of willing purchasers (Pingali *et al.*, 2009). When alternative markets develop and competing buyers offer competitive prices, farmers are given the incentive to break their contracts, often failing to repay input credit to the contractor (Key and Runsten, 1999). The absence of an effective legal system and the lack of collateral held by small farms can result in considerable risks for agro-business firms. Further more Eaton and Shepherd (2001), argue that an issue involving input diversion occurs when farmers are tempted to use inputs supplied by the firm for non-intended purposes.

2.12.4 Bias toward large farms

It has been argued that one of major problems in private-led contract farming is that contracting firms favor large-scale farmers (Key and Runsten, 1999). Contracting firms may be motivated to seek contracts with larger farmers to reduce transaction costs and allow for the procurement of more uniform products (Baumann, 2000). In this respect, the cost of managing a large number of small farms may indeed influence a firm's decision to establish such relations.

Nevertheless, in the context of developing countries, contract farming with small farms has proven successful in some instances (Simmons *et al.*, 2005; Warning and Key, 2005). Furthermore Bijman (2008), argues that although contract farming appears to involve small farms, such arrangements may exclude the poorest of the poor. The landless peasants and households possessing only limited marginal lands tend to be overlooked by firms (Warning and Key, 2005; Porter and Howard, 1997).

2.12.5 Requirements for increased management skills

Contract farming requires high-level managerial skills on the part of the contracting firms. Although the level of supervision is likely to be significantly less than that required for plantation operations, highly skilled management is needed to properly supervise farmers (Porter and Howard, 1997). Poor management and a lack of communication among contractual parties may lead to farmer dissatisfaction and a breakdown in contractual agreements (Eaton and Shepherd, 2001). By employing local staff or community leaders in managing farmers, contracting firms can improve their conflict resolution management and avoid cultural challenges as seen in one firm's hiring expatriate management in Africa (Porter and Howard, 1997).

2.12.6 Increased risk

Firms are required to bear increased risk in contract farming. Most contracts stipulate that the firm will purchase all the produce, usually at a price higher than the prevailing market price. The firm may bear the price risk as well as the risk of crop failure due to poor management or seasonal factors (Singh, 2002; Key and Runsten, 1999).

To ease potential losses, the firm may maintain tight control over management and offer seasonal or annual contracts so as to exclude unproductive farmers from the future contracts (Singh, 2002). Farmers also face greater production risk in the case of newly introduced crops which may take time to adapt to new growing environment and required new growing techniques which are new to farmers (Key and Runsten, 1999).

2.13 Conditions for the Success of Contract Farming

2.13.1 Improving contract enforcements

Agreements, in the form of a written contract or a verbal understanding, usually cover the responsibilities and obligations of each party, the manner in which the agreement can be enforced and the remedies to be taken if the contract breaks down (Key and Runsten, 1999). In most cases, agreements are made between the contracting firm and the farmer, although in the case of multipartite arrangements and some others, the contracting firms are often between the sponsor and farmer associations or cooperatives (Bijman, 2008).

Eaton and shepherd (2001), argue that in the case of arrangements through intermediaries, the sponsor contracts directly with the intermediaries who make their own arrangements with farmers. As neither side is likely to seek a legal remedy through the courts, it is important that ways of resolving disputes are identified in the agreement. A body representing the contracting firm, farmers and other interested parties could be established in some cases, while in others a government agency might be the most appropriate forum.

However Eaton and Shepherd (2001) further argue that it is preferable that the contract farming industry regulates itself in order to offer a measure of protection for all participants. They assert that agreements between sponsors and contracted farmers are essentially voluntary undertakings and, in most cases, the two parties should control their own contract formulas and specifications.

2.13.2 Minimizing monopsony control: The role of the government

Contract farming in the first stage of development generally places firms in a monopsony position (Swain, 2008). The monopsony power of firms would decline with increased number of firms operating in the same area; thus, government-created policies for investment and competition would lead to decline of monopolistic power of firms over farmers. Eaton and Shepherd (2001), particularly argue that the government in most developing countries can take the following measures to improve contract farming.

- Creating joint ventures with private firms that want to use contracting
- Providing complementary infrastructure
- Regulating the terms of the contract
- Using the police and court systems to help enforce the terms of the contract

They further argue that state promotion of contract farming can also serve to reduce some of the negative effects associated with opportunistic behavior. Simmons *et al.* (2005) has identified the role of Governments as market regulators to guard against contracting firms abusing its market power. He argues that the government should undertake Training, arbitrating disputes, undertaking research, and providing extension services relevant to the expansion of contracting. Training programs for

smallholders in literacy, accounting, and cash management may reduce miscommunication in contracts.

2.13.3 Improving bargaining power and contract management: The role of farmers' organizations and NGOs

The type and amount of benefits acquired by smallholders depend largely on the strength of their bargaining power (Eaton and Shepherd, 2001). Small farms typically have limited bargaining power, particularly if they possess few assets and scarce alternative income opportunities (Key and Runsten, 1999). In an effort to reduce transaction costs, firms often prefer to organize farmers into groups or deal with existing farmer organizations. Key and Runsten, 1999 provide advantages to small farmers' organizations that they are not only able to improve the bargaining power of smallholders, but also serve to lessen some of the criticisms of contract farming.

On the other hand it has been argued that domestic and foreign NGOs can be of significant help for smallholders to enter into beneficial contract farming arrangements. Eaton and Shepherd (2001), specifically argues that NGOs can take up the public sector role when the state is unable or unwilling to provide the services needed for making contract farming viable and sustainable. For the other part, NGOs can temporary provide services, expertise and credit to farmers and/or contractors to get contract farming arrangement off the ground. For instance, NGOs can also support the establishment of farmers associations which would help reduce transaction costs for contracting firms, making the option of contracting with smallholders more attractive.

Key and Runsten (1999), also argues that producer organizations can improve the power balance between farmers and contracting firms, thereby strengthening the incentives for both parties to continue bilateral contracting. Furthermore Bijman (2008), argues that farmers' organizations can reduce the transaction costs in the contracting arrangement, as the contractor does not have to deal with numerous smallholder farmers but with only one organization of smallholders.

2.13.4 Ensuring that contract farming benefits smallholders' farmers: The importance of exploiting comparative advantage

While it cannot be denied that contract farming has benefited large farms instead of smallholders in several cases, there have also been a number of successes in contract farming with smallholders (Warning and Key, 2002; Simmons *et al.*, 2005). Generally, firms choose to contract with smallholders when enforcement costs associated with large farms is high enough to outweigh the various fixed transaction costs (Key, 2005). Apart from the issue of contract enforcement costs, however, firms may also decide to contract with smallholders when the contracted crop is labor intensive rather than capital intensive (Warning and Key, 2002).

Contract farming of labor intensive crops could potentially benefit the poor smallholders since they generally have large families and can provide high-quality labor to meet quality requirements of such crops. Key and Runsten (1999) argue that one promising area in this regard would be promoting contract farming for organic agriculture of non traditional horticultural crops to poorer farmers in marginal areas, since it is organic agriculture rather than conventional methods that can lead to higher yields and better incomes.

2.14 Approaches in Measuring Impact of Contract Farming on Income of Smallholder Farmers

Several methods can be used to measure the impact of contract farming on smallholders' income. Simple methods such as partial budgets and comparison of mean incomes require little data but do not test statistical significance, nor do they control for observable or unobservable factors, making it difficult to infer causality (Warning and Key, 2002; Birthal *et al.*, 2005).

A double-difference study using panel data on households at two points in time could directly measure the effect of contract farming on those who participate, if enough farmers joined and data are collected between the first and second data collection period. Among farmers who joined contract it becomes a type of pair-matched sample which controls both observed and unobserved variables (Baker, 2000). However such a study measures the impact of income on farmers that are participants into the contract but it does not necessarily accurately predict the gains non-participants would enjoy if they joined the contracts (Minot and Roy, 2007; Baker, 2000).

A regression model that regresses income as a function of contract farming participation and other household characteristics is a significant improvement as it offers tests of significance and controls for observable factors (Minot and Roy, 2007). However, unobservable factors, such as individual ability may still cause biased and misleading results (Minot and Roy, 2007; Warning & Key, 2002). The Heckman and instrumental variable regression models on the other hand address the problems of selection bias and endogeneity, provided that good instruments can be identified (Heckman, 1979).

CHAPTER THREE

3.0 RESEARCH MATERIALS AND METHODS

3.1 Description of the Study Area

3.1.1 Location of the study area

This study was carried out in Mbozi District, Mbeya Region. The choice of the area was due to the fact that it is one of the districts where farmers have been practicing paprika contract farming for the past five years. Mbozi District is located in the south western part of Mbeya region, in Tanzania between latitude 8° and 10° South of Equator and Longitudes 32° and 34° East of Greenwich Meridian. The District shares borders with Mbeya Rural District to the East, Ileje District to the South, Zambia and Rukwa Regions to the West and Chunya District to the North. The District occupies a total area of 9679 km² (967 900 ha) whereas 766 640 Ha (79.2%) are generally classified as Arable land. The District is divided into 6 Divisions, 26 Wards, and 175 Villages (Malocho, 1997).

3.1.2 Population and demographic characteristics

According to the National Population Census of 2002, URT (2002) Mbozi District had a population of 513 600 people of which 243 948 are males and 269 652 females, with an intercensal growth rate of 3.1% which is above the national annual average of 2.9%. District average rate of population growth for the period of 1978 to 1988 and 1988 to 2002 decreased from 3.4% to 3.1%. Number of households are 122 286 which reflect the average household size of 4.2 and about 90% of Mbozi population are rural based (URT, 2002). Population projection for 2007 is about 599 709. The high population growth rates are attributable to high rate of immigrants looking for

fertile soil and pasture and high fertility rate due to early marriage and low practice of family planning. Life expectancy is estimated to be 52 years of age for females and 49 years for males. Overall dependence ratio in Mbozi district is high where 100 people in age 15-64 support 101 people in age group 0-14 and 65 and above (URT, 2002).

3.1.3 Land ownership

The household characteristics in Mbozi show the mean number of household members and a breakdown into male and female and further into age groups. The mean size of the household is 4.2 members and the number of males and females were more or less equal. Moreover the average land owned by each household is about 2 ha in the majority of villages the land owned is enough for a household to produce enough food for household consumption (NBS, 2005).

3.2 Research Design

A cross-sectional research design was adopted at which information at one point in time was collected.

3.3 Sampling Procedure

3.3.1 Sample size and sampling frame

The choice of sample size was based on the farm level applied research methods for East and South Africa (FARMESA) experience which contend that 80-120 correspondents are adequate for social-economic studies in Sub Saharan Africa (Matata *et al.*, 2001). Therefore a sample of 150 respondents was chosen from area comprising of 75 farmers who participated in paprika contract farming and 75 farmers who did not participate. A purposeful sampling procedure was employed to

select wards and villages which were involved in contract farming whereby two villages from each ward were chosen, these villages includes, Iyula, Igale from Iyula ward and from Isansa wards the villages were Isansa and Mpito.

Farmers who participated in contract farming were chosen randomly from the list provided by ADP Mbozi however farmers who did not produce paprika in 2009 were dropped from the list. A sample of farmers who did not participate in paprika contract farming was randomly selected from the list which was provided by the village office.

3.3.2 Sources of data and data collection tools

Primary data were obtained from farmers who participated in paprika contract farming as well as from farmers who did not participate in paprika contract farming in selected villages in Mbozi district. A pre tested structured questionnaire and in some cases focus group discussions were used to collect data from farmers. Secondary data were gathered from ADP Mbozi, a local NGOs which have been working with farmers in the district for the past twenty years and which have been implementing the access to markets program of which contract farming was one of the strategies of the program, other secondary data were obtained from the ministry of agriculture and cooperative (MAFC) in Dar es Salaam, Sokoine National Agricultural Library (SNAL) the company, Tanzania Spices LTD and the internet. The major tools for secondary data collection used include Journals, books, document reports, workshop proceedings and theses.

3.3.3 Types of data and data collection process

The survey data for this research comprised of data on household characteristics (age, level of education, number of people in the household, crop production, costs of

production, number of livestock owned, leadership, farming experiences, marketing, access to financial services, extension services and infrastructure, assets ownership, crops production and marketing, livestock production, inputs costs, sources of income, access to services such as extension and credits, and village infrastructure) were collected from individual households and not from farmers as with households it was anticipated that more useful information on income and household labour would be available. Eight students who were in field practical from Naliendele Agriculture Training Institute were chosen to be enumerators and they were given training on how to administer the questionnaire for three days before they were given the assignment of actual data collection.

At the end of training they were evaluated for speed, ability to ask questions properly and proper recording. At the end of the training five enumerators were chosen and participated in questionnaire pre testing in a nearby village to test for validity and reliability of the data collection instruments and also to expose the enumerators in the real field condition.

Modification of the questionnaires was done based on the outcome of the preliminary survey. Data collected comprised mainly data from the 2009 cropping season, therefore farmers had to recall on some aspects such as costs of production, yield of different crops and inputs use. Data on yield and input costs and prices however were cross checked using records kept by the contracting company and the facilitating NGO. Similar approaches were employed by (Magembe, 2006; Simmons *et al.*, 2005; Warning and Key, 2002).

3.4 Analytical Framework

3.4.1 Data analysis and discussion

This study employed two types of data analysis techniques namely descriptive statistics and parametric estimations, LIMDEP 8.0 and SPSS 11 computer programs were used in the data analysis.

3.4.2 Simple descriptive analysis

Descriptive statistics such as frequencies means and cross tabulation of some critical values were used to compare basic characteristics of farmers who participated in contract farming and farmers who did not participate.

3.4.3 Econometric models for assessing the determinants of participation and income

Heckman two stage econometric estimation procedure, Heckman (1979) was used to analyze the determinants of farmers' participation decisions in contract farming and to analyze the effect of contract farming on income of smallholder farmers. Comparison of income levels among farmers who participated in contract farming and farmers who did not participate in contract farming was done using the independent T-test. A simple linear regression was used to analyze factors affecting income in contract farming for contract farmers.

3.4.4 The problem of selection bias

To measure the impact of contract farming on income of small holder farmers we could use a linear regression;

$$y_i = X_i\beta + C_i\kappa + \varepsilon_i \dots\dots\dots (1)$$

Where y_i the total income of the household during the 2009 season, X_i is a vector of exogenous characteristics; C_i is a dummy variable indicating whether or not the household participated in the contracts farming. However, it is possible that unobservable variables are correlated with both the farmer’s decision to contract and farm income (Green, 2005). For example, farmer ability which is unobservable could be positively correlated with the decision to contract. This correlation could lead to an under-estimation of the impact of contracting on income, if it were not accounted for (Greene, 2005).

To account for possible sample selection bias, we specify a “treatment effects” also known as Heckman selection model. The model introduces an addition equation that models the decision to contract:

$$C_i^* = Z_i\gamma + \mu_i, \dots\dots\dots (2)$$

In practice C_i^* is unobservable but we observe dummy variable C_i defined as:

$$C_i = 1 \text{ if } C_i^* > 0, 0 \text{ otherwise.}$$

This gives $prob (C_i = 1) = Prob(\mu_i > -\beta'x_i) = 1 - F(-\beta'x_i)$
(3)

Where, F is the cumulative distribution function for μ_i . The log likelihood function is

expressed as: $L = \prod_{y_i=0} F(-\beta'x_i) \prod_{y_i=1} (1 - F(-\beta'x_i), \mu_i \sim, 0, \sigma^2)$
(4)

Where C_i is a latent variable measuring net benefit to participation in contract farming and Z_i is a vector of household characteristics (Key, 1979).

If the decision to contract is determined by unobservable variables (management ability, hard working etc.) that would also affect income, the error terms in (1) and (2) will be correlated, leading to biased estimates of κ and β . We account for this selection bias by assuming a joint normal error distribution, where ρ is the covariance of the errors. To derive consistent estimates of κ and β we use a two-stage approach starting with a Probit estimation of (2). In the second stage, estimates of \mathcal{V} are used to compute the inverse Mills ratio, which is included as an additional term in an OLS estimation of (1) (Greene, 2005).

It is important to note that the parametric coefficients in probit models are not easily interpreted like in the linear probability models. To overcome this, we compute the marginal effects of a change in x_i upon the expected outcome y_i . The marginal effects on $\text{Prob}[Y = 0]$ are the partial derivatives of probabilities with respect to the vector of characteristics. They are computed as the means of the X's (Green, 2005).

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Overview

This chapter presents the main findings from the study. It contains five sections. Section one presents the social and economic characteristics of the respondents. Section two presents the analysis of the factors that determine farmers' participation in contract farming. Section three analyzes the effect of contract farming on income of smallholder farmers while section four gives the account of factors affecting income in paprika contract farming. The analysis of the constraints and prospects of paprika contract farming is presented in section five.

4.2 Socio-economic Characteristics of the Respondents

4.2.1 Analysis of social -economic attributes of the respondents

4.2.1.1 Age of the respondent

The age distribution of respondents is shown in Fig.1. The mean age of all the sampled respondents is 41.5 years. About 69% of the respondents aged between 30 and 50 years while 16% aged more than 50 years and the rest 15% had ages of less than 30 years. This means that most of the respondents were within the economically active age for agricultural production.

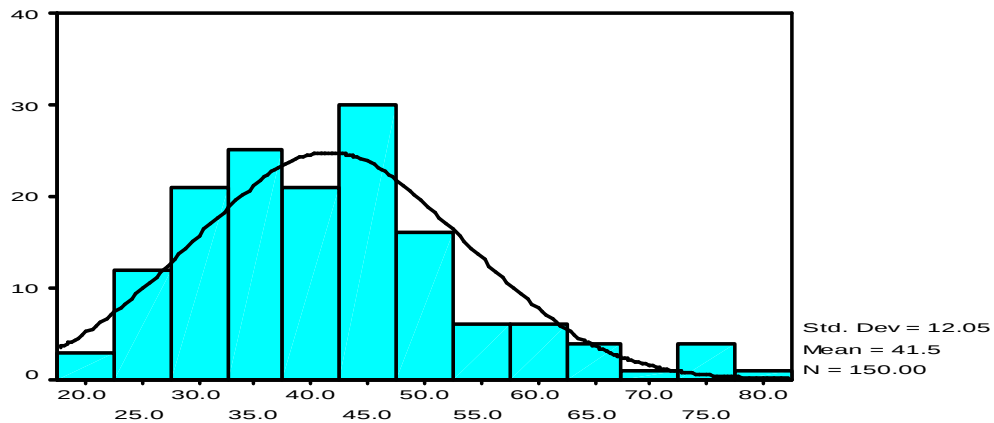


Figure 1: Respondent age distribution

4.2.1.2 Sex of the respondent

Table: 1 shows the number and frequency of the sex of the respondents interviewed. Generally, 80.3% of all the respondents were male and only 18.7% were female. Male dominance in development projects is very common in Tanzania especially when they are engaged in cash crop production.

Table 1: Sex of the respondent (n=150)

Sex	Frequency	Percentage
Male	122	80.3
Female	28	18.7
Total	150	100.0

4.2.1.3 Education level

The education level of respondents is presented in Table 2. The result indicates that most of the respondents about 74% had primary education, followed by those who had secondary education who accounted about 15%. A small number of respondents 11% had adult education while those who had post secondary education were only 2% of all the respondents. The main implication of the result is that participation in

contract farming does not propagate rural inequality which is the main assumption which most of the opponents of contract farming argue.

Table 2: Education level of the respondents (n=150)

Sex	Frequency	Percentage
Adult education	16	10.0
Primary education	109	73.0
Secondary education	22	15.0
Post secondary education	3	2.0
Total	150	100.0

4.2.2 Comparison of participants and non participants in paprika contract farming

Comparisons of household characteristics of farmers who participated in the program against those who did not participate was done using independent T test data analysis procedure using SPSS 11 computer program and the results are presented in Table 3.

Participants and non participants differed in age significantly at 5% level of probability with participants having older farmers than non participants. Generally, of all the farmers who were interviewed 62.5% of the participants in the contract farming aged more than 50 years, while non participants aged more than 50 years were only 37.5%. This is could be so because land ownership was one of the criteria used during selecting farmers. Since traditionally land is owned by the older people, it is not surprisingly to get older farmers in the contract farming than in non participants. Eaton and shepherd (2001) recommend various forms of land ownership to encourage smallholder farmers' participation in contract farming

Participants and non participants also differed significantly at 5% level of probability in household size. Results indicate that in both cases participants had large size of household members as well as large number of household members working on the farm. This could be an obvious result as paprika contract farming is basically a labour intensive, therefore one is likely to find households participating in such programs having relatively large number of households' members.

Furthermore there was a significant difference between participants and non participants in terms of land cultivated in 2009 with more land being cultivated by participants than non participants. Also they differed significantly in income from household labour with participants getting the average of TAS. 54 360 per annum against TAS. 10 960 per annum for non participants. Land offer opportunities for farmers to engage into production of other crops apart from the one in contract hence farmers with more land are less risks averse compared to farmers with little land , therefore a household having more land is likely to participate in contract farming and is likely to get more income.

Another explanation might be the difference in household labour endowment among them which could have facilitated more income from participants as a result of offering their household labour in paid works.

Participants and non participants did not differ in terms of their education levels, distance from their houses to the village office, the irrigated land owned, number of livestock kept, or income from livestock products, forestry, income from grants, and income from businesses. However there was a significant difference at 5% level of probability for the total net household income among the household which

participated in contract farming and those which did not participate. Households which participated in contract farming had a total mean income of TAS. 565 409 per annum per household against the mean total household income of TAS. 459 997 per annum for the farmers who could not participate in contract farming. Hence participants and non participants differed in their mean income by TAS. 105 412 (Table: 3).

Table 3: Independent T-test results for comparison of mean values of basic household characteristics of participants and non participants in contract farming

Variable	Participants	Non participants	P [Z < Z]
Age	44.64	38.40	0.001***
Hhnumb	8.0	6.0	0.007***
Hhwork	4.0	3.0	0.006***
Distance	1.266	1.516	0.179
Irrig	0.77	0.56	0.163
Land	5.09	4.05	0.005***
Nlive	28.0	19.0	0.280
Ilive	32636.0	49402.0	0.287
Inforestry	24146.0	10013.0	0.329
Inbusiness	20726.0	32933.0	0.372
Inpwork	54360.0	10960.0	0.035**
Grants	10533.0	8373.0	0.663
Hhincome	565408.8	459997.0	0.022**

** Significant at the 5% level of error probability

*** Significant at the 1% level of error probability

4.3 Factors Determining Farmers Participation in Contract Farming

4.3.1 The probit model: Determinants of participation in contract farming

We model the determinants of contract farming as a function of various household characteristics such as age, gender, number of people in the household, and other household endowments such as land, livestock ownership and access to capital. The household characteristics were analyzed using probit model in LIMDEP 8.0 computer

program. The results of the first-stage binomial probit estimation are presented in Table 4. The table presents the marginal effects of each factor on the probability of contracting. Explanation of households' characteristics (explanatory variables) used in the analysis and how they were expected to influence participation in contract farming is given below.

Table 4: Probit model results for determinants of farmers' participation in contract farming

Variable	Marginal Coefficient	Standard error	P [Z < Z]
Constant	-1.641249	0.471571	0.0005
Age	0.009487	0.005480	0.0835*
Sex	0.149397	0.142755	0.2953
Educ	0.074056	0.108599	0.4953
Status	0.278473	0.139996	0.0467**
Hhnumb	-0.007325	0.022702	0.7470
Hhwork	0.024324	0.030063	0.8090
Lead	-0.039945	0.109909	0.7163
Distance	-0.044274	0.045720	0.3329
Irrig_1	-0.051203	0.112316	0.6485
Exte	0.490186	0.084200	0.0000***
Loan	0.470186	0.108083	0.0000***
Land	0.014385	0.024347	0.5546
Livest	0.321894	0.127208	0.0114***
Observations		148	
Log likelihood		-68.07835	
Restr. log likelihood		-102.5723	
Chi-squared		68.98784	
Pro(Ch-sqred) value		0.0000	

* Significant at the 10% level of error probability

** Significant at the 5% level of error probability

*** Significant at the 1% level of error probability

4.3.1.1 Age of the respondent (age)

It is argued that age attribute of the household head is crucial for his or her decision making. Most of the studies like D'Silva *et al.* (2009), indicate that most of the youth do not find incentive to participate in contract farming and instead find alternative jobs in town. On the other hand, young farmers may be more entrepreneurial minded than older farmers hence find it more profitable to participate in contract farming than older farmers. Therefore in this study it is hypothesized that young farmers will be more likely to participate in contract farming than older farmers.

4.3.1.2 Sex of the respondent (Sex)

This is a dummy variable which indicates whether a respondent is a male or female. Just like age, sex of household head is an important factor in household decision making. Past studies have indicated that male headed households tend to focus on income generating crop production while women headed households focus more on food crops (Ellis, 2000). In this study it is hypothesized that male headed households are likely to have more interest in income generation than focusing on having sufficient food, hence more likely to participate in contract farming compared to their female headed counterparts.

4.3.1.3 Education of the respondent (educ)

This is a continuous explanatory variable. Education of household, in this study refers to the number of years a household head spent in school. Evidence from most literatures has proved that education and new technology use is directly correlated (D'Silva *et al.*, 2009). It is hypothesized, therefore, that the higher the education level

of a household head, the higher the probability of the household to participate in contract farming.

4.3.1.4 Status of the respondent (status)

Most of household studies have assumed that household decisions are made by one household member but for the benefit of the whole household (Ellis, 2000). An empirical case study is provided by White (1997) in his study of dairy contract farming ventures in West Java where he determined that in “family” run dairy farms women and children provided an estimated 60% of all labor inputs. However, contractual agreements are often signed and the proceeds controlled by the male head of the household. Therefore in this study it is hypothesized that male headed households would be more likely to participate in contract farming.

4.3.1.5 Farm size of the household (farms)

Land as a major factor of agricultural production has been used in several studies. In his study of Kinyara outgrowers’ scheme in Uganda, Magembe (2005), found a positive and significant relationship between farm size and participation in contract farming. Based on these studies, it is hypothesized that the more the land a household owns, the higher the probability to participate in contract farming.

4.3.1.6 Number of household members who work on a farm (hhwork) and

Number of members in the household (hhnumb)

This is the total number of economically active male and female members in the household. Many studies found that households with more family labour had higher probability of participation in contract farming than households with low family

labour (Warning and Key, 2002; Simmons *et al.*, 2005). Since paprika is a labour intensive crop, it is hypothesized that families with large labour force would find it more profitable to enter into contract as they are more likely to get more profit due to decreased cost of production.

4.3.1.7 Leadership position in the village (lead)

Participation in leadership positions signifies one of the strong social capital. Considerable efforts have already been made by social scientists and they have found that social capital affect their economic and social performance, (Marshall *et al.*, 2006). In this study it is hypothesized that being in leadership positions favour farmers participation in contract farming.

4.3.1.8 Ownership of irrigated land (irrig)

Household ownership of irrigated lands plays a crucial role in participation in contract farming. It should be noted that those with irrigated land are more likely to benefit from economies of scale and have lower production costs which will attract contractors to offer them contracts. Simmons *et al.* (2005) found that ownership of irrigated land was a very significant factor in determining farmers' participation in seed corn contract farming in Indonesia. It is therefore hypothesized that households with irrigated land are more likely to participate in contract farming than households who do not have irrigated land.

4.3.1.9 Distance from the household to the village office (distanc)

This is a continuous variable indicating the distance from the households' residence to the village office. Households who are closer to the office are more likely to receive

message from the village leaders and any other project which is coming in their village than households who reside very far from the village office. Miyata *et al.* (2005) report a strong and significant probability of participation by farmers living near the village office than farmers living far. It is hypothesized therefore, that an increase in distance from the village office is likely to reduce the households' probability to participate in contract farming.

4.3.1.10 Access to extension services (Exte)

A household which receives extension services will be more likely to participate in contract farming than a household which did not receive extension services. Household production activities are largely influenced by the nature and extent of its extension services. While we recognize the fact that households' access to extension services could be a dependent variable, in this study we consider it as an explanatory variable because extension messages reach households through several channels including radio (Magembe, 2006). This implies that a household can be exposed to extension messages even though it chooses not to participate in contract farming. Therefore, it is hypothesized in this study that household with an access to extension services have higher probability to participate in the scheme.

4.3.1.11 Access to credit (Loan)

This dummy variable indicates whether households had access to credit or not in 2009 season. Normally households with cash constraints would find it more attractive to joint contracts than households with access to credit (Key and Runsten, 1999). It should be noted that crops normally cost more per hectare than traditional crops. As a result, households with low capital cannot finance their production without accessing

credit. Therefore, it is hypothesized that households with no access to credit are more likely to participate in contract farming than household with access to credit.

4.3.1.12 Livestock ownership (Livest)

The number of livestock owned by the household is measured in terms of tropical livestock units. It should be noted that paprika contract farming requires high inputs, such as manure especially at nursery stage where paprika seedlings are produced. Furthermore, such households with livestock may not face liquidity constraint as long as they can easily convert their livestock into cash. In this study, therefore, it is hypothesized that households with large number of livestock would more likely participate in contract farming.

4.3.2 Probit model results: Factors determining farmers' participation in contract farming

Results from the probit model are shown in Table 4; the model is highly significant and correctly predicts 77.703% of the observed outcomes.

4.3.2.1 Age of respondents (age)

In this study it was hypothesized that young farmers will be more likely to participate in contract farming than older farmers. Results show that age had a marginal coefficient of about 0.01 meaning that age increases the probability of participating in contract by 1% and significant at 10% level of significance. Therefore this result rejects the hypothesis that young farmers are more likely to participate in contract farming than older farmers.

4.3.2.2 Education of respondents (educ)

The respondent's level of education measured by years of schooling did not have a significant effect in determining participation in contract farming though it was positive. Results show that increase in years of schooling increased the probability of participation by 7.4% (marginal coefficient 0.0740).

4.3.2.3 Sex status of respondents

Results show that being a male headed household had a marginal coefficient of about 0.3 and was significant at 5% level of probability. The fact that it is positive indicates increased probability of participating in contract by 30% by male headed households. Therefore the decision to participate in contract farming will depends on the status of the household whether it is male headed or female headed.

These results are possible because contracts were awarded to head of the households who in most cases were male headed. Furthermore since contracts were given to farmers who could justify the land ownership and who were recognized as the head of the household by the program it is obviously that most of the households who are male headed were likely to participate in the program.

4.3.2.4 Number of household members who work on a farm (hhwork)

This study hypothesized that households with more family labour have high probability of participating in contract farming than households with limited family labour. Results indicate that size of family labour in the household who work on a farm was not significant at 5% level of probability though it increased the family's probability of participation by 2.4%. This is an obvious result as paprika is a labour

intensive crop hence the increased probability of participation by households with more members working on a farm.

4.3.2.5 Leadership position in the village (lead), ownership of irrigated land

(irrig) and distance from the household to the village office (distanc) and number of members in the household (hhnumb)

Results show that leadership position, ownership of irrigated land and distance from the household to the village office reduced the probability of farmers to participate in contract farming though not significant. The effect of these variables indicates that they are not significant in determining the decision of a farmer to enter into contract.

4.3.2.6 Access to credit (Loan) and access to extension services (exte)

Access to loan and access to extension services increased the probability of farmers to participate in contract farming by 49% and 47% respectively and were all significant at 1% and 5% level of probability. Result for access to extension services was expected because paprika is a new crop; therefore farmers who received training from the government extension office were likely to participate in contract farming since they had access to information on paprika farming techniques and marketing. Furthermore training enabled farmers to be aware of the risks involved in the contract and hence be able to make decisions accordingly.

Result for access to loan was contrary to our hypothesis that households with cash constraints would be more likely to participate in contract. This is probably because the contract arrangement did not include provision of loan or any other financial

support to farmers. Thus only farmers who had access to loan were likely to participate.

4.3.2.7 Livestock ownership (Livest) and farm size of the household (land)

The results for ownership of livestock and land ownership all show increased probability of farmers participation in contract farming by 32% and 1.43% respectively though the effect of farm size was not significant. The result on livestock ownership was expected because paprika contract farming is input intensive therefore a smallholder farmer having livestock means that farmer can be able to convert the animal into cash and be able to get the required inputs for paprika contract farming. Eaton and shepherd (2001) assert that farmers with less land have less ability for self insurance in case of crop failure hence are more risk averse.

These results positively support the hypothesis that participation in contract farming favours households with more social and economic endowment than households with less social and economic endowments. However it should be noted that since land ownership did not have significant effect in participation there was no evidence that paprika contract farming favoured large farmers against small ones. Furthermore as Warning and Hoo (2005) point out, sometimes companies prefer to work with small farmers rather than larger farmers to take advantage of their poor organization and lack of alternatives.

4.3.3 Selection model results: Factors determining farmers' participation in contract farming

Results from the probit selection model Table 5: also shows that access to extension services was significant at 1% and 5% level of probability. However the probability

for ownership of livestock and marital status of the household was only significant at 10% level of significance. When looked at the percentage of their probabilities there is a high increase as the livestock ownership percentage is now 91.98% compared to 32% while for access to extension services the percentage is 129.6% compared to 49%. The numbers of people in the household as well as household members who worked on the farm were not significant at 5% level of probability; furthermore household size negatively influenced the household participation in contract farming.

4.4 Effect of Contract Farming on Income of Smallholder Farmers

4.4.1 Selection model for estimation of effect of contract farming on income of smallholder farmers

To evaluate the effect of contract farming participation on income of smallholder farmers, data comprising of total income of the household in the entire year was used. The total household income was defined as the total amount generated from agricultural and non-agricultural activities. This included income generated from sales of crops, livestock products and poultry. Non-farm income included income from paid works, small businesses, and income from forestry products, gifts, grants, and pension or retirement benefits.

Farm income was obtained by deducting costs of production including costs of inputs except the cost of employed family labour. Similar approach was used by Simmons *et al.* (2005) and Minot *et al.* (2007) in their studies titled: Analysis of contract farming in East Java, Bali and Lombok in Indonesia and Impact of contract farming on income: Linking small farmers, packers and supermarkets in China respectively.

Simmons *et al.* (2005) particularly argue that potential methodological problems exist in evaluating the welfare effects of contract farming on smallholders through measuring the benefits of a new crop when it is only produced by participant households. This approach was inevitably chosen because all the farmers who grew paprika sold their crops under contract, there were no farmers who grew paprika and sell under spot market. Hence there was no clear comparison which could warrant other methodological approach such as gross margins analysis between farmers who sold under contract and those who sold under spot markets.

According to Simmons *et al.* (2005) such adoption of gross margin analysis could suggest that contract farming is profitable for the crop but it is possible that the gains may have come from shifting resources from other agricultural activities or from other crops. Hence use of total household income offers a better way of analysis.

Household's income was expressed as the function of household basic characteristics age, gender, number of people in the households, number of people in the household who work, access to credit, ownership of various assets such as irrigated land and livestock contract farming participation was included as a dummy variable. The analysis was implemented as maximum likelihood estimation in which all parameters in both models are estimated simultaneously unlike in the two step procedure (Green, 2005).

A well-known difficulty in implementing the Heckman model emerges when there is a high degree of multicollinearity between the independent variables and the inverse Mills ratio, which results in high standard errors on the coefficient estimates and

parameter instability. Effectively addressing this problem and controlling for sample selectivity bias in the second stage regression requires the selection of at least one variable that uniquely determines the discrete choice of participation in contract farming but not the household total income (Minot and Roy, 2007; Baker, 2000).

Identification is provided by the inclusion of a variable in the selection model that is not found in the outcome equation. Our identifying variable was the distance from the household to the village office. According to Marsh (2002) being closer to the village office in most of the rural areas in Africa facilitate access to vital information concerning projects or programs being implemented in such a village hence determination of the possible participants in such a program or project. Therefore distance from the office would be a significant determining factor for the household to participate in the contract farming with households residing near the office being more likely to participate, but the same variable can not directly influence the income. Therefore distance is a good predictor of participation though it does not have a direct effect on income hence a useful identification variable (Miyata *et al.*, 2005).

4.4.2 Results from maximum likelihood estimation (MLE): effect of contract farming on household income

The analysis of the treatment effect model was estimated using the maximum likelihood method (Table 5). The results indicate that the four variables access to loan, education, number of livestock and value of agricultural production had significantly effect at 5% level of significant on the income in the contract program. However access to loan and ownership of livestock had negative effect on household income. The results probably indicate that the contract scheme did not target the

worse off farmers at the beginning of the contract farming (indicated by the positive sign in the probit model) those who owned livestock and had access to loan had the motivation to participate in the program. However because of that it was not very successful in improving income of participants to the level compared to the non participants with the same endowments

The results indicate that ρ (rho) the parameter showing correlation between error terms in selection and outcome equation is not significant meaning that there is no selection bias in this model hence we can estimate the model using ordinary least square (Miyata *et al.*, 2005). The results also indicate that all household demographic characteristics, age, gender and education as well as number of people in the household and number of members who are working were not significant. The possible explanation for the result is that demographic factors as well as competency factors have little influence on household income in this particular case.

The coefficient for contract participation using maximum likelihood estimation (partic) was 64 263.84 meaning that contract farming increased income TAS. 64 263.84 per household per annum but it was not significant. However when estimation was done using ordinary least square the contract farming coefficient indicates that it is significant at 5% level of probability. The possible explanation for this variation is due to the fact that maximum likelihood estimation is very sensitive to misspecification especially when the sample size is not very large (Sartori, 2003).

Table 5: Results from maximum likelihood estimation (MLE): effect of contract farming on household income

Variable	Marginal Coefficient	Standard error	P [Z < Z]
Age	3174.58	1873.47	0.0902*
Status	33095.27	41244.44	0.4223
Educ	85857.78	33963.26	0.0115***
Hhnum	-8720.76	10822.71	0.4204
Hhwork	18039.68	13176.46	0.1710
Irrig	-54890.94	44933.87	0.2219
Land	10167.17	10977.57	0.3544
Vlive	0.000111	0.013204	0.9933
Loan	-187105.34	78840.80	0.0176***
Nlive	-3800.08	1968.11	0.0535**
Agric	0.15056	0.017104	0.0000***
Non farm	-0.24286	0.237160	0.3058
Partic	64263.84	85605.05	0.4528
Sigma	218759.58	17660.43	0.0000
Rho	0.1000142	0.27708098	0.7178

Note: * Significant at the 10% level of error probability

** Significant at the 5% level of error probability

*** Significant at the 1% level of error probability

4.4.3 Results from ordinary least square estimation (OLS): effect of contract farming on household income

The OLS results for the estimation of effect of contract farming on household income (Table 6) indicate that the model predict about 41% of the variation in income across the sample. The household income is positively affected by value of agricultural production, number of household members working on farm and value of livestock. The number of household working on a farm could offer their labour in other off farm work hence increasing the household income. The value of agricultural production as well as livestock affects directly the income of the household through creation of capital hence affecting positively the amount of income.

The results also show that after correcting for observable household characteristics participation in contract farming raised the income of household significantly at 1% as well as 5% level of probability. The coefficient of contact farming participation (Partic) is 108 815 implying that contract farming increased household income by TAS. 108 815 per year per household per annum.

Both access to credit and household size had negative effect on income of contract farming. The explanation is that these factors when constrained could negatively affect the returns from the agricultural production. Simmons *et al.* (2005) observed the same.

Table 6: Ordinary Least Square (OLS) estimation for the effect of contract farming on income

Variable	Coefficient	Standard error	P [Z < Z]
Constant	460551.21	109371.50	0.0000
Age	-845.29	1529.46	0.5814
Status	-61054.84	45927.31	0.1860
Educ	5418.04	27867.31	0.8461
Hhnumb	-10147.63	27867.196	0.1992
Hhwork	20584.95	7865.057	0.0475**
Irrig	-51446.18	10290.795	0.1928
Land	5000.23	39307.20	0.5871
Vlive	1.000-04	0.491-05	0.0435**
Loan	-196236.19	63375.52	0.0024***
Nlive	-4143.56	1475.81	0.0057***
Agric	0.1540	0.0296	0.0000***
Non farm	-0.299	0.18496	0.1080
Partic	108815.0	39239.80	0.0063***
Observations		148.0	
R –Squared		0.461547	
Adjusted R-Squared		0.40931	
F- value		0.0000	

Note: *Significant at the 10% level of error probability
 **Significant at the 5% level of error probability
 ***Significant at the 1% level of error probability

4.5 Factors Affecting Income in Paprika Contract Farming

In order to answer objective three on the analysis of the factors which determine income in paprika contract farming, an OLS estimation procedure was employed, it was hypothesized that distance to the market would influence the amount of income a farmer would get from paprika production, hence farmers who are far from the buying centre would get lower income compared to farmers who are close to the buying centre as distance would increase transport costs and so as lower the net income.

Due to problems in estimating the distance, transport costs were used as indicative to the effect of distance since estimation of distance is normally difficult in most of the rural areas. Income from paprika contract farming was considered as a function of household characteristics including age, household labour employed, labour productivity which is computed as net income over average labour used, experience in paprika production in years, land ownership including irrigation land, costs of production, costs of transport, production area, area under Paprika production, and input use which is translated into paprika production per unit area.

Table 7 shows the results from the analysis. According to the results in Table 7 the variables in the model have been able to explain about 99% of the variation in the income from paprika farming. Also F- statistic was highly significant at 1% level of probability.

Table 7: Ordinary Least Squares (OLS) results on factors affecting income in Paprika contract farming

Variable	Coefficient	Standard error	P [t >t]
Constant	1541.05	1118.38	0.4093
Age	-9.685	31.607	0.7603
Hhnumb	-125.86	112.63	0.3804
Hhwork	-70.27	79.26	0.7147
Loan	1276.18	989.35	0.1182
Irrig_1	-28.43	517.02	0.9721
Costs_1	-0.987	0.0266	0.000***
Training	291.372	780.35	0.7756
Area	-2085.36	1447.50	0.1951
Prod	1400.22	3.002	0.000***
Expe	-256.548	166.91	0.4879
Livest	-646.57	817.56	0.5935
Costs_2	-0.986	0.01354	0.000***
Hh-labour	-13.8014	275.217	0.9622
Ldays	-3.257	-0.286	0.9242
Tech	-2.0928	1.103	0.5151
Observations		76	
R-Squared		0.999913	
Adjusted R-Squared		0.99989	
F-value		0.00000	

Note: * Significant at the 10% level of error probability
 ** Significant at the 5% level of error probability
 *** Significant at the 1% level of error probability

Definition of independent variables:

Hhnumb	- Number of members in the household
Hhwork	- Number of household members who work on a farm
Loan	- Dummy, if household received loan during the 2009 cropping season (1=yes, 0= no)
Livest	- Number of livestock owned by the household in 2009 season
Irrig_1	- Dummy, if household own an irrigation land (1=yes, 0=no)
Costs_1	- Total costs of production of Paprika production per acre in TAS.
Train	- Dummy, if household received training from the contracting company or NGO (1=yes, 0=no)
Area	- Total production under Paprika production in acre per household in the 2009 cropping season.
Prod	- Total volume of Paprika produced by the household in (kg) in the 2009 season
Exp	- Number of years which the household has been involved in contract farming
Costs_2	- Total costs of transport in (TAS) incurred by the household in transporting Paprika to the market
Ldays	- Number of labour days used in Paprika farming in 2009
Livest	- Dummy, if household owned livestock during the 2009 cropping (1=yes, 0=no)
Tech	- Household technology use in Paprika production, considered as production per acre in (kg/acre)

Just as hypothesized, transport costs as well as costs of paprika production negatively affected the income of farmers and were highly significant at 1% and 5% level of probability. Considering the costs of paprika production for instance, an increase of a unit of paprika production costs decreases farmers' income by almost the same amount of money.

The results are not surprising as paprika contract farming is a high input crop. Therefore it is expected that large amount of money would be spent in buying the inputs and hence this will have a negative effect on the net income that farmers get in the end. Subsidizing the inputs under the non traditional crops contract farming could result into farmers getting higher income as is the current situation as the government has subsidized inputs for food crops only.

The increase in transport costs positively support the hypothesis that farmers who are far from the buying centre would get less income compared to those who are near the buying centre as transport costs reduced net income almost the same amount TAS. 1.055 for every 1.0 TAS increase in transport cost. Farmers could transport their produce in groups to utilize the economies of scale and reduce transport costs.

Another coefficient which showed to be significant is the production per unit area of paprika which was highly significant at 5% level of probability. The results show that for every 1 kg increase in the volume of paprika, there is an increase of income by TAS.1399.294, this shows that farmers still need to increase the production per unit area if they are to get more income from paprika contract. Farmers can be organized

into cooperatives which will ensure that high production is realized through group purchase of inputs which are major constraints in paprika production.

One of the striking finding in this analysis is the effect of farmer's experience, and input use translated as technology use in determining the income. It was expected that farmers with more experience and technology use were expected to have positive effect on income. Ideally farmers who use more inputs are expected to get more output from paprika production as they would use improved skills in lowering production costs and use more inputs to increase production and hence get more income. However, the results show that years of experience with paprika contract farming as well as technology use both negatively affected the income though not significantly, this could be caused by the fact that factors other than inputs use and experience contributed to the increased income in paprika farming.

4.6 Constraints and Prospects for Contract Farming of Non-traditional Crops

4.6.1 Constraints faced by farmers in Paprika contract farming

In order to answer objective four of the research, farmers were asked to mention major constraints they faced in the 2009 season with regard to paprika contract farming and their contractual relationship with the company and were asked to mention one issue which they felt was a major constraint in the paprika contract. Farmers' responses and their percentage of the total are reported in Fig. 2.

Figure 2: Farmers response on constraints faced by farmers in contract farming for the 2009 season

According to the results in Fig. 2, about 48% of the farmers said they had problems with price setting, whereby during the negotiation it was obvious that the price of TAS. 850/kg of dry paprika which was proposed by the company was just enough to cover the costs of production and give farmers a small profit margin. But according to the company officials, the profit margin that farmers were getting was enough to get more income provided farmers followed good agronomic practices as advised by the company.

Furthermore, 47% of farmers reported that their main constraint was low production per ha which prevented them from getting enough income. This is obvious because since access to credit was found to be a major determining factor for farmers' participation in contract farming, the issue of high inputs costs as one of the major constraints which reflect the farmers' inability to access credit strongly support this evidence. Other farmers reported problems related to relationship between them and the company by saying that there was no respect on the side of the company and they were not ready to listen to whatever demand they presented

On the other hand, the major complaint from the company was on low production of paprika by farmers. The company said that farmers are not using required inputs and it was unable to offer credit for the inputs due to lack of financial resources. According to the information provided by the company agronomist, in 2009, the company planned to get more than 200 tonnes of paprika from Mbozi but instead it managed to get only 45.78 tonnes which made them lose due to high fixed costs.

Other complaints from the company included the failure of farmers to adhere to the standards as some farmers were putting stones in their paprika bags in order to fetch more weight and also some farmers were not drying paprika to the required moisture content. Further more when asked as to why such problems occurred 41% of the farmers mentioned high costs of production as the major reasons that contributed to most of the constraints encountered. The findings show that generally there were no serious constraints that faced farmers which were related to the contracts per se, but most of the problems relate to the context in which it has been operating.

Of recent when was collecting data for this study, the company (Tanzania Spices LTD) announced that it will not buy paprika from farmers for the season of 2009/2010 for the reason that they have been affected by the global financial crisis. However the announcement came while farmers had already signed the contract and they had already bought seeds.

When farmers wanted to go to court asking for compensation, they were advised by the district lawyer to settle their difference outside the court as the existing legal system of the country does not support them as there are no laws which govern contract farming in the country. Moreover the farmers were organized into smaller groups which were not legally recognized. In order to know the reasons for their pull out, ADP Mbozi staff went to visit their office in Iringa and found the offices have been closed. Information from people in the area said that the company has closed its business and the owners have left the country.

4.6.2 Why farmers are not entering contract farming?

To supplement the finding from the probit model which assesses the determinants of farmers' participation in contract farming, farmers who did not participate in the contract were asked to mention one strong reason as to why they could not join the contract farming. Results for their responses are presented in Table 8.

According to the results in Table 8, 41% of farmers did not see the need to join contract farming due to high costs of inputs which is associated with paprika farming. Other reasons reported by farmers were previous year bad experience, land and labour shortage, lack of training and lack of interest.

Table 8: Farmers response on the reasons why farmers are not entering contract farming n=75

Constraints	Frequency	Percentage
Previous year bad experience	11	14.7
High costs of inputs	31	41.3
Labour shortage	10	13.3
Land shortage	8	10.7
Lack of training	11	14.7
Lack of interest	4	5.3
Total	75	100.0

4.6.3 Benefits of contract farming

To get farmers opinion on the benefit they got from paprika contract farming, farmers who participated in contract farming were asked to mention one significant benefit they have got by participating in contract farming. The results are presented in Fig. 3 which shows that generally all the farmers who participated in the contract did get some benefits from contract farming.

About 39% of farmers said they got higher income which helped them to pay for school fees followed by 30% who said they gained knowledge and skills on different aspects of paprika contract farming and 12% who said they bought different kinds of assets including plough, and furniture. About 9% said they used their income to build new improved houses. Those who bought a piece of land and those bought iron sheets each accounted to 5% of the respondents.

Figure 3: Farmers response on benefits of contract farming

4.6.4 Farmers and contracting company's opinions on improvement in contract farming

When asked to give their opinions on how to improve contract farming, farmers and the company representative gave different responses. Table 9 shows that 32% of farmers were interested in seeing the government having a role in contract farming system because the company has been setting the price without considering the farmers' costs of production. The government should act as a watch dog and set a minimum price requirement based on average costs of production which can be set as a minimum price requirement.

Some farmers wanted to have more than one buyer in paprika contract farming, while 29.3% of the farmers wanted the company to put a provision of offering inputs on credit. The rest of the farmers were interested in establishing collection centres in the villages and need of having longer term contracts. The company on the other hand wanted the government to support farmers in terms of input subsidy and incorporating the issue of contract farming in the districts plan. They argued that so long as some of the non -traditional crops such as paprika are not given priority in the district plans, their chance of getting necessary support from the government and hence their success in terms of increasing production and are minimal.

Table 9: Farmers opinion on what should be done to improve conditions under contract farming n=75

Constraints	Frequency	Percentage
Government to supervise contracts	24	32.0
There should be long term contracts	2	2.7
There should be more than one buyer	23	30.7
Companies should provide inputs	22	29.3
Establish collective centre in villages	4	5.3
Total	75	100.0

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Overview

This chapter presents the conclusions and recommendations regarding the findings from this study. The general objective of the study was to assess the impact of contract farming on the income of smallholder farmers growing non traditional crops. Specifically the study aimed at (i) analyzing the requirements for farmers participation in contract farming (ii) factors that determine income in contract farming (iii) the effect of contract farming on income of smallholder farmers and (iv) identifying constraints and prospects for contract farming of non traditional crops. Conclusions were made basing on the objectives of the study and responses from questions asked.

5.2 Findings of the Study

5.2.1 The requirements for farmers to participate in contract farming

From this study, it can be concluded that there are a number of factors which determine farmers' participation in contract farming; farmers level of education, access to credit, ownership of livestock, marital status of the head of the household, size of the farm, number of household members who work on a farm and access to extension services were all found to increase the probability of farmers' participation in contract farming.

However access to extension services and access to loan were found to be highly significant in increasing the probability of farmers' participation in contract farming.

This was probably due to the fact that paprika is a new crop and is input intensive hence farmers had to receive extension services and access inputs before they could start production since this contract scheme did not have credit provision to farmers. Other factors, like leadership, distance from to the village office, number of members of the household and ownership of irrigated were found to have negative effect on probability of participation and they were not significant.

However land ownership, number of household members who work on a farm, education level of the household, and marital status were found to increase the probability of farmers to participate in contract farming but were not significant. The results confirm the hypothesis that households with large endowment tend to participate in contract farming than household with fewer endowments. The results further reveal that there is selection bias which actually tends to underestimate the effect of contract farming on income.

5.2.2 Factors that determine income in contract farming

This study reveals that contract farmers who were close to the market earned more income than contract farmers who are far from the market. The study concludes that transport costs had reduced their net income. On the other hand, area of production had a positive effect on income from paprika farming and an increase in area cultivated, significantly increased the income from paprika farming by TAS 1400. Due to farmers inability to apply required inputs, farmers with more land earned more income from paprika than farmers who had smaller plots of land.

5.2.3 Effect of contract farming on income of smallholder farmers

From this study it can be furthermore concluded that contract farming increased significantly the income of smallholder farmers. Contract farming increased the income of farmers by TSh. 108 815 which is about 24% increase compared to the income of farmers who did not participate in contract farming. Apart from increasing income, farmers benefited from contract farming through payment for the school fees in time, gained knowledge and skills on different aspects of paprika contract farming, enabled them to purchase different kinds of assets including plough, land, iron sheets and furniture.

5.2.4 Constraints and prospects of contract farming of non traditional crops

This study has indicated that farmers involved in paprika contract farming in Mbozi faced a number of constraints related to a number of issues from production to marketing of paprika. Some of the problems revealed by the study include unsuitable price setting, low production, high costs of production due to high costs of inputs. Farmers say the problems have been there due to presence of one buyer, lack of government support and bad contracts. Apart from increasing production costs, high costs of inputs also prevented other farmers from entering the contracts.

5.3 Recommendations

5.3.1 Provision of input subsidies and other support services

This study has revealed that contract farming has the potential of increasing smallholder farmers' income and hence contributing towards poverty alleviation; however most of the farmers are unable to participate in contract farming due to limited access to production technologies and inputs. Therefore this study

recommends the government to support farmers mainly through provision of subsidized inputs and extension services like what it is doing with food crops. By so doing farmers will be able to increase production per unit area, improve crop quality and hence the price. This should be backed up with improvement of infrastructures, provision of extension services and micro credit to farmers as well as companies willing to start contract farming.

5.3.2 Creating legal framework for contract farming

In many contractual arrangements of non traditional crops including the one under this study, breach of contracts by both parties is very common. This results in companies getting huge losses and terminating contracts with farmers because they do not get the required volume due to side selling by farmers. On the other hand many farmers had incurred losses due to the breach of contract by companies. This study recommends that the government should create a strong legal framework protecting both farmers and contracting firms so as to see that legal action is taken in case there is a breach of contract by any party. Further more there is a need for the government to provide an executive body which can settle disputes and solve conflicts in the contract farming schemes, the same approach have been adopted by China and Vietnam.

5.3.3 Strengthening farmers' organization

This study has showed that farmers face several constraints related to price setting and access to improved production technologies in the contract farming. These constraints can be addressed by many stakeholders including the NGOs working with smallholder farmers in the area. The study recommends the need for NGOs to help

farmers form stronger farmers' organizations which can have strong bargaining power to be able to negotiate better price with contracting firms.

5.4 Major Limitation of the Study

The major limitation of this study is on the accuracy of household income data and the methodological approach used. Income data are normally very difficult to get from farmers, as normally farmers give large or small figures depending on what they anticipate to get. And sometimes some farmers even fear of being attacked by bandits when they reveal their true income. Also the fact that farmers had to recall their statistics even reduces the reliability of the figures.

5.5 Area for Further Study

Although the results have shown that contract farming has increased income of farmers, still the same study should be conducted elsewhere in the country as there are different types of contract farming relationships depending on the type of crops being contracted, details of contracts, level of formality, and the number of smallholders participating which significantly affect its effect on smallholder farmers income and hence yield different results.

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APPENDICES

**Appendix 1: Gross margins calculations for some selected crops in Mbozi district
in TAS**

Cost of production	Maize	Beans	Sunflower	Groundnuts	Paprika
Farm hiring	20,000.00	15,000.00	20,000.00	15,000.00	20,000.00
Farm preparation	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
Nursery management					57,000.00
Ploughing	18,000.00	18,000.00	18,000.00	20,000.00	18,000.00
Harrowing					12,000.00
Planting	10,000.00	8,000.00	10,000.00	10,000.00	
Transplanting	-	-	-	-	20,000.00
1 st Weeding	15,000.00	5,000.00	8,000.00	5,000.00	15,000.00
2 nd weeding	15,000.00	-	9,000.00	-	15,000.00
3 rd weeding					10,000.00
Pruning	-	-	-	-	
Harvesting	10,000.00	5,000.00	10,000.00	8,000.00	10,000.00
Sorting					3,000.00
Sub total cost of production	93,000.00	56,000.00	80,000.00	63,000.00	195,000.00
Input costs					
Seedlings	-	-	-	-	
Pesticides	7,500.00	7,500.00	-	-	30,000.00
Pesticide application	6,000.00	-	-	-	6,000
Fertilizer	56,000.00	-	20,000.00	-	25,000.00
Fertilizer application	6,000.00	-	6,000.00	-	6,000.00
Seeds	20,000.00	24,000.00	7,500.00	24,000.00	15,000.00
Sub total cost of inputs	95,500.00	31,500.00	33,500.00	24,000.00	82,000.00
Total costs of production	188,500.00	87,500.00	113,500.00	87,000.00	277,000.00
Total no of kgs	1,500	300	800	300	800
Farm get price per kg	150	600	150	600	850
Income	225,000.00	180,000.00	120,000.00	180,000.00	680,000.00
Gross profit	36,500.00	92,500.00	6,500.00	93,000.00	403,000.00
Gross margin	16%	51%	5%	52%	59%
Crop rank	4	3	5	2	1

*Calculations are based on 1acre of cultivated land. 1acre=0.4ha

*1 bag is equivalent to 100kg. , * Paprika weight is based on dried Paprika, Source: ADP Mbozi field survey results July 2003.

Appendix 2: General questionnaire for farmers interview

Economic analysis of the impact of contract farming on income of small holder farmers: The case study of Paprika contract farming in Mbozi district, Tanzania

Confidentiality

Dear respondent, I would like to assure you that the information provided in this questionnaire will be kept confidential and will be used only for academic purposes.

**Name of interviewer..... Date
(DD/MM/YY) -----...**

A. HOUSEHOLD'S BASIC CHARACTERISTICS

1. Household ID.....
2. Village.....
3. Ward.....
4. Name of respondent.....
5. Sex of respondent (*Please circle appropriate answer*)
1= Male 2 =Female
6. Respondent's age?years
7. What is your education level? (*Please cycle appropriate answer*)
1=Adult education 2= Primary education 3 =Secondary education 4
=Post secondary education
8. Respondent head of the household status (*Please cycle appropriate answer*)
1=male headed 2= female headed

B. REQUIREMENTS FOR FARMERS' PARTICIPATION IN CONTRACT FARMING

9. How many people live in your Household? (*Note: These are all the people who usually eat from the same pot and sleep under the same roof*)
10. How many household members including you work on the farm.....members?
11. Does the household own or use irrigated agricultural land? (*Please circle appropriate answer*)
1=Yes 0=No if No please go to question 13
12. IF yes, how much irrigated land did the household use for farming in 2009 cropping season...Ha

13. Did the household receive any extension services from the government extension office in the 2009 cropping season? *(Please circle appropriate answer)*

1=Yes 0 =No if NO please go to question 15

14. If yes, the training centered on what type of crop or livestock?

15. If no why you did not receive the training?

16. Did the household receive loan from any financial services for the 2009 cropping season? *(Please circle appropriate answer)*

1= Yes 0= No if Yes please go to question 18

17. If no what are the reasons for not receiving the loan.....

 ...

B. COMPARISON OF INCOME LEVELS AMONG CONTRACT AND NON CONTACT FARMERS

18. What is the major source of household income?

1= Farming 2 =Livestock rearing 3= Paid salaries 4 =others *(specify) (Please cycle appropriate answer)*

Income from agriculture

19. How much income did the household earn per annum in the 2009 cropping season from agriculture production.....TAS. *(Note: This account for the income from crop production)*

Crop	Area under cultivation (Ha)*	Total production (Kg)	Family consumption (Kg)	Remaining for Sale (kg)	Price (TAS)	Total value =prod× sales price (TAS)	Total costs (TAS)	Net income (TAS)

Inputs costs for agriculture production

Types	Amount	Unit	Unit price (TAS)	Total costs (TAS)
Seeds				
Fertilizers				
Draft power				
Herbicides				

Pesticides				
Manures				
Hired labour				
Others specify				
Total				

20. Did the household own the livestock in the 2009 season? (*Please circle appropriate answer*)

1= Yes 0 =No *If NO please go question 22*

21. If yes what income did the household get from livestock per annum in the 2009 cropping season?

Type	Number owned*	Number sold or slaughtered	Number slaughtered for family consumption	Price per animal (TAS)	Income on consumption (TAS)	Cash income (TAS)	Income total (TAS)
Bull							
Cow							
Goats							
Sheep							
Pigs							
Chicken							
Ducks							
Others specify							

Costs of inputs used in livestock production

Type of input	Amount	Unit	Price per unit	Total costs (TAS)
Medicine				
Vaccine				
Fodder				
Fencing				
Feeds				
Hired labour				
Others, specify				

22. Did the household produce any livestock products in the 2009 cropping season? (*Please circle appropriate answer*)

1=Yes 0=No if *NO* go to question 24

23. If yes what income did the household get per annum from livestock products in 2009 cropping season?

Product	Amount	Unit	Family consumption (litres)	Amount sold (litres)	Price/unit (TAS/l)	Total income (TAS)
Milk						
Samli						
Eggs						
Hides						
Skin						
Others, specify						

24. Did your household get income from forest products? *(Please circle appropriate answer)*

1=Yes 0=No if NO go to question 26

25. If yes what income did the household get per annum from forest products in 2009 cropping season?

Product	Amount obtained (unit)	Amount sold (unit)	Price per unit(TAS/unit)	Costs (TAS)	Total net Income (TAS)
Timber					
Poles					
Firewood					
Charcoal					
Others, specify					

Income from other sources

26. Apart from agricultural production and forest income, did your household get any other income from own business in 2009 cropping season? *(Please circle appropriate answer)*

1=Yes 0=No *If No, go to question 28*

27. If yes how much income did the Household earn from own business per year in 2009?

Type of business	Gross income(TAS)	Purchased input(TAS)	Hired labour(TAS)	Transport +marketing costs(TAS)	Paid Tax (TAS)	Net income(TAS)
Shop						
Carpentry						
Restaurant						
Others, specify						

28. Apart from agriculture, livestock, forest and own business income, has anyone in the household been paid to work in 2009? *(Please circle appropriate answer)*

1=Yes 0 =No *If No, go to question 30*

29. If yes how much income did the Household earn from paid work in the year 2009?

Type of work	Relationship to household head	Number of people working	Amount paid in a year (TAS)	Sum total wage to the household (TAS)
Shopkeeper				
Carpentry				
Agriculture				

30. Has any member of your household received income from other sources apart from the sources mentioned above in 2009? *(Please circle appropriate answer)*

1=Yes 0= No *If No, go to question 32*

31. If yes how much income did the Household earn from other sources in the year 2009?

Type of income	Amount received (TAS)
Remittances	
Support from government or NGO	
Pension	
Others, specify	

D. FACTORS DETERMINING INCOME IN CONTRACT FARMING

32. Is the household involved in contract farming? *(Please circle appropriate answer)*

1= Yes 0 =No *if Yes go to question 34*

33. If no, why is your household not involved in contract farming?.....

34. If yes, for how long has the household been involved in Paprika contract farming?.....

35. Did the household receive any training on contract farming during the 2009 cropping season? *(Please circle appropriate answer)*

1=Yes 0=No

36. How does your involvement in Paprika contract farming benefited your household?.....

37. How much did the household earn from Paprika contract farming in the 2009 cropping season?

Year	Production (kg)	Price per kg	Gross income (TAS)	Costs (TAS)	Net income (TAS)

38. How much does the household spend in each of the following activities in Paprika contract farming?

Activity	Days	Number of family members involved	Hired labour	labour cost (TAS/day)	Total cost (TAS)
Land prep					
Ploughing					
Nursery prep					
Planting					
Weeding					
Harrowing					
Transplanting					
Fertilizer application					
Harvesting					

39. How did you bring Paprika to the market in 2009 season? *(Please circle appropriate answer)*

1=company provide transport 2= own transport 3= others, specify

40. How much costs did you incur in transporting Paprika to the market?.....

E. Constraints and prospects of contract farming

41. What are the major problems encountered in Paprika contract production in the 2009?.....
.....
.....

42. What are the major reasons for the occurrence of the problems encountered?.....
.....

43. In your opinion , what should be done to make Paprika contract farming be more profitable to smallholder farmers?.....
.....
.....

END OF QUESTIONNAIRE

THANK YOU VERY MUCH FOR ANSWERING MY QUESTIONS