AN ASSESSMENT OF THE PERFORMANCE OF SMALL-SCALE FARMERS WHO SUPPLY FRESH FRUITS AND VEGETABLES TO SUPERMARKETS IN ZAMBIA.

A Research Report Presented to the Department of Agricultural Economics and Extension of the University of Zambia

BY

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LIST OF ABBREVIATIONS

CF	Contract Farming
FFV	Fresh Fruits and Vegetables
FAO	Food and Agriculture Organization
MACO	Ministry of Agriculture and Co-operatives
SPSS	Statistical Package for Social Scientists
NGO	Non Governmental Organization
VIF	Variance Inflation Factor

ABSTRACT

An Assessment of the Performance of Small-Scale Farmers who Supply Fresh Fruits and Vegetables to Supermarkets in Zambia.

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Contract farming can be defined as a form of vertical integration within agricultural commodity chains, such that the firm has greater control over the production process, as well as the quantity, quality, characteristics and the timing of what is produced. (Likulunga 2007, Prowse 2012).Many developing countries like Zambia face a critical need to exploit the potential of contract farming as an institution that can assist linking small scale farmers to supply chains, (Little, 1994; Watts, 1994, Kristen and Sartorius, 2002).This study was carried out in Lusaka province with the aim to assess the performance of small scale farmers who supply fresh fruits and vegetables (FFV) to supermarkets in Zambia. The objectives of the study were to determine the difference in gross margins between contracted and non-contracted FFV farmers, to find out the factors that determine farmers' participation in FFV contract farming and to identify the opportunities and constraints of FFV contract farming. The primary instrument used to collect data was a structured questionnaire. Descriptive statistics were generated using SPSS. A sample size of 91 farmers was used with 44 of them contracted with Freshmark and 47 who sold to local markets. Parameters hypothesized to affect farmer's participation in FFV farming were estimated using the PROBIT model. Among the factors that were found to be significantly important at 95% confidence level included; the age of farmer (p=0.067), gender of farmer (0.061), ownership of vehicle (p=0.000), farming experience (0.05), household income (p=0.000) and membership of farmer to a cooperative (p=0.073). Gross margin analysis was also conducted which showed that the gross margins of farmers who participated in contract farming with Freshmark were higher than for those farmers who sold to local markets. It was also found that being contracted to a supermarket had more benefits than challenges. Increasing the number of farmers who participate in contract farming therefore can lead to increased outputs in the agricultural sector and improvements in incomes of farmers. Farmers must thus be provided with incentives by supermarkets that would encourage them to participate in contract farming and they must also be educated on the benefits of FFV contract farming.

CHAPTER ONE
INTRODUCTION

1.1Introduction

Small-scale farmers often face difficulties in production and marketing of their produce. They usually sell their produce individually at the farm gate to middlemen or on local markets at given prices. This reduces farmers to price takers irrespective of the costs they incur in the production and marketing process. Furthermore, they must bear the high risk of not being able to market the entire amount of their produce. On the other hand, processors often are not able to procure the quantity and quality of the product they are looking for, (Little, 1994).

Contract farming (CF) is a possibility to improve such a situation. It is one form of vertical co-operation along value chains where a farmer or producer organization co-operates with a marketing partner (wholesaler or agro-processor) by stipulating regulations and mutual liabilities within a contract on the production, supply and acceptance of the agricultural produce.

Access to markets is an essential requirement for farmers if they are to enjoy the benefits of agriculture (Reardon, 2005). In order for the farmers to access this market, they should produce high value crops that meet quality standards. Small scale farmers are usually excluded from these markets because it is difficult for them to satisfy the market, achieve consistency and remain sustainable.

The development of supermarkets has created a market for the small scale farmers through contract farming. A contract can be defined as a range of initiatives taken by private and public firms to secure access to smallholder produce under forward agreements. It is an arrangement between farmers and other firms, whether oral or written, specifying one or more conditions of production and/or marketing of an agricultural product" (Rehber, 2007); Contract farming can also be defined as a form of vertical integration within agricultural commodity chains, such that the firm has greater control over the production process, as well as the quantity, quality, characteristics and the timing of what is produced.(Likulunga 2005, Prowse 2012).

The role of contract farming in developing countries has been a topic of interest and some controversy at least since the 1970s (Glover, 1984; Minot, 1986; Morrisey, 1974). Critics of contract farming argue that large agribusiness firms use contracts to take advantage of cheap labor and transfer production risk to farmers. Another concern is that smallholders will be marginalized because companies will prefer to work with medium- and large-scale growers, thus exacerbating rural inequality (Little & Watts, 1994; Singh, 2002).

Others are less pessimistic, seeing contract farming as a means to incorporate small farmers into growing markets for processed goods and export commodities. Because the contracts often involve the provision of seed, fertilizer, and technical assistance on credit and a guaranteed price at harvest, this form of vertical coordination simultaneously solves a number of constraints on small-farm productivity, including risk and access to inputs, credit, and information. In this view, contract farming is an institutional solution to the problems of market failure in the markets for credit, insurance, and information (Grosh, 1994; Key &Runsten, 1999).

The path between vegetable sales up until final consumption of the farm products is known as the marketing channel. The supply chain for the vegetables may involve a combination of the producers, traders, retailers and consumers. Contract farming in fresh vegetables for domestic market can be traced back to the 1970's when government created Zambia Horticultural Products Company parastatals. Since then, there has been an expansion in vegetable production both informally and formally to secure supply.

The majority of the small scale farmers rely on some form of short term production contract to supply vegetables to public institutions such as schools, hospitals, hotels and lodge etc. these contracts specify quantities, quality, price and the date of delivery. Limited grading takes place, but the producer is expected to supply good quality produce. (Likulunga, 2007) Small scale farmers also supply vegetables to supermarkets in major towns of Lusaka through contract farming. Freshmark, a purchasing company which supplies FFV to Shoprite obtains some of its vegetables from farmers through contract farming. It does not provide farmers with any inputs. The only assistance it gives to farmers is knowledge about how to grow quality vegetables

through workshops. Freshmark also links farmers to input supply companies. The farmers are then expected to supply quality vegetables in right quantities consistently.

Well-managed contract farming is an effective way to coordinate and promote production and marketing in agriculture. When efficiently organized and managed, contract farming reduces risk and uncertainty for both parties as compared to buying and selling crops on the open market.

This research will look at the performance of the contractual arrangements between small holder fresh fruits and vegetable farmers and supermarkets.

1.2Statement of the Problem

When small scale farmers sell their produce, they normally have little choice about who they sell to or how much they charge. Well-managed contract farming is an effective way to coordinate and promote production and marketing in agriculture. Supplying large supermarkets presents both potentially large opportunities but also enormous challenges for smallholder farmers. When efficiently organized and managed, contract farming reduces risk and uncertainty for both parties as compared to buying and selling crops on the open market. (Key and Runsten, 1999)

Contract farming is a form of vertical coordination largely aimed at correcting the market failure associated with spot markets that arise due to imperfect information. However there is still no consensus in the literature on the impact of contract farming on the welfare of smallholder farmers. While some studies have argued that contact farming improves access to ready markets by smallholder farmers, other studies have suggested that contract farming lowers the incomes of smallholder farmers because the contractors wield greater market power over the farmers. Consequently, it is seen as a blessing by some and a necessary evil by others.

Contract farming is viewed as essentially benefiting sponsors by enabling them to obtain cheap labour and to transfer risks to growers. However, this view contrasts with the increasing attention that contract farming is receiving in many countries, as evidence indicates that it represents a way of reducing uncertainty for both parties.(Prowse, 2012) . As more and more agribusiness

firms and retailers contract directly with large farmers there still seems to be considerable reluctance amongst them to engage smaller farmers in similar contractual arrangements. In most cases, specialized supermarket suppliers procure products from small farmers who produce for them under contract farming schemes. Nevertheless, when Farmers cannot meet specific requirements they are dropped which represents losses for the firm as well as for the farmers. (Alvarado and Charmel, 2002).

A lot of studies have been done on procurement systems of supermarkets but an assessment of the performance of contractual arrangement between small scale farmers and supermarkets in Zambia has not yet been done. Hence this study was meant to fill this knowledge gap.

1.3Research Objectives

1.3.1General Objective

The overall objective of the research was to assess the performance of small scale farmers who supply fresh fruits and vegetables (FFV) to supermarkets in Zambia

1.3.2Specific Objectives

The specific objectives were;

1. To determine the difference in gross margins between contracted and non-contracted FFV farmers
2. To find out the factors that determine farmers participation in FFV contract farming
3. To identify the opportunities and constraints of FFV contract farming.

1.4Hypothesis

H1- Gross margins of FFV farmers supplying to Freshmark will be higher than that of those supplying to local markets.

H2- Farmers who own a vehicle are more likely to participate in contract farming with Freshmark.

H3- belonging to a cooperative increases the likelihood of a farmer to participate in contract farming

H4- Farmers with higher household incomes are likely to participate in contract farming

H5- Farmers who have been farming for a long time are more likely to participate in contract farming with Freshmark.

1.5 Study Significance

The purpose of this study was to provide an assessment of the performance of small scale farmers who supply fresh fruits and vegetables to supermarkets.

1.6 Organization of the Report

The report opened with chapter one which highlighted the background information about the subject. It covered the problem statement, objects, the hypothesis and the study significance. Chapter two focused on the literature review in which the definition of contract farming and the previous behavioral studies on contract farming are discussed. Chapter three focused on the methods and procedure used in the study. It encompassed the research design, description of the data collection procedure, sampling design and data analysis. Chapter four highlights the findings and interpretation of the findings of the study, while chapter five looks at conclusion and recommendations based on the findings of the study.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter begins with an overview of FFV contract farming in Zambia, then defines some key terms and looks at types of contractual arrangements. It also looks at selected literature on contract farming in developing countries and ends with a conceptual framework.

2.2 Overview of Fresh Fruits and Vegetables Contract Farming in Zambia

Contract farming in fresh vegetables for domestic market can be traced back to the 1970's when government created Zambia Horticultural Products Company a parastatal. Since then, there has been an expansion in vegetable production both informally and formally to secure supply. The majority of small-scale farmers rely on some form of short-term production contract to supply vegetables to public institutions such as schools, hospitals, hotels and lodges etc. These contracts specify quantity, quality, price and date of delivery. Limited grading takes place, but the producer is expected to supply good quality produce.

Another channel through which small-scale farmers supply vegetables is through super markets in major town centers such as Lusaka, Livingstone and the Copperbelt towns. The super markets require a constant supply of good quality vegetable for a specified period, (Likulunga, 2005).

According to the Ministry of Agriculture and Cooperatives (MACO) report, (2006), an efficient marketing system is critical to the development of the vegetable production. Enhancement of agricultural production largely depends on the development of an efficient marketing system whose essential components include commodity supply for trade, access to the market and efficient distribution channels.

Therefore the availability of contract farming arrangements cannot be over emphasized. The small scale farmers who mostly participate in contract farming are usually organized in to cooperatives or small farmer groups. The advantage of contract farming is that the market is

always assured and the disadvantage is that the standards set by the supermarkets are very high and there is a lot of product rejection.

2.3 Key Definitions

It is important to define some words that were of very important use in this study.
The definition of contract farming varies from country to country depending on prevailing conditions, (Williams, 1996 and Watts, 1994). In Zambia **contract farming** (or out-grower) may be defined as a range of initiatives taken by private and public firms to secure access to smallholder produce under forward agreements, (Likulunga, 2007).

Glover and Kusterer(1990) defines Contract farming as an agreement between a farmer and a firm – either a simple verbal commitment or one based on written documents – where the farmer produces a fresh or partially processed product and the firm is committed to buying it under certain stipulated conditions. It can also 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 and Shepherd, 2001).

A small scale farmer can be defined as one whose landholding is less than 2 Hectares (5 acres).**A supermarket** is a self-service store offering a wide variety of food items and household merchandise. **Traditional markets:** These are other marketing channels other than supermarkets. They Include Soweto market, chawama and chilenje market. **Supermarket-channel**: This is a channel whereby farmers supply their commodities to supermarket either directly or indirectly. **Traditional-channel**: This is a channel whereby farmers supply their commodities to the traditional market either directly or indirectly.

2.4 Types of Contract Farming

There are four models of contract farming arrangements namely centralized model, multipartite model, intermediary model and the informal model (Eaton and Shepherd, 2001). The **centralized** model involves a centralized processor and/or buyer procuring from a large number of small-

scale farmers. The cooperation is vertically integrated and in most cases involves the provision of several services such as pre-financing of inputs, extension and transportation of produce from the farmer(s) to the buyers' processing plant.

Multipartite contract farming model arises when a combination of two or more organizations (state, private agribusiness firms, international aid agencies or non-governmental organizations (NGOs) work together to coordinate and manage the cooperation between buyers and farmers.

An **intermediary** model shows many characteristics of a centralized model with the difference that they act as an **intermediary** on behalf of another firm. Normally, the intermediaries organize everything on behalf of the final buyer starting with input supply, extension service, payment of the farmers and final product transport. Indeed, handling several thousands of out growers involves significant management effort and therefore it might be economically attractive for a buyer to outsource this task to an intermediary.

Lastly **Informal arrangements** involve casual oralagreements between contracting parties and regularly repeated marketing transactions, but are characterized by the absence of written contracts or equally binding and specifying documents.

2.5 Selected literature on Contract Farming in Developing Countries

In an early review of contract-farming schemes, Minot (1986) finds that most of them improved the income of participants, although rigorous evaluations were rare and the failure rate of contract-farming schemes was high. Little and Watts (1994) compile a set of seven case studies of contract farming in Sub- Saharan Africa, focusing on conflicts between farmers and the contracting firms, the imbalance of power between the two parties, intra household tensions over the allocation of new revenues, and the increasing rural inequality as contract farmers grow wealthy enough to hire farm laborers.

Nonetheless, Little (1994) concludes that "incomes from contract farming increased for a moderate (30–40%) to a high (50– 60%) proportion of participants." In a review of the

experience of contract farming in Africa in the early 1990s, Porter and Phillips-Howard (1997) conclude that farmers were generally better off as a result of their participation in contract farming, in spite of a number of social problems that arose in the communities.

Singh (2002) identifies a series of problems associated with contract vegetable production in Punjab state in India: imbalanced power between farmers and companies, violation of the terms of the agreements, social differentiation, and environmental unsustainability. Nonetheless, his surveys reveal that most contract farmers have seen incomes rise and are satisfied with the contract arrangement.

In Africa and many other developing countries, there are conflicting views on its impact on the welfare of smallholder farmers. Some authors argue that contract farming is beneficial to the small holder farmers since it enables farmers to access ready markets and also to access global markets (Key and Rusten, 1999; Warnings and Key, 2002; Gulati*et al,* 2005; Minot, 1986; Minot and Roy, 2006; Minot *et al*, 2009). Such authors also argue that contract farming enhances the income of farmers which they attribute to the economies of scale enjoyed in contract farming. On the other hand other authors argue that contract farming is a means of exploiting farmers by the large agribusiness firms due to the unequal bargaining power (Little and Watts, 1994; Singh, 2002).

They criticize contract farming on the basis that most of the contractual terms are too costly for smallholder farmers to comply with and that most large firms break the contractual terms at the expense of the smallholder due to unequal market power. Some other critics of contract farming (e.g. Guo et.al, 2005) argue that contract farming is only beneficial for large scale farmers and that it only serves to push smallholder farmers out of the market and could even lead to rural inequality and entrench poverty among the rural smallholder farmers.

However the question still remains as to whether contract farming indeed improves the welfare of the farming communities.

2.6 Agri food Markets and Small Scale Farmers

With the increasing commercialization of agriculture and food systems worldwide, the food industry is increasing being dominated by agribusiness firms whilst the influence of farmers is declining, (Reardon and Berdegue, 2002). International experience has shown that small scale farmers produce low value commodities, which face declining reduction in prices and increasing competition from medium to large scale producers and they are excluded from the market.

Small scales farmers find it difficult to make the transition to a more commercial food system because they struggle to meet the private standards set by food processors and are also limited by government support, (Bierabeetal, 2004). Experience with contract farming has shown that in both developed and developing countries supermarkets prefer to deal with large scale farmers then small scale farmers because they are more consistent in their supply, (Key and Runsten, 1999).

However, Louw and Chikazunga (2007) discovered that many commercial farmers are not interested in the contract arrangements as they are of the opinion that their profits are squeezed and they cannot afford the additional capital outlays to comply with the stringent quality standards. Consequently, this may offer small scale farmers a major opportunity to engage in contract farming if they are supported along the value chain.

For small scale farmers to supply to supermarkets, they need a certain size of production, high quality products, certain size and type of product and consistency in quality and supply-requirements which they find difficult to meet consistently.

The participation of small scale farmers in the high value markets is constrained by the challenges they must face. A range of impediments to market participation has been identified including lack of access to finance, on farm infrastructure, market information and training. The situation is worsened by the fact that farmers are located far away from the markets. (Kristen,

1994).Van Rooyan and Christodoulou (1987) emphasized the need for structural reform of the participation of small scale farmers in the commercial agriculture sector is to be enhanced.

2.7 Small Scale Farmers and Supermarkets

The growth of supermarkets offers opportunities as well as challenges to small-scale producers. This is an opportunity because there is a scope to increase their revenue if they produce and supply to the supermarkets (Kirsten &Emongor, 2006). They also indicated that in Zambia, small-scale farmers negotiate contracts and supply the supermarkets. They may supply fresh produce directly to the supermarkets or to the distributing centre of each store. In South Africa, local procurement with small farmers triggers benefits in terms of freshness of vegetable produce with an acceptable quality level and low transportation cost (Louw*et al*, 2008). He also indicated that farmers form groups to jointly market outputs hence reducing transaction costs and increasing negotiation power. There are other benefits which include loans, investments in farming assets, improved technical knowledge, improved fresh quality produce and higher yields hence high income (Vermeulen&Bienabe, 2008).

For small-scale producers in developing countries, who usually deliver their goods directly to open markets or to local wholesalers, dealing with the procurement system of a supermarket chain can be a painful shock (Balsevich*et al*, 2003). If they succeeded in growing the goods demanded, the supermarket procurement officers might reject a high percentage of produce as being of low quality. For goods that are accepted, payment may often be delayed up to 60 days after product delivery which is too long for many small farmers to wait. The farmers also find it difficult to meet the increasing demand for certification that the goods were produced using sustainable farming practices and strict labor standards, (Claris, 2011).

2.8 Conceptual Framework

Economic literature reveals that the appropriate estimation methodology developed for the investigation of the effects of explanatory variables on dicohotomous variables are the logic and probit models. The Probit model is used to estimate the probability that a given household will

participate in a contract-farming scheme. The regressors include household size and composition, the age and education of the head of household, and ownership of land and other assets. This analysis addresses the question of whether contract farmers tend to be better endowed than noncontract farmers.

The dependent variable in the model estimated to assess the determinants of participating in contract farming is binary taking the value of 1 if a farmer participated and 0 otherwise. Other authors have used Probit regression model to estimate such binary dependent variable regression models. Both the Logit and Probit models estimate parameters using maximum likelihood. These are the most commonly used models being bound between 0 and 1 and they also compel the disturbance terms to be homoscedastic (Silwana and Lucas, 2002). In addition to being able to determine the probabilities of the adaptation or participation, these models enable the assessment of the effects of the changes of given attributes or characteristics of farmers on adaptation probabilities (Langyintuo and Mekuria,2005).

Some authors have used an ordinary least squares (OLS) model to estimate per capita income as a function of household and farm characteristics and a dummy variable representing participation in the contract scheme. By including household characteristics in the model, they control for observable differences between contract and noncontract farmers, such as differences in farm size, education, and the availability of family labor. However, this model does not take into account possible selection bias in contract participation. If contractors tend to be more industrious or more skilled than noncontractors, for example, they would have higher incomes regardless of whether they participated in the contract-farming scheme.

In this study the probit model was used to determine the factors that influence participation in contract farming. The Probit model was chosen over the Logit due to the attractive assumption of the normal distribution of the error term.

The Probit model was specified as:

$Y_i=1$ if Y_i^* $Y_i^*>0$ or 0 otherwise

Where

$Y_i^* = \beta X + \mu_i$ μ-N $(0, \sigma 2)$

Yi* is the latent variable which takes the value 1 if the farmer participates in contract farming and zero if otherwise. X is a vector of the variable that affects the possibility of a farmer participating in contract farming and β is a vector of unknown parameters to be estimated.

Studies that have been conducted on the participation of farmers in the vegetable contract farming have indicated that some factors that influence farmer participation in vegetable contract farmer include; age, the level of education, gender of farmer, farming experience, farmers off-farm income, farmers farm size and availability of irrigation equipment.

2.9 Conclusion

General benefits and challenges facing small scale farmers under contract farming in developing countries should be emphasized and acknowledged prior to the implementation of polices with the objective of promoting small scale farmers.

CHAPTER THREE
RESEARCH METHODS AND PROCEDURE

3.1Introduction

This chapter outlines the type of data that was used in the study and the methods of collection and analysis used.

3.2 Study Area

The study was done in the farming areas of Lusaka. These areas included; Makeni, Chilanga and Lusaka West. These areas were selected because that is where the majority of farmers under contract farming with Freshmark lived.

3.3 Data and Sample size

The type of data used in the study was primary data. The data was collected through personal interviews using structured questionnaires. The data collected focused on the household characteristics associated with participation in a contract farming scheme, the impact of contract participation on gross margins and the benefits and constraints of contract farming. This data was collected through personal interviews with the farmers using structured questionnaires as a guide.

The sampling unit was a farmer under contract farming with Freshmark and a sample size of 49 farmers where randomly selected. A control group of an equal number of farmers who supplied to local markets was also purposively selected bringing the total of the sample size to 98 farmers.

3.4 Sampling Procedure

The sample size for contracted farmers was determined using the formula:

$N=t^2*p\ (1-p)/e^2$

Where;

N=sample size

P=probability of participation

t=critical value

e=margin of error of confidence level expressed as a percentage.

The sample size of contracted farmers obtained was 49 farmers.

For the non-contracted farmers, due to lack of a list of names of farmers in the areas, a purposive sample of 49 farmers was used to act a comparison group.

3.5 Methods

To achieve the first object of determing the gross margins, information on the yields of the vegetables was obtained together with the average prices through structured questionnaires. This gave the total revenue. Information of variable costs was also obtained. The difference between the two gave the gross margins.

To identify the factors that determine the probability of a farmer participating in contract farming with Freshmark, a probit model was used.

The model took the form as below;

$$Y^*=\beta o+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+\beta_6X_6+\beta_7X_7+\beta_8X_8+\beta_9X_9+\beta_{10}X_{10}+\beta_{11}X_{11}+\beta_{12}X_{12}+\beta_{13}X_{13}+\beta_{14}X_{14}+\beta_{15}X_{15}+\mu i.$$

Y^*= participation in FFV contract farming

X_1= Age of farmer

X_2= Gender of famer

X_3= highest education level obtained by the farmer

X_4=Number of years in farming (experience)

X_5=Size of the farm

X_6= Access to credit

X_7= Size of last loan obtained

X_8= off- farm income

X_9= Marital Status

X_{10}= Type of land tenure system

X_{11}= Availability of Irrigation water

X_{12}= Irrigation equipment

X_{13}=Distance of farm from town

X_{14}= ownership of vehicle

X_{15}= Cooperative member

3.6 Data Analysis

Field data was analyzed in SPSS to obtain descriptive statistics. A Variance Inflation Factor scores (VIFs) test was done to test for multicollinearity which was not found to be present as the average VIF value was less than 10.A hettest was also done to test for heteroskedasticity which was not found to be significant at any level. An OV test was also conducted to check for omitted variables and there were no omitted variables.

The probit model was then run in stata to determine the factors that affected farmer participation in contract farming.

3.7 limitations of the study

A sample of 98 farmers was supposed to be interviewed. But out of the 49 farmers contracted with Freshmark, only 44 of them where interviewed. This is because some farmers chose to answer the questionnaires at their own time and they never returned them. For non-contracted, only 47 farmers were interviewed due to resource constraint

CHAPTER FOUR

STUDY FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the results and discussion of the study. It begins with a comparison of the demographic factors between contracted farmers and non-contracted farmers, it then further goes on to calculate the difference in gross margins between the two groups and gives a presentation of the probit model results. The chapter ends by looking at the benefits and constraints of contract farming.

4.2 Demographic characteristics of the farmers

Age of the farmers

Table 1 below shows the distribution of age between farmers supplying Freshmark and those supplying traditional markets. As seen below, 2.3% of the Freshmark farmers were aged between 20-29years, 29.5% were aged between 30-39years, 36.4% were aged between 40-49years, 22.7% were aged between 50-59years and 9.1% were aged above 60years. For those supplying to traditional markets, 19.1% were aged between 20-29years, 20.9% were aged between 30-39years, 45.1% were aged between 40-49years, 22.0% were between 50-59years and the remaining 6.6% were aged above 60years. Chi – square tests was conducted to assess if there was any significant difference between Freshmark supply-channel and traditional-channel farmers with respect to their age and the results were not significant at 95% confidence level as the chi-square value=6.930 and the p value=1.140

Table 1: farmer's age in years

Farmer's age in years	participates in contract farming		Total
	Yes	No	
20-29	1 (2.3%)	4 (19.1%)	5 (5.5%)
30-39	13 (29.5%)	6 (12.8%)	19 (20.4%)
40-49	16 (36.4%)	25 (53.2%)	41 (45.1%)
50-59	10 (22.7%)	10 (21.3%)	20 (22.0%)
>60years	4 (9.1%)	2 (4.3%)	6 (6.6%)
Total	**44**	**47**	**91**

Chi-square=6.930 p=1.140

Source: Own survey data (2013)

Farm activities are greatly affected by age. Most supermarkets farmers are relatively young hence wanted to do farming as a business other than for subsistence. They also tend to be innovative entrepreneurial farmers who produced in response to the supermarket demands (Kamau, 2008).

Farmers Education Level

The majority of the farmers who participated in contract farming with Freshmark reached secondary level education as indicated in table 2. These were about 70.5%. This means that most of the Freshmark contracted farmers were elite and more informed. These farmers have the ability to negotiate contracts and also tend to understand the requirements of the contracts. Higher education also means more information on potential sources of credit for investment in farming and better management of credit facilities. Hassine (2008) focused on the agricultural sector and found strong evidence that the level of education affects agricultural productivity

growth by increasing the capacity to adopt foreign technologies. The chi- square test was also conducted and education was found to be a significant factor in contract farming with a chi-square value of 15.206 and a p value=0.002 as shown in table 2.

Table 2: farmer's highest level of formal education attained

Farmers highest level of education obtained		participates in contract farming		
		Yes	No	Total
	no formal education	1 (2.3%)	4 (8.5%)	5 (5.5%)
	Primary	4 (9.1%)	19 (40.4%)	23 (25.3%)
	Secondary	31 (70.5%)	20 (45.5%)	51 (56.0%)
	Tertiary	8 (18.2%)	4 (8.5%)	12 (13.2%)
Total		**44**	**47**	**91**

Chi-Square=15.206 P=0.002
Source: Own survey data (2013)

Experience of farmer in farming

It was found that most farmers who participated in contract farming with Freshmark had been farming for about five to ten years. These represented 45.5% as seen in table 3. The majority of farmers who supplied to traditional markets, about 38.3%, had been in the farming business for over 15years. The chi=square value was found to be 9.281 while p value was found to be 0.02, which showed that farming experience is statistically significant in determining farmer participation in contract farming.

Table 3: Farmer's farming experience in years

Farmers Experience in years		Participates in Contract Farming		
		Yes	No	Total
	less than 5 years	9 (20.5%)	4 (8.5%)	13 (14.3%)
	between 5 and 10 years	20 (45.5%)	12 (25.5%)	32 (35.1%)
	between 10 and 15 years	7 (15.9%)	13 (27.6%)	20 (22.0%)
	more than 15 years	8 (18.1%)	18 (38.3%)	26 (28.6%)
Total		**44**	**47**	**91**

Chi-square=9.481 p=0.02

Source: Own survey data (2013)

Distance of farm from town

The majority of farmers who participated in contract farming with Freshmark lived about 10-19km away from farm while the majority of those who supplied to traditional markets lived about 20-29km away from town as shown in table 4 below.

The assumption made here is that those farmers living near town can easier access Freshmark compared to those living far away and hence those living near have low transport costs.

Table 4: Distance of farm from town in kilometers

Distance of farm from town	Participates in Contract Farming		Total
	Yes	No	
<10	2 (4.5%)	0 (0.0%)	2 (2.2%)
10-19	23 (52.3%)	15 (31.9%)	38 (41.8%)
20-29	12 (27.3%)	16 (34.0%)	28 (59.6%)
30-39	6 (13.6%)	11 (23.4%)	17 (18.7%)
40-50	1 (2.3%)	2 (4.3%)	3 (3.3%0
>50	0 (0.0%)	3 (6.4%)	3 (3.3%)
Total	**44**	**47**	**91**

Source: Own survey data (2013)

Membership to a farmer group

Farmer groups are organized around commodity crops and involve production and marketing (Nguthi, 2007). In table 5 below, 61.4% of farmers participating in contract farming belonged to a cooperative.

Table 5: Member of farmer group

	Participates in Contract Farming		
	Yes	**No**	**Total**
Do you belong to a Cooperative **Yes**	27 (61.4%)	9 (19.1%)	36 (39.6%)
No	17 (38.6%)	38 (80.9)	55 (60.4%)
Total	**44**	**47**	**91**

Source: Own survey data (2013)

Ownership of an irrigation system

As seen from table 6 below, it is evident that all farmers contracted to Freshmark own an irrigation system. About 56.8% owned sprinklers, 22, 7% owned pumps, 13.6% owned drips and about 6.8% owned buckets. Given the harsh Zambian climate and the need for FFV consistently, this is expected. Those farmers who do not own any irrigation system tend to produce field crops like maize because they rely on rains. Such farmers therefore, cannot supply supermarkets because of their erratic production.

Table 6: Irrigation system owned

Type of Irrigation system		Participates in Contract Farming		
		Yes	No	Total
	Bucket	3 (6.8%)	17 (36.2%)	20 (21.9%)
	Pump	10 (22.7%)	14 (29.8%)	24 (26.4%)
	Sprinkler	25 (56.8%)	11 (23.4%)	36 (39.6%)
	Drip	6 (13.6%)	1 (2.1%)	7 (7.7%)
	None	0 (0.0%)	4 (8.5%0	4 (4.4%)
Total		**44**	**47**	**91**

Source: Own survey data (2013)

4.3 Determination of Gross margin

Gross margin is the difference between the total revenue and the total variable cost. Total revenue is found by multiplying the total yield of crops obtained by the prices of the crops. It was important to calculate the gross margins in order to assess if contract farming increases the revenues of the farmer.

To compare the gross margins, three vegetables were considered. These included; Rape, Pumpkin leaves and Chinnese cabbage. These vegetables were selected because they were the ones that were common for both contracted and non-contracted farmers.

Gross margin was found as shown in table 7 below. Note that the amounts indicated for the expenses are the summation of the expenses for the three crops. This is because the questionnaire was designed in a way that the input costs were being obtained as total input costs for all crops not individual crops.

Table 7: Calculation of Gross margin for 2012

	PARTICIPANTS		NON PARTICIPANTS	
	AMOUNT	**COST**	**AMOUNT**	**COST**
RAPE				
Yield	2456 bunches		1560bunches	
Price		K 2/bunch		K 1/bunch
Total		K4912		K1560
CHINNESE				
Yield	2000bunches		2500bunches	
Price		K 2/bunch		K 1/bunch
Total		K4000		K2500
CHIBWABWA				
Yield	2150bunches		3150bunches	
Price		K 1.50/bunch		K 0.75/bunch
Total		K 3225		K2362.5
REVENUE		**K12,137**		**K6,422.5**
EXPENSES				
Seed		K 429		K 324
Fertilizer		K1900		K 645
Pesticides		K 540		K 120
Labour		K1475		K 575
Transport		K 960		K1000
Total Expenses		**K5304**		**K2663**
GROSS MARGIN		**K6, 833 (56.3%)**		**K3, 759.5 (58.5%)**

Source: Own survey data (2013)

As seen in table 7, total revenue of farmers contracted with Freshmark was found to be K12, 137. This was higher than the total revenue of farmers who supplied to traditional markets-K6, 422.5. The total expenses for the contracted farmers was found to be K5, 304 will that of the farmers supplying to traditional markets was K2, 663. It can be seen that the total expenses for contracted farmers was higher than that of the non-contracted farmers. This is because for contracted farmers, to produce high quality produce consistently, they require high quality seeds, more labour, more fertilizer and more chemicals than farmers supplying to traditional markets. Contracted farmers are thus more quality conscious than non-contracted farmers.

Despite having high expense cost, gross margin of farmers supplying to Freshmark was found to be higher (K6, 833) than that of farmers supplying to traditional markets (K3, 759.5).But when you compare the gross margin as a percentage of the total revenue, the gross margin as a percentage of total revenue for contracted farmers is 56.3% while that of non-contracted farmers is 58.5%. Despite the percentage for contracted farmers being low, their gross margin is still higher than that of non-contracted farmers because their revenues the revenues of contracted farmers are higher.

Therefore, contract farming increasing the gross margins of small scale farmers.

4.4 Discussion on the results of the Probit Model

Table 12 presents the maximum likelihood estimates and the marginal effects from the probit regression. Among all the exogenous variables considered, age, gender, house hold income, farming experience, membership to a cooperative and ownership of a vehicle significantly influenced the probability of participation in FFV contract farming at 95% percent confidence level.

Gender, age and membership to a cooperative were found to be significant at $p<0.1$. Gender had a p value equal to 0.061, age had a p value equal to 0.067 and membership to a cooperative had a p value equal to 0.073. Farming experience had a p value less than 0.05. Its p value was found to

be 0.04. Ownership of a vehicle and house hold income both had p values= 0.000. This means that the two factors were significant at $p<0.001$ as shown in table 8.

Table 8: Probit Regression Parameter Estimates for the factors affecting farmer participation in the FFV contract farming with Freshmark.

VARIABLES	PARTICIPATION.	P-VALUES
Gender	0.141* (0.0755)	0.061
Education	0.0920 (0.0808)	0.255
Age	0.0697* (0.0381)	0.067
House hold income	0.0112*** (0.0003)	0.000
Marital Status	-0.0402 (0.0364)	0.270
Land tenure	-0.0932 (0.0614)	0.129
Farm size	-0.00610 (0.0353)	0.863
Farming Experience	-0.0814** (0.0402)	0.043
Credit	-0.00885 (0.232)	0.970
Loan size	0.0394 (0.116)	0.734
Distance	-0.0205 (0.0318)	0.519
Irrigation equipment	0.0272 (0.0323)	0.399
Transport	0.0846 (0.0936)	0.366
Cooperative Member	-0.133* (0.0742)	0.073
Ownership of Vehicle	0.195*** (0.0553)	0.000
Observations	**91**	

Standard errors in parentheses
***** p<0.01, ** p<0.05, * p<0.1**

Gender has a positive marginal effect value of 0.141. This implies that a male farmer has 14% chance of participating in contract farming as opposed to a female.

Age of the farmer also had a positive marginal effect value of 0.0697. This means that increasing the age of the farmer by 1 year will increase the chances of participating in contract farming by 0.6%.

Household income also positively and significantly influences the decision to participate in FFV contract farming with Freshmark as shown by the marginal effect value of 0.0112. A percentage increase in the household income of a farmer will increase the likelihood of the farmer to participate in contract farming by 1 percent, other things constant. These findings suggest that farmer's financial endowment increases the probability of participating in contract farming. The finding that households with higher levels financial endowments are more likely to participate in contract farming than their counterparts suggests that contract farming can exclude poor farmers. Therefore, we fail to reject the hypothesis H4 which stated that farmers with higher household incomes are more likely to participate in contract farming,

Farming experience had a negative marginal effect value of 0.0814. This means that a 1 unit change in farming experience leads to a decline in the probability of a farmer to participate in contract farming by 0.8%. This is contrary to what was expected. Hypothesis H5 stated that farmers who had been farming for a long time would be more likely to participate in contract farming. But since this is not the case, we reject H5.

Membership by the farmers to a cooperative was found to be negatively related to participation in FFV at 10% level of significant with a marginal effect of 0.133. This result is contrary to the expected result. It is documented that farmer cooperation may mitigate the problem of low volumes of produce required by supermarkets and give them power to negotiate better. Since this is not the case, we reject hypotheses H3 which stated that belonging to a cooperative increased the likelihood of a farmer to participate in FFV contract farming with Freshmark. The cooperatives though, are helping farmers to access inputs and market information on prevailing market prices.

Ownership of a vehicle had a positive marginal effect of 0.195. This means that owning a vehicle will increase the probability of a farmer in participating in contract farming by 19%. Thus we fail to reject the hypothesis H2.

4.5 Benefits and constraints of contracting with Freshmark.

When asked about the benefits and constraints that the farmers participating in contract farming with Freshmark faced, they gave the following;

Benefits

- Offers a good reliable market .this security increases farmer's motivation to work harder and give an incentive for investments.
- Better prices compared to traditional markets. The contracts often fixes a price for a relatively long period, which means that in times of oversupply, the guaranteed contract price are higher than the one in the open market.
- All seasoned buyers.
- Mode of payment makes saving easy and gives room to plan. Freshmark pays the farmers straight into the bank account every two weeks.
- Helps one improve on quality of products. Being contracted with Freshmark helps farmers to improve the quality of their products. This is because Freshmark provides farmers with quality guides to follow when growing the products.
- Increases commitment to your work on the farm.

Constraints

- Meeting the desired quantities and qualities is a challenge. Supplying to Freshmark means that one has to produce quality products in right quantities consistently.
- Prices though good are rigid. Farmers complained that it was very difficult to negotiate the prices and they were times when the prices were changed without famers' knowledge.
- Wastage when over production takes place. Farmers are given required quantities to supply hence if a farmer produces more than enough, one has to sell to local market or feed it to livestock.

CHAPTER FIVE
CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter presents the conclusion and the recommendations of the study based on the findings and interpretations of the study.

5.2 Conclusion

This study was designed to assess the performance of small scale farmers who supply fresh fruits and vegetables to supermarkets in Zambia.To do this, the gross margins of the farmers participating in contract farming were determined and the factors influencing farmer participation in contract farming were also determined. The study also looked at some of the benefits and constraints of contracting with Freshmark.

The gross margin of the farmers supplying to Freshmark was found to be higher than that of the farmers supplying to traditional markets. This is because farmers supplying to Freshmark had higher yields due to improved farming practices and the also received better prices for their produce compared to those farmers supplying to traditional markets. Hence the first objective was achieved.

The probit analysis was employed to analyze and discuss the financial, human and physical factors that influenced farmer participation in contract farming. Of all the factors studied, the ones that were found to be statistically significant were gender of farmer, age of the farmer, household income, farmer's years of experience in farming, membership to a cooperative and the ownership of a vehicle.

The study showed that farmer experience and membership to a cooperative had a negative effect on explaining participation of farmers in FFV contract farming. Farmer's gender, age, household

income and ownership of vehicle had a positive effect on participation of farmers in FFV contract farming.

Hence the second objective of determing the factors that affect farmer's participation in contract farming was achieved.

The benefits and constraints of contract farming were also assessed and it was found that they were more benefits in participating in contract farming than there are constraints.

5.3 Recommendation

Increasing the number of farmers who participate in contract farming can lead to increased outputs in the agricultural sector and improvements in incomes of farmers. Therefore, farmers must be educated on the benefits of FFV contract farming. This will encourage most of the small scale farmers to take part in contract farming.

Farmers must also be provided with incentives by supermarkets that would encourage them to participate in contract farming. These incentives would include providing farmers with inputs such as seed and fertilizers. Freshmark does not provide any incentives to contracted farmers. This discourages some of the farmers from participating in contract farming

.

The contract agreements between small-scale farmers and Freshmark to supply fresh produce are largely only verbal agreements. Written contracts only apply in the case of processed products and for large-scale farmers. The danger with the verbal agreement is that these agreements are not always honored creating some mistrust between small-scale farmers and Freshmark. It quite often happens that there is excess supply to the Freshmark depot resulting in them not being able to purchase the produce and thus forcing the farmers to make alternative marketing arrangements at short notice such as selling at the Soweto market where the produce may fetch much lower prices. Hence Freshmark must introduce written contracts.

Therefore, more small-scale producers could be helped to enter into contract farming but structures for enforcement of these contracts need to be improved.

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APPENDICES

Appendix 1

Questionnaire serial number:

Assessment of performance of contractual arrangements between fresh fruits and vegetable (FFV) small scale farmers and the supermarkets.

Department of Agricultural Economics and Extension Studies

The University of Zambia - Lusaka

This questionnaire is for academic purpose only. Be rest assured that all the information you provide will be treated as private and confidential as possible. Feel free to answer all the questions honestly. Your cooperation in this regard will be highly appreciated.

Instructions: Please tick in the boxes provided, circle where appropriate and write in the blank spaces provided.

Background information

1. Area of farm location.....
2. District.....
3. Age.....
4. Nationality.....
5. Sex of respondent
   a) Male ☐
   b) Female ☐
6. Marital status
   a) Married ☐
   b) Single ☐
   c) Divorced ☐
   d) widowed ☐
7. Highest education level attained
   a) No education ☐
   b) Primary ☐
   c) secondary ☐
   d) tertiary ☐
8. Please indicate your occupation.....

9. What is your household annual income (ZMK –rebased figures).....

Farm characteristics

10. Type of land tenure system
    a) owned ☐
    b) Customary ☐
    c) leasehold ☐

11. Total acreage of farm.....
12. Distance of farm from town (km) .....
13. General farming experience in years
    (a) < 5years
    (b) 5 – 10 years
    (c) 10 -15 years
    (d) > 15 years
14. What fresh fruits and vegetable (FFV) crops do you currently grow (circle all that apply)

		Yes	No
a.	Broccoli	1	0
b.	Cabbage	1	0
c.	Cauliflower	1	0
d.	Carrots	1	0
e.	Chinese cabbage	1	0
f.	Egg plants	1	0
g.	Lettuce	1	0
h.	Rape	1	0
i.	Tomatoes	1	0

Others (specify) .....

15. What is the current area cultivated with FFV (acres).....
16. What is the approximate yield of FFV per growing season?

FFV	Yield
Broccoli	
Cabbage	
Cauliflower	
Carrots	
Chinese cabbage	
Eggplant	
Lettuce	
Rape	
Tomatoes	

Other (specify).....

17. Do you have any access to credit (e.g. loans)?
    Yes ☐
    No ☐
18. If yes, who provides you with credit?
    a. Microfinance institution
    b. Cooperatives/association
    c. Bank
    d. Supermarket

    Others (specify).....

19. What was your last loan size?
    a. <ZMK 5 thousand
    b. ZMK 5- 10 thousand
    c. > ZMK 10 thousand

Marketing of produce

20. Where do you sell your FFV?
    a. Supermarket ☐
    b. Traders ☐
    c. Traditional markets ☐
21. At how much do you sell the FFV?

FFV	Quantity (kg)	Price(ZMK – rebased figures)
Broccoli		
Cabbage		
Cauliflower		
Carrots		
Chinese cabbage		
Egg plant		
Lettuce		
Rape		
Tomatoes		

Others (specify).....

.....

22. How often do you supply to the supermarkets/market
    a. Daily
    b. Weekly
    c. Fortnightly
    d. Monthly

Others (specify).....

23. How do you deliver produce to the supermarket/market?
    a. Self transport
    b. Supermarket picks them up
    c. Through traders
    d. Through farmers group

Others (specify).....

24. Do you own a vehicle
    a. Yes
    b. No
25. If self, what means of transport do you use to deliver your product to the supermarket/market/
    a. Own vehicle
    b. Hired vehicle
    c. Public transport

Others (specify).....

26. What is your approximate transport cost (ZMK - rebased).....
27. What amount of inputs did you use last growing season?

Input	Amount	Price (ZMK)
Labour		
Fertilizer(kg/ha)		
Seed(kg/ha)		
Pesticides		

Other(specify).....
.....
.....

28. Do you belong to a cooperative?
    a. Yes
    b. No
29. Do you own an irrigation equipment
    a. Yes
    b. No
30. If yes to question 29, what irrigation equipment do you own?
    a. Bucket
    b. Sprinkler
    c. Pump
    d. Drip
    e. None

If contracted to supermarket

31. Which supermarket(s) do you supply produce to?

Name of supermarket	Produce (FFV) supplied	Quantity	Maximum Price	Minimum price

32. When did you start supplying to the supermarket mentioned above?
33. Why did you choose that supermarket?

a.
b.
c.
d.
e.

34. What are the terms and conditions of the contract?

35. Are you happy with the contract?
36. If no to question 30, why not?

37. What is the duration of the contract? .....
38. What is the frequency of payment?
    i) Weekly
    ii) Fortnightly
    iii) Monthly

Others (specify).....

39. What are the benefits of producing to supermarkets
    i)
    ii)
    iii)
    iv)
    v)
    vi)
    vii)

viii)

40. What are the challenges of producing to supermarkets?
    i)
    ii)
    iii)
    iv)
    v)
    vi)
    vii)
    viii)
41. What happens to the produce that is rejected?

42. What is the total income earned from sell of FFV?
43. Given a choice, would you prefer to sell your FFV elsewhere?
44. What do you think government has done to improve marketing of FFV?

45. Any other information you would like to share concerning FFV

End – Thank you for your cooperation