

**FACTORS AFFECTING PROFITABILITY OF SMALLHOLDER ONION
PRODUCTION IN ZAMBIA'S CHONGWE
DISTRICT**

**A Research Report presented to the Department of Agricultural Economics and Extension
of the University of Zambia.**

BY

JACK K. CHIPILI

**In Partial Fulfillment of the Requirements for the Degree of Bachelor of Agricultural
Sciences**

© Jack K. Chipili, 2012

ACKNOWLEDGEMENT

First and foremost I want to thank God Almighty for enabling me to pursue a B.Sc. in Agriculture Science with a major in Agricultural Economics. I therefore want to acknowledge the following parties;

Mrs. Ngcobo my supervisor her unprecedented support rendered to me during consultations as my supervisor

The members of staff in the Department of Agricultural Economics and Extension, especially Dr. Kalinda who also provided me with sound advice and direction in my research work.

I would also want to sincerely thank my family members for their encouragement, moral and financial support.

Finally, I want to thank all my friends and classmates for the sincere help they offered to me when I needed them and for making my stay at campus worthwhile.

TABLE OF CONTENTS

ACKNOWLEDGEMENT i

LIST OF TABLES iv

LIST OF ACRONYMS..... v

ABSTRACT..... vi

CHAPTER ONE- INTRODUCTION..... 1

 1.1Background..... 1

 1.2 Problem Statement..... 2

 1.3 General Objective 3

 1.4 Specific Objectives 3

 1.5 Rationale..... 4

CHAPTER TWO- LITERATURE REVIEW 5

 2.1 Introduction 5

 2.2 Definition of Key terms.....5

 2.3Known Findings.....6

 2.4 Conceptual Framework.....10

CHAPTER THREE-METHODS AND PROCEDURES 12

 3.1 Introduction 12

 3.2 Area of Study..... 12

 3.3 Sampling Procedure..... 12

 3.4 Sample Size 12

 3.5 Data Collection..... 12

 3.6 Data Analysis..... 13

CHAPTER FOUR-RESULTS AND DISCUSSION 14

 4.1 Introduction 14

 4.2 Regression Model Results 14

 4.3 Coefficient of Variation.....17

 4.4 F-test and its Significance.....17

CHAPTER FIVE -CONCLUSION AND RECOMMENDATIONS 18

5.1 Introduction 18

5.2 Conclusion..... 18

5.3 Recommendations 18

REFERENCES..... 20

APPENDICES..... 22

APPENDIX I: QUESTIONNAIRE 22

LIST OF TABLES

Table 1: Statistical Results of Constants and Coefficients.....	15
Table 2: Best of Fit Summary.....	16
Table 3: ANOVA Results from SPSS.....	17

LIST OF ACRONYMS

CSO	Central Statistics Offices
FSRP	Farming System Research Programme
GRZ	General Republic of Zambia
FNDP	Fifth National Development Plan
MDG	Millennium Development Goal
AMICO	Agriculture Marketing Information Center
USAID	United States Agency for International Development

ABSTRACT

Factors Affecting Profitability of Smallholder Onion Production in Zambia's Chongwe District

Jack K. Chipili
The University of Zambia, 2012

Supervisor:
Mrs.M.Ngcobo

The continued reliance on onion has contributed to income generation among smallholder farmers. This study was carried out in Chongwe district, aimed at determining the factors that affect profitability of onion production in Zambia's Chongwe district. The objectives of the study were to identify the factors that affect onion profitability, determine the extent to which these identified factors influence onion production among small scale farmers. The structured questionnaire was the primary instrument used for data collection with a sample size of 67.

The study revealed several factors that affect profitability of onion production, Identified ones as being significant at 95% confidence level in explaining onion profitability in Lusaka's Chongwe District were education level (P-value=0.028), farm size (P-value=0.031), seed varieties (P-value=0.026), and household size (P-value=0.008). Increase in Education level, farm size and household size positively adds to profitability while seed varieties impacts negatively to profitability.

In light of the results it would be recommend that farmers should consider expanding farm size to increase capital base, business size, and efficiency in order to increase income generation capacity for their farming business. Further, government and the private sector should help farmers with the necessary facilities required to increase the profit and marketability of farm produce.

Farmers need intervention policies from the government that would assure them producer floor prices or higher farm gate prices to avoid risks of losses that might arise as a result of high onion supply, considering that besides domestic production, Lusaka receives 60% of its onion from imports. This is in line with the fact that farm yield increases with farm size.

CHAPTER ONE

INTRODUCTION

1.1 Background

Onion (*Allium cepa*) belongs to the lily family, the same family as garlic, leeks, chives, scallions and shallots. There are over 600 species of *Allium*, distributed all over Europe, North America, Northern Africa and Asia. The plants can be used as ornamentals, vegetables, spices, or as medicine. There are over 120 different documented uses of the *Alliums*. While various studies have been undertaken to study onion production, this study focuses on the profitability of onion in Zambia. The general objective of this study is to determine the profitability of onion. The result of this study will add to the existing literature knowledge of the body of agricultural economics.

Onion is the second most important crops after tomato. Onion and other *Allium* vegetables are characterized by their rich content of thiosulfinates, sulfides, sulfoxides, and other odoriferous sulfur compounds. The cysteine sulfoxides are primarily responsible for the onion flavor and produce the eye irritating compounds that induce lacrimation. The thiosulfinates exhibit antimicrobial properties. Onion is effective against many bacteria including *Bacillus subtilis*, *Salmonella*, and *E. coli*. Onion is not as potent as garlic since the sulfur compounds in onion are only about one-quarter the level found in garlic.

Onion is increasingly playing a major role in improving farmers' livelihood. In addition to their contribution to food and nutritional security the crop is somehow a source of income for smallholder farmers. Thus onion has the potential to contribute substantially to health, income creation, food security and agricultural sustainability of less developed countries.

Onion is commonly grown in many African counties such as Malawi, Tanzania, South Africa, Zambia etc. Some of these countries have high incidences of poverty, for example Zambia has poverty levels of 73% (CSO). Farmers in these countries are able to produce onion due to their adaptability to marginal production agro-ecologies and relatively high market value. Onion is

extensively cultivated by semi smallholder famers for household food security. It's vital to undertake studies on onion because increasing knowledge about this crop will not only address issues mentioned above but will also lead to development of sustainable value chain which is important in sustaining firms and industrial competitiveness.

The main grower of onion in Zambia is the semi smallholder famers, who mainly grow these crops as food security crops rather than cash crop. It is common for gender to play a role in the types of crops grown in different communities in Zambia. Cash crops are to the larger extent grown by male farmers while food security crops such as onion are grown by female farmers. As a result the income levels tend to be higher for men than women. (Unit District Planning), onion is grown in most of the Zambia's provinces. This presents an opportunity for Zambian farmers to exploit the market by increasing its production. The characteristics of the different onion markets channels reflect that most of the onion (58%) is imported. Within local areas, onion is supplied mostly by medium (27%) followed by small (14%) and then large farm areas (2%). Onion from the small farm areas is predominantly supplied through traders (13% compared to 0.7% for direct farmer sales). This is not the case for medium and large farm areas. The share of direct farmer sales in the medium farm areas is also higher but the difference is not as much as in the large farm areas. The weighted price obtained by traders is higher than that obtained by farmers for onion from all the local farm area. Investment need to be stimulated to enhance onion production. This will enhance capacities of actors in its distributions' which will lead to response to market demand and effective participation in domestic, regional and international market. One of the factors that should be considered in onion production to commercial production is profitability. Profitability is a major incentive for any enterprise to be considered. To remain competitive farmers have to be able to identify onion profitability enterprises. However in Zambia it has been quite difficult to assess the profitability of onion mainly due to the fact that information required is scarce and sparse leading to inadequate baseline data and information. Farmer may also lack the knowledge and skills they require to keep good records.

1.2 Problem Statement

Most research on crops has focused on the crop yield enhancement through breeding, improving varieties, increasing productivity, disease tolerance, soil management and other agronomics

properties (Tenywa, 1999). However, other important factors of influence concerning onion production includes profitability, production efficiency, market dynamics and consumer preference e.t.c. of these factors profitability of crops in particular onion seem to have been neglected in terms of researches and have received little attention. The profitability of onion production may be affected by many factors that needs to be identified under local condition, this would as well help to explain why Lusaka keep importing onion despite it having a higher domestic production of onion, secondary data from the (FSRP, 2010), reveals that Lusaka draws nearly 60% of its onion production from imports, with half of this coming from Johannesburg, about 1,200 km away. A number of factors have been outlined as causes of this disparity but there is no certainty on whether these factors affect the profitability of onion production by small scale farmers, other factors that affect profitability also needed to be investigated on smallholder onion producers, furthermore there was need to identify these factors and see whether their effect contributes positively or negatively to onion production in Zambia. However it is not clear as to whether factors such as home consumption, methods of production, and whether the farmer produces to sell or produces for home consumption that prove to have a substantial effect on onion production in other countries also could be among factors that would affect onion production in Zambia.

1.3 General Objective

The overall objective of this study is to determine factors that affect profitability of onion production

1.4 Specific Objectives

To identify factors that affect profitability of onion production.

To determine how profitability factors contributes to profit.

1.5 Rationale

Traditional crops have become an important source of income to Zambia in the recent past. The various governments that have existed since the collapse of copper prices in the 1970's have focused on agriculture diversification. This has been so due to the Governments' realization of the strong linkages that exist between agriculture and poor people's livelihoods. However, a number of factors affect the ability of small-scale farmers to increase production and improve their livelihoods. The small-scale agriculture sector would potentially impact poverty reduction and national economic growth besides addressing health issues such as cancer, blood pressure, blood lipids, as well as medicinal effect only if sufficient numbers of the rural poor are actually able to address such factors that negatively affect yield.

The Government of the Republic of Zambia (GRZ) has put in place policies and strategies to promote the development of efficient and transparent public and private sector driven marketing systems for agricultural commodities and inputs. One of the strategies includes encouraging the establishment of cooperatives in rural areas and promoting crops for both export and domestic markets (FNDP, 2004). To successfully solve the problem of profitability in onion production, knowledge of the factors that affect farmer's onion production is required. This study generated knowledge that can help farmer address issues that arises during onion production. This knowledge further helps provide insight into the reasons why some smallholder onion farmers may incur losses.

The Zambian Government is party to the Millennium Development Goals (MDG's) agreement that acts as a coherent frame of action aimed at achieving global development. Policies have been put in place to meet the set goals. The smallholder farming arrangement is one initiative that contributes to meeting goal number one; to eradicate extreme hunger and poverty by 2015. This research aims at finding out how some factors affects farm level production.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

With the high poverty levels that affect smallholder farmers, there is need for farmers to make use of the country's favorable climate for vegetable production in particular onion so as to empower themselves economically. Onion production in many areas has proved to be important employment creators for disadvantaged groups in society, particularly the youth and women (Lorenz *et al*, 1988). Additionally, the fact that growers are assured of a ready market for produce should be a motivation for them to diversify into the production of crops such as onion. Onion as a Vegetable may be produced for the export market, the fresh market or for consumption at home (Downey, 1981).

2.2 Definition of Key Terms

Smallholder agricultural producers are considered as poor farmers who use simple technologies (hand hoes and oxen) and cultivation practices to produce rain-fed as well as irrigated vegetables in particular onion, mostly both for own consumption and for sale basically on five hectares or less. Zambian smallholder farmers are a heterogeneous group of farmers with various degrees of commercialization potential. Other features of smallholders are Asset composition, human and social capital characteristics, farm household characteristics, spatial characteristics such as agro ecological zones, access to roads, infrastructure, market access and proximity to population centers. Given these characteristics, some smallholder farmers are better positioned to become commercialized than others given that their characteristics affect their liquidity position and ultimately the farm level production (Byamugisha et al, 2007). On the other hand profit is defined as "an increase in the net worth through time and is measured by the amount of what is increased" according to (Omary, 1978). Using this definition, an increase in net worth in terms of onion results in an increase in onion production.

2.3 Known Findings

Onion has been highlighted in marketing channel analysis of vegetable such as rape, onion and tomato; most basic finding is that these vegetables are a quantitatively important component of urban diets in Zambia. The top three staple vegetables - tomato, rape, and onion - account for a higher share of consumer expenditure (9.1%) than any food group other than cereals, staples, meat, eggs, and account for two-thirds of all vegetable consumption. Expenditure on all vegetables is four times that on fruit. While the share of expenditure, previous work (Hichaambwa *et al*, 2006) has shown that fresh produce marketing at farm level is highly concentrated, with 3% of farmers in 2004 accounting for 75% of all sales in the country. This paper reinforces this finding: the top three areas supply tomato, for example, accounting for over a third of total supply, had median lot sizes of 2.5 to nearly 4 metric tons. Very few farmers in Zambia are able to finance the inputs, labor, and transport needed to produce and bring such quantities to market in a timely fashion several times over production cycle. Another finding is that rural-urban market linkages, including regional linkages, are central to the availability and cost of these staple vegetables. At least 98% of the value of consumed tomato, rape, and onion was purchased in markets, not produced and then consumed from small urban plots. Furthermore, with the partial exception of rape, the vast majority of the production of these vegetables took place in rural areas, not urban: peri-urban agriculture plays some role for rape, but little if any role for tomato and onion. Over half of onion (but none of the tomato) reaching Lusaka is imported from the region, not produced within Zambia.

The traditional marketing system plays a dominant role in vegetable marketing, and Soweto wholesale market is at the center of this system. Of the tomato, rape, and onion purchased by Lusaka consumers, over 90% comes from open air markets or the ka sector. While supermarkets are present and growing, and while their market share may begin to grow more rapidly at some point, the traditional marketing system will remain dominant for many years to come, and its performance will thus have an important impact on consumer welfare. Our fifth finding is that, while marketing channels are short, gross marketing margins are high. Of produce originating in Zambia and consumed in fresh form, less than 40% of tomato passes through traders before reaching a wholesale market, none of the rape does so, and one-third of onion does so From

consumers' homes (onion, tomato, and to a lesser extent rape), and retail traders of rape arbitraging between buying at Soweto and buying from nearby plots. Yet even with these stabilizing mechanisms, wholesale prices are highly variable. (FSRP working paper No. 46 June, 2006). There might have been greater returns to scale for the business. Neither experience nor education is a strong predictor of profitability. In summary, onion vending is a profitable business, and greater marginal profits could be achieved by enlarging the scale of operation in this study the profitability of vendors was determined. However the study did not determine the profitability of farmers who produce and supply the onion. The fact that onion consumption is high implies that onion has high demand. This study implied that onion is profitable but did not assess its profitability directly. Further, the study identified ways to improve record keeping studies to reduce the cost of future data collection. The analysis showed that among the sample of farmers included in the record keeping survey. Studies conducted in analyzing the market participation and volume of sale in different crops.(Abay *et al*,2005 and 2006) studied the market participation of vegetables and pepper marketing at Fogera and Siltie Zone respectively. Their studies indicate that both where used Heckman two step model t identifying the factors that affect the market participation and volume of sales. The results show that distance from main road, frequency of extension contact and number of oxen were found significant, for onion while experience of the farmers and distance from road were significant for tomato. The identified variables found in pepper marketing study were pepper production, crop yield of the households and extension contacts. Similarly, (Makhura, 2001) determined the effect of transaction costs on market participation in the four commodities horticulture, livestock, maize and other field crops in South Africa. He estimated by following Heckman two-step procedure heckit. The variables were household endowment, access to information, household characteristics and interaction factors. He also used Tobit model to answer the two questions by identifying the factors affecting the decision to participate and the level of participation at the same time. Also Heckman two-steps estimation was applied for the two crops (due to data availability rice result was not given) and the result shows that distance to market place didn't have effect on market orientation, there was a U shaped relation between age of household head and market orientation of household in the cereal crops, availability of cultivated land, traction power, and household labour supply, are important factor that induces households to be market oriented, A survey by (Tesfaye *et al*, 2005) identified the challenges of the rice production, utilization and marketing of rice at Fogera,

Dera and Libokemke districts. The studies pointed out both production and market constraints and more recommendations were forwarded. On the same area, (Wolelaw, 2005) identifies the main determinants of rice supply at farm level. The study uses Cobb Douglas production function model to estimate the limiting factors. The result that identified were, the current price, one year lagged price, actual consumption in the household, total production of rice in the farm, distant to the market and weather variables were significant to influence the supply of rice. A similar study on production part, (Moses *et al*, 2007), examined the factors determining rain fed rice production in Adamawa state Nigeria. Production function analysis was used to analyze the factors. The result shows that two of the variables used (farm size and seed) were significantly affect the production. Also resource productivity analysis revealed that seed was over utilized, while land and herbicide were underutilized. Decreasing the quantity of seed use and increasing the size of land and quantity of herbicide respectively could increase efficiency. (Due Hai, 2003) also studies the organization of the Liberalized rice market in Vietnam. The result shows that the major rice market places were competitive and that no barriers to entry are detected that influence the formation of prices; there is no concentration of market shares in the hands of private companies; product differentiation is not a major issue in the market; information is accessible for traders. However, in the case of large scale millers/ polishers, important barriers to entry concern access to capital, an unstable output market and proper milling technology. The Rice chain study in farmer's community in North Sumatra/Indonesia, shows that paddy/rice distribution was one factor that determines rice supply in consumer level. Main actors in conventional rice chains were the capital owner both in village level (small rice chain owner, and paddy retailer) and in outside village level (whole seller and big rice mill owner). These owners controlling the chains implement strategies such as giving credit to peasant for production and even living cost, and developing human relationship with peasant.

Methodology of partial budgeting model included a gross margin analysis which was used to determine the costs of various inputs and the profitability of carrot cultivation. (Ahmad, 2004). Factors affecting yield in this study were determined by carrying out a regression analysis using Cobb-Douglas production function which was used due to its ease in computation and interpretation. Quantitative inputs such as seed, land preparation, irrigation, labor used for weeding and fertilizer were included in the function. Some qualitative variables were also

included in the model in order to take into account yield variation due to these variables. In another research that was done on the profitability of sorghum farming in Tanzania, a gross margin analysis was also used to determine the profitability of sorghum. In this study gross margin analysis was done using Microsoft Excel in which the total variable costs were subtracted from the total revenue. (Erbaugh, 2008). A regression model was then carried out in this study in order to test factors that might have influenced gross margin and hence profitability of sorghum production. The gross margin variable was regressed on the farm size used to produce sorghum, farm gate price, farm production costs, farm location, the interaction between production costs and farm gate prices, seed variety used, technology used such as fertilizer, the interaction between seed variety and fertilizer applied and production technology used. The regression findings showed that farm size, production costs, farm location, interaction between production costs and farm gate price as well as the interaction between the varieties used and fertilizer applied were significant. Surprisingly, farm size was negatively influencing the gross margin contrary to the literature. However, the interaction between Production cost and farm gate price was positive and significant while farm gate price alone was not significant. In addition, the variety used, application of fertilizer and tillage method were not significant but the interaction between the variety used and fertilizer application was positive and significant. (Erbaugh, 2008). In another study that was done on the performance and profitability of the banana sub-sector in Uganda, a gross margin analysis was used to determine the profitability of banana production.

The gross margin analyses involved cost benefit trade -offs where total variable costs were subtracted from total revenue. Budgeting techniques were used to measure comparative advantage of various crops to the farmer in terms of income earned and return to family labor. Regression analysis was used to determine the factors affecting banana productivity and profitability in the study area. Yield of bananas was regressed against variables thought to influence farmers' decisions to invest in agricultural production. Thus yield of bananas was regressed on the total farm size, total farm income, off-farm income, age of the farmer, weevil damage, interaction with government extension agents, gender of the farmer, distance from the farm to the tarmac, years spent in school and number of cattle owned. (Bagamba, 1998)

applied were significant. Surprisingly, farm size was negatively influencing the gross margin contrary to the literature. However, the interaction between Production cost and farm gate price was positive and significant while farm gate price alone was not significant. In addition, the variety used, application of fertilizer and tillage method were not significant but the interaction between the variety used and fertilizer application was positive and significant. (Erbaugh, 2008). In another study that was done on the performance and profitability of the banana sub-sector in Uganda, a gross margin analysis was used to determine the profitability of banana production.

The gross margin analyses involved cost benefit trade -offs where total variable costs were subtracted from total revenue. Budgeting techniques were used to measure comparative advantage of various crops to the farmer in terms of income earned and return to family labor. Regression analysis was used to determine the factors affecting banana productivity and profitability in the study area. Yield of bananas was regressed against variables thought to influence farmers' decisions to invest in agricultural production. Thus yield of bananas was regressed on the total farm size, total farm income, off-farm income, age of the farmer, weevil damage, interaction with government extension agents, gender of the farmer, distance from the farm to the tarmac, years spent in school and number of cattle owned. (Bagamba, 1998)

2.4 Conceptual Framework

There is perhaps no topic in the whole economic theory which has been in such a confused and tangled state as the theory of profits. (Ahuja, 2006). Some economists have described profits as nonfunctional income. J.M Keynes expressed the view that profits result from the favorable movements of the general price level. Joan Robinson, Chamberlin and Kalecki associate profits with imperfect competition and monopoly. According to them the greater the degree of imperfection or monopoly, the greater the profits made. Profits have been associated with uncertainty (Knight, 1957), innovations (Schumpeter, 1960) and with risk bearing (Hawley, 1975). In general each individual theory tends to omit some crucial points and fails to bring out some important economic phenomena having a relation with profits. The theory of profits as a dynamic surplus is one of the most popular concepts of profits first proposed by (Clark, 1987). According to this theory profits arise in a dynamic economy. Clark argued that in a stationary

and costs affect producers. For example farmers are constantly faced with changing costs of inputs thus this affects their profitability. In addition farmers are also faced with demand and preferences of different varieties of onion and thus affect their profitability. The farmer is also affected by the market price of onion. Thus the theory above applies to the study.

CHAPTER THREE METHODS AND PROCEDURES

3.1 Introduction

This chapter outlines the methods and procedures to be used to achieve the stated objectives. It gives information on the data collection, sample size, limitations of the procedure and data analysis tools that were applied in the study.

3.2 Area of Study

The survey was conducted in Chongwe. This province was selected because this study area is one of the surplus onion producing area and has a good potential for onion production. Key informant interviewed were farmer, focus group, and individual interviews with farmers.

3.3 Sampling Procedure

Simple random sampling method was used. The sampling unit was a household. The sampling frames were obtained.

3.4 Sample Size

A sample of 67 household farmers was randomly selected from amongst farmers that grow onion in Chongwe district. The number selected in each area was determined by the number of smallholder farmers taking part in onion production.

3.5 Data Collection

The data used in this study was primary data and this was collected through a pretested questionnaire. Secondary data used was collected from Agriculture Marketing Information Centre (AMIC) and Central Statistics Office (CSO).

3.6 Data Analysis

The gross margin analysis and multiple regressions was the means of analyzing data in statistical package called SPSS. The field data collected was analyzed in SPSS. Heteroscedasticity may be present across households due to the use of cross sectional data. The data was tested for potential Heteroscedasticity using the Breusch-Pagan Godfrey test. Heteroscedasticity was insignificant at 95 percent level of significant. The presence of Multicollinearity was also investigated by checking the values of the Variance Inflation Factors (VIF) of all the variables in the model. None of the variables was found to have a VIF value greater than ten. Therefore, Multicollinearity was not present.

A multiple regression model will then be used to determine the effects of various variables on the profitability of the beans and cowpeas production. More generally an unknown population model is expressed as (Dougherty, 2002).

$$Y_i = \beta_1 + \beta_2 X_{2i} + \dots + \beta_k X_{ki} + U_i$$

Where Y is the dependent variable, X's are K-1 explanatory variables and U_i is the error term. Multiple Regression analysis allows one to discriminate between the effects of the explanatory variables, making allowances for the fact that they may be correlated. The regression coefficient of each X variable provides an estimate of its influence on Y, controlling for the effects of all the other X variables (Dougherty, 2002).

The Y denotes profitability and it was used as the dependent variable, where as the explanatory variables are the age, education level, farm size, seed variety, experience, record keeping, household size and sex. $Y_i = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7$

Where,

Y _i = Profitability,	X ₁ = Age
X ₂ = Farmers Education Level,	X ₃ = Farm Size,
X ₄ = Seed Variety Used,	X ₅ = Farmers Experience Level
X ₆ = Farmers Record Keeping,	X ₇ = Household Size

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter gives the results of the analysis and discussion. It defines the model and gives the regression model results in terms of ANOVA table, coefficient, and the coefficient determination. The interpretations of results are also included in this chapter.

4.2 Regression Model Results

Sixty eight farmers were interviewed and the regression model was used where (Y) profitability was regressed on different variables using the multiple regression models to see their contribution on profit, these variables are as follows below. The dependent variable, profitability was regressed on independent variables. The constant was found to be -2.364 and coefficients for independent variables were found as reflected in the tables below.

Table 1: Statistical Results of Constant and Coefficients

Variables	Coefficients	P-value
Intercept	-2.364	0.444
Age	0.002	0.856
Education Level	0.015	0.028*
Farm Size	0.332	0.031*
Seed Variety	-0.527	0.026*
Farmers Experience Level	0.113	0.673
Record Keeping	-0.72	0.64
Household Size	0.334	0.008*
Sex	0.192	0.856

Table 1; above presents the analysis of the estimates of multiple regression model. From the results, it was found that profitability was strongly dependent on education level, farm size, seed variety, as well as household size; these are statistically significant at 95% confidence level. However, profitability is not statistically dependent on age, experience, record keeping, and sex at 95% confidence level.

The coefficient of farmer’s education level indicates that an additional attainment in education increase result in a K0.015 increase in onion profit. This is because the knowledge acquired through education help farmer to develop better skills to improve farming practices. The role of education in technology adoption has been extensively discussed in the literature. Education enhances the allocative ability of decision markers by enabling them to think critically and use information sources efficiently. Farmers with more education should be aware of more sources of information, and are efficient in evaluating and interpreting information about innovations than those with less education.

The coefficient of farm size indicates that an increase in farm size by one hectare results in increased profit K0.332. This could be attributed to the fact that as farmers gets one additional land; its resource allocation tends to be unlimited there by not restricting its production.

The coefficient of seed varieties reflected that additional cost of seed variety by a kwacha unit due to improved technology reduces profit by -0.527 kwacha. This could be because of the fact that as a farmer spends more money in purchasing improved technology their total production cost increases.

The coefficient of number of household members supplying agricultural labour indicates that an increase in number of household members supplying agricultural labour by one member will increase profit by 0.334 hectares. This is because of the increased labour that makes it possible to cultivate a larger portion of land. The goodness of fit for the model was found to be .747 as shown in table 2 below

Table 2; Best of Fit Summary

Model	R	R ²	Adjusted R ²
1	.864	.747	.655

The R squared of the production function=.747

The R squared of 0.747 implies that 74.7 percent of the variation in onion profitability is explained by the variation in the independent variables of the model.

The overall significance of the regression is given by the F test in the table 3 below:

Table 3; ANOVA Results from SPSS

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	112.371	17	6.610	8.156	.000 ^a
Residual	38.090	47	.810		
Total	150.462	64			

This table shows the F value of 8.156 with a significant value of 0.000^a which implies that the variation in regression variables is significant and it makes the regression reliable for prediction

4.3 Coefficient of Variation, R^2

The goodness of fit for the model was found to be 0.747 as shown in table 2 above. The R squared of 0.747 implies that 74.7 profit is explained by the variation in the independent variables.

4.4 F- test and its Significance

The overall significance of the regression is given by the F test in the ANOVA table 3 above. This table shows an observed F value of 8.156 is not significant with a P-value of 0.000^a at 0.05 level of significance. This implies that the variation in regression variables is significant and it makes the regression reliable for prediction.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

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

5.2 Conclusion

This study was designed to determine the factors affecting the profitability of onion production. Regression analysis was employed to analyze and discuss the factors. The factors studied included age, farm education level; farm size, seed variety, experience, record keeping, farm labour, and sex. The factors which were identified as being statistically significant (with the multiple regression model) were farmers education level, farm size, seed variety and household size. The significance of each of these variables was discussed to reveal its impact on the level of profitability.

5.3 Recommendations

Most small holder farmers cannot afford to hire sufficient labour, and therefore the need to look into the matter. These farm families that face insufficient labour should consider optimizing the use of unpaid idle family labour which comes in form of cheap labour. In sufficient labour is one of the most limiting factors in onion production for smallholder farmers. A form of assistance at farm level should be formulated to address this issue. It is true that farm household characteristics affect the farm position in terms of labour contribution towards farm production and need not to be overlooked by smallholder farmers.

Farmers need intervention policies from the government that would assure them producer floor prices or higher farm gate prices to avoid risks of losses that might arise as a result of high onion supply considering that besides domestic production, Lusaka receives 60% of its onion from imports. This is in line with the fact that farm yield increases with farm size.

In light of the results above concerning quantity contribution to profit, I would like to recommend that farmers should consider expanding output i.e. increase in capital base, business size, and efficiency which increases income generation capacity.

A suggestion to future studies is to carry out surveys across the country with a much larger sample size in order to increase variations within the sample hence, capture more variables of importance. When results of such a survey are analyzed with available literature on the characteristics of the factors that affects onion production,

REFERENCES

- Ahuja H. L , (2006) **Advanced Economic Theory** S. Chand & Company, New Delhi.
- Agricultural Consultative Forum, (2008). **Zambia Food Security Monitor**. Lusaka: Agriculture Consultative Forum.
- Bashir S. H. (2004). Factors Affecting Profitability and Yield of Carrot in Two Districts in Punjab. Pakistan: **International Journal of Agriculture Biology**.
- Clark, J. B. (1987) **A Generalized Uncertainty Theory of Profit**, American Economic Review.(CSO/FSRP) 2004 Survey
- Central Statistical Office (2008), **Crop Focus Survey Report**, March 2009, Lusaka.Consultancy Report for Food and Agriculture Organization. Draft 3.
- Dougherty, C. (2002). **Introduction to Econometrics**. Newyork: Oxford University Press
- FSRP Working Paper No. 17. Lusaka, Zambia: **Food Security Research Project**.
- FSRP Working Paper No. 46 June 2006, Lusaka Zambia: **Food Security Research Project**.
- Forestry, A. F. (2009). **Farm Gross Margins**. State Government of Victoria.
- Bagamba, F. J. S. (1998). **Performance and Profitability of the Banana Sub-Sector in Uganda Farming Systems**. C.Picq, E.Foure and E.A Frison, INIBAP, Montpelier.
- Haantuba H. (2003). **Linkages Between Smallholder Farm Producers and Supermarkets in Zambia**.
- Republic of Zambia (2001). **Selected Socio-Economic Indicators 2000**. Central Statistics Office, Lusaka, Zambia.
- Hichaambwa M. and David T. 2006. **Zambia Horticultural Rapid Appraisal: Understanding the Domestic Value Chains of Fresh Fruits and Vegetables**.
- Hawley. F. (1975) A Note on Profit and Uncertainty. **Economica**, Volume XIV.
- Erbaugh. J. Mark D. J. **Profitability Analysis of Sorghum Framing and its Influence on Sorghum Value Chain in Tanzania**, Tanzania.
- Lunven P. (1982). **The Nutritional Consequences of Agricultural and Rural Development Project**, Food Nutr. Bull. 4:17-22.
- University of Zambia (2004). **How Rural Producer Organizations are Influenced by Economic and Agricultural Policy Environment and how they Work to Influence this**

Institute of Economic and Social Research, Consultancy Report Prepared for the Norwegian Institute for Urban and Regional Research, February 2004.

APPENDICES

APPENDIX I: QUESTIONNAIRE

Questionnaire serial number:

--	--	--

.

Factors affecting profitability of onion production in Zambia' Chogwe District.

Department of Agricultural Economics & Extension Education

The University of Zambia

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 write some answers in the tables, boxes & blank spaces provided.*

PERSONAL INFORMATION

1. Your name:

2. Gender

a. Male ☐

b. Female ☐

3. Your age on your last birthday

4. Your location (Village of the farmer)...

5. Your level of education attained

a. Primary ☐

b. Secondary ☐

c. Tertiary ☐

d. None ☐

6. What kind of farming are you involved in?

a. Small scale ☐

b. Large scale ☐

7. Are you involved in crop production?

a. Yes ☐

b. No ☐

8. If yes to 7 above, what kind of crops do you grow

9. What is your monthly income (ZMK?)

- a. Less than 500,000 []
- b. 500,000-1,000,000 []
- c. Above 1,000,000 []

10. What is your household size?

- a. Less than 5 []
- b. 5-10 []
- c. More than 10 []

11. Age distribution of household (Please write the number of your household members who lie in each of these ranges in the brackets provided)

- a. Below 16 years []
- b. 16-30 years []
- c. 31-40 years []
- d. Above 60 years []

PROFITABILITY

12. What is the farm size of your farm?

- a. Less than a hectare []
- b. 1-5 hectares []
- c. Above 5 hectares []

13. Main colour type (variety) of onion Cultivated?

- a. reddish []
- b. whitish []

14. How much onion do you produce per hectare?

- a. Less than 0.5 ton []
- b. 0.5-1 tones []
- c. Above 1 tones []

15. What is the cost of producing onion per hectare?

- a. Than K200,000 []
- b. K200, 000-K500, 000 []
- c. Above K500, 000 []

16. How many porches/ bags of onion do you sell?

- a. less than 10 Bags []
- b. 10-50 Bags []
- c. Above 50 Bags []

17. Which mode of land ownership do you use for your onion production?

- a. Owned land []
- b. Rented/hired Land []

18. What is the main source of labour for your onion production?

- a. Hired labor []
- b. Family labour []

19. What is the farm gate price per bag/porches of onion?

- a. Less than K10, 000 []
- b. K10, 000-K50, 000 []
- c. Above K50, 000 []

21. What is the number of years of your experience?

- a. Less than 5year []
- b. Between 5 and 10years []
- c. Above 10 years []

22. Who are the main buyers of your onion produced?

- a. Processor []
- b. Wholesaler []
- c. Retailer []
- d. Consumers at Local Market []

23. Are there any price variations in the sales of onion?

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

24. Does available market were to sell onion exist?

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

25. What are some of the factors that affect profitability of onion?

- a. Prices []

b. Distance to the market []

c.both (a) and (b) above []

d. Others.....

26. Approximately what % of the farm's onion does not sell due to failure to meet quality and standard requirements?

a. less than 5% []

b. between 5%-10% c. above 10% []

27. Does (any member of) this farm keep records of production, use of inputs, sales, or profit & loss accounts?

a. No []

b. Yes []

28. What type of production record keeping system do you currently use?

a. Written []

b. Computerized []

c. Other (specify)