

**PARTICIPATION OF SMALL SCALE FARMERS IN SUPPLYING IRISH POTATOES
TO THE LOCAL MARKETS: CASE STUDY; LUSAKA DISTRICT.**

A research report presented to the department of agricultural economics and extension education
of the University of Zambia.

BY

MOSES .M CHANDA

In partial fulfillment of the requirements for the degree of bachelor of agricultural sciences

© MOSES .M CHANDA, 2013

ACKNOWLEDGEMENTS

First and foremost I want to thank the Almighty God for making it possible for me to complete my studies.

I wish to express my heartfelt appreciation to Ms. D. J Banda, my Supervisor for her tireless counsel and guidance in producing this report. I also wish to extend my gratitude to all Members of Staff in the Department of Agricultural Economics and Extension for their support in my academic endeavors. 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 help they offered to me when I needed them and for making my stay at campus easy.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	i
LIST OF TABLES	iv
LIST OF ABBREVIATIONS	iv
ABSTRACT	vi
CHAPTER ONE: INTRODUCTION	1
1.1 Problem Statement	2
1.2 Research Objectives	3
1.3 Rationale of the Study	4
1.4 Study Scope.....	4
1.5 Structure of the Report	5
CHAPTER TWO: LITERATURE REVIEW	6
2.1 Introduction	6
2.2 Models used in Participation or Adoption Studies.....	8
2.3 Conceptual Framework	8
CHAPTER THREE: METHODS AND PROCEDURES	10
3.1 Introduction	10
3.2 Data Collection	10
3.3 Data Analysis	10
3.4 Limitations of the Study.....	14
CHAPTER FOUR: STUDY FINDINGS AND DISCUSSION	15
4.1 Introduction	16
4.2 Characteristics of the Sample.....	16
4.3 Descriptive Statistical Results.....	16
4.4 Tobit Regression Model Results	19
CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS	22
5.1 Introduction	22
5.2 Conclusion	22
5.3 Recommendations	23

REFERENCES23
APPENDICES.....25
APPENDIX 1: Questionnaire25

LIST OF TABLES

Table1: Distribution of Farmers by Sex.....	16
Table2: Distribution of Farmers by Age, Household Size and Income.....	17
Table3: Distribution of Farmers by Education Levels.....	17
Table4: Distribution of Farmers by Marital Status.....	18
Table5: Distribution of Farmers by Growing Potatoes.....	18
Table6: Distribution of Farmers by Supplying Potatoes.....	19
Table7: Tobit Model Results.....	20

LIST OF ABBREVIATIONS

CSO	Central Statistical Office
FAO	Food and Agriculture Organization
SSF	Small Scale Farmers
PHS	Post Harvest Survey
NGO	Nongovernment Organization
FSRP	Food Security Research Project

ABSTRACT

PARTICIPATION OF SMALL-SCALE FARMERS IN SUPPLYING IRISH POTATOES TO THE LOCAL MARKETS

Moses M. Chanda
The University of Zambia, 2013

Supervisor:
Ms. D. J. Banda

Irish Potatoes (*Solanum tuberosum*) are an important source of food, employment and income in developing countries (FAO, 2008). Irish potato is the world's fourth largest food crop after wheat, rice and maize. In Lusaka, most of the local potatoes which are sold on the market are produced by commercial farmers, like Buyabamba farm. There is little known statistics showing small scale participation in supplying Irish potatoes to the local market.

Small-scale farmers remain very important suppliers of fresh produce (except Irish potato) to urban markets such as Lusaka (FSRP, CSO, 2007). Most of the potatoes sold through the formal retail sector in Zambia are produced by large-scale farmers, mainly under irrigation (Faostat, 2008). A survey of smallholder and medium scale agricultural households in Zambia carried out in 2001/2002 also confirms this paucity of data on potato production since the study did not report potatoes as one of the crops grown by these farmers. This means that small-scale producers and medium farmers under rain fed conditions produce minimal potatoes which are consumed at the farm level. Identification of SSF who don't grow and supply Irish potatoes is very important to determine factors hindering the SSF from participating in supplying Irish potatoes to the local markets.

This paper uses data from a survey which was carried out in Makeni and Lusaka west of Lusaka district. These farmers were SSF living in farm households. Among the factors hindering SSF from participating in supplying potatoes were; inadequate knowledge on Irish potatoes, high input cost especially seeds and little interest by farmers. The findings suggest a need to increase extension work through different extension methods and approaches to provide knowledge and arouse interest in farmers. Also suggested is the need to start producing seeds locally by plant breeders. And in this way participation of SSF in supplying Irish potatoes will increase.

CHAPTER ONE

INTRODUCTION

Irish Potatoes (*Solanum tuberosum*) are an important source of food, employment and income in developing countries (FAO, 2008). A medium sized potato contains 45% of the daily adult requirement of vitamin C, 18% of the potassium we require as well as significant amounts of iron, zinc, thiamine, niacin and vitamin B6. The potato also contains valuable supplies of such essential trace elements as manganese, chromium, selenium and molybdenum. The potato's high energy content and ease of production have also made it an important component of urban agriculture which provides jobs and food security to some 800 million people globally (Hoffler and Ochieng, 2008). Irish Potatoes grow well in areas with cool temperatures of not more than 80 F. Potatoes thrive in places where temperatures are moderate throughout the year. Potatoes need lots of water and rich loamy soils produce the best potatoes because potatoes need a lot of nutrients to do well.

Irish potato is the world's fourth largest food crop after wheat, rice and maize. World production reached a record of 320 million tons in 2007, and production in the developing countries has almost doubled since 1991, with a corresponding increase in consumption (Hoffler and Ochieng, 2008; FAO, 2008). Hundreds of millions of people in developing countries are facing food crisis as the cost of their staple foods continues to rise. But On the contrary, the price of potato has remained stable (Hoffler and Ochieng, 2008). The potential of the potatoes is yet to be fully realized and has never been more evident until the recent rising prices of rice, wheat and maize (FAO, 2008).

In Lusaka specifically. Consumers can purchase fresh potatoes from a number of outlets such as Soweto market, Supermarkets, street vendors and hawkers, smaller retail stores and other markets not mentioned. A considerable proportion is also purchased at the farm gate. Processed potato chips are sold by fast service stores such as Hungry Lion, Nandos, Zamchik, etc. This is a fast growing sector in Zambia especially as the economy improves and middle to high-income groups increase in the population, especially in urban areas such as Lusaka (FAO, 2008).

In Lusaka, most of the local potatoes which are sold on the market are produced by commercial farmers, like Buyabamba farm. There is little known statistics showing small scale participation in supplying Irish potatoes to the local markets. Below is the data on the area and quantities of potato produced in Zambia by Commercial farmers from 1997 to 2003.

Commercial Scale Farmer Potato production in Zambia

Year	Area planted (Ha)	Total Potato Produced (Mt)
2003	1,200	11,000
2002	1,200	11,000
2001	1,200	11,000
2000	1,100	10,000
1999	1,100	10,000
1998	900	8,000
1997	1,000	9,000

(Faostat, 2008)

1.1 Problem Statement

As reported in the crop forecast survey, 1806Ha of land were planted for Irish potatoes in 2010/2011 agriculture season, with expected yield of 27,563Mt (CSO/MACO, 2011). But there is no known published research showing statistics of small scale farmers who are participating in supplying Irish potatoes to the local market of Lusaka, such as Soweto market and other market entrants within Lusaka. Small-scale producers and medium farmers under rained conditions produce minimal potatoes which are consumed at the farm level. It is therefore important to find out the levels of participation if any; and the factors inhibiting small scale farmer participation in supplying Irish potatoes to the local market.

Most of the potatoes sold through the formal retail sector in Zambia are produced by large-scale farmers, mainly under irrigation (Faostat, 2008). FAO reports also show that relatively few large commercial and medium-sized farmers dominate production of potatoes while little is grown by subsistence cultivators (Chileshe, 1988) as quoted in the World Potato Atlas.

A survey of smallholder and medium scale agricultural households in Zambia carried out in 2001/2002 also confirms this paucity of data on potato production since the study did not report potatoes as one of the crops grown by these farmers. This means that small-scale producers and medium farmers under rained conditions produce minimal potatoes which are consumed at the farm level. Most small-scale farmers are reported as growing maize, sweet potato, vegetables, millet, etc, but not Irish potatoes.

The literature also reviews that; Small-scale farmers remain very important suppliers of fresh produce (except Irish potato) to urban markets such as Lusaka (FSRP, CSO, 2007).

According to the Zambia Horticultural Rapid Appraisal research (M. Hichaambwa and D. Tschirley, 2006), the research also pointed out the importance of small scale farmers in supplying horticultural products to local market except Irish potatoes.

1.2 Research Objectives

General Objective

To determine factors that exclude Small scale farmers from participating in supplying Irish potatoes to the local markets.

Specific Objectives

- To identify factors hindering SSF participation in supplying Irish potatoes.
- To determine the participation levels of SSF in supplying Irish potatoes.
- To recommend best solutions to encouraging SSF participation in supplying Irish potatoes.

1.3 Rationale of the Study

The study on SSF participation in supplying Irish potato to the local market is very important because, it will help to determine factors affecting SSF participation which will then help to provide proper recommendations to boost SSF participation. The study therefore, will increase farmers' income, provide employment and improve the living standards of SSF households. Potatoes have the potential to relieve the pressure of increasing cereal prices on the poorest people and contribute significantly to food security.

The crop has opportunities to develop, there is potential for value addition at various points along the chain, dry matter/starch content of the crop is high which makes it possible to get nonfood products from it. Potatoes also have the potential to develop because of the increasing demand for potatoes by the fast food service sector and supermarkets. The Zambian government recently introduced a ban on the imports of fresh potatoes, though imports are still coming, it's lower than the amount used to be imported before, and this has increased demand and created opportunity for small scale farmers and other local producers to be supplying Irish potatoes.

Consumption of Irish potatoes in urban areas like Lusaka is higher than rural areas because of higher incomes and an emerging middle to high income groups that consume fast foods such as potato chips (Faostat, 2004). Urban consumption per capita was found to be comparable to that estimated for developing countries at about 14kg/capita in 1995-1997 (CIP, 2002). This consumption is extremely low compared to per capita consumption in Europe pegged at 86kg /capita/yr and for America at 63kg/capita/year. If it is assumed that Zambians now consume 14 kg/capita/year nationally, then there is room for growth in potato market, and hence production should be increased.

1.4 Study Scope

This study was conducted in Makeni and Lusaka west of Lusaka district. Primary data was collected using structured questionnaires and a sample of 128 households was selected using simple random sampling. This area was selected because it comprises small scale farmers who

supply horticultural crops except Irish potatoes, as reported in previous studies. The small scale farmers in this area are near the local markets of Lusaka, e.g Soweto market where the demand for Irish potatoes is high. There are traders who bring Irish potatoes from other districts and/or provinces. Apart from that, there are traders who supply the local markets of Lusaka with imported Irish potatoes from South Africa and others from Tanzania. These farmers are at the disposal of this market but there is little or no participation in supplying Irish potatoes to these local markets.

1.5 Structure of the Report

This report begins by giving an introduction of the research topic in chapter one. The introduction highlights the background information about the subject. It further gives the problem statement, objectives, rationale and scope of the study. Chapter two focuses on literature review in which past studies on potato supply are reviewed including the models used in the study. It also reviews research findings of the past similar studies and discusses conceptual framework. Chapter three looks at the methods and procedures that were used for the study. It covers the data collection methods used for the study, data processing and analysis as well as the limitations encountered during the study. Chapter four highlights the findings and interpretation of the study, while chapter five gives conclusions and recommendations based on the findings of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section reviews the findings by other researchers and tries to analyze the findings and see how they can be used in the *Zambian* set up. It reviews the causes of the problem and the solutions that can be used to reduce the problem. It also reviews the models used in other empirical studies as well as the types of variables employed in other models that provide a foundation from which my study departs.

Researches done and Findings

Lack of markets and market information for timely buying and selling, and the lack of support services like credit and extension hinder increased productivity and adoption of higher value crops, e.g. Irish potatoes. Constraints facing rural producers in Zambia are related more to market access and the ability to obtain necessary inputs in a highly volatile economic environment rather than application of more productive technology (Dcininger and Olinto, 2000).

In Kenya; the major constraint to potato production in the cool highlands is the rapid decline in soil fertility occasioned by continuous cultivation without adequate replenishment of mined nutrients (Kiiya et al, 2006). There is also inadequate supply of certified seeds to the extent that farmers almost solely depend on informal seed sources such as farm-saved, local markets or neighbors. Self-supply is the major source of seed for most farmers (Kaguongo et al., 2008). Only about 1% of potato farmers can access quality planting material (Ayieko and Tschirly, 2006).

Bacterial wilt caused by *Ralstoniasolana cearum* is an important disease contributing to yield reduction. High cost of inputs especially seeds; fungicides and fertilizers greatly limit the production of ware potatoes in Kenya. This leads to under application of fungicides and fertilizers and coupled with poor quality seeds, the net returns to the farmer are minimal.

Poor marketing channels is another problem; most farmers do not store potatoes but sell directly from the field leading to glut periods, depressed prices and correspondingly low net returns to farmers. Seasonality in production and supply makes rain dependent producers prone to exploitation by traders and brokers. This results in widely fluctuating farm gate and market potato prices, sometimes with the minimum and maximum prices varying by more than 70% (Kaguongo et al., 2008).

In Tanzania, at the production and marketing levels, the major constraints include: poor and unspecialized extension services, poor accessibility to inputs and their high cost, lack of strong and effective farmer organizations, poor market information and heavy reliance on distant urban markets, bad roads which raise transport costs, high product quality deterioration of about 40 percent, inadequate access to markets, lack of finance, inadequate institutions and weak cooperative unions, lack of entrepreneurial and marketing skills, lack of contractual arrangements, high transaction and marketing costs and inadequate vertical coordination and integration of marketing channels. Small-scale farmers also have difficulty accessing niche markets, such as supermarkets and tourist hotels, because of the difficulty in adhering to safety and quality standards (Ashimogo and Greenhalgh, 2007:2).

Overall, in SADC, the major challenges faced by small-scale producers in supplying modern markets are; high consumer quality demands and preference, lack of a public policy environment that is supportive of small-scale producers in the market including those at municipal level, lack of equal access to market information, quantities produced by farmers are small and erratic, high cost of inputs, failure of the credit market to meet small-scale producer's needs and dependency on traditional credit providers and inadequate cooperation between farmers and need for cooperative action (Proctor, 2007b).

Access to credit permits a farmer to enhance efficiency by overcoming liquidity constraints which may affect their ability to apply inputs and implement farm management decisions on time hence use of credit therefore loosens financial constraints. ensures timely acquisition and use of inputs and results in increased economic efficiency. It is of crucial importance to provide

smallholder farmers who are often cash constrained with credit in order to facilitate the timely purchase of critical inputs (Binam *et al.*: 2006), Cameroon.

The choice of a variety by our SSF is very important in order to maximize the benefits. Round potato produces remarkable quantities of calories comparable to cereals, and that it is more profitable than many other food crops. The revenue from potatoes is generally 10 times greater than that from grains (Seyfu, 2004). The choice of round potato variety in Tanzania serves both for food as well as for income to the small scale farmers and the rural population. (Scott *et al.*, 2000; CIP, 2008; FAOSTAT, 2008).

2.2 Models used in Participation or Adoption Studies.

Studies on participation or adoption of new crops by farmers have utilized a variety of econometric models. The majority of participation and adoption papers have incorporated maximum likelihood estimation techniques. Among the more commonly used estimation techniques is Tobit model (Adesina and Zinnah 1993, Adesina and Baidu-Forson 1995, Nkonya *et al.* 1997), Logit model (Green and Ng'ong'ola 1993, Sain and Martinez 1999) and Probit model (Negatu and Parikh 1999, Kaliba *et al.* 2000, E. Knepper 2002).

2.3 Conceptual Framework

According to Batz *et al* (1999) two conceptual models can be used to explain the decision of a farmer to adopt crops and technologies. These are the innovation-diffusion model and the economic constraints model. Innovation-diffusion model emphasize that innovation is transferred from the source to the intended end users by extension workers. The model assumes that a technology is ready for use unless it is hindered by lack of effective communication.

Empirical models which have been used to study participation include Probit, Logit and Tobit models. Probit and Logit models use a binary variable that takes a value of one if the decision maker participate in the innovation in question, and zero otherwise. While these two models have wide empirical application in participation studies, they have been criticized for their failure to

measure and account for the extent of participation. This loss of information is prevented by using the Tobit model (Baidu-Forson, 1999; Shapiro et al. 2002).

The Tobit model accounts for a continuous dependent variable that has a zero limit that is characterized by a non-zero probability mass. This description fits well with participation study in supplying Irish potatoes to the local market. In the Tobit model, the willingness of the farmer to participate in supplying Irish potatoes can be presented as;

$$y_i = \begin{cases} y_i^* & \text{if } y_i^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

Where Y_i is the participation in supplying Irish potatoes, the latent variable $Y_i^* = \beta x + \mu$, where x is a vector of explanatory variables postulated to explain the variation in the participation of SSF, β is a vector of parameters to be estimated, and μ is the independent normally distributed random error term assumed to be normal with zero mean and constant variance σ^2 , that is $\mu \sim N(0, \sigma^2)$.

CHAPTER THREE

METHODS AND PROCEDURES

3.1 Introduction

This chapter outlines the methods and procedures used to achieve the stated objectives. It gives information on the data collection and data analysis tools that were used in the study.

3.2 Data Collection

A research survey was conducted in which primary data was collected using a questionnaire. This primary data was collected in Makeni and Lusaka west by simple random sampling covering only small scale farmers who supply horticultural crops to local markets of Lusaka.

3.3 Data Analysis

Data was organized and sorted to separate the relevant variables. Some dummy variables were generated from the data and among the dummy variables generated and used in the model included; female as dummy variable for sex, married as dummy variable for marital status, income less k2 million as dummy, less 5 years of farming as dummy for farming years, tertiary as dummy for education, mechanic tillage as dummy for tillage method. Other independent variables used in the model included age of household head, inadequate knowledge, high input cost, little interest, month income and Education level. The independent variables were regressed on the dependent variable (participation in supplying potatoes) in which 107 non growers of potatoes were left censored at a zero limit using Tobit model. The 107 of the respondents reported not growing potatoes and/or not supplying potatoes, because if one can't grow then can't supply. The model was tested for multicollinearity, heteroscedasticity and omission of variables. It was corrected for heteroscedasticity by running a robust Tobit regression model and a robust regression model. The marginal effects of the independent variables on the dependent variable were then obtained. The data was analyzed in STATA to produce all the descriptive statistics, and the output was organized in word.

In summary, the model was defined as;

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 \\ + \beta_9X_9 + \beta_{10}X_{10} + \beta_{11}X_{11} + \beta_{12}X_{12} + E$$

Where:

Y is the participation in supplying potatoes

β_0 is the Constant

X1 is the Household head Age

X2 is the Female Dummy

X3 is the Married Dummy

X4 is Inadequate Knowledge

X5 is High Input Cost

X6 is Inadequate Interest

X7 is Income

X8 is Educational Level

X9 is Less K2M Dummy

X10 is Farm of Five to Ten years

X11 is Tertiary Education Dummy

X12 is Mechanic Tillage Dummy

E is the Error Term

Among the dummy variables generated, at least one in each category was left out as the benchmark for comparison.

The total change in Y_i associated with a change in the explanatory variable can be decomposed into the change in the probability of being above zero and the changes in the values of y , if it is

above zero. The relationship between the expected value of all observations, Ey and the expected conditional value above the limit Ey^* is given by:

$$Ey = F(z)Ey^*$$

Where $F(z)$ is the cumulative density normal distribution function and $Z = X\beta/\sigma$. Consideration of the effect of the K th variable of X , for example age can be decomposed as follows;

$$\frac{\delta Ey}{\delta Xk} = F(Z) \left(\delta Ey^* \times \frac{1}{\delta Xk} \right) + Ey^* \left(\frac{\delta F(Z)}{\delta Xk} \right)$$

Thus the total change in Ey is made up of two components; (1) the change in the expected value of Y for those observations above the limit of zero, weighted by the probability of being above the limit, and (2) the change in the probability of being above zero, weighted by the expected value of Y , if above zero.

Household Head Age

The age of the household head is expected to be related to the experience that the household head has had over the years. The older the household head, the more experience they are assumed to have acquired.

Female

Female headed households are expected to participate in growing Irish potatoes because there are assumed to have a higher preference for potatoes than males. And so females are more likely to grow and supply potatoes than males.

Married

Married people are more likely to participate in growing Irish potatoes because Irish potatoes are assumed to be food enjoyed by couples. It's also assumed to be a high class type of food.

Inadequate Knowledge

Inadequate knowledge on potatoes, e.g, how to grow potatoes is likely to have a negative effect on potato growing and supplying by small scale farmers. Farmers with little knowledge on potatoes are likely not to grow potatoes.

High Input Cost

High input cost of potatoes is expected to have a negative impact on participation of small scale farmers in growing and supplying Irish potatoes. That is, the higher the input cost the lesser the participation.

Interest

Little interest is expected to have a negative effect on participation. The lower the interest the lesser the participation, many small farmers are not used to growing Irish potatoes but Sweet potatoes, and hence little interest in Irish potatoes.

Income

The farmers with more income are expected to participate in growing and supplying Irish potatoes because they have more money to purchase the inputs like seeds than those with little income.

Educational Level of Household Head

The educational level of the household head is expected to be related to the knowledge and analytical thinking capacity of the farmer and their ability to comprehend, understand and use new technologies and participate in supplying Irish potatoes.

Income Less Two Million Kwacha

Farmers with income less two million kwacha are likely not to participate in growing and supplying Irish potatoes because they are likely not to afford the costs of production involved with potatoes.

Five to Ten Years of Farming

Longevity of farming is likely to have an effect on participation in supplying Irish potatoes. Farmers who have been farming for five years and more are expected to participate in growing Irish potatoes because of the experience they have acquired for many years.

Tertiary Education

Farmers who have gone up to tertiary level are more likely to participate in supplying Irish potatoes than those farmers who ended in lower levels like primary and secondary levels of education.

Mechanic Tillage

Farmers who use mechanic method of tillage are more likely to participate in growing and supplying Irish potatoes than those who use hoe tillage and oxen because of the efficiency and effectiveness of mechanic tillage. And so they are likely to take up many enterprises including Irish potato production.

3.4 Limitations of the Study

Several limitations were encountered during the study. The major limitation was that not all variables as suggested by previous studies and economic theory were included in the model. This limitation however did not affect the outcome of the results because only irrelevant variables to the study were omitted. Other limitation is that there was no sampling frame to determine the

total number of farm households who supply horticultural crops from which to determine a sample size, and so simple random sampling of farm households was used.

CHAPTER FOUR
STUDY FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents and discusses the study findings. It begins with a presentation and discussion of the sample characteristics of the respondents. It goes on to present the descriptive statistical findings and Tobit regression estimates with a discussion of the resulting outputs.

4.2 Characteristics of the Sample

This study involved small scale farmers living in Makeni and Lusaka west of Lusaka District who participate in supplying horticultural products to the local markets of Lusaka. These farmers are reported to be important suppliers of horticultural crops like tomato, onion, rape, Chinese, cabbage, etc, with little information on them participating in supplying Irish potatoes.

4.3 Descriptive Statistical Results

From the total sample of 128, there were 59 males heading agricultural production of crops, representing 46.09%. 69 were females heading agricultural production, representing 53.91%. This information is shown in table 1 below.

Table 1: Distribution of Farmers by Sex

Sex	Number	Percent
Male	59	46.09
Female	69	53.91
Total	128	100

As shown in the table below; the mean age was 49.08594 years with a standard deviation of 12.89328. Minimum age was 22 years, and maximum of 87 years. The mean household size was 6.03125, standard deviation of 2.212838 with minimum of 2 and maximum of 13 members. The mean number of crops grown for households was 4.414063, standard deviation of 1.859334, minimum of 1 and maximum of 10.

Table2: Distribution of Farmers by Age, Household size and Income

Variable	Number	Mean	Std. Dev.	Min	Max
Age	128	49.08594	12.89328	22	87
HH Size	128	6.03125	2.212838	2	13
No: Crops Grown	128	4.414063	1.859334	1	10

The distributional of farmers by Educational level was that, Tertiary education level had the highest number of 83 represented by 64.84%, followed by secondary with 25.78% and primary with 9.38%, as shown in table 3, below.

Table 3: Distribution of Farmers by Education Levels

Education	Number	Percent
Primary	12	9.38
Secondary	33	25.78
Tertiary	83	64.84
Total	128	100

Majority of the farmers were married represented by 82.03%, with divorced represented by 0.78% as the least percent of respondents. Single had 8.59% and widowed 8.59% as well. This is represented in table 4, below.

Table 4: Distribution of Farmers by Marital Status

Marital status	Number	Percent
Single	11	8.59
Married	105	82.03
Divorced	1	0.78
Widowed	11	8.59
Total	128	100.00

From Table 5 below, out of the 128 farmers, only 21 grow Irish potatoes, 107 farmers reported not growing Irish potatoes.

Table 5: Distribution of SSF by Growing Potatoes

Potato growers	Number	Percent
Yes	21	16.41
No	107	83.59
Total	128	100.00

As shown in Table 6 below, Out of 21 growers of potatoes from 128 farmers, only 11 sell/supply to the local markets of Lusaka. 10 farmers reported not selling potatoes but use for home consumption.

Table 6: Distribution of SSF by Supplying Potatoes

Suppliers/Sellers	Number	Percent
Yes	11	52.38
No	10	47.62
Total	21	100.00

4.4 Tobit Regression Model Results

The farmers who reported not growing Irish potatoes were subjected to further questions asking them about the reasons as to why they do not grow potatoes. Also the farmers who grow but do not sell were asked the same questions with those who don't grow, this was in order to determine the factors hindering small scale farmers from participating in growing and supplying Irish potatoes to the local markets of Lusaka. In the Tobit model, 107 farmers who don't grow potatoes were left censored and observed as non-growers of potatoes at ≤ 0 , to find factors hindering SSF from participating in supplying Irish potatoes to the local market.

Table 7 presents the Tobit model results. From the results, it can be said that participation in supplying Irish potatoes is strongly dependent on knowledge, input cost and interest of farmers in growing potatoes. These are statistically significant at 95% confidence level. However, participation in supplying potatoes is not statistically dependent on the mechanic tillage, tertiary level of education, 5 years of farming and more, education, income, household head age, female and married at 95% confidence level.

Inadequate knowledge on potatoes was significant at 5% and had a negative relationship to the participation in supplying potatoes. The marginal effect of inadequate knowledge indicates that inadequate knowledge will reduce participation in supplying Irish potatoes by 0.1212879. This is due to the fact that farmers have little or no interest in growing crops they don't have enough knowledge about.

Number of Obs = 128

Prob>F=0.0000

Table 7: Tobit Model Results

R2=0.1898

Variable	Coefficients	Marginal effects	P-value	Elasticity
Age	-.0042636	-.001501	0.746	-.006196
Female	.2207307	.0454365	0.532	-.090225
Married	-.65298	-.0888311	0.169	-.273
Inadequate Knowledge	-.8307365	-.1212879	0.034	-.255691
High Input Cost	-1.994743	-.2916115	0.000	-.433694
Little Interest	-1.918078	-.273931	0.000	-.408128
Month Income	-.0568769	-.0406363	0.903	-.21775
Education	1.05172	.101563	0.167	-.106679
>5yrs. of farming	.057698	.026169	0.880	-.11003
Tertiary	-.83294	-.03937	0.412	-.383359
Mechanic Tillage	-.04505	.031673	0.912	-.112795

High input cost on potatoes was significant at 5% and 1%, and had a negative relationship to the participation of SSF in supplying Irish potatoes. The marginal effect of high input cost indicates that high input cost will reduce participation of SSF in supplying Irish potatoes by 0.2916115. This is due to the fact that most SSF are not risk takers and so they cannot afford to risk huge amount of resources especially if they don't have enough knowledge or information on a particular crop or enterprise.

Little interest on growing potatoes was found significant at 5% and 1%, and had a negative relationship to the participation of SSF in supplying Irish potatoes. The marginal effect of little interest indicates that little interest will reduce participation of SSF in supplying Irish potatoes by 0.273931. This is due to the fact that farmers cannot take enterprises in which they have little or no interest. Little interest may be as a result of not being used or familiar to a particular crop or enterprise as was highlighted by some respondents. Also the high input cost and inadequate knowledge as was established in the research can be attributed to causing little interest in SSF to participate in growing and supplying Irish potatoes.

Household head age, female dummy variable, married dummy variable, income of household, education, farming years, tertiary dummy variable and mechanic tillage dummy were found to be statistically insignificant at 95% confidence level.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this chapter, the conclusions that were made from the study are presented. These are the main insights brought out by the study. The recommendations that are based on the findings and the process of carrying out this study are also presented.

5.2 Conclusion

Irish potato is a very important crop in providing the SSF with food as potato is a very nutritious food crop. Apart from providing SSF with food security, potatoes are a good source of income and can provide employment to a good number of our SSF. The small scale farmers of Lusaka particularly of Makeni and Lusaka west are reported to be important suppliers of horticultural products such as rape, cabbage, tomato, onion, Chinese, etc., except Irish potatoes. Most of the potatoes sold through the formal retail sector in Zambia are produced by large-scale farmers, mainly under irrigation (Faostat, 2008).

Household head age, female dummy variable, married dummy variable, income of households, education, lessk2m income dummy, 5years and more of farming, tertiary dummy variable and mechanic tillage dummy variable are not statistically significant in explaining participation in supplying Irish potatoes by small scale farmers at 95% confidence level.

Inadequate knowledge was found to be significantly important to inhibiting SSF participation (p-value 0.034) with marginal effect of -0.1212879 and elasticity of -0.2557. High input cost was found significantly important to inhibiting SSF participation (P-value 0.000) with marginal effect of -0.2916115 and elasticity of -0.4337. Little interest was significantly important to inhibiting SSF participation (P-value 0.000) with marginal effect of -0.273931 and elasticity of -0.4081.

5.3 Recommendations

In order to increase knowledge and skills in farmers on how to grow potatoes, there is need to increase extension work, this can be done through method and result demonstrations, provided so that farmers can observe and see how the operation is done and also to see the expected results from carrying out such particular operations. Providing lectures on how best farmers can grow and take care of potatoes, also providing lessons on Irish potato production. Presenting Agricultural shows to farmers, so that fellow farmers can learn from other farmers and also have first-hand information on implements and equipment they need to use in production of Irish potatoes and other crops.

In order to induce interest in farmers on Irish potato growing, it is important to increase extension methods like competitions, Agricultural shows, field days, look and learn tours/field trips to arouse interest. This will provide opportunity for farmers to learn from other farmers and they will be encouraged to take up production of certain crops like Irish potatoes so that the next times there are such events like competitions and Agricultural shows they can emerge as winners.

To reduce the cost of inputs in Irish potato production especially seeds which are currently going at around K350.00 per 25kg bag of small potato seedlings, Plant breeders need to look into potato seed production, to reduce the high input cost and the scarcity of seeds. Farmers also need to be taught how they can cut big potatoes and plant them as “seeds”.

REFERENCES

- Adesina, Akinwumi A. and M. Zinnah (1993). "Technology Characteristics, Farmers Perceptions and Adoption Decisions: A Tobit Model Application in Sierra Leone", *Agricultural Economics*. V. 9: 297-311.
- Ayieko M.W, D. Tschirley and M. Mathenge (2005). "Fresh Fruit and Vegetable Consumption Patterns and Supply Chain Systems In Urban Kenya". Tegemeo Institute of Agricultural Policy and Development, Egerton University. Nairobi. 12p.
- Drecher, A.W. (1997). *Urban Agriculture in the Seasonal Tropics of Central and Southern Africa, A Case Study of Lusaka Zambia*.
- Emongor R.A, Louw .A, Kirsten J.F and Madevu .H (2004). *Securing Small Producer Participation in Restructured National and Regional Agri-Food Systems*. International Institute for Environment and Development, London.
- Food and Agriculture Organization of the United Nations. *International Year of the Potato, 2008*.
- Ghadim, A. K. Abadi and J.P David (1999). "A Conceptual Framework of Adoption of an Agricultural Innovation", *Agricultural Economics*. V. 21: 145-54.
- Haantuba .H (2003). *Linkages Between Smallholder Farm Producers and Supermarkets in Zambia*. Consultancy Report for Food and Agriculture Organization. Draft 3.
- Hichaambwa .M and Tschirely .D (2006). *Zambia Horticultural Rapid Appraisal: Understanding the Domestic Value Chains of Fresh Fruits and Vegetables*. Working Paper No. 17. Food Security Research Project.
- International Potato Centre (2007). (CIP). CIP Press Room. Media Releases. *Origin of the Potato Centre in Peru*.
- Marc F.B and Christopher B.B, June 25, 2004. *An Ordered Tobit Model of Market Participation: Evidence from Kenya and Ethiopia*.
- Tschirley .D And Munguzwe .H (2010a). "The Structure and Behavior of Vegetable Markets Serving Lusaka: Main Report". Research Report #46, Food Security Research Project. Lusaka.

APPENDICES

APPENDIX 1:

Questionnaire

Questionnaire serial number:

--	--	--	--

**PARTICIPATION OF SMALL SCALE FARMERS IN SUPPLYING IRISH POTATOES
TO THE LOCAL MARKETS.**

Department of Agricultural Economics & Extension Education
The University of Zambia

This questionnaire is for academic purpose only. Be rest assured that all the information provided will be treated as private and confidential. Feel free to answer all the questions honestly.

Instructions: Ensure that the main respondent is knowledgeable about the house hold agricultural activities. If not, postpone the interview and call back when a knowledgeable person is around. Mark the correct answer with a tick [√]

SECTION A: DEMOGRAPHICS

1. Are you the owner of the farm?

1. Yes []

2. No []

2. If the answer is No, what is your relationship to the owner?

1. Spouse []

2. Farm manager []

3. Others (Specify).....

3. Sex of the respondent?

1. Male [] 2. Female []

4. Age (at last birthday).....years.

5. What is your marital status?

1. Single [] 2. Married [] 3. Divorced [] 4. Widowed []

6. What is your highest level of education?

1. Primary [] 2. Secondary [] 3. Tertiary [] 4. None []

7. How many are the house hold members?

SECTION B: SOCIO-ECONOMIC STATUS

8. For how long have you been farming here?

1. < five years [] 2. Five–Ten years [] 3.> Ten years []

9. Which tillage method do you mostly use on the farm?

1. Hoe tillage [] 2. Mechanic tillage [] 3. Oxen tillage []

10. What is the household monthly income?

1. < K2, 000,000 [] 2. K2, 000,000-K5, 000,000 [] 3.>K 5,000,000 []

11. On approximation, how much did you earn from all the crop sales of 2012?

1. < K10, 000,000 [] 2.K10, 000,000-K50, 000,000 [] 3.> K50, 000,000 []

SECTION C: PRODUCTION AND SUPPLY FACTORS.

12. How many crops do you grow on this farm household?

Number.....

13. Does the household grow Irish potatoes? If no go to question 20.

1. Yes [] 2. No []

14. What is the Lima size for Irish potatoes on your farm?

1. <Two limas [] 2. Two to Four limas [] 3. > Four limas []

15. Do you supply/sell them to the market? If no go to question 20.

1. Yes [] 2. No []

16. Which specific markets do you supply the Irish potatoes to?

1. Soweto market [] 2. City market [] 3. Kamwala [] 4. Other (Specify).....

17. How much in terms of quantity did you supply in 2012?

1. < 1000 kg [] 2. 1000kg-5000kg [] 3. > 5000kg []

18. Do you face any constraints in the supply of Irish potatoes?

1. Yes [] 2. No []

19. If yes, do the constraints include the following?

	Yes	No
a. Inadequate working capital	[]	[]
b. Lack of market information	[]	[]
c. Little knowledge of production	[]	[]
d. High input cost	[]	[]
e. Little interest	[]	[]
f. Unfavorable soil type	[]	[]
g. Inadequate water	[]	[]

- h. Land limitation
- i. Inadequate labor
- g. Others (Specify)

20. If doesn't grow/supply, which of the following are the limiting/hindering factors?

- | | Yes | No |
|-----------------------------------|--------------------------|--------------------------|
| a. Inadequate working capital | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Lack of market information | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Little knowledge of production | <input type="checkbox"/> | <input type="checkbox"/> |
| d. High input cost | <input type="checkbox"/> | <input type="checkbox"/> |
| e. Little interest | <input type="checkbox"/> | <input type="checkbox"/> |
| f. Unfavorable soil type | <input type="checkbox"/> | <input type="checkbox"/> |
| g. Inadequate water | <input type="checkbox"/> | <input type="checkbox"/> |
| h. Land limitation | <input type="checkbox"/> | <input type="checkbox"/> |
| i. Inadequate labor | <input type="checkbox"/> | <input type="checkbox"/> |
| g. Others (Specify) | | |

THANK YOU FOR YOUR CO-OPERATION