

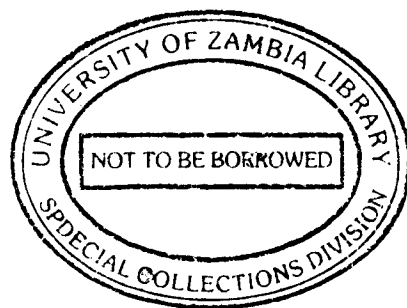
**AN ASSESSMENT OF FACTORS AFFECTING THE PERFORMANCE OF  
AGROFORESTRY FARMER-TO-FARMER TRAINERS IN CHIPATA DISTRICT**

**A Thesis presented to the Department of Agricultural Economics and  
Extension Education of the University of Zambia.**

**By**

**JULIUS MANDA**

**In partial fulfilment of the requirements for the Degree of Bachelor of  
Agricultural Sciences.**



**© Julius Manda, 2005**

## ACKNOWLEDGEMENTS

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

Sincere gratitude to Mr. E Kuntanshula, my Supervisor for his professional guidance and contribution. His dedication contributed a lot to the success of this study. I would also want to sincerely thank Dr G Tembo, my Econometrics lecturer for his immeasurable suggestions and contributions towards this report. My thanks also go to the staff at ICRAF for their help during my data collection.

I want thank my family for the love and support they gave me throughout my academic life. Special thanks also go to my elder sister (Mary) for the encouragement and support she gave me during my stay at campus.

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

## TABLE OF CONTENTS

<b>ACKNOWLEDGEMENTS.....</b>	<b>i</b>
<b>TABLE OF CONTENTS.....</b>	<b>ii</b>
<b>LIST OF TABLES.....</b>	<b>iii</b>
<b>LIST OF FIGURES.....</b>	<b>iv</b>
<b>LIST OF ACRONYMS.....</b>	<b>v</b>
<b>ABSTRACT.....</b>	<b>vi</b>
<b>CHAPTER 1: INTRODUCTION.....</b>	<b>1</b>
1.1 Background and introduction.....	1
1.2 Problem statement.....	2
1.3 Objectives .....	3
1.4 Significance Of The Study .....	3
1.5 Organization of the thesis.....	4
<b>CHAPTER 2: LITERATURE REVIEW.....</b>	<b>5</b>
2.1 Introduction.....	5
2.2 Evolution of Farmer To Farmer Extension Approach.....	5
2.3 Performance of Farmer To Farmer Approach.....	6
2.4 Factors that Affect Agro Forestry Farmer Trainers .....	8
<b>CHAPTER 3: METHODOLOGY.....</b>	<b>11</b>
3.1 Introduction.....	11
3.2 Profile of the Study Area.....	11
3.3 Target Population and Sample Size.....	12
3.4 Data Collection.....	12
3.5 Data Analysis.....	12
3.6 Specification Analysis.....	13
3.6.1 Multicollinearity.....	14
3.6.2 Heteroskedasticity.....	14
3.6.2 Test for Multicollinearity and Heteroskedasticity.....	15
3.7 Study Limitations.....	15
<b>CHAPTER 4: RESULTS AND INTERPRETATION.....</b>	<b>16</b>
4.1 Introduction.....	16
4.2 Demographic Characteristics.....	16
4.3 Factors Affecting Farmer Trainers Extension Activities.....	18
4.4.1 Implication of the Analysis.....	19
4.3 The Total Number of Farmers Trained.....	20
<b>CHAPTER 6: CONCLUSION AND RECOMMENDATIONS.....</b>	<b>22</b>
5.1 Introduction.....	22
5.2 Conclusion.....	22
5.3 Recommendations.....	23
<b>REFERENCES.....</b>	<b>24</b>
<b>APPENDIX.....</b>	<b>25</b>
<b>APPENDIX I: Survey Questionnaire.....</b>	<b>26</b>

## LIST OF TABLES

Table 1: Demographic Characteristics.....	17
Table 2: Generalized Least Squares Regression Results.....	18

## LIST OF FIGURES

Figure 1: Hypothesised Factors affecting Farmer Trainers.....	10
---	----

## LIST OF ACRONYMS

<b>AF</b>	-	Agroforestry
<b>DWDA</b>	-	District Women Development Association
<b>FT</b>	-	Farmer Trainer
<b>ICRAF</b>	-	International Centre for Research in Agroforestry
<b>ITDG</b>	-	Intermediate Technology Development Group
<b>NGO</b>	-	Non Governmental Organization
<b>SAP</b>	-	Structural Adjustment Programme
<b>ToT</b>	-	Transfer of Technology
<b>T&amp;V</b>	-	Training and Visit Extension
<b>WVIAP</b>	-	World Vision Integrated Agroforestry Project

## ABSTRACT

### AN ASSESSMENT OF FACTORS AFFECTING THE PERFORMANCE OF AGROFORESTRY FARMER-TO-FARMER TRAINERS IN CHIPATA DISTRICT

**Julius Manda**  
**University of Zambia, 2005**

**Supervisor:**  
**Mr Kuntashula**

The main objective of this study was to assess the factors that affect the performance of Agroforestry farmer-to-farmer trainers in Chipata district. The study also attempted to establish the total number of farmers trained by the farmer trainers. The data used in the analysis was mainly primary data, which was collected through the use of a semi-structured questionnaire. Since this was cross sectional data, heteroskedasticity was tested using the Breush-Pagan-Godfrey (BPG) test and it was present at 5% level of confidence. Estimated Generalized Least squares (EGLS) method was used to correct for heteroskedasticity. The findings from the study revealed that the factors that affect farmer trainers training activities were farmer trainer house hold labour availability, number of years of being a trainer, sex of the farmer trainer and workshop attendance by the farmer trainer. An increase in amount of household labour available decreased the total number of farmers trained by the farmer trainer, implying a negative relationship. On the other hand a one-year increase in the number of years of being a trainer increased the total number of farmer trained by 21. Male farmer trainers trained on average 9 more farmers than female farmer trainers. The farmer trainers who attended a workshop on average trained 13 more farmers than those who did not. The research results also showed that a total of 2435 farmers were trained out of which 49.6% were male and 50.4% were female. However, It was not out rightly concluded that male farmers are not interested in Agroforestry but this could be attributed to many factors, which may include males being out in town looking for paid jobs leaving women to take care of household activities including farming and other related activities such as Agroforestry. From these findings it was concluded that in order to improve the performance of farmer trainers the factors such as the number of years of being a trainer, sex of the farmer trainer, farmer trainer household labour availability and workshop attendance should be taken into consideration. In light of the findings of the study, some of the recommendations which were made included the need for further training to be given to the farmer trainers so that they can be conversant with new extension methods and technology, a further comprehensive study to look at the characteristics and views of farmers trained , the need to reduce the area covered by the farmer trainers to a manageable size to enable farmer's reach many farmers and also the need to work with experienced farmer trainers who can then train other farmers.

# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction and Background

The decline in soil fertility in smallholder systems is a major factor hindering equitable development in, not only Zambia but also in most of the Sub-Saharan Africa. Smaling (1997) estimates that soils in Sub-Saharan Africa are being depleted at annual rates of 22kg/ha for nitrogen, 2.5kg/ha for phosphorus and 15kg/ha potassium. The increase in the cost of chemical fertilizer has also increased the problem of infertility of the soils, as small-scale farmers cannot afford to buy the commodity. Population increase also implies there is more pressure on the land, hence leading to reduced fallowing periods thereby translating into reduced crop yields. This therefore calls for cheaper and more effective way of applying nutrients to the soil and Agroforestry has been identified as one of the ways in which soil fertility could be replenished. However Agroforestry technologies, being knowledge intensive, require innovative ways of extension if they are to be taken by many small-scale farmers.

In the past governments were largely responsible for the provision of extension services. During the 1990s, however, cuts in fiscal deficits as part of structural adjustments have led to a dismemberment of classical agricultural extension services to the extent that these services are now unable to serve the needs of smallholder farmers (Hellin and Higman, 2002). Reduced government extension services support had a severe impact on technologies with long-term benefits such as agroforestry. Therefore the evolvement of bottom up approaches such as the farmer-to-farmer extension approach became popular among projects, NGOs and others promoting agricultural development. Organizations involved in agroforestry promotion in Eastern Zambia have been using the farmer-to-farmer extension approach. Simply defined, the farmer-to-farmer training strategy involves the training of farmers who in turn train other farmers in agricultural

technologies. Farmer to farmer extension can also be defined as the emergence of a movement initiated and sustained by farmers themselves, with occasional support for instance from an NGO: the provision of training by themselves to farmers often through the creation of a structure of farmer trainers. (Scarborough et al. 1997). In Eastern Province, Zambia, the strategy is an informal and extensive one. The bulk of farmers trained (here with referred to as farmer trainers or FTs) are simple farmers with a will to experiment and to share with others. The role of the farmer trainers varies greatly depending on the communities, institutions promoting them and individuals involved. Institutions support FTs by providing them technical assistance, sponsoring field exchange visits and in some instances providing transport assistance. Farmers become FTs through regular participation in agroforestry activities, willingness to share innovations and demonstration of teaching capacity to others. Many of them are excellent innovators and are quite willing to receive groups or individuals on their farm for field days or informal training. The radius of operation of trainers varies considerably, though in most cases tends to be limited to their neighbors and extended families.

The organization that is involved in the selecting, training and supporting agroforestry farmer trainers include ICRAF (the International Center for Research in Agro forestry), The organization select those farmers (both women and men) that are exemplary farmers, serious active people, accepted by and committed to the community and those farmers dedicated to hard work.

## **1.2 Problem Statement**

The extension service has been facing a number of problems such as poor infrastructure, inadequate facilitation by the government, and inadequate extension staff on the ground. In the recent past, these problems have been exacerbated by the Structural Adjustment Programme (SAP) that most sub-Saharan countries have been implementing. Many developmental organizations

technologies. Farmer to farmer extension can also be defined as the emergence of a movement initiated and sustained by farmers themselves, with occasional support for instance from an NGO: the provision of training by themselves to farmers often through the creation of a structure of farmer trainers. (Scarborough et al. 1997). In Eastern Province, Zambia, the strategy is an informal and extensive one. The bulk of farmers trained (here with referred to as farmer trainers or FTs) are simple farmers with a will to experiment and to share with others. The role of the farmer trainers varies greatly depending on the communities, institutions promoting them and individuals involved. Institutions support FTs by providing them technical assistance, sponsoring field exchange visits and in some instances providing transport assistance. Farmers become FTs through regular participation in agroforestry activities, willingness to share innovations and demonstration of teaching capacity to others. Many of them are excellent innovators and are quite willing to receive groups or individuals on their farm for field days or informal training. The radius of operation of trainers varies considerably, though in most cases tends to be limited to their neighbors and extended families.

The organization that is involved in the selecting, training and supporting agroforestry farmer trainers include ICRAF (the International Center for Research in Agro forestry), The organization select those farmers (both women and men) that are exemplary farmers, serious active people, accepted by and committed to the community and those farmers dedicated to hard work.

## **1.2 Problem Statement**

The extension service has been facing a number of problems such as poor infrastructure, inadequate facilitation by the government, and inadequate extension staff on the ground. In the recent past, these problems have been exacerbated by the Structural Adjustment Programme (SAP) that most sub-Saharan countries have been implementing. Many developmental organizations

have been forced to look for alternative ways of providing the extension services. The use of farmers to train other farmers has increasingly taken the center stage among these alternatives. Organizations involved in Agroforestry technologies in Zambia's Eastern Province have not been exceptional to the use of the farmer-to-farmer extension approach. However, performance of some farmer trainers has been poor to say the least. Some FT s have trained lower numbers of farmers than others while farmers trained by different farmer trainers may also differ in the agroforestry knowledge they obtain. The farmer trainer's effectiveness in training certain groups of farmers could also be different. Several studies on the dissemination and on the adoption of agroforestry technologies have been conducted in Zambia's Eastern Province. However none of these studies looked at the factors that favor or constrain the operations of the FTs. What factors therefore affect an agroforestry farmer trainer in his or her training activities? This study attempted to answer this question.

### **1.3 Objectives**

#### **General Objective.**

The main objective of the study was to assess the performance and factors that favors or constrains farmer trainers in the agroforestry extension process.

#### **Specific Objectives.**

- To identify the factors affecting farmer trainers extension activities.
- To establish the total number of farmers trained by each farmer trainer.

### **1.4 Significance of the Study**

This study will provide vital information to not only the organizations involved in agroforestry but also to the government agricultural policy makers on how to effectively relay agroforestry technologies to the farmers using farmer to farmer

training approach. Thus, it is justifiable that a study like this be undertaken so as to establish the factors that may affect the efficiency of farmer trainers in agroforestry. The results could be generalized to other technologies with long-term benefits.

### **1.5 Organization of the Thesis**

The study consists of five chapters. The first chapter presents the background of farmer to farmer extension approach. It also gives the statement of the problem, objectives of the study and the significance of the study. The second chapter presents the literature reviewed on studies done on farmer to farmer approach and the conceptual frame work which outlines the theory linking the statement of the problem through objectives to the methodology. Chapter three outlines the methodology, which includes the target population, sample size data collection methods and data analysis. Chapter four presents the findings of the study as well as the interpretations of the findings. Chapter five outlines the conclusions drawn from the study and recommendations

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

The literature begins with a brief theoretical background on how the bottom up approaches (farmer to farmer approach) evolved in Zambia. This is followed by previous research findings that relate to the research problem from other parts of the world and research results from the Eastern Province of Zambia. The last part of this chapter reviews literature on the possible factors that affects farmer trainers' training activities.

#### **2.2 Evolution of Farmer-To-Farmer Extension Approach**

The Zambian agriculture system has used several extension approaches including the "transfer of technology model" (ToT) also called linear model and the training and visit (T & V) system developed in the mid 70s by David Benor for the World Bank, in its quest to transfer innovations to farmers. These approaches were based on the top – down transfer of technology principles. The models assumptions were that development could be achieved by triggering down the transfer of technologies and knowledge from scientists to the farmers who are passive receivers, who themselves are the main constraint to achieve the goal. Later there was wide recognition of the failure of top-down approaches to reach as many farmers as envisaged. In the 90s the general feeling was that bottom-up extension participatory approaches could be more effective. Through these approaches coupled with worsening budget deficit and conditionalities attached to Structural Adjustment Programme implementation a farmer-to-farmer extension methodology evolved.

## 2.3 Performance of the Farmer To Farmer Approach

Literature reviewed on previous research comprises six results i.e. research on the use of farmer-to-farmer extension elsewhere apart from Zambia and that reviewed in Zambia. In Peru, since the late-1990s, Intermediate Technology Development Group (ITDG), a non-governmental development organization, has been working in farming communities in the Peruvian Andes, to improve their livelihood security using this approach. Mainly, in Peru the farmer-to-farmer training approach is used in the production of maize, potatoes and beans in the communities. These communities are poorly served by government extension services, hence the use of the farmer-to-farmer extension agents (Bunch and Lopez, 1999).

In the uplands of Cebu, Philippines, agroforestry technologies have been developed with farmers, on their farms, and promoted through a system in which farmer trainer's share with other farmer's lessons drawn from their own experiences. In some cases these promoters were paid salaries and reimbursed for their expenses by the NGOs, and in other cases work was strictly voluntary. A key element in the success of the strategy involved it's tapping a long-held agricultural tradition of mutual-help work groups (Zimmerman, 2002)

Zimmerman, (2002) also noted in Philippines that most Successful programs made use of the farmer to farmer extension where it already existed, they revived it where it had fallen into decline, and introduced it where it was absent. Many of the technologies developed and promoted were too labor-intensive for an individual farmer to implement. The technologies had both structural and vegetative components designed to minimize soil erosion, improve fertility, and increase water-holding capacity of the soil, especially on sloping lands

In Mexico, Marsh (1991) found out that, employing farmers as extension agents resolved many problems that undermined more typical extension agents. Local farmers brought a wealth of knowledge and experience to technology generation

and diffusion project that is only partially attainable by out side experts. Farmer promoters were also up to date on agriculture calendars and current production problems and did not comply with regular office hours hence were able to provide technical assistance in a timely manner.

Muok et al (2001) in the dry lands of Kenya noted that the use of farmer-to-farmer extension was an effective approach for sustainable technology dissemination, bearing in mind the limited human resources facing the forestry sector to day. The target farmers were able to simplify technical information from extension agents using the local language, other farmers could simply understand. Core farmers were also able to mobilize other farmers especially if she or he was a member of a given group for tree planting.

Scarborough et al (1997) reports similar success of farmer extensionists in Latin America and Asia especially in areas where extension officials do not exist

Kabwe (2001) carried out a research in dissemination pathways for agroforestry technologies in Eastern Province, Zambia. Out of the three dissemination pathways, which have been tried, i.e. government agricultural extension officers, farmer trainers and local leaders (chiefs and headmen), the use of farmer trainers appeared to clear cut advantages over the other two pathways.

The literature reviewed above shows that the use of farmer to farmer extension has been very successful. However none of the researches reviewed looked at the possible factors that may affect farmer trainers training activities in their quest to transmit Agroforestry technologies to their fellow farmers.

## 2.4 Factors that Affect Agro Forestry Farmer Trainers

Muok et al (2001), in the dry lands of Kenya found out that the age classes of 21-40 years presented the majority of the farmers who were interested in Agroforestry and according to them this was because this age group contained a lot of youths who had just completed school and yet to get paid jobs. The other reason which was given was that the age group also comprised people who were most knowledgeable members of society and therefore were more receptive to new ideas. Hence the increase in the age of the farmer trainer is expected to reduce the total number of farmers trained. Similarly an increase in the farmer trainers level of education is expected to increase the total number of farmers trained.

Selener et al (1997) noted that the proportion of women farmer trainers in development organizations was typically low. Some of the reasons attributed to this low representation included limited time that women have available to dedicate to activities outside their own households. The other reason that was given was that in most rural communities the basic work of the household is performed by women. Additionally, the role of being a mother requires her to be closer to the home for child care and other household chores, compared to men. Cultural norms was also found to be a contributing factor as it required women to spend more time in the household. It is therefore expected that men will train more farmer than women.

In Mexico, it was found out that attendance of workshops by the farmer trainers strengthened the knowledge and also taught new methods of Agroforestry technologies. It was noted that workshops served as a fora for exchange of theoretical and practical information. (Lopez, 1997).

Oduol, et al (2003), also showed that attending workshops in agroforestry exposed farmer trainers to new AF technology, increased awareness and

promoted AF technologies to other farmers. Therefore attending workshops is expected to increase the number of farmers trained by the farmer trainer.

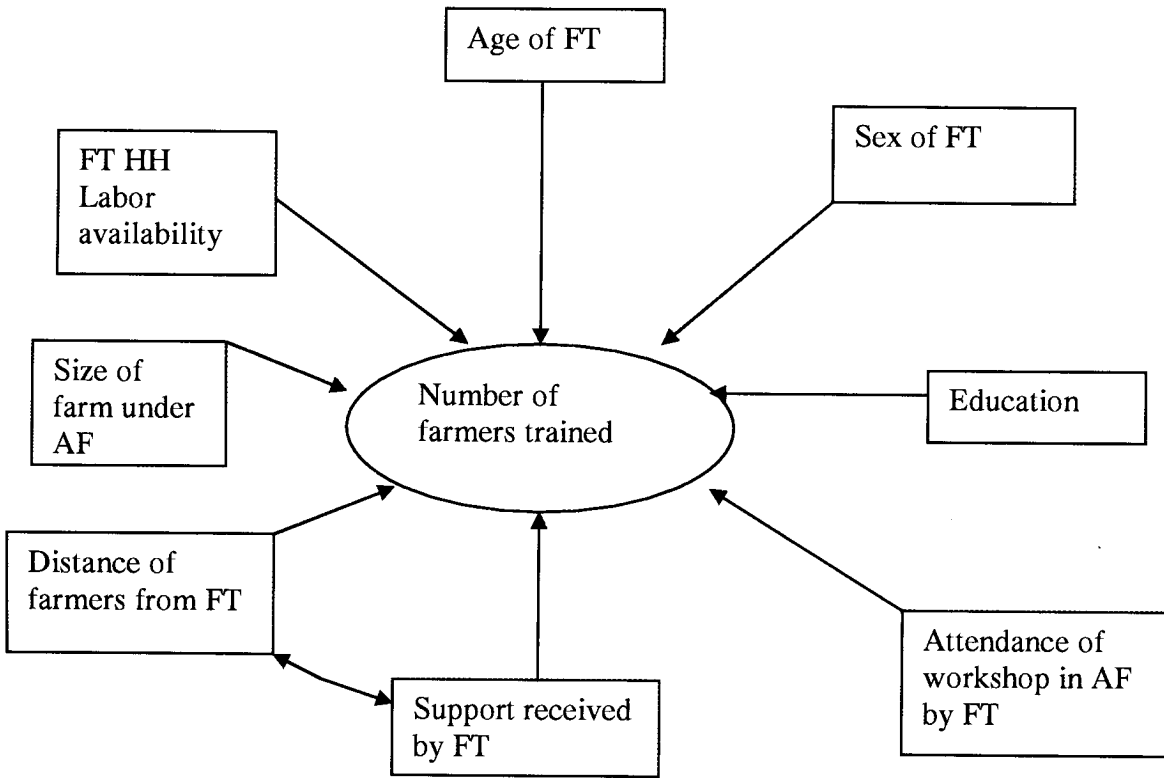
Selener et al (1997) stated that the farmer trainers should be given job incentives such as promotion and provision of bicycles. According to them the rise of farmer extensionists, with increased training that the farmer trainer obtains doesn't only keep the farmer trainer interested in his job, but also increases the quality of his work. The provision of incentives to the farmer trainers is expected to increase the total number of farmers trained.

Selener et al (1997) noted that farmer trainers work in several villages and therefore have to cover long distances in order to visit the farmers they train. They went on to say that having farmer trainers walk was not necessarily economical, especially when distances are great as it reduced the motivation of the farmer trainers, reducing the quality of their work. Hence the greater the distance between the farmer trainer and farmer is expected to affect the total number farmers trained negatively.

Place (2002) found out that household labour availability posed an important limitation to the area that a farmer allocates to the technology. There fore it is assumed that if the farmer trainer has enough house hold labour, he or she will be more dedicated to their Agroforestry work.

Therefore, it can be noted that several variables affect farmer trainers. The variables that were presumed to affect the total number of farmers trained included the age of the FT, sex of the FT, level of education of the FT, workshop attended by the FT, support received by FT, distance of farmers from FT, size of farm under agroforestry and FT household labour availability. The Figure 1 below shows the relationship between the hypothesized independent variables and the dependent variable (number of farmers trained)

**Figure 1: Hypothesized Factors affecting Farmer Trainers**



## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 Introduction**

This chapter presents the study methodology. It begins by giving a profile of Chipata District where the study was conducted. This is followed by a description of the target population, data collection method, and data analysis. The last part of the chapter shows how the regression model was specified and also attempts to highlight the problems associated with the model.

#### **3.2 Profile of Study Area**

Chipata is situated in the eastern part of Zambia. It is just at the border with Malawi. Chipata is situated between longitude  $30^{\circ} 25'$  and  $34^{\circ} 00'$  east and latitude  $10^{\circ} 20'$  and  $15^{\circ} 00'$  south. Chipata is  $1198\text{km}^2$  in area.

The Eastern part is a plateau area; the middle area is the escarpment zone while the western part is the valley. Since part of Chipata is a plateau, it is rooted by gentle to moderate slopes that are interspersed with hills, ridges and minor escarpments in a rolling landscape. Dambos, which are seasonally water logged and low lying areas, are a common feature in Chipata.

There are three distinct seasons in Chipata. These are warm, wet season, the cool dry season and hot dry season. The annual rainfall ranges from 800 to  $1000\text{mm}^3$ . In the valley the rainy season tends to start and end earlier than any where else in Chipata.

The predominant soil group is the sand veldt. The most common soil type are the yellowish-red to light-yellowish brown loamy sands or sand on well drained sites

and gray brown, loamy sands or sand on poorly drained sites. Hand hoe-valley and ox-cultivation in the plateau are the common farming systems.

### **3.3 Target Population and Sample Size**

In the study, the target population included all farmer trainers trained by ICRAF, in Chipata district and the sampling unit included both male and female trainers. Though there are 8 districts in the eastern province, Chipata district was chosen because that is where ICRAF has its headquarters' i.e. most of the agroforestry activities takes place in this district and also for easy accessibility.

The method used to generate the data, sample size and the sampling method were dependent on the objectives, cost and time. Based on records from ICRAF a sampling frame was made. Forty-five farmer trainers were interviewed out of a total population of 56 farmer trainers. This implies therefore that 80% of the farmer trainers were interviewed.

### **3.4 Data Collection**

Data collection included a field study, in which Primary data was obtained through a semi-structured questionnaire with both open and closed ended questions. Informal interviews with AF farmer trainers, trainees and ICRAF were also carried out. Secondary data was collected from the university and ICRAF libraries.

### **3.5 Data Analysis**

Data was analyzed using Statistical Package for Social Scientists (SPSS). Estimated Generalized least squares (EGLS) regression analysis to explore the relationship between the total number of farmers trained and the selected

independent variables. Equation (1) below was then implemented using a sample of 45 farmer trainers

The dependent variable (Y) and the independent variables included in the regression equation were defined as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 D_1 + \beta_6 D_2 + \beta_7 D_3 + \beta_8 D_4 + \beta_9 D_5 + e_1 \dots \dots (1)$$

Where;

Y = Total number of farmers trained

X<sub>1</sub> = Age of farmer trainer

X<sub>2</sub> = FT house hold labor availability

X<sub>3</sub> = Number of years practicing AF

X<sub>4</sub> = number of trainings in AF by FT

D<sub>1</sub> = Sex Dummy equal to 1 if, male and 0, otherwise.

D<sub>2</sub> = Education Dummy, equal to 1 if trainer went beyond primary and 0 otherwise.

D<sub>3</sub> = Support Dummy, equal to 1 if received support and 0 otherwise

D<sub>4</sub> = Distance Dummy, equal to 1 if distance is Presumed to affect FTs work and 0 otherwise

D<sub>5</sub> = Workshop Dummy, equal to 1 if attended AF training and 0 otherwise.

$\beta_0$  is the intercept while  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8,$  and  $\beta_9$  are regression coefficients and  $e_1$  is the random error term.

### 3.6 Specification Analysis

In specifying the models there were problems that were suspected to have affected the model and these included multicollinearity and Heteroskedasticity. Multicollinearity was suspected because the method used to estimate the factors affecting farmer trainers training activities was a multiple regression analysis with a high probability of having an exact linear relationship among the explanatory

variables. On the other hand heteroskedasticity was suspected because the data that was used in the analysis was cross sectional data.

### **3.6.1 Multicollinearity**

The term multicollinearity refers to the existence of a perfect or exact linear relationship among some or all of the explanatory variables of a regression model. This usually leads to high standard errors for estimated regression coefficients. If there is perfect multicollinearity, the regression coefficients of the  $x$  variables are indeterminate and their standard errors are infinite. If multicollinearity is less than perfect, the regression coefficients although determinate possess large standard errors (in relation to coefficients themselves), which means that the coefficients cannot be estimated with great precision or accuracy.

Some remedial measures that can be taken to take care of multicollinearity include combining cross sectional data and time series data (pooling of data), dropping a variable(s) and specification bias, transformation of variables and using additional or new data

### **3.6.2 Heteroskedasticity**

One of the assumptions of the classical linear regression model is that the variance of each disturbance term  $e$ , conditional on the chosen values of the explanatory variables is some constant. This is the assumption of Homoskedasticity or equal (homo) spread (skedasticity) that is equal variance. Therefore Heteroskedasticity refers to situation where there is unequal variance. It is caused mainly by the presence of outliers, violating the assumption that the model is correctly specified, skewness in the distribution of one or more regressors included in the model, incorrect transformation of data and incorrect functional form. The presence of heteroskedasticity can be detected by use of

tests such as Goldfeld-Quandt test, Breusch-pagan-Godfrey test and whites General Heteroskedasticity test. Remedial measures that can be taken to correct Heteroskedasticity include the use of the method of Weighted Least Squares and Whites heteroskedasticity-consistency Variances and standard Errors.

### **3.6.3 Test for Multicollinearity and Heteroskedasticity**

The variance inflation factor (VIF) was used to measure multicollinearity. This test showed that there was no serious multicollinearity among the regression coefficients with values ranging between 1.257 and 1.798.

Heteroskedasticity was tested using the Breusch-Pagan-Godfrey (BPG) test and it was significant at 5%. Heteroskedasticity was then later corrected by use of Estimated Generalized Least Squares (EGLS) method.

### **3.7 Study Limitations**

The study was limited by the budget constraints and this forced the researcher to be confined in Chipata rather than the whole eastern province, which could have been more ideal. Time was also another limiting factor. Carrying out an effective research involves a lot of time since most of the villages were located far away from the main town.

## **CHAPTER 4**

### **RESULTS AND INTERPRETATION**

#### **4.1 Introduction**

This chapter presents the study results and interpretation. It begins with a description of the demographic characteristics based on forty five farmer trainers who were interviewed and this is summarized in Table 1. It also presents the Estimated Generalized Least Squares (EGLS) results factors and these are also presented in Table 2 below, which summarizes the factors that affect farmer trainers' training activities and this is followed with the implications or interpretation of the results. It is suffice to say here that only the variables, which were significant at 5% confidence level, were interpreted.

#### **4.1 Demographic Characteristics of Farmer Trainers**

With reference to table 1 below, approximately 53.3 percent of the farmer trainers interviewed were male while 46.7 percent were female i.e. 24 were male and 21 were female.

A total of 66.6 percent of the farmer trainers were aged below 50 years with the majority of the farmers trained aged between 40-44 years. The minimum and maximum ages of the FTs were 31 and 60 years respectively. The mean age of the distribution was 45.16 years with a standard deviation of 7.3

Of the trainers interviewed, 51.1% had at least attended primary, and 48.9% secondary. The study findings also showed that the majority of farmer trainers' households were male headed, with (91.1%) representing male headed households and only 8.8% were female headed

**Table 1: House Hold Demographic Characteristics**

Characteristic	Number	Percentage
Sex of FT		
Male	24	53.3
Female	21	46.7
<b>Total</b>	<b>45</b>	<b>100</b>
Age		
Under 35	2	4.4
35-44	23	51.1
45-54	16	35.5
Above 55	4	8.9
<b>Total</b>	<b>45</b>	<b>100</b>
Education		
Primary	23	51.1
Secondary	22	48.9
<b>Total</b>	<b>45</b>	<b>100</b>
House category		
Male headed with one wife	36	80
Male headed with more than one wife	5	11.1
Female-headed single	2	4.4
Female-headed divorced	1	2.2
Female-headed widowed	1	2.2
<b>Total</b>	<b>45</b>	<b>100</b>
Source of income		
Farming	40	88.9
Business	4	8.9
Working	1	2.2
<b>Total</b>	<b>45</b>	<b>100.0</b>

Source: Own Survey

A majority of farmer trainers (88.9%) said that their main source of income was farming and this. The least important source of income was working, which was represented by 2.2%

## 4.2 Factors Affecting Farmer Trainer's Extension Activities

The table below summarizes the regression results for the model. All the variables except level of education, household labour availability, the intercept and support received had signs, contrary to theoretical expectations.

**Table 2: Estimated Generalized Least Squares Regression Results**

<b>Variable Description</b>	<b>Parameter Estimate</b>	<b>p-value</b>	<b>standard error</b>
Intercept	-1.511	0.961	2.466
Age of Trainer	-0.648	0.112	0.398
Household Labor availability	-2.605	0.041	1.226
Number of Years of being a Trainer	21.215	0.000	3.356
Size of Farm under AF (in Lima)	0.536	0.915	4.984
Sex Dummy equal to 1 if, male and 0, otherwise.	8.534	0.044	4.092
Education Dummy equal to 1if trainer went beyond primary and 0 otherwise.	-3.566	0.639	7.540
Support Dummy, equal to 1 if received support and 0 otherwise	-5.980	0.242	5.026
Distance Dummy, equal to 1distance is Presumed to affect FTs work and 0 otherwise	-2.768	0.750	8.615
Workshop, Dummy equal to 1 if attended AF training and 0 otherwise.	13.190	0.006	6.856

<sup>a</sup> Dependent Variable: Total number of farmers trained

Source: Own Survey Data

#### 4 .2.1 Implication of the Analysis

The overall model was statistically significant because the p-value was less than 0.05 and the F-statistic of the model is 10.529. The R-squared was 0.73; meaning that approximately 73% of the variability of total number of farmer trainers was accounted for by the variables in the model.

The t-statistic was used to test whether or not a particular explanatory variable was significant. The decision rule that was used to test the significance of the estimates at 95% confidence interval was that if the p-value was more than 0.05 parameter estimates was not significant. On the other hand if the p-value was less than the, 0.05 then the estimate was significant. In the study it was revealed that only the parameter estimates of sex, ( $D_1$ ), household labor availability ( $X_2$ ), number of years of being a farmer trainer ( $X_3$ ) and attendance of workshop ( $D_5$ ) were significant. The other variables were retained even though they were not significant because their removal would have affected the expected relationship between the Dependant and independent variables.

The results suggest that the total number of farmers differs significantly by farmer trainer household labor availability, sex of the farmer trainer, number of years of being a trainer and workshop attendance.

It is expected that an increase in the amount of house hold labour would in turn lead to an increase in the total number of farmers trained by the FTs. The result however was contrary to theoretical expectation in that with an increase in the amount of labor by one unit, the number of farmers trained will on average reduce by approximately 3 farmers. The decrease in the number of farmers trained with an increase in house hold labour availability could be attributed to the fact that a larger proportion of the household labor maybe comprised of people who considerably old with little contribution to farming activities.

When all other independent variables are held constant, a one-year increase in the number of years of being a trainer will on average increase the number of farmers trained by 21. Thus a positive relation was observed between the number of years of being a trainer and the total number of farmers trained and was consistent with the theoretical expectation. This was obviously expected because farmers who have been trainers for a long time are very familiar with agroforestry technologies and therefore have a lot of experience in training other farmers.

Male FTs on average trained approximately 9 farmers more than female FTs. Since the coefficient of the dummy variable is statistically significant, we safely say that there is a difference in the average number of farmers trained by of the two groups of FTs. Some of the reasons attributed to this result may include limited time that women have available to dedicate to activities outside their own house holds and in most rural communities also, the basic work of the household is performed by women.

There was also a statistically significant difference in the average number of farmers trained by the FTs who attended a workshop and those who did not in that on average, FTs who attended workshops trained 13 more farmers than those who didn't. This could have been the case because workshops serve as a form of further training as FTs become knowledgeable about new AF technologies and this makes them more efficient in training other farmers.

#### **4.3 The Total Number of Farmers Trained.**

An investigation into the total number of farmers trained revealed a total of 2435 farmers were trained by the 45 farmer trainers interviewed, out of which 1208 were male (49.6%) and 1227 were female (50.4%). The fact that majority of farmers trained were female was an important observation. It may not be out rightly concluded that males are not interested in AF because the males are not

available due to a number of reasons which may include being in town for paid jobs, leaving women to take care of household activities including farming and other related activities such as AF. Another reason, which may make the number of male trainees to be less than female trainees, could be because women are in the majority and most men feel uncomfortable in a group where women are in the majority.

## **CHAPTER 5**

### **CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter summarizes the findings of the study and recommendations. The recommendations proposed can be very vital to the Government and organizations involved in the use of farmer to farmer approach. The recommendations may also help to find ways of improving the performance of the farmer trainers in Agroforestry.

#### **5.1 Conclusions**

The farmer-to-farmer extension needs to be seen as a complex system of various factors influencing its success. In this study it was found out that the factors that affect the farmer trainer's extension activities include sex, household labour availability, number of years of being a trainer, and workshop attendance. On the other hand factors such as number of years of being trainer, sex and workshop attendance led to an increase in number of farmers trained by the farmer trainer. I.e. there was a Positive relationship. This therefore implies that such things as workshops should be encouraged, as it would lead to an increase in the total number of farmers trained by the farmer trainer. House labor availability also affected the total number of farmers trained, though it was contrary to theoretical expectations because the total number of farmers trained reduced with an increase in availability of labor.

The study also revealed that out of the total number farmer's trained females were slightly more than males. This result may have been due to a lot of reasons which may include men being in town for paid jobs, leaving women to take care of household activities including farming and other related activities such as AF among others. Hence it is imperative that organizations involved in using farmer

to farmer approach take these factors into consideration as it will help them in assessing the performance of farmer trainers as well as comparing the total number of male and female farmers trained

## **5.2 Recommendations**

In view of the research findings, the following are the recommendations made:

- A more comprehensive study is recommended which could look at the characteristics and views of the farmers i.e. the trainees
- The area covered by farmer trainers should be reduced to a manageable size to enable farmer's reach many farmers. However it is also imperative to increase the number of trainers in order to reduce the coverage per trainer.
- When ever possible a program should work with experienced farmer trainers who can then train other farmers. In this way training tends to be more realistic and effective.
- The organizations involved in dissemination of AF technologies should pay attention to both the factors that lead to increase and decrease in the number of farmers trained. Provision of bicycles should be encouraged, as this would reduce the distances traveled by the trainers. Alternatively help in form of an allowance should be given to farmers trainers as this would not only reduce the transport problems but also help the farmer trainers run their fields or farms while being engaged in their AF work.
- Further training should also be given to the farmer trainers so that they can be conversant with new extension methods and technology.

## REFERENCES

- Achola P and Bless C. (1989), **Fundamentals of Social Research Methods: An African Perspective** UNZA press, Lusaka
- Adams M.E., (1982) **Agriculture Extension in Developing Countries**, Longman Singapore publishers Pte Limited
- Atsushi.I Kimondo J, and Muouk.B, (2001), **Farmer to Farmer Extension: Experience in Dry lands of Kenya.**
- Banda J, Banda P and Tengnas B (1997), **Agroforestry Manual for Extension Workers, for Central and Lusaka provinces** SIDA, Nairobi, Kenya
- Coello, J., Hellin, J. and, Rodriguez, D. (2003.) **Measuring the Livelihood Impact of Farmer-to-Farmer Extension Services in the Andes.** ITDG Publishing and Latin America Bureau, London
- Gujarati D, (2003), **Basic Econometrics**, fourth edition. Mc graw publishing House.
- Kabwe G. (2001) **Dissemination Pathways for Agroforestry Technologies: the case for improved Fallows in Eastern Zambia**
- Kwesiga, F et al, (2002), **Improved Fallows in Eastern Zambia**, Lusaka.
- Madala, G.S (1992), **Introduction to Econometrics**, second edition, McMillan. Publishing house
- Selener, D. Chenier J and. Zelaya, R, (2002) **Farmer to Farmer Extension. Lessons Learned from the Field**, International Institute for Rural Reconstruction

## **APPENDIX**

## APPENDIX I: QUESTIONNAIRE

### An Assessment of the Factors Affecting the performance of Agroforestry Farmer-To-Farmer Trainers in Chipata District

#### SECTION A: IDENTIFICATION INFORMATION

District.....

Village.....

Camp.....

Date.....

#### SECTION B: BACKGROUND INFORMATION

1. Name of trainer.....

2. Sex of trainer

a) Male

b) Female

3. Age of trainer/birth/year.....

4. Household category

Male headed with one wife		Female headed married	
Male headed more than one wife		Female headed single	
Male headed single		Female headed divorced	
Male headed divorced		Female headed widowed	
Male headed widowed			

5. What is your highest level of Education?

a) Attended Primary .....

- (b) Completed primary.....
- (c) Attended Secondary .....
- (d) Completed Secondary.....
- (e) Never attended school.....
- (f) Other, Specify .....

6. What is your main source of income?.....

- (a).....
- (b).....
- (c).....

7. What is the number of your household.....

YEARS	CHILDREN		DEPENDANTS	
	Male	Female	Male	Female
Between 0-14				
Above 15				
Total				

**SECTION C: AGRICULTURAL DATA**

8. Have you been a farmer throughout your life?

- a) Yes
- b) No.

9. If no to question 8, what have you been doing before you started farming.....

10. What do you do apart from farming?

.....  
.....

11. What is the size of your farm.....

12. What size of the farm do you cultivate?.....

13. How much of it is under agroforestry?.....

14. Do you hire any labour?.....

15. If yes, what is the form of payment?.....

16. Did you receive any training in agroforestry?

a) Yes

b) No

16. If yes, specify when?

Year	Duration

17. For how many years have been a trainer?.....

18. Explain how you were selected as a farmer Trainer.....

.....

20. Through which organization were you selected?

a) ICRAF .....

b) WVIAP .....

c) . DWDAs.....

d) Other, (specify).....

21. Which organization trained you?
- (a) ICRAF.....
- (b) WVIAP.....
- (c) DWDA.....
- (d) Other, (specify).....

22. Do you receive any support from your organization?

- a) Yes.
- b) No

23. If yes, what kind of support

Source of support	Type of support

24. If yes, does the support you receive help you in your AF work?

- a) Yes
- b) No

How does it help you?.....

25. What do you think would be the best support that could help you in your work?.....

25.1 why.....

26. From the time you were first trained, have you attended any workshop or training related to Agroforestry?

- a) Yes .....
- b) No.....

26.1. If yes when.....

27 What topics did the workshop/training include?.....

28. Which organization organized them?.....

29. How long does it take you to reach the farmers that you train?

a) By bicycle

The furthest.....

The nearest.....

(b) By walking.

The furthest.....

The nearest.....

30. Do you think the distance from where you stay affect your work?

a) Yes.

b) No.

31. If yes, how?.....

32. If the answer to question 31 is no, why?.....

33. Would you say the road net work is bad?

a) Agree.....

b) Strongly agree

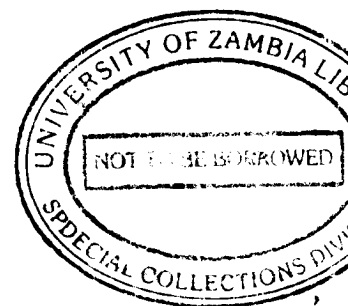
c) Disagree

d) Strongly Disagree

34. How is your relationship with the community in general in your village as a result of your work?

a) Good

b) Very good



c) Bad

d) Very bad

Explain.....

35. What do you think are the major constraints in your work as a farmer Trainer? (Rank in order of importance)

1.....

2.....

3.....

4.....

36. What is the number of villages that you are in charge of?.....

36.1 What are the names of the villages.....

.....

37 How many farmers have you trained from the time you started?.....

Year	Male	Female	Total	

38 .How many farmers have planted?

Year	Male	Female	Total	

39. What other training have you received apart form AF?.....