

**IMPACT OF E-VOUCHER FARMER INPUT SUPPORT PROGRAMME
(FISP) ON CROP PRODUCTIVITY AND INCOME DIVERSIFICATION
AMONG SMALL SCALE FARMERS OF LUKANDA AGRICULTURAL
CAMP IN KAPIRI MPOSHI DISTRICT IN ZAMBIA**

CHIBIZWA CHIBE CHIBBOMPA (201602105)

Research Report submitted to Mulungushi University in partial fulfillment of the requirements for the degree of Master in Disaster Studies in the School of Agriculture and Natural Resources

August 2018

CERTIFICATION

I hereby certify that this research paper entitled: impact of the e-voucher farmer input support programme (FISP) on crop productivity and income diversification among small scale farmers of Lukanda agricultural camp in Kapiri Mposhi district in Zambia is a bonafide work of MR. CHIBIZWA CHIBE CHIBBOMPA, Registration No 197692/76/1 in partial fulfillment of the requirements of the Master's degree in Disaster Studies in the school of Agriculture Mulungushi University.

DECLARATION AND COPYRIGHT

a) Student

I CHIBIZWA CHIBE CHIBBOMPA (MR) do declare that this Research report is my original work and has not and will not be submitted for a degree award or similar qualification in any other university or institution of higher learning. I further wish to note that acknowledgement of other peoples work has been well appreciated and recognized throughout the publication.

Signature.....Date.....
Computer/Registration Number..... NRC/Passport No.....

(b) Supervisor

This Research report has been submitted for review with my/our approval as supervisors appointed by the Director of Research and Postgraduate Studies as recommended by the School of Agriculture and Natural Resources of Mulungushi University.

Supervisor

Signature.....Date.....
Name.....
Department/School.....

ACKNOWLEDGMENT

This study would not have been a reality without the support and encouragement given by various people and institutions whose contributions I feel strongly indebted to. I would like to begin by thanking my able Supervisor Mr. Nchimunya Bbebe, whose main interest in my opinion was to see me succeed in academic life.

I am also greatly indebted to my lecturers; Dr. Mitulo Silengo, Dr. Adrian Phiri, Dr. Chomba Chola, Mr. Masautso Mwale, Mr. Joseph Thokozani Mwale, Mr. Siyanga Boyd and Mr. Daka for their tireless efforts to make sure that i succeed in academic life.

Special thanks go to Dad and Mum, Brothers and Sisters, Wife and Children, my friends and class mates whose support and encouragement motivated me to do this study. I wish to thank Mulungushi University for allowing me to enroll with them and give me this rare opportunity to do this research.

Finally, I thank Simon Mumba Senior Agricultural Officer (SAO) for Kapiri Mposhi offices of Ministry of Agriculture, not forgetting Euphrasia Phiri Camp Officer (Lukanda camp) for Mulungushi farm block who helped me organize farmers to enable conduct the research. I will be failing in my duties if I don't include Mr. Kasangulu from Kapiri Mposhi office of the District Commissioner's office for assistance in terms of transport to enable me with my assistant researcher reach out to respondents. Many thanks to people of Mulungushi farm block whose support, co-operation and to some extent tolerance enabled me to carry out this research.

DEDICATION

I dedicate this Research report to my wife Bridget my children Chibelenga, Chipego, Choolwe and Chiinga my late father Mugande Mungazi Chibizwa, my mother Nelia Mutinta Siazeele, my brothers Chibi, Chindivwi and Chikkwati, my sisters Chuma and Charity for their support, encouragement and care in the frail moments of life.

DISCLAIMER

Though a number of people contributed in coming up with this Research Report, it is entirely my own work.

ABSTRACT

In order to revamp agricultural production in Zambia, Government in 2002 introduced the Farmer Input Support Programme whose aim was to improve small scale farmers' access to maize based agricultural inputs. However, in 2015/16 season, the Ministry of Agriculture moved away from the conventional FISP and introduced an Electronic Voucher system which broadened the target inputs farmers were allowed to purchase beyond maize inputs only. The overall objective of this study was to assess the impact of the E-Voucher system on crop productivity and income diversification among small scale farmers.

The study was conducted in Lukanda Agricultural Camp in Mulungushi farm block of Kapiri Mposhi district which was selected purposively. The study interviewed One Hundred and Fifty Four (154) small scale farmers who were randomly selected using a structured questionnaire out of which 104 were FISP E-voucher beneficiaries and 50 non-beneficiaries. Data was analyzed using the Statistical Package for Social Sciences. The study explored the richness of the livelihood sources that directly contribute to food security and income.

Major inputs purchased using the e-voucher cards among sampled farmers in addition to fertilizers were; maize seed (21%), livestock drugs (18%), vegetable inputs (15%), CA implements (7%) and poultry inputs (5%). The trend analysis show that FISP input support has contributed to a 2.8% increase in maize productivity among the beneficiaries in the period 2014/15-2016/17. An increase in income diversification was reported during the E-voucher implementation period among the FISP E-voucher beneficiary farm households. The following recommendations are made; firstly, there is need to consider timely release of inputs under the FISP E-voucher system and secondly, more investment is required in terms of the value of the E-voucher so that farmers are able to source more productive inputs and assets beyond maize inputs.

Key words: Farmer Input Support Programme, E-voucher, Productivity, Diversification, Small Scale farmers

TABLE OF CONTENTS

CERTIFICATION	ii
DECLARATION AND COPYRIGHT	iii
ACKNOWLEDGMENT	iv
DEDICATION.....	v
DISCLAIMER	vi
ABSTRACT	vii
TABLE OF CONTENTS	viii
LIST OF FIGURES	xi
LIST OF TABLES	xii
LIST OF APPENDICES	xiii
ACRONYMS AND ABBREVIATIONS	xiv
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background.....	1
1.2 Problem Statement	3
1.3 Aim.....	3
1.4 Objectives	4
1.5 Research Questions	4
1.6 Rationale	4
1.7 CONCEPTUAL AND THEORETICAL FRAMEWORKS	5
1.7.1 Agricultural Household Model	5
1.7.2 Logic Model.....	6
CHAPTER TWO	8
LITERATURE REVIEW	8

2.1 Introduction.....	8
2.2 Overview of FISP and E-voucher Programme	8
2.3 The National Agricultural Policy	10
2.4 E-voucher Programme in the region	11
2.5 The Role of government Subsidies in Agricultural Growth of Small Scale Farming.....	13
CHAPTER THREE-	15
MATERIALS AND METHODS.....	15
3.1 Introduction.....	15
3.2 Study area location and description	15
3.2.1 Location	15
3.2.2 Description.....	16
3.3 Research Design.....	16
3.4 Data collection methods/Techniques.....	17
3.4.1 Study population	17
3.4.2Sampling Procedure	17
3.4.3Types of data.....	17
3.4.4Instruments for Data Collection	17
3.5 Data Analysis	17
3.6 Ethics	19
CHAPTER FOUR.....	20
RESEARCH FINDINGS	20
4.1 Introduction.....	20
4.2 Socio-Economic Characteristics of the study households	20
4.2.1Human Capital of FISP E-voucher beneficiary and non-beneficiary households	20
4.2.2 Livelihood Analysis.....	22
4.2.3 FISP E-voucher	23
4.3 Crop Production Characteristics of the FISP Beneficiaries.....	24
4.3.1 Crop Production and Productivity.....	25

4.3.2 Income Diversification	30
4.4 Sustainability of E-voucher	34
4.5 Challenges of FISP E-voucher	36
4.6 Suggestions for improvement	37
CHAPTER FIVE	39
DISCUSSION OF THE RESULTS	39
5.1 Introduction.....	39
5.2 Crop Productivity	39
5.3 Crop Diversification	40
5.4 Effectiveness of E- FISP.....	41
CHAPTER SIX.....	43
CONCLUSION AND RECOMMENDATIONS	43
6.1 Introduction.....	43
6.2 Conclusion	43
6.3 Recommendations	43
References	44
Appendix 1 Questionnaire	48
Appendix 2 Focused Group Discussion	53
Appendix 3 Interview Schedule to Agriculture Officer	54

LIST OF FIGURES

Figure 1. The FISP E-voucher flow chart	7
Figure 2. Survey site location within agro-ecological regions of Zambia	16
Figure 3. Crop share in terms of contribution to food security	23
Figure 4. Percent response on major source of labour by household type	25
Figure 5. Household ownership of agricultural productive assets, 2017/18	26
Figure 6. Comparison of maize yield ($\times 50\text{kgha}^{-1}$) between E-voucher beneficiaries and non-beneficiaries by farming practice	30
Figure 7. Percent Share of input types purchased using E-voucher support	31
Figure 8. Richness of income sources by farmer type based on FISP support	34

LIST OF TABLES

Table 1. Human capital characteristics of households by FISP E-voucher beneficiary	22
Table 2. Percent farmer response on inputs purchased using e-voucher, by gender	24
Table 3. Trend in maize productivity analysis during the FISP e-voucher, 2014/15-2016/17	27
Table 4. Trend in area cultivated, by FISP Input access.....	28
Table 5. Diversity of income sources, by access to FISP E-voucher support.....	32
Table 6. Farmer recommendations for improvement	38

LIST OF APPENDICES

Appendix 1 Questionnaire48

Appendix 2 Focused Group Discussion53

Appendix 3 Interview Schedule to Agriculture Officer54

ACRONYMS AND ABBREVIATIONS

ACF	Agriculture Consultative Forum
AHM	Agricultural Household Models
CA	Conservation Agriculture
CF	Conventional Farming
CSO	Central Statistics Office
E-FISP	Electronic voucher Farmer Input Support Programme
FAO	Food Agriculture Organization
FISP	Farmer Input Support Programme
FSP	Fertilizer Support Programme
GESI	Growth Enhancement Support Scheme
GRZ	Government of the Republic of Zambia
HIV/AIDS	Human Immune Virus/ Acquired Immunal Virus
ID	Identity
KM	Kilometre
MACO	Ministry of Agriculture Cooperation
MOA	Ministry of Agriculture
NAP	National Agricultural Policy
NGOs	Non Governmental Organization
SPSS	Statistical Package for Social Science
SSA	Sub Saharan Africa
WB	World Bank
WFP	World Food Programme
ZNFU	Zambia National Farmers Union

CHAPTER ONE

INTRODUCTION

1.1 Background

Nearly three decades after the initiation of agricultural market reforms in Sub-Saharan Africa (SSA), subsidies for fertilizer and seed are once again the cornerstone of many governments' agricultural development and poverty reduction strategies (IAPRI, 2014). Food insecurity among the resource constrained farm households in Zambia has been a key challenge in their livelihood for many decades. Financial capital is also low and this has further constrained farmers' ability to enhance crop productivity as well as diversify their production. In view of such agricultural production challenges, the Government of the Republic of Zambia has committed itself to ensuring that smallholder farmers have access to affordable agricultural inputs through the introduction of the government supported Farmer Input Support Programme (FISP).

Government introduced FISP in 2002 with the aim of improving small scale farmers access to agricultural inputs and enhance participation and competitiveness of the private sector in the supply and distribution of agricultural inputs timely and in adequate amounts. In the last decade, the Government of Republic of Zambia (GRZ) has devoted a considerable share of its agricultural budget to input subsidies (MoA, 2016). Between 2004 and 2011, spending on the Farmer Input Support Programme (FISP) accounted for an average of 30% of total GRZ agricultural sector spending, and 47% of GRZ agricultural sector Poverty Reduction Programme spending (Mason et al, 2013).

Nonetheless, the system came at other costs. For example, between 1964 and 1991, Chizuni (1994) reports that maize production was encouraged throughout the country, even in regions which are not suitable for maize production. According to Scott (1995), the GRZ has never distinguished between agricultural development and social welfare. The consequence is that subsidies, hand-outs and other "coercive" incentives undermined the development of a sense of self-reliance and more business-like approach to farmer decision-making.

By the mid-1980s, government subsidies to the maize sector consumed 17% of the total Zambian government budget (GRZ, 1990). Under donor pressure, the Government of Zambia pursued a Structural Adjustment Programme and most parastatal companies went bankrupt. When the nascent private sector was unable to meet the demand of the nations' dispersed smallholders, adoption of improved maize seed and maize productivity declined. Concerned for national food security and stability, the GRZ reinstated subsidy schemes for maize production in 2002, now known as the Farmer Input Support Programme (FISP), (MoA, 2016).

The seed sector was one of the first to be liberalized, and is today one of the strongest in Eastern and Southern Africa, with five major companies and a number of smaller-scale enterprises. Although fertilizer was a major focus of FISP, seed has also been a component of the package delivered to farmers via registered associations.

The introduction of certified, improved maize seed, and particularly hybrids, changed the role that maize production, and agriculture in general, plays in the livelihoods of Zambian smallholder farmers especially in the context of food security and income. Several previous studies have shed light on this relationship. A detailed study led by Kumar (1994) and supported by the International Food Policy Research Institute, the University of Zambia's Rural Development Studies Bureau, and the Zambian National Food and Nutrition Commission, explored the implications of maize hybrid adoption in Eastern Province of Zambia for gender relationships, resource allocation, income, food consumption and nutrition. Among other findings, Kumar concluded that adoption was almost always associated with the expansion of ox-drawn cultivation. Nearly all farmers with over 5 hectares adopted hybrid maize, although adoption was also substantial on smaller-scale farms, where it was also more profitably produced. She found that marginal improvements in income from hybrid maize production deteriorated with farm sizes over 4 hectares, reflecting labor and management constraints. Farmers continued to grow local maize for home consumption, selling hybrid maize as a cash crop. The report by Kumar (1994) further reports that women-headed households were less likely to adopt hybrid maize varieties. Although women were heavily involved in maize production, they participated less in decision-making once hybrid seed was adopted.

During the 2015/2016 farming season, 241,000 farmers across 13 FISP E-voucher pilot districts in Southern, Lusaka, Central and Copperbelt Provinces received the input subsidy through the

pre-paid VISA bank cards as opposed to receiving physical inputs centrally procured by Government (Musika, 2016). Subsidized agricultural input support programmes such as the current 'E-voucher' programme in Zambia has the potential to accelerate diversification of the smallholder sector by allowing farmers to purchase a wide range of recommended inputs such as veterinary drugs, agricultural equipment, livestock, poultry and fingerlings (GRZ, 2013). The E-voucher, has made farmers to freely choose exactly the type of fertilizer and variety of seed to buy, unlike in the past where we had no option but to receive whatever was made available. Thus the research investigated the impact of FISP E-voucher system in enhancing crop productivity and crop diversification among FISP farm household beneficiaries in Lukanda Agricultural Camp, in Kapiri Mposhi district.

1.2 Problem Statement

Productivity for most staple food crops has for a long time remained far below the genetic potential of the crops. The current yield productivity for maize the major staple food crop which is heavily supported under FISP in Zambia for instance ranges between 1.5 – 2 tons/ha despite most varieties having yield potential which is above 5 tons/ha (ZARI, 2016). Furthermore, farmers have not diversified their agricultural income sources beyond the major staple food crops such as maize. Among the key factors that have limited increased crop productivity and income diversification for small scale farmers are mainly centred around challenges of accessing agricultural inputs for crop and livestock production especially seed, agrochemicals, livestock drugs, as well as implements. The moving away from the conventional FISP to E-voucher system has enabled farmers to purchase diversified crop and livestock inputs beyond maize production input requirements. This study, therefore, is meant to understand how the pre-paid FISP E-Voucher subsidized input programme has contributed to the enhancement of crop productivity as well as income diversification among small scale farmers.

1.3 Aim

The overall objective of this study was to assess the impact of the FISP E-Voucher system on enhanced crop productivity and income diversification among small scale farmers.

1.4 Objectives

- To compare the extent of income diversification among FISP E-voucher beneficiaries and non-beneficiaries in Kapiri Mposhi district
- To determine whether FISP E-voucher has contributed to increased crop productivity among small scale farmers.
- To explore the potential of the E-voucher system in poverty reduction among vulnerable small scale farmers.
- To draw policy implications of the research findings in terms of improving the effectiveness of the E-voucher system in addressing food and income insecurity among farmers

1.5 Research Questions

- To what extent has FISP E-voucher increased crop productivity among beneficiary small scale farmers?
- What is the extent of income diversification among FISP E-voucher beneficiaries?
- How has the FISP E-voucher contributed to increased crop and livestock related income?
- What are the key challenges faced by small scale farmers in accessing inputs under the E-voucher programme?
- What policy recommendations would be key in enhancing the contribution of FISP to increased crop productivity and diversification?

1.6 Rationale

There exist a dearth of knowledge and information on the impact of FISP E-voucher on crop productivity enhancement and income diversification. FISP has always been generally viewed as a subsidy programme that is aimed at alleviating the financial resource challenges for the purchase of maize agricultural inputs among the resource constrained farm households. However, with the introduction of the E-Voucher system in fifty two (52) pilot districts in the last three seasons (2015/16 – 2017/18), government expanded the focus of FISP support beyond maize inputs to include other crops and livestock. Despite such efforts, there is still no documented benefits with regard to crop productivity and income diversification. This research study provides an opportunity to document such information with the view of improving delivery of agricultural input support as well as learn positive lessons for scaling out FISP support to a

wider geographical coverage in terms of districts as well as farmer beneficiaries using the E-Voucher system.

1.7 CONCEPTUAL AND THEORETICAL FRAMEWORKS

This research study used theoretical concepts from two models; i.e, the Agricultural Household Model (AHM) and the Logic model in the understanding of the impact of the FISP E-voucher system in the enhancement of crop productivity and income diversification.

1.7.1 Agricultural Household Model

The research uses the Agricultural Household Model in understanding farmer's behaviours and decisions towards agricultural production. Understanding the behaviour of farmers is important for policy intervention aimed at alleviating their plight. This is because farmers are rational producers. Using the AHM, it is possible, given the prevailing conditions, to predict the likely outcomes of a policy intervention (De Janvry et al. 1991; Singh et al. 1986). The AHM explains the behaviour of farmers both as producers and consumers at the same time (Udry and Bardhan 1999). Depending on the market conditions, decisions at production may or may not be associated with preferences. If market failure exists, separability between household and farm decision breaks down. This means farmers only produce for consumption. If markets are perfect, separability between farm and household decisions hold. Farmers maximize profits before maximizing utility. With breakdown in separability, allocation of resources may not be optimal. This equally enhances net selling-net buying behaviour of farmers. Net selling depresses prices thereby lowering the value of output. The smaller the agricultural holding, the more farmers tend to net buy and this may be exacerbated by market failure. The flow of information as well as farmer behavioural considerations is primary for good planning in agriculture.

Zambian crop agriculture is riddled with imperfect markets in that farmers never know the price of maize well in advance. The government funded FRA announces producer prices after harvesting. Unless the rural policies incorporate such behaviours of the intended beneficiaries, they may not be effective in the general sense. With such imperfections in the market, neoclassical policies are likely to fail hence requiring more government and stakeholders' involvement in the system.

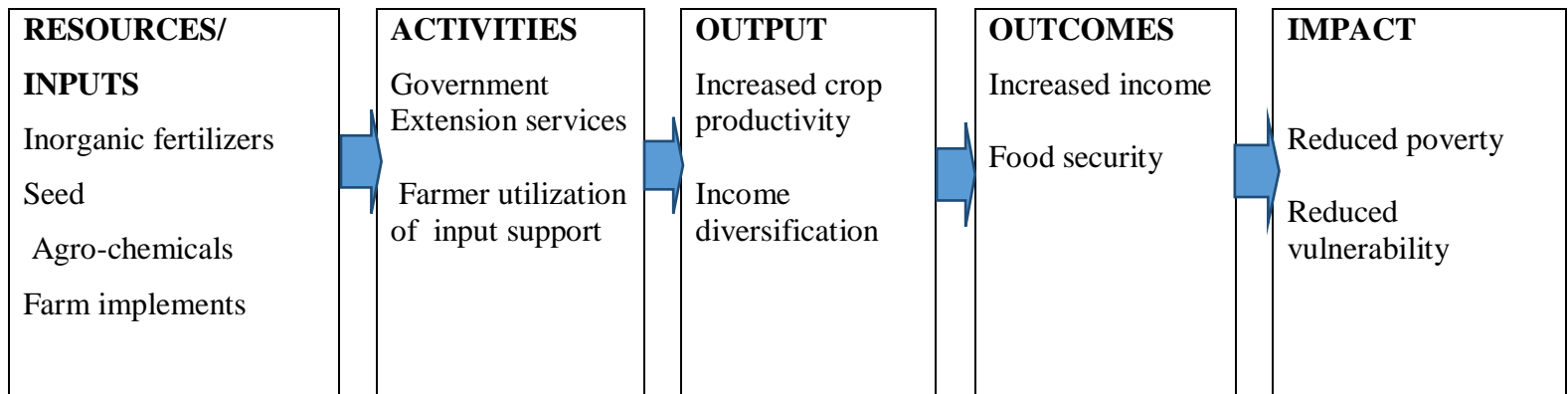
1.7.2 Logic Model

In addition to the Agricultural Household model, this research also benefited from the Logic model developed by Dickinson and Prabhakar (2009:8). Basically, a logic model is a systematic and visual way to present and share an understanding of the relationships among the resources that have to operate in a programme, the activities which are planned to be done, and the changes or results you hope to achieve.

The model starts with the context in which the initiative was developed, in this context the conditions that led to the introduction of the FISP e-voucher. It goes on to look at the objectives of the empowerment initiative, increase agricultural productivity among small scale farmers, and reduce poverty. To achieve this, government through FISP supports vulnerable small scale farmers with subsidized inputs in form of seed and fertilizer.

The study looked at outputs, outcomes and impacts of FISP e-voucher on beneficiary households in terms of crop productivity enhancement as well as income diversification. The study also inquired on the spillover effects of the FISP E-voucher support in terms of the indirect and/or unintended consequences.

Figure 1. The FISP E-voucher flow chart



Source: Author

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section gives a review of past research that has been conducted in line with the impacts of input subsidy on crop productivity and income diversification within the context of agricultural production. Literature reviewed was mainly focused on; the FISP E-voucher programme in Zambia, policy documents, E-voucher programmes in Southern Africa region, role of government subsidies in agricultural growth for small scale farming and lastly, a review of challenges for E-voucher systems.

2.2 Overview of FISP and E-voucher Programme

The World Bank (2007) reports that most smallholder farmers in developing countries are subsistent oriented, cultivate food crops mainly for household consumption and grow a small proportion of cash crops to meet non-food household needs. Furthermore, the report indicates that 75 per cent of rural people in developing countries are poor and food insecure, and therefore, improvement of agricultural production is the main strategy to reduce rural poverty and food insecurity. However, it is clear in the World Bank report that there has been less emphasis on increased productivity as well as income diversification among smallholder farmers in developing countries despite being the major recipients of subsidized inputs. Morris (2007) also points out that among several factors that impede increased productivity are limited livelihood strategies such as the low use of improved farm inputs in crop production, especially fertilizer and hybrid seeds. Druilhe and Barreiro-Hurle (2012) argue that with low household incomes and limited income sources most smallholder farmers, especially in Africa, are unable to self-finance the purchase of adequate improved farm inputs to produce enough food and cash crops to meet household food and income security requirements. In order to promote the use of fertilizer and hybrid seeds, subsidies are one of the most pervasive policy instruments used by most governments in developing countries (World Bank, 2007).

The Farmer Input Support Programme (FISP) is one of the programmes the Zambian government has put in place to help small scale farmers improve their livelihood and food security. The principal objective of the Government was to stimulate sustainable increase in

small-scale agricultural productivity as a poverty reduction strategy and for the general improvement of rural livelihoods. However, the conventional input subsidy programme under FISP was mainly targeted at maize inputs and lacked a deliberate policy to diversify beyond maize input support to include other agricultural crops and enterprises with a view to diversify income sources. ZNFU (2008) also elaborates that FISP was introduced to catalyze small-scale agriculture by providing subsidized inputs (fertilizer and maize seed) over a fixed period of time. In 2015/16, however, government reviewed the conventional FISP support and introduced the Electronic voucher (E-voucher) system as one way of promoting agricultural diversification.

The current programme has increased the number of beneficiaries' participation by reducing the size of input pack to four bags of fertilizer and 10 kg of seed (that is 2x50kg basal; and 2x50kg top dressing) for the 2009/10 farming season. The programme was planned to cover 500,000 small scale farmer as compared to 250,000 covered in 2008/09 farming season. The FISP is aimed at improving small scale farmers food security improve agriculture production, increase access of small scale farmers to seed and promote private sector participation in supply of inputs (GRZ, 2008). In a review study, Imboela (2005) observed that Farmer Input Support Programme (FISP) in Kaoma district of Western province had not improved livelihoods of small scale farmers. The author highlighted some factors that inhibit FISP from being an effective poverty reduction instrument among small-scale farmers in Kaoma such as logistical problems of implementation like the late delivery of inputs, non-delivery of inputs, too many maize seed varieties and poor marketing facilities.

Zambia was in the process of reforming the Farmer Input Support Programme (FISP) to implement the subsidy programme through a flexible electronic voucher (e-voucher). After years of lobbying by various stakeholders for the government to reform the FISP subsidy programme, the Ministry of Agriculture (MoA) finally launched the *e-voucher* programme as a pilot in (13) thirteen selected districts during the 2015/2016 agricultural season with an initial target of 241,000 smallholder farmers. MoA later on started working on the modalities of expanding the pilot to 52 districts during the 2016/17 farming season. From this expansion, it was expected that the programme will be rolled out to the rest of the country.

The e-voucher was recommended in order to address major challenges with the traditional FISP where government distributes the physical inputs to selected recipients (currently 4 by 50kg bags

of fertilizer and 10kg of maize seed). Other seeds (rice–10kg, sorghum–5kg, groundnuts–20kg, orange maize– 10kg, soya beans–50kg, cotton–10kg, beans– 30kg, and sunflower–4kg) were recently added to the package to try to address crop diversification issues. It cannot be disputed that maize production has increased tremendously during the fertilizer subsidy period (mainly through area expansion), but this has been achieved at a huge cost to the treasury while the impact on crop yields, input, market development and poverty has remained dismal. Several studies have shown that subsidized fertilizer is disproportionately allocated to wealthier households (Jayne et al. 2011; Chibwana, Fisher, and Shively 2011; Ricker-Gilbert Jayne, and Chirwa 2011), crowds out private sector (ACF 2009; World Bank 2010), and has not resulted into economically viable increases in maize production (Mason and Tembo 2015).

Under the traditional FISP, the private sector has remained constrained in providing input and output marketing services. As households develop a dependence syndrome on fertilizer subsidies, it crowds out commercial fertilizer purchases and affects investments from the private sector. In terms of agricultural productivity, the traditional FISP fails to recognize the spatial variability of soil fertility and climatic conditions in the country and as a result uses the blanket fertilizer recommendation of *one-size fit all* as the basis for determining the package size, disregarding the comparative advantage of different areas. To that effect, we have seen the government continuing to invest heavily in Compound D and Urea fertilizer, which is not suitable to large parts of the country where soils are acidic (ACF 2009; World Bank 2010).

The other challenge is that, it has been difficult to quantify subsidized fertilizer which was characterized by leakages through diversion and resale before reaching the intended beneficiaries (Mason and Tembo 2015). The e-voucher was recommended to mitigate some of these challenges and was specifically, intended to: i.) Crowd in more private sector participation in agro-input distribution, thereby reducing public expenditure on the delivery of private goods such as fertilizer and seed; ii.) Ensure timely delivery and access to inputs by smallholder farmers; iii.) Allow farmers to choose inputs of their choice thereby promoting agricultural diversification; and iv.) Reduce leakages and increase the number of beneficiaries.

2.3 The National Agricultural Policy

The overall objective of the agricultural sector, as set out in the National Agricultural Policy (NAP), is “to facilitate and support the development of a sustainable and competitive agricultural

sector that will ensure food security and income generation at household and national levels and maximize the sector's contribution to gross domestic product" (GRZ, 2003,Pg9). To achieve the above objective, enhanced crop productivity and income diversification become critical factors of government concern. Therefore, the government has accorded attainment of food security in the country the highest priority on policy agendas.

2.4 E-voucher Programme in the region

Gregory (2006) conducted a study on E-voucher Programme in on Malawi, Afghanistan and Nigeria. The study revealed that farmers generally expressed satisfaction with the voucher scheme and wanted it to continue because it provided easy and timely access to cheaper subsidized fertilizer and accessibility to supplies was improved by the proximity of dealer locations. Agro dealers were generally favorably disposed to the sale of fertilizers through the voucher system but indicated some early implementation problems regarding the countersigning and endorsement of vouchers. They conclude vouchers provide pro-poor flexible interventions that reduce risk in developing markets for the most food-insecure and input dealers. Sustainable development can be achieved only when vouchers are used in conjunction with other necessary market development initiatives and impacts monitored. They can provide a flexible means of providing crop production credit by donors with benefits for both food-insecure farmers and Agric-input dealer networks. The vouchers can also play a vital role in "jump starting" market inclusion for millions of smallholder farmers in Sub Sahara Africa (SSA).

The e –voucher system involves the inclusion of private players in the distribution of inputs. The rationale behind this is that the market works better in sharing of information with the public (WFP, 2014). A voucher is a coupon that is issued to a customer with a determined value; it can be used in participating locations. An e-voucher is an advanced voucher system and used in conjunction with an electronic system, recording and tracking transmission. Unlike FISP which was limited to government involvement alone.

In addition, there are also mobile vouchers that are a combination of an electronic system and mobile phones, the mobile phones are used to receive and redeem e-vouchers. In some cases, in the distribution networks e-voucher programmes make use of rural retail shops as the distribution networks. Studies have shown that villagers prefer inputs stock isn't close to their villages (Alloyce, Gabagambi and Hella, 2014). In addition, e voucher has become one of the most

preferred modes for inputs subsidy programmes because the e-voucher crowds in the private sector, this may increase farmers' access and lower inputs diversion (Mason, Jayne and Mofya-Mukuka, 2013). The key idea for private sector involvement is to limit government's involvement and stimulate demand for commercial fertilizer (Kijima, 2016).

In an e-voucher system, agro dealers are trained by the government or by any other appropriate stakeholder (Gregory, 2006). The agro dealers participate on an agreed margin basis (Elijah, 2017). It is also argued that in reality the purpose of e –vouchers like any other smart subsidy is to address access not availability. Before the e voucher is sent to beneficiaries, a registration process is done and information collected usually includes national ID, name, mobile number and input requirements (Elijah, 2017). In some countries such as Rwanda, bank staff registers and train farmers on how to use the electronic platform.

Nigeria implemented the E – wallet under GESS1, the scheme targeted the most vulnerable households, aimed at increasing agriculture information dissemination and input supply (Fadairo, Olutegbe and Tijani, 2015). The key aspects of an e –voucher system is that it must be hinged on; innovation, adaptation, scale and performance indicators (Dorward and Chirwa, 2011). An e-voucher system must introduce new security features, improve the scale of inputs access and there must be ways or methodologies for measuring implementation of the e-voucher. There are several tasks involved in the implementation of the e-voucher, some key ones include; beneficiary identification, farmer registration, coupon security, input security, input distribution, coupon redistribution, coordination and control (SOAS, 2008; Dorward and Chirwa, 2011). In evaluating subsidy implementation focus must be on cost, modalities, timing, targeting, rationing of input access (SOAS, 2008 cited in Dorward and Chirwa, 2011). Rationing is a result of resource constraints; as such governments specify the quantities of inputs per beneficiary (Chirwa and Dorward, 2013).

The success of a subsidy programme is also hinged on the provision of complementary investments (Dorward and Chirwa, 2011; Nalwimba, Qi and Mudimu, 2017). Complimentary investments include improvements in infrastructure and market access. Subsidy targeting can have many aspects such as geographical and categorical (Kato, 2016). The former refers to a specific location and the later refers to the provision to a specific group of beneficiaries for example small-scale farmers or female farmers. Additionally, there could be intra community

targeting such as between different categories of people or households (Chirwa and Dorward, 2013).

E-voucher is beneficial for instance Kijima (2016) argues that in Nigeria there was improved transparency and accountability in the inputs distribution scheme. Furthermore, farmer awareness of the GESS programme rose from 45-75% in the first year. Similarly in other studies farmers' access to inputs increased by 80% (Abedo, 2014). On the other hand, there are challenges associated with e-voucher such as agro dealers incapacity to restock, no means of verifying if one is a genuine farmer or not, unclear procedures, late payment leading to closure of agro dealers, need for more government support staff for registration and political pressures especially use of input programmes for patronage and at times fails to pay attention to gender issues (Dorward and Chirwa, 2011; Fadaïro, Oluteggbe and Tijani, 2015; Kijima, 2016; Abedo 2014; Xu et.al, 2009 cited in Jayne and Rashid, 2013; Kato, 2016).

2.5 The Role of government Subsidies in Agricultural Growth of Small Scale Farming

The role of FISP in promoting the growth of emergent farmers is mostly the targeting of individuals who are able to afford inputs at commercial scale and rather than those who cannot. To qualify to receive more inputs, MACO (2011) states that, a farmer is measured by his farm size and the ability to pay upfront costs of participation in the programme. This means that only farmers with farm size of 0.5 ha are to participate hence neglecting about 20 percent of the country's poorest farming households. Emergent farmers make up 3.8 % of the small-holder farmers receive more fertilizers and seed hence their productivity. This means that the growth in farm size and crop yields is uneven in Zambia.

On the other hand emergent farmers are the major suppliers of maize, according to Nkonde (2011) they account for 50 % of total surplus maize produced, as compared to peasant farmers who share the 25 percent. Both FRA and FISP have a double effect on farmer's productivity as they have a direct effect of land use and farm expansion. Mason (2012) estimated that from 2006-2011 these programmes contributed to an increase farm size under maize from 23 to 27 %. Research further found out that this expansion concentrated on wealthier household with large landholding. This presents a vivid picture that FISP is likely to negatively affect the expansion of growth of small-scale farm into emergent farm population.

The Malawi Government has reintroduced a large scale farm input subsidy programme since the 2005/06 agricultural season and use it as a policy tool to improve maize production, productivity, food security and household income from crop sales. However, despite the implementation of the programme, food insecurity and poverty are still wide-spread among smallholder farmers. This raises doubts about the effectiveness and sustainability of the programme. Recent studies show that poverty rate has only decreased by two percent from 52.4 percent in 2004/05 to 50.7 percent in 2010/2011 (GOM, 2012b). A comparison of household food security during the same period shows slight improvement. According to the GOM (2005; 2012b), 57 percent of households subjectively assessed themselves to be food insecure in 2004/2005, while in 2010/2011, 42 percent felt food insecure.

CHAPTER THREE-

MATERIALS AND METHODS

3.1 Introduction

This section gives a detailed description of the study implementation methodology that was used with regard to selection of the study location, target population, sampling procedures, research design, data collection and analysis.

3.2 Study area location and description

3.2.1 Location

The countryside of Zambia is classified into three agro-ecological regions which are delineated on the basis of agro-climatic conditions, including rainfall patterns, temperature, farming systems and soil types. The nation is divided administratively into nine provinces: namely, Central, Copperbelt, Eastern, Luapula, Lusaka, Northern, North Western, Southern and Western Provinces.

This study was conducted in Lukanda Agricultural Camp in Mulungushi Farm Block which is among the communities benefitting from the FISP E-voucher programme. Lukanda Agricultural Camp is geographically located 13°45' South and 26°50'E in terms of latitude and longitude respectively on the world globe. The location is 40km west of Kapiri Mposhi town in Central province. The camp was selected on the basis of convenience for the researcher in terms of time available to collect data and also limited financial resources. The study targeted both households that have benefited from FISP E-voucher as well as those who have not benefited in the period 2014/15 to 2016/17 season

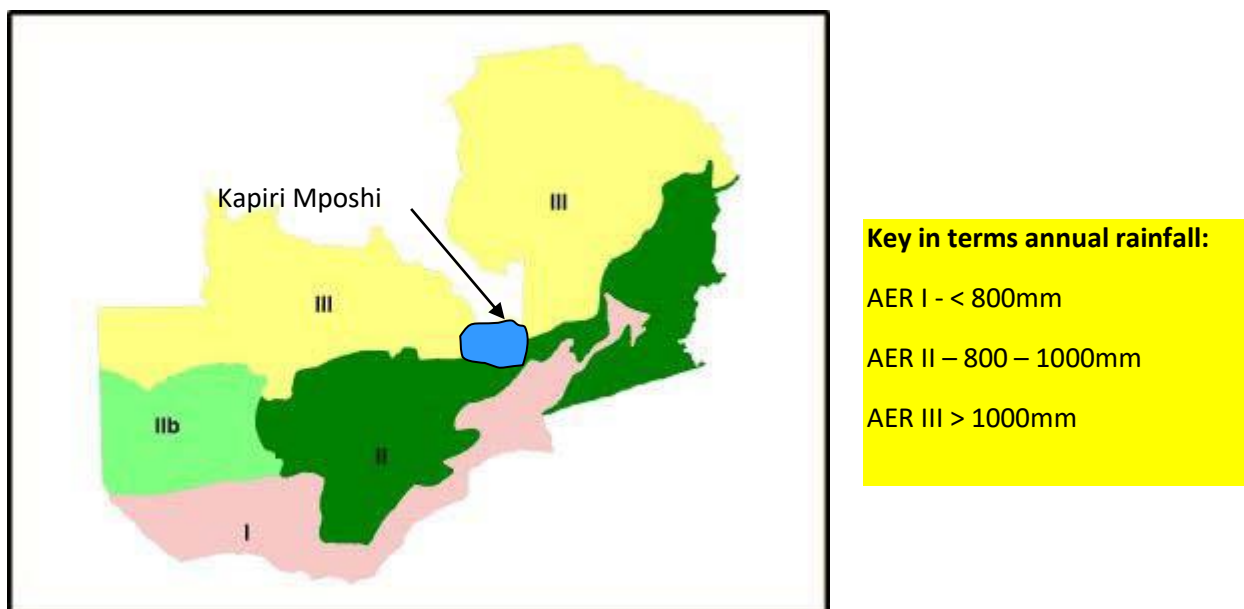


Figure 2. Survey site location within agro-ecological regions of Zambia

Source: ZARI 2016 Annual report

3.2.2 Description

Lukanda Agricultural Camp is one of the most productive areas in terms of agriculture and crop production in particular in Kapiri Mposhi district. The major crops of economic importance grown in the area include; maize, groundnuts, soya beans, cotton, sweet potato and sunflower.

The soils are typically characterized as well-drained acrisols, luvisol-Phaeozem and arenosol soils. The vegetation type is predominantly open woodlands and savannah grassland. In the context of agro-climatic conditions, the camp falls within Agro-Ecological Region II of Zambia which is the medium rainfall region whose annual rainfall intensity ranges between 800-1000 mm.

3.3 Research Design

Research design is defined as a plan used to study a problem or questions (Hines and Vailant, 2002). Orodho (2003) further defines a research design as a plan that is used to generate answers to research problems. The study was a case study of FISP E-voucher beneficiaries in Lukanda Agricultural Camp in Mulungushi farm Block of Kapiri Mposhi district. In addition to the FISP beneficiaries, the study also sought information from the Ministry of Agriculture which is the FISP implementing ministry for the programme.

3.4 Data collection methods/Techniques

3.4.1 Study population

The sampling frame was a total One Thousand Five hundred small scale farmers in Lukanda Agricultural Camp under Mulungushi Farm Block that comprised one thousand two hundred and eighty eight (1,288) FISP E-voucher beneficiaries and two hundred and twelve (212) non-beneficiaries. This block is located in Kapiri Mposhi district. The sample was drawn from the 2016/17 farmer register which managed by the Ministry of Agriculture.

3.4.2 Sampling Procedure

The study used a random sampling procedure in selecting the study sample. A sample size of 104 E-voucher beneficiary households was randomly selected from a total population 1,288 FISP beneficiaries using a sampling interval of 12. Furthermore, a random sample of fifty (50) non-beneficiaries was selected from the 212 non-FISP E-voucher beneficiary farm households. The study sample represents 10.3 percent of the target farm households in the Mulungushi Farm Block.

3.4.3 Types of data

The data which was collected and used in the research study comprised of secondary data which was sourced from the Ministry of Agriculture in the district as well as other sources such as past research study reports, journals, newspapers and other written sources. The study also collected primary data from the FISP E-voucher beneficiaries as well as non-beneficiaries through in-depth household interviews as well as focus group discussions.

3.4.4 Instruments for Data Collection

The study used a structured quantitative questionnaire for capturing primary quantitative data at household level. A qualitative checklist was also developed and administered to farm households through focus group discussions as well as Key Informant Interviews.

3.5 Data Analysis

The data in this research was analyzed using the Statistical Package for Social Sciences software (SPSS) coupled with MS- Excel to help generate descriptive statistics. Income diversification

was analyzed based on the richness of income sources among E-voucher beneficiary and non-beneficiary farm households. The study, applied the diversity indices commonly used in the ecology literature (e.g. Magurran, 1998), which has also been applied to the study of on-farm crop and variety diversity (see collection of studies in Smale 2006, Hamazakaza, 2013). Diversity indexes as utilized in the ecology literature are quantitative measures that generally reflect two underlying features of a population. The first is richness, or the number of types (such as species or in this research study, crop and livestock activities). It is a simple count indicator of richness, each unit has equal weight. A second concept is proportional abundance, or equitability. Indicators of proportional abundance express how evenly the units of analysis (individuals of a species, or households) are distributed among types.

In this study, the researcher was interested in agricultural activities, including both farm sources (crops and livestock) and non-farm sources (remittances, petty trade and self-employment). The study measured richness as a count over sources of income or livelihood in the context of the FISP E-voucher input support.

As an equitability or evenness indicator, the study chose the Herfindahl index tool of analyzing income source diversity, which is defined as $H = \sum \alpha_i^2$, where α_i is a proportion or share represented by each type of the unit under analysis.

The Herfindahl index (also known as the Herfindahl-Hirschman index) has been extensively used by economists (e.g., Albert O. Hirschman) to analyze the extent of competition among firms in an industry, calculated in terms of market shares. The index assigns a heavier weight to firms with more market power, and can thus be used as an indicator of the concentration of sales in analysis of monopolistic or oligopolistic behavior in anti-trust lawsuits.

The Herfindahl index ranges from $1/n$ to 1, where n is the number of income sources or enterprises. The Herfindahl index in economics is equivalent to the Simpson index in the ecology literature. Applied to household income, the Herfindahl index is the sum of squared income shares among income-earning activities undertaken by household members. The higher the index, the more inequitable the distribution of income among sources.

3.6 Ethics

Participation in the study was voluntary for all the selected participants. A consent form was used in explaining the purpose of the study, the benefits as well as risks for participation. In addition, the researcher ensured that maximum confidentiality of the information given by the respondents was observed and no name of any individual or organization was attached to a particular response or research feedback. Finally, the researcher ensured that the time allocated for visitation to a particular institution for the purpose of interviewing respondents was adhered to.

CHAPTER FOUR

RESEARCH FINDINGS

4.1 Introduction

This section gives a presentation of findings from the study. The findings are mainly centred on descriptive statistics and addresses issues pertaining to socio-economic characteristics of the study sample, farmer perceptions and experiences on FISP E-voucher, crop production characteristics and income diversification.

4.2 Socio-Economic Characteristics of the study households

The study sought socio-economic data pertaining to the characteristics of the FISP-E-voucher beneficiary as well as non-beneficiary households. Socio-economic household factors have a bearing on the household's ability to effectively use input support for enhancement of crop productivity and income diversification. The critical socio-economic factors that were taken into consideration in the study were; education level of household head, household size, gender and age of household head, marital status, agricultural physical asset endowments as well as farm size.

4.2.1 Human Capital of FISP E-voucher beneficiary and non-beneficiary households

FISP support is targeted at vulnerable farm households who are financially constrained in terms of their ability to purchase crop production inputs especially seed, agro-chemicals as well as farm implements. In terms of gender composition, the randomly sampled households comprised 57.8% male and 42.2% female headed households.

Education is a key pre-requisite to farmer's ability to read, write and even communicate with key organizations involved in farmer input support. Farmers have to understand the conditions that surround external support either through written guidelines or rules and also have to participate in public facilitated farmer meetings. As such, educated farmers tend to be more dynamic in terms of their institutional interaction as compared to the less educated. The educated play critical roles in the management of farmer cooperatives and play managerial roles. In this study, the researcher sought information on the education status of the sampled farmers which helped in

statistical inference for the general population in the community. Statistically, findings as presented in table 1 show that both the E-voucher beneficiary and Non-beneficiary household heads are not statistically different and have achieved on average secondary education.

In the context of crop productivity and diversification, larger households are more endowed in terms of human capital which is a critical source of labour at household level. Crop productivity is a factor which is greatly dependent on human labour for various operations such as timely planting, weeding, pest and disease management as well as fertilizer application. On the other hand, crop diversification has an impact on labour demand and the ability of a household to diversify is greatly dependent on the human resource endowment. In terms of human capital which this study addressed from the perspective of household size show that there was significant difference at 95% confidence interval in this variable between the E-voucher beneficiary and non-beneficiary households with beneficiary households having an average of about 9 members compared to 7 for non-beneficiaries.

Marriage is also an element that is likely to positively impact on the household's ability to access FISP support. In couples that are married, the trend is that both husband and wife tend to register for FISP inputs. By implication, such households are likely to access more than one pack of inputs compared to the households that are headed by single and widowed household heads. In this study, majority (83.1%) of the households are married, 9.7% have never married and still single, 5.2% are widowed and 1.9% are divorced.

Out of the total sampled population, 41% were aged between 40-59 years, 30% were aged above 60, whereas 23% were between 20-39 years and only 6% was below 20 years old, respectively. However, findings from the study show that both beneficiary and non-beneficiary households were married and not statistically different at 95% confidence level. This is the true reflection of Zambia's population structure where majority of the farmers are in their productive age and require more support in terms of production inputs. This finding is also supported by CSO (2010) where the age analysis at national level indicates that about 68 percent of the household heads belongs to the age groups that are around 50 years, which is the economically active population.

Table 1 Human capital characteristics of households by FISP E-voucher beneficiary

Parameters	FISP E-voucher Beneficiaries		Non-FISP E-voucher Beneficiaries		T-Test (P-Value)
	Mean	Std. Error Mean	Mean	Std. Error Mean	
Age of Respondents in years (<i>1<15, 2=15-30, 3=31-45, 4=46-60, 5>60</i>)	3.60	0.102	3.43	0.128	0.310
Marital Status of Respondents (1=Married, 2=Single, 3=Divorced, 4=Widowed)	1.20	0.070	1.42	0.105	0.081
Level of education (1=Not been to school, 2=Primary school, 3=Secondary school, 4=Tertiary)	2.52	0.072	2.58	0.192	0.714
Household size	8.97	0.448	7.12	0.327	0.002

Source: Author. P-values refer to two-tailed t-tests.

4.2.2 Livelihood Analysis

The study explored the richness of the livelihood sources that directly contribute to food security and income. The major sources of livelihood for the target FISP beneficiaries include; Field crop production, vegetable production, trading, livestock production as well as formal employment. Statistically, 96.1% of the farmers sampled are engaged in field crop production, 1.9% are into vegetable production while another 1.9% are involved in livestock production. In terms of crop share for the other crops other than maize the main staple food crop, as presented in figure 3, groundnuts constitute the largest percentage (32.5%) of area cultivated followed by sweet potato (26.0%), cotton (22.1%), sunflower (7.8%) and soya beans (5.8%).

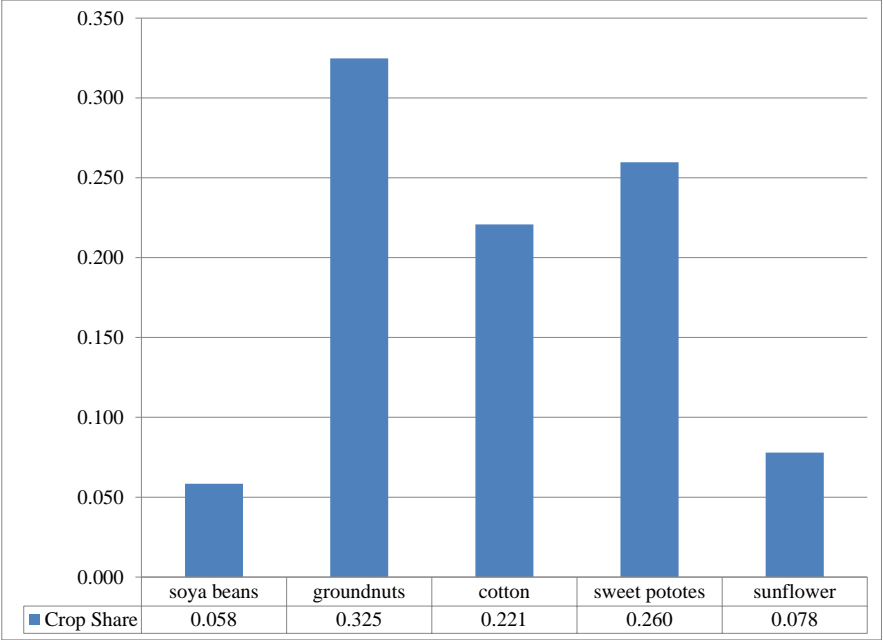


Figure 3 Crop share in terms of contribution to food security

4.2.3 FISP E-voucher

As contained in the FISP E-voucher guidelines of 2015/16 season, farmers are free to source any type of agricultural inputs using the e-voucher cards in addition to maize seed and fertilizers. The E-voucher beneficiaries who were interviewed sourced the following types of inputs; seed, agro-chemicals and conservation agriculture equipment. It is apparent from the findings in table 2 that female headed households (18.8%) invested more of the FISP e-voucher input support into conservation agriculture (CA) implements compared to male headed (6.7%). CA was adopted in 1999 by the Zambian government as a key strategy to enhancing crop productivity especially among the vulnerable and resource constrained farm households such as the female headed. The major implements the female headed households purchased using the FISP e-voucher are the labour saving related equipment such as knapsack sprayers and rippers. Knapsack sprayers have multiple uses that include; administration of herbicides for weed management as well as accaricides in livestock disease control especially tick borne diseases.

However, fertilizer remains the major input type which is sourced by both male and female headed households as reported by 64% and 64.1%, respectively. It is scientifically common

knowledge that fertilizer is a critical resource in crop productivity enhancement in addition to other agronomic operations.

Table 2 Percent farmer response on inputs purchased using e-voucher, by gender

Inputs	Farm Household Type	
	Male headed	Female headed
Seed crop and agricultural chemicals	29.2	17.2
Conservation Agricultural equipment	6.7	18.8
Fertilizer	64.0	64.1

Source: Author, based on survey field data

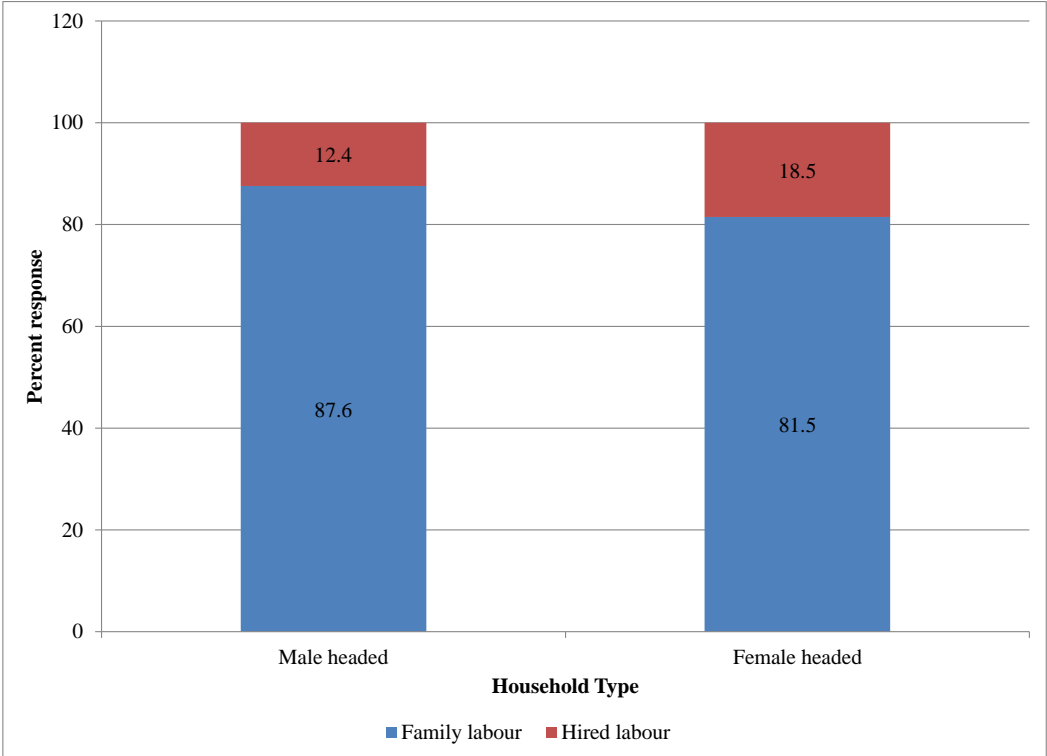
4.3 Crop Production Characteristics of the FISP Beneficiaries

In order for FISP input support to have impact on the beneficiaries, farmers need to have access to other support resources especially the basic capital assets that include; land, agricultural implements and financial resources. Majority of both the male (74.2%) and female (86.2%) headed FISP beneficiary households occupy land which is under the customary land tenure system. About 10.1% of male and 9.2% of female headed households are growing crops using FISP inputs on rented land. Rented land poses serious challenges in terms of long term soil fertility improvement such as those centred on conservation farming, improved fallows and annual rotation cycles due to uncertainty of ownership and continued use of the land in the coming seasons. This scenario tends to compromise long term investment on the land in terms of soil fertility amendments which are aimed at enhancing crop productivity.

Access to adequate land however, was not a serious hindrance for most farmers. Statistically, close to half (46.4%) of the sampled farmers had access to above 10 hectares of land. This scenario provides an opportunity for farmers to diversify their agricultural enterprises beyond maize production. Farming experience is another important factor that directly influences productivity as well as farmer's ability to diversify. About two thirds (64.9%) of the sampled farmers have vast experienced in farming with over 8 years of involvement in farming.

In view of the female headed households having smaller family sizes as presented in table 1, these households also tend to rely more on hired labour than the male headed households. Figure 5 gives a pictorial presentation of the sources of agricultural labour among the male and female headed households in the study site.

Figure 4 Percent response on major source of labour by household type



Source: Author, based on field survey

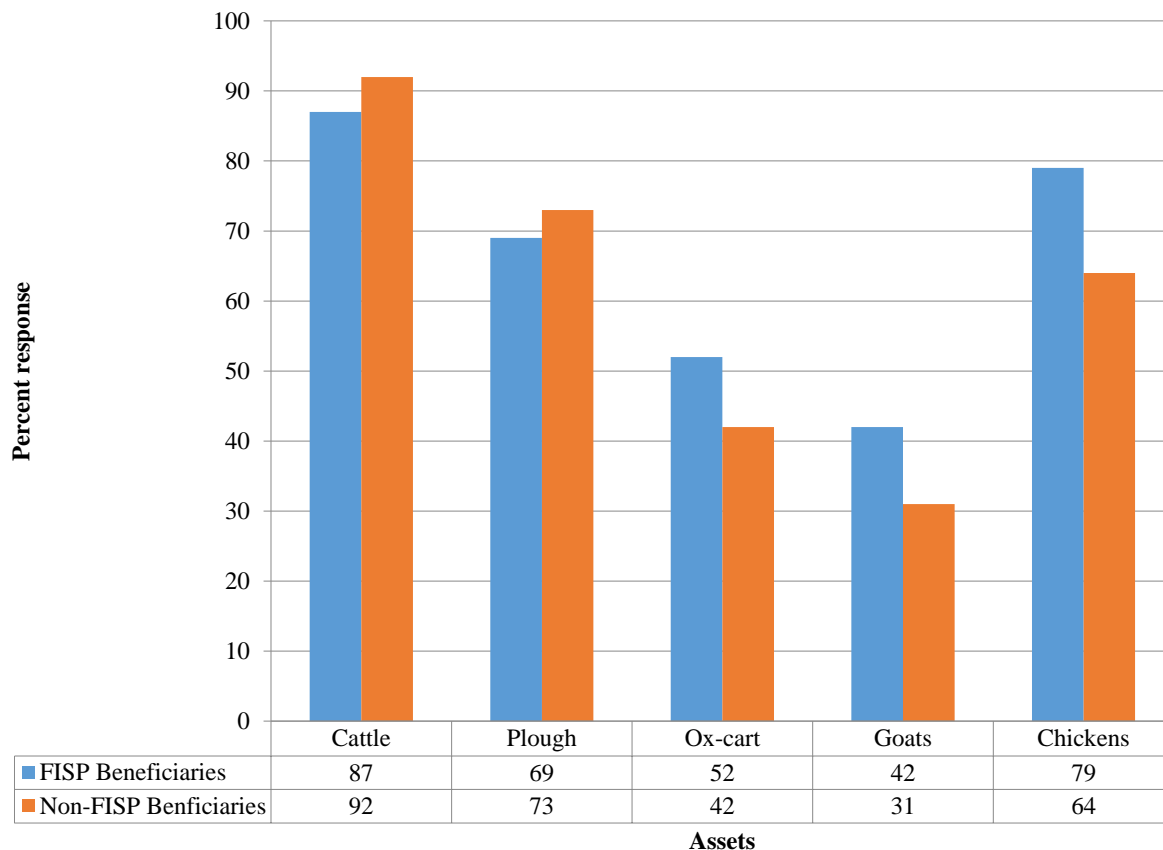
4.3.1 Crop Production and Productivity

Farmer access to physical agricultural productive assets play a key role in terms of the effective and efficient utilization of inputs for crop production. These assets have a direct bearing with regard to enhancing productivity. In the context of understanding how the FISP e-voucher input support has contributed to both production and productivity, an analysis of assets ownership as well as productivity trends for maize the major staple food crop was done.

Figure 6 affirms that FISP beneficiaries are more constrained in terms of ownership of key crop production assets especially cattle and ox-drawn ploughs compared to non-beneficiaries. This

finding however, points to effective targeting of input support as FISP inputs are meant to benefit economically vulnerable farm households.

Figure 5 Household ownership of agricultural productive assets, 2017/18



Source: Author, based on survey data

It is observed from the trend analysis that E-voucher input support has to some extent contributed to an increase in both maize production as well as productivity among the beneficiary farm households. Table 3 indicates that in the last three seasons, there has been a 2.8% increase in maize productivity. This finding could be attributed to a number of factors but primarily, improved resource constrained farmer access to inputs especially high yielding hybrid maize varieties, fertilizers and labour saving agricultural implements such as knapsack sprayers and ox-drawn rippers.

Table 3 Trend in maize productivity analysis during the FISP e-voucher, 2014/15-2016/17

Seasons	Harvest (kg)	Area planted (ha)	Productivity (kg/ha ⁻¹)	% change in yield/ha
2016/17	3,256	2.47	1,318 (26.4 bags X 50kg)	2.8
2015/16	3,167	2.45	1,293 (25.9 bags X 50kg)	0.8
2014/15	2,885	2.25	1,282 (25.6 bags X 50kg)	-

Source: Author, based on field data

Field findings also indicate that the farmers who are the beneficiaries of FISP E-voucher were investing more in productive assets in the period under review. This is a clear indication of agricultural growth and diversification. Most of the money used to buy these assets was proceeds from maize sales.

To assess if there was an increase in the size of maize plots cultivated each successive year, results were gotten in hectares from 2015 to 2017 farming season. The maize plots were divided into three categories namely below 2 ha, between 2.1 to 5 ha and above 5 ha respectively. Table 6 shows the results on plot size in hectares for 2015 to 2017 farming seasons.

Table 4 Trend in area cultivated, by FISP Input access

Hectares Ploughed in 2016/17 farming Season			
Household Type	Below 2 ha	2.1ha to 5 ha	Above 5.1 ha
E-voucher beneficiary	69%	23%	8%
Non beneficiary	81%	19%	0%
Hectares Ploughed in 2015/16 farming Season			
Household Type	Below 2 ha	2.1ha to 5 ha	Above 5.1 ha
E-voucher beneficiary	64%	27%	8%
Non beneficiary	84%	14%	1%
Hectares Ploughed in 2014/15 farming Season			
Household Type	Below 2 ha	2.1ha to 5 ha	Above 5.1 ha
E-voucher beneficiary	71%	18%	11%
Non beneficiary	91%	4%	5%

Source: Author, based on survey data

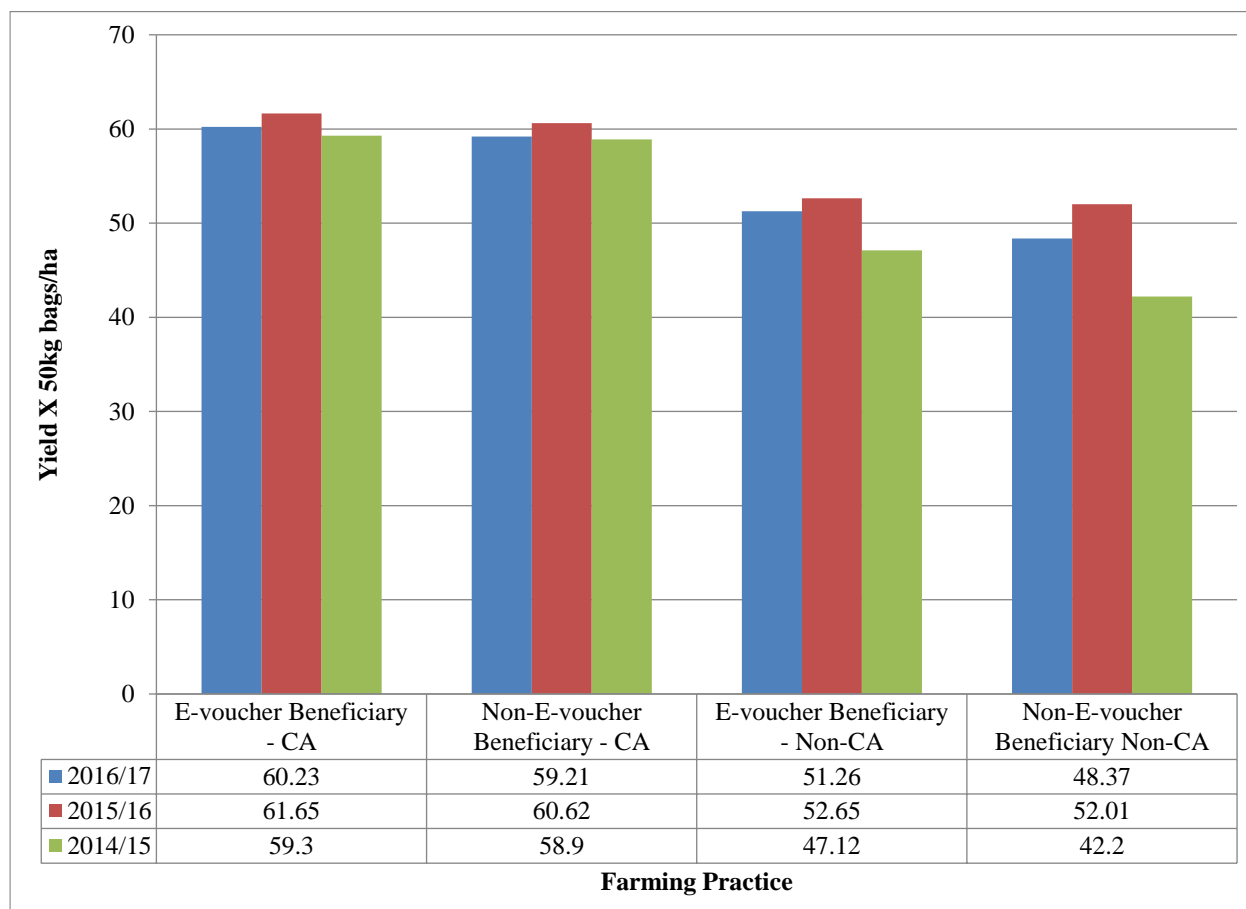
The results from table 4 indicate that the majority of non-beneficiary of FISP E-voucher farmers cultivated less than 2 hectares and none of them cultivated above 5.1 hectares. There were a number of farmers who graduated from 2 hectares to between 2.1 to 5 hectares, though the number of those cultivate above 5.1 hectares remained constant for the 2015/16 to 2016/17 farming season under the voucher system. The reverse happened for the non-beneficiary who in 2014/15 had 5 percent cultivating above 5.1 hectares and sharply dropped to 1 percent in 2015/16 farming season. Some farmers under the voucher system sustain their growth in 2017 as most of them graduated into cultivating above 5.1 hectares in 2017 represent by 8 percent.

To assess productivity in Lukanda Agricultural Camp, the Maize yield potential (productivity) of the Conservation Agriculture (CA) practice being promoted through the E-voucher scheme was tested by comparing the maize yield of beneficiaries against non-beneficiaries. Maize was

chosen for comparisons because the quantitative collected during the study showed that it was the crop that was grown most by both practitioners of Conservation Agriculture (voucher recipients or beneficiaries) and non-practitioners (non voucher recipients or non-Conservation Agriculture practitioners).

The comparisons reflected in figure 6 generated from quantitative data after the voucher intervention revealed that maize yield under Conservation Agriculture averaged approximately three tons per hectare (60 bags x 50kg) compared to the yield under the conventional farming practice that averaged approximately 2.5 tons per hectare (51 bags x 50kg). E-voucher beneficiaries had on average 59 bags by 50 Kgs (2.9 tonnes per hectare) This shows some increase in productivity by the beneficiaries of the voucher scheme that could be attributed to early access to inputs, farming practices, the weather pattern and extension services. The difference between voucher beneficiary farmers is approximately 10 bags x 50 (0.5 tonnes per hectares).

Figure 6 Comparison of maize yield (X 50kg ha^{-1}) between E-voucher beneficiaries and non-beneficiaries by farming practice



Source: Author, based on survey data

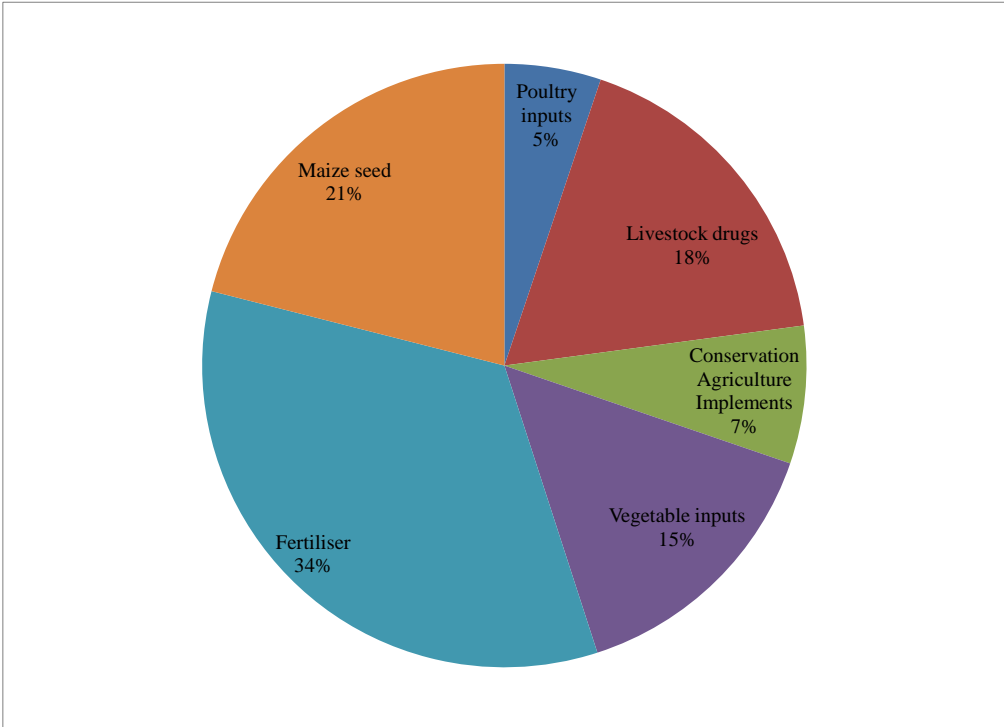
Studies conducted by Haggblade and Tembo (2003) confirmed that conservation farming increases yields by 60% for both maize and cotton growers. The practice of early preparation of basins in the dry season makes them able to plant during the first rains before conventional farmers start preparing the land. Conventional farming methods resulted in failure to achieve the expected minimum of the three ton per hectare thereby limiting the impact of FISP on agricultural production and food security.

4.3.2 Income Diversification

One of the key objectives of the FISP e-voucher system is to encourage diversification in terms of agricultural production and move away from the maize monoculture cropping system. The respondents were asked as to what type of farming inputs they purchased using the voucher

cards. As presented in figure 6, fertilizer which constituted the largest share of the e-voucher value (34%) remains the primary input type that is sourced using the FISP e-voucher input support. This input is cardinal both in terms of improving crop productivity as well as crop diversification. The figure also portrays diversity of enterprises that farmers are now engaged in as a result of the e-voucher system. Among the other inputs purchased in terms of the e-voucher value and distribution in addition to fertilizers are the following; maize seed (21%), livestock drugs (18%), vegetable inputs (15%), CA implements (7%) and poultry inputs (5%).

Figure 7 Percent Share of input types purchased using E-voucher support



Source: Author, based on survey data

Hybrid maize is the major staple food crop that has been supported under the FISP e-voucher system. This type of variety has been supported heavily due to its high productivity potential in terms of yield per hectare compared to non-hybrids. In Table 3 below, the Herfindahl indices of 0.671 and 0.733 for FISP Beneficiaries (also hybrid maize growers) and non- FISP Beneficiaries (also referred to as non-hybrid maize growers) respectively suggest poorly distributed income sources for either group, and as a consequence, some vulnerability to income risk. In this research study, the index ranges from the inverse of the number of income sources (0.09) to 1. If

two sources of income represented the same share, the index would be equal to 0.5. An index above 0.25 is considered to be high in studies of collusion in US industries. The P-value of 0.0569 confirms statistical differences between the two farmer groups, with higher concentration of income among non-hybrid growers.

Maize contributes the largest percentage (26%) of income at household levels followed by horticultural products (21.4%) and piecework at 10.5%. However, among the non-hybrid maize growers, piecework contributed the highest share (23.3%) to household income. Other important income sources based on their share contribution to household income were horticultural products (15.7%), petty trade (11.4%), cotton (10.6%) and livestock (9.8%). Statistically, there were significant statistical differences in income share contributions between hybrid and non-hybrid maize growers for piecework and maize grain income sources at 95% confidence level.

Table 5 Diversity of income sources, by access to FISP E-voucher support

Indicator of income diversity		FISP Beneficiary	Non-FISP Beneficiary	t-test of difference of means (P Values)
<u>Richness</u>				
Count of crop activities	Mean	1.963801	1.938272	
	Std. Error Mean	0.0532201	0.0792435	0.7990
Count of livestock activities	Mean	1.307692	1.148148	
	Std. Error Mean	0.0649458	0.0995532	0.1958
Count of all farm and non-farm activities	Mean	2.330317	1.814815	
	Std. Error Mean	0.0954419	0.1166814	0.0031
<u>Concentration</u>				
Herfindahl	Mean	0.6709042	0.7334045	
	Std. Error Mean	0.0170443	0.0275224	0.0569
<u>Shares</u>				

Maize	Mean	0.2596266	0.0422066	
	Std. Error Mean	0.0235999	0.0183553	0.0000
Horticulture	Mean	0.2143219	0.1565282	
	Std. Error Mean	0.0241818	0.0354094	0.2029
Cotton	Mean	0.0628614	0.1058356	
	Std. Error Mean	0.0141297	0.0288185	0.1410
Livestock	Mean	0.0713701	0.097664	
	Std. Error Mean	0.0137979	0.02752	0.3520
Groundnuts	Mean	0.0107356	0.0073636	
	Std. Error Mean	0.0031586	0.0051108	0.5783
Other crops	Mean	0.0406516	0.032016	
	Std. Error Mean	0.0080702	0.0158169	0.5988
Self-employment	Mean	0.0744928	0.0674083	
	Std. Error Mean	0.0172658	0.0256726	0.8273
Petty trade	Mean	0.0641227	0.1143982	
	Std. Error Mean	0.0142034	0.032029	0.0994
Piecework	Mean	0.1053098	0.2332927	
	Std. Error Mean	0.018494	0.0451142	0.0020
Remittances	Mean	0.0440287	0.0660562	
	Std. Error Mean	0.0115229	0.0269717	0.3800
Other income sources	Mean	0.0524789	0.0772306	
	Std. Error Mean	0.132942	0.0289025	0.3783

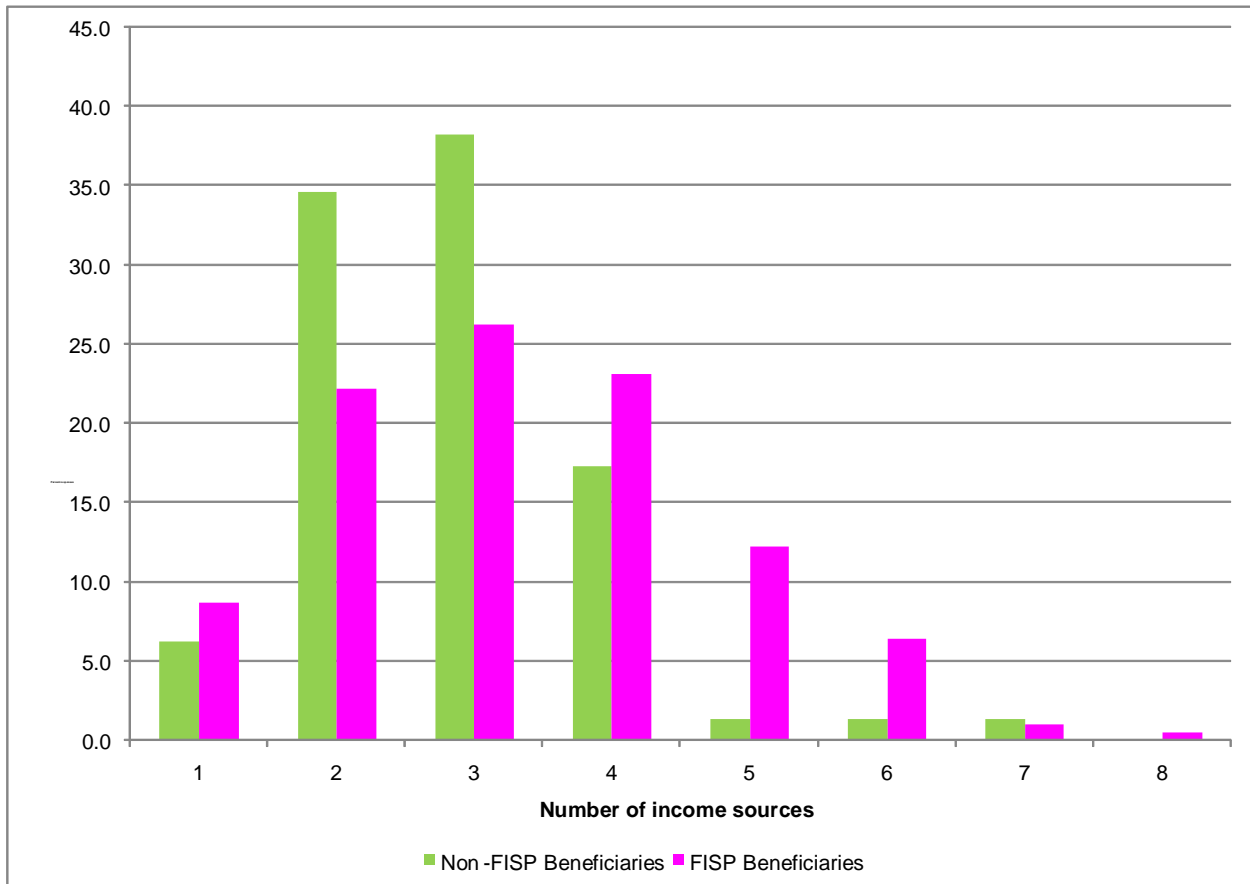
Source: Author, P-values refer to independent samples t-tests.

Figure 8 below shows higher income diversity among FISP beneficiaries who are also hybrid maize growers with a significant number realizing income from more than three sources.

Generally, the spread of income sources was more normally distributed among FISP

beneficiaries compared to non-FISP beneficiaries who were more limited to four sources of fewer.

Figure 8 Richness of income sources by farmer type based on FISP support.



Source: Author, based on survey data

4.4 Sustainability of E-voucher

The respondents were asked if they have received technical support on how to use the cards in terms of redeeming and safe keeping. Seventy eight percent of the respondents were reliably informed on card use through agricultural extension services and twenty two percent were not.

The results indicate majority of the respondents were aware on card use and were able to redeem the farming inputs without difficulty

Seventy percent of the farmers acknowledged that e-voucher was effective in their agricultural growth as they had a choice of the type of inputs they needed. Furthermore, the majority of the farmers contended that the voucher system has brought about food security, cheap inputs and has increased their farming capital.

*a farmer during the focus group discussion, explained the benefits of the E-FISP:
“I really like the e-voucher compared to the ordinary FISP which restricted us [farmers] to fertilizer and maize seed only. I’m now able to get inputs of my choice like herbicides, insecticides for my garden, and other farming tools like sprayers.”*

Another farmer also pointed out the benefits of the e-voucher programme:

“... because it gets more money from the government. Before we’d get four 50kg bags of fertilizer. Now, adding the 400 kwachas [the upfront farmer contributions] to the 1,700 kwachas from the government, makes 2,100 kwachas [USD 220], which is a lot of money to buy a diverse range of inputs.”

The lead farmer under the conservation farming comments on having better control of the distribution process:

“The e-voucher card is personalized, and that has helped us not to have our inputs diverted by other agents. I’m also able to redeem inputs at my own time as an individual, unlike with the ordinary FISP where farmers had to collect inputs as a group, and if a member was missing at the time, they risked having their inputs taken by other greedy group members.”

Late activation of the cards was a major challenge faced by the farmers as it delayed them in accessing inputs. The other challenge was that the fertilizer received was too little as such it was not enough to cater for all the field crops grown. A number of people were left out under the e-voucher system and this affected their agricultural activities.

For instance, Ngona (2017) argued that all the farmers interviewed in his study indicated that there is delayed activation of cards schemes offered by the government under the voucher systems. According to GRZ (2006) agricultural productivity among small-scale farmers in Zambia is affected by inadequate access to oxen, limited access to agricultural inputs, high transport costs, diseases and pest attacks on crops and livestock, inadequate agricultural services, particularly credit and markets, and effects of diseases like HIV/AIDS. These constraints have had a negative impact on agriculture. For example, delayment in receiving farming inputs on time of fertilizer, lack of seeds and lack of finances portray lack of resources to invest in production. As a result, households reduce land under cultivation.

The farmer's also advice agro dealers not to exaggerate prices of the farming inputs as this negatively affect their productivity. Most of the agro dealers were far away from the farmer's communities and as such transport costs were incurred. Stealing from the farmers was also a common phenomenon as farmers are not well informed on when cards have activated or not, as most agro dealers debit their accounts without their knowledge. McEwen (2003) in a study of macro and micro factors influencing livelihoods trends in Zambia reports similar results, that high transport costs and the conditions of the Zambian rural road network restrict the opportunities for investment in outlying areas. The most affected being the small-scale farmers living far from the main road network resulting in high costs of bringing inputs to the farm and outputs to the market and therefore leaves the farmer with little choice but to produce only for home consumption and limited level of marketing.

4.5 Challenges of FISP E-voucher

Key informant interviews as well as Focus group Discussions revealed that despite the positive aspects of the FISP E-voucher system in terms of increased crop productivity as well as income diversification, a number of challenges were still reported regarding the effective utilization of the input support using this system. Firstly, the down payment contribution by the farmer remains high for the targeted recipients, Secondly multiple beneficiaries from the same household means that well off households have more access to the government input subsidy than the poorer ones. As long as the subsidy is targeted via cooperatives set up only to access

benefits from a government programme, it is likely that well deserving households may fail to benefit from the government subsidy.

Other challenges of the voucher systems are delayed submission of beneficiary lists to the Ministry of Agriculture which is the Programme Coordinating Office resulting in delayed delivery and activation of e-cards. There were also cases of non-crediting of e-cards in time, a problem that led to delayed access of inputs by some farmers.

4.6 Suggestions for improvement

Respondents were asked to suggest recommendations for improvement of farming as a result of voucher system. The results in table 7 indicate that, as usual, 60 percent said inputs should be delivered on time and activation of e-voucher cards. Eleven (11) percent each said they should have access to loans to secure farming equipment and 9 percent said, Conservation Farming Unit (CFU) should continue educating farmers through workshops on farming adaption strategies. Ten percent said there is need for the diversification of e-voucher for poultry inputs. One (1) percent provision of market for farm products. 3 percent each said relief food is required, 4 percent said information of weather should be given to farmers and 2 percent talked about buying prices of crops should be revised by government.

Table 6 Farmer recommendations for improvement

Recommendations	Percent response
Early delivery of inputs and activation of the cards	60
Acquisition of loans to secure farming equipment	11
Conservation Farming Unit should continue educating farmers through workshops	9
Diversification of E-voucher for poultry farming inputs	10
Relief food is required	3
Information of weather should be given to farmers	4
Buying prices of crops should be revised by government	2
Provision of market for farm products	1

Source: field survey, 2018

CHAPTER FIVE

DISCUSSION OF THE RESULTS

5.1 Introduction

This chapter discusses the policy implications of the study findings pertaining to the impact of the FISP e-voucher on crop productivity and diversification among small scale farmers in Lukanda Agricultural Camp.

5.2 Crop Productivity

Production is a process and method employed to transform tangible inputs (raw materials, seeds, fertilizers, semi-finished goods) and intangible inputs (trainings in conservation farming practices or other extension messages, ideas, information, knowledge) into goods or services (outputs). In the farming sector, crops are the primary goods produced by combining the factors of production such as land, labour, capital and technology. The unit measure of productivity is yield per hectare.

Through improved input access in terms of fertilizers, improved seed, coupled with access to agricultural productive assets, the targeted farmers have improved their crop productivity especially for maize the main staple food crop. The flexible e-voucher system under FISP has also enabled farmers to purchase critical production inputs that have for a long time impeded their productivity. Among these inputs are the labour saving implements such as knapsack sprayers and rippers for which government needs to encourage farmers in terms of utilization.

The promotion of conservation agriculture practices as a complementary strategy in crop production among the FISP beneficiaries has also greatly contributed to enhanced crop productivity as reported in table 5 and lessons from this study would be key in scaling out to other areas that benefit from the FISP e-voucher system.

The yields recorded under this study for the Conventional Farming seems to be in line with other findings. For example, the 2016 CSO/MACO crop forecast data estimated an

average maize yield of two tons per hectare for the Government's Farmer Input Support Programme beneficiaries, far less than three tons per hectare tenable under the Conservation Agriculture practice. As for this study, the findings are that the yield difference between Conservation Agriculture and conventional farming averaged 10 X 50 Kg bags (0.5) in Lukanda Agricultural Camp, implying that households that practiced Conservation Agriculture had a chance of getting extra 0.5 tonnes (10 X 50 Kg) bags on every hectare of land cultivated to maize. While for the conventional methods, it implied that the farmers were getting less maize by 10 X 50 Kg (0.5) tonnes for the same quantity of agricultural inputs same size of land/hectare as that which is under conservation farming.

On the other hand, the research looked at the farms size for the past two years to determine whether area under crop cultivation was increasing. The (80) eighty percent of the beneficiaries of e-FISP cultivated above 2 hectares while (91) ninety one percent of non-beneficiaries cultivated less than 2 hectares. There were a number of farmers who graduated from 2 hectares to between 2.1 to 5 hectares, though the number of those cultivate above 5.1 hectares remained constant for the 2015/16 to 2016/17 farming season under the voucher system. The reverse happened for the non-beneficiary who in 2014/15 had 5 percent cultivating above 5.1 hectares and sharply dropped to 1 percent in 2015/16 farming season. Some farmers under the voucher system sustain their growth in 2017 as most of them graduated into cultivating above 5.1 hectares in 2017 represent by 8 percent. The results are in support with (Mulwanda2013, Kodayama, 2014 and Haggblade and Tembo, 2015) who found out that input subsidy programmes in Kalomo and Chibombo district had increases area under maize cultivation in each successive year.

5.3 Crop Diversification

The results indicate that the farmers have diversified into other crops and this depends on the marketability of the crop in that particular season. Most of the farmers cultivate groundnuts, which is common among rural small scale farmers. Sweet potatoes are also grown in the study area as a result of the good sandy loamy soils of the area. In fact Kapiri district is well known for the production of sweet potatoes. Others have ventured into vegetable gardening represented by (10) ten percent and the least grow soya beans at (6) six percent respectively. Other crops which

are not grown on large scale included rice, pumpkins, tomatoes, water melons, and butter nuts. Crop diversification is one of the coping mechanisms of food security, production and market risks. For example, diversification was the single most important source of poverty reduction for small farmers in South and Southeast Asia (FAO and World Bank, 2001). Winters et al. (2006) have identified three key factors that derive farmers “demand” for crop diversity: i) managing risk, ii) adapting to heterogeneous agro-ecological production conditions and iii) meeting market demands and food security. Degye et al. (2012) confirmed that households in Central and Eastern highlands of Ethiopia would be able to improve their food security conditions by enhancing their crop diversification.

5.4 Effectiveness of E- FISP

Seventy five percent (75%) of the farmers acknowledged that e-voucher was effective in their agricultural growth as they had a choice of the type of inputs they needed. Furthermore, the majority of the farmers contended that the voucher system has brought about food security, cheap inputs and has increased their farming capital. The effectiveness of the voucher scheme can also be assessed by looking at the diversity of income sources of both the beneficiaries and the non-beneficiaries. The purpose of looking at income levels of both groups is to establish if there are any differences between the two groups of farmers and the extent to which the differences can be attributed to the voucher scheme interventions. Additionally, the performance can also be assessed by looking at the value that the farmers attach to the voucher scheme as this is one way of judging the possible success of the programme.

Looking at the qualitative data that was collected in Lukanda Agricultural camp, the comparisons of total mean income between beneficiaries and non-beneficiaries showed that beneficiaries of the voucher scheme had slightly higher mean total annual income than the non-beneficiaries. For instance, the data collected as shown in figure 4 indicates that the mean income for none beneficiaries was K4, 332 while for the voucher beneficiaries it was K7, 724. In simpler terms, this meant that there was a difference of K3, 392 annual incomes between beneficiaries and none beneficiaries in the study areas. These figures have to be taken with caution since it is usually difficult to get accurate income data for obvious reasons (Makunka, 2014). The beneficiary farmers partly attributed their high income levels to voucher scheme interventions that provided

them with agricultural inputs, training in conservation farming practices and timely planting. It can be deduced that the Voucher scheme was a major contributing factor to enhancing the income of its beneficiaries.

Late activation of the cards was a major challenge face by the farmers as it delayed them in accessing inputs. The other challenge was that the fertilizer received was too little as such it was not enough to carter for all the field crops grown. A number of people were left out under the e-voucher system and this affected their agricultural activities. These constraints have also been cited in the literature with regard to *Zambian agriculture*. For instance, *Ngona (2017)*, argued that all the farmers interviewed in his study indicated that there is delayed activation of cards schemes offered by the government under the voucher systems. According to *GRZ (2006)* agricultural productivity among small-scale farmers in Zambia is affected by inadequate access to oxen, limited access to agricultural inputs, high transport costs, diseases and pest attacks on crops and livestock, inadequate agricultural services, particularly credit and markets, and effects of diseases like HIV/AIDS. These constraints have had a negative impact on agriculture. For example, delayment in receiving farming inputs on time of fertilizer, lack of seeds and lack of finances portray lack of resources to invest in production. As a result, households reduce land under cultivation.

The farmer's also advice agro dealers not to exaggerate prices of the farming inputs as this negatively affect their productivity. Most of the agro dealers were far away from the farmer's communities and as such transport costs were incurred. Stealing from the farmers was also a common phenomenon as farmers are not well informed on when cards have activated or not, as most agro dealers debit their accounts without their knowledge. *McEwen (2003)* in a study of macro and micro factors influencing livelihoods trends in Zambia reports similar results, that high transport costs and the conditions of the *Zambian rural road network* restrict the opportunities for investment in outlying areas. The most affected being the small-scale farmers living far from the main road network resulting in high costs of bringing inputs to the farm and outputs to the market and therefore leaves the farmer with little choice but to produce only for home consumption and limited level of marketing.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This section presents the key issues under the conclusion and recommendations made based on the study findings.

6.2 Conclusion

It is apparent from the findings that FISP e-voucher system has contributed to enhanced crop productivity as well as income diversification for the resource constrained farm households. A positive trend is observed in productivity during the E-voucher implementation period among the resource constrained farm households especially women farmers. The input support has also contributed to the scaling out of income diversification beyond crop production to include livestock as well. However, farmer access to FISP support is hindered by delayed crediting of the cards which leads to non-redeeming of the cards in time during the season. The amount of cash in the input pack is still limiting in terms of diversification of income sources.

6.3 Recommendations

- There is need to consider timely release of inputs under the FISP E-voucher system as it has shown potential in terms of increased productivity and income diversification
- E-voucher cards need to be credited in time
- More investment is required in terms of the value of the E-voucher so that farmers are able to source more productive assets
- Value of e-voucher cards require upgrading in terms of value so as to encourage diversification
- Farmers need to be adequately educated on critical crop and livestock adaption strategies that promote productivity

References

- ACF. 2009. Report on Proposed Reforms for the Zambian Fertilizer Support Programme. Lusaka: Agricultural Consultative Forum.
- African Union.(2006). Abuja-Declaration. Abuja.
- Aloyce G. M, Gabagambi D. M. and Hella J. P. (2014). Assessment of operational aspects of the input supply chain under national agriculture input voucher scheme (NAIVS) in Tanzania. *Journal of Development and Agricultural Economics* Vol. 6(3), pp. 94-104,
- Andrew Dorward and Ephraim Chirwa. (2011). The Malawi Agricultural Input Subsidy Programme: 2005-6 to 2008-9. *International Journal of Agricultural Sustainability (IJAS)*, January (volume 9:1)
- Andrew Dorward, Philip D. Roberts, Cambria Finegold, David J. Hemming, Ephraim Chirwa, Holly J. Wright, Rachel K. Hill, Janice Osborn, Julien Lamontagne-Godwin, Luke Harman, Martin J. Parr . (2013). Protocol: ^[11] ^[SEP] Agricultural Input Subsidies for improving Productivity, Farm Income, Consumer Welfare and Wider Growth in Low- and Middle-Income Countries: A Systematic Review. Campbell Collaboration.
- Auckland N. Kuteya, ChinyamaLukama, Antony Chapoto, and Vincent Malata.(2016). Lessons Learnt from the Implementation of the E-voucher Pilot. Indaba Agricultural Policy Research Institute. Policy Brief Number 81
- Chibwana, C., M. Fisher, and G. Shively. 2011. Cropland Allocation Effects of Agricultural Input Subsidies in Malawi. *World Development* 40.1: 124–133.
- CSO (2014) Crop Forecast Survey (CFS). Lusaka Zambia.
- DeGroff A and Cargo M. (2009). Policy implementation: Implications for evaluation. In J. M. Ottoson & P. Hawe (Eds.), *Knowledge utilization, diffusion, implementation, transfer, and translation: Implications for evaluation*. *New Directions for Evaluation*, 124, 47–60.
- Dickinson, S. and M. Prabhakar (2009) ‘An analytical framework for community empowerment evaluations’ www.communities.gov.uk/documents/communities/.../1412080.pdf

(accessed
13/01/18)

Dorward, A. (2009). Rethinking Agricultural Input Subsidy Programmes in Developing Countries. SSRN Electronic Journal. <https://doi.org/10.2139/ssrn.1808847> 8. FAO. (2012). E-vouchers in Zimbabwe.

Druilhe, Z. and Barreiro-Hurle, J. (2012). Fertilizer subsidies in sub-Saharan Africa. ESA Working paper No. 12-04, Rome, FAO.

Government of the Republic of Zambia. (2011). *Sixth Nation Development Plan 2011-2015, Sustained Economic Growth and Poverty Reduction*, Lusaka, Zambia.

Grace Modupe Adebo.(2014). Effectiveness Of E-Wallet Practice In Grassroots Agricultural Services Delivery In Nigeria - A Case Study Of Kwara State Growth Enhancement Support Scheme. *Journal Of Experimental Biology And Agricultural Sciences*, Volume – 2(4)

Hamazakaza, P, Smale, M and Kasalu. H. 2013. The impact of hybrid maize on smallholder livelihoods in Zambia: Findings of a household survey in Katete, Mkushi, and Sinazongwe Districts. IAPRI, Working Paper.

IAPRI (2013) *The Rising Class Of Emergent Farmers: An Effective Model For Achieving Agricultural Growth And Poverty Reduction In Africa*, Washington Dc.

Jayne, T.S., N.M. Mason, W. Burke, A. Shipekesa, A. Chapoto, and C. Kabaghe. 2011. *Mountains of Maize, Persistent P*

Kuteya, A. N., Lukama, C. Chapoto A. and Malata, V. (2016). *Lessons Learnt from the Implementation of the E-voucher Pilot*.

Lunduka, R., J. Ricker-Gilbert, and M. Fisher. 2013. What Are the Farm-level Impacts of Malawi's Farm Input Subsidy Programme? A Critical Review. *Agricultural Economics* 44: 563-79.

Magurran, A.E. 1998. *Ecological diversity and its measurement*. Princeton University Press, Princeton, New Jersey.

MAL 2004, *Implementation Manual for the 2015/2016 Agricultural Season Farmer Input Support Programme*, Lusaka, Zambia.

Mason, N, Jayne and Mukuka. 2014. A Review of Zambia's Agricultural Input Subsidy Programmes: Targeting, Impacts, and the Way Forward. IAPRI

Mason, N.M. and S.T. Tembo. 2015. Do Input Subsidy Programmes Raise Incomes and Reduce Poverty among Smallholder Farm Households? Evidence from Zambia. IAPRI Working Paper No. 92. Lusaka, Zambia: IAPRI.

Mason, N.M., T.S. Jayne, and R. Mofya-Mukuka. 2013. Zambia's Input Subsidy Programmes. *Agricultural Economics* 44: 613-28.

Ministry of Agriculture and Livestock, Department of Policy and Planning. (2014) Report on the assessment of small-scale farmers' perception on the farmer input support programme (FISP) reforms. A case study of Chibombo, Kaoma and Sinazongwe districts. Lusaka, Zambia.

Ministry of Agriculture and Livestock, District Agricultural Coordinating Office. (2015). Choma District 2015 First Quarter Report.

Ministry of Agriculture and Livestock, District Agricultural Coordinating Office. (2016) Choma District 2015/2016 Farmer Input Support Programme Wrap Up Report

Ministry of Agriculture and Livestock, District Agricultural Coordinating Office. (2017) Choma District 2016/2017 Farmer Input Support Programme Wrap Up Report

Ministry of Agriculture, FISP Review Meeting E Voucher National Performance 10th to 11th March 2017. Mulungushi International Conference Center.

Morris, M., Kelly, V.A., Kopicki, R., and Byerlee, D. (2007). *Fertilizer use in African Agriculture: Lessons Learned and Good Practice Guidelines*, Washington, DC: World Bank.

Musika. (2017). Farmer Input Support Programme (FISP) E-Voucher Roll-Out-Lessons and Recommendations. 2017 FISP Review Meeting. Mulungushi International Conference ,Lusaka.

Nicole M. Mason, T.S. Jayne and Rhoda Mofya-Mukuka .(2013). *Agricultural Input Subsidy Programmes in Theory and in Practice: The Case of Zambia*. Lusaka. IAPRI.

Nkonde, C., N.M. Mason, N.J. Sitko, and T.S. Jayne. (2011) “Who Gained and Who Lost from Zambia’s 2010 Maize Marketing Policies?” FSRP Working Paper #49, Department of Agricultural, Food and Resource Economics, Michigan State University.

Nkumbu Nalwimba Gubo Qi George T. Mudimu.(2017).^[11]_{SEP} A Synopsis of Constraints to Crop Productivity among Smallholder Farmers in Choma District, Zambia Journal of Economics and Sustainable Development Vol.8, No.24, 2017

Ricker-Gilbert, J., T.S. Jayne, and E. Chirwa. 2011. Subsidies and Crowding Out: A Double-Hurdle Model of Fertilizer Demand in Malawi. American Journal of Agricultural Economics 93.1: 26–42.

Smale, M. (ed.) 2006. *Valuing Crop Biodiversity: On-Farm Genetic Resources and Economic Change*. CAB International, Wallingford, UK.

World Bank, (2007). Agriculture for Development, World Development Report 2008, The International Bank for Reconstruction and Development, Washington, DC: World Bank.

World Bank. 2010. Impact Assessment of the Fertilizer Support Programme, Analysis of Effectiveness and Efficiency: Zambia. World Bank Sustainable Development Department Report No. 54864ZM. Washington, D.C.: World Bank. Agricultural and Rural Development, Africa Region

World Food Programme.(2014) E-Vouchers for Food Security-A Potential for India’s Social Safety.

ZARI. 2016. Annual report. Ministry of Agriculture

Appendix 1 Questionnaire

INFORMED CONSENT STATEMENT

Hello. My name is _____. I am a Research Assistant for Mr. Chibizwa Chibe Chibbompa I am conducting research on assessing the impact of E-voucher system among small scale farmers in terms farm size, crop yields and crop diversification in Lukanda Agricultural Camp. You have been randomly chosen to participate and would very much appreciate your participation in this research. I would like to ask you questions about some important issues. The information you will give is for academic purposes only and will be kept in strict confidence.

May I begin the interview now?

SECTION I: RESPONDENT INFORMATION

NO	QUESTION FILTERERS	CODING CATEGORIES
1.	SEX	1. Male [] 2. Female []
2	Age	1. Below 15 years [] 2. 15 to 30 [] 3. 31 to 45 [] 4. 46 to 60 [] 5.60 years []
3	What is your marital status?	1. Married 2. Single 3. Divorces 4. Widowed 5. Others specify.....
4	Education level;	1. Not been to school 2. Attained primary education 3. Attained secondary education 4. Attained tertiary education
5	What is the size of your household?	
6	What is the main occupation of the head of the household?	1. Field crop production 2. Vegetable production 3. Trading

		4. Livestock production 5. Formal employment 6. Other specify
--	--	---

7.	Other than head of the household is there any other beneficiary of FISP e-voucher?	1. Yes <input type="checkbox"/> 2.No <input type="checkbox"/>	
8.	What package of inputs was the e-voucher meant for?	1= seed crops & Agricultural chemicals 2=Conservation Agriculture Equipment. 3=Other inputs (Specify)	
9.	Indicate the names quantities and value of inputs obtained through the e- voucher you were given	Name	Quantity
10.	What inputs did you purchase with your own money?	Name	Quantity

Section 2 Production Characteristics

11	What type of land occupancy do you have?	1. Titled 2. Customary 3. rented	
12	How many hectors is your farm size?	1. 0-4 2. 5-9 3. 10 and above	
13	For how long have you been farming?	1. Less than 3 years 2. 4 to 7 years 3. Above 8 years	
14	How many hectors of land did you use in maize production for the past three years?	1. 2016/17..... 2. 2015/16..... 3. 2014/15.....	
15	What type of labour do you use?	1. Family labor 2. Hired labor	
16	How much did you spend on hired labor?		Cost (K)
		1. 2016/17	

		2. 2015/16			
		3. 2014/15			
17	What type of implements did you use in the last three years?		hoe	plough	tractor
		1. 2016/17			
		2. 2015/16			
		3. 2014/15			
18	Where the implement owned or rented?	1. 2016/17 owned[] rented[] 2. 2015/16 owned[] rented[] 3. 2014/15 owned[] rented[]			
19	How many bags of fertilizers did you apply in the last three years?		Basal	Top	Cost (K)
		2016/17			
		2015/16			
		2014/15			
20	How many bags of seed did you plant in the last three years?	1. 2016/17..... 2. 2015/16..... 3. 2014/15.....			
21	How many bags of maize did you harvest in the last three years?	1. 2016/17..... 2. 2015/16..... 3. 2014/15.....			
22	How many bags did you sell to FRA?		1.Yes	2.No	Cost (K)
		2016/17			
		2015/16			
		2014/15			
23	If not all were sold to FRA, how many did you sell to the open market?				
		2016/17			
		2015/16			
		2014/15			

Section 3: Crop Diversification

24	What other crops do you grow and what are their proportions in terms of farm size?	crop	Initial (Ha)	Currently Ha
		1. maize		
		2. Groundnuts 3. cotton		

		4. sweet potatoes 5. sunflower		
		6. Others (specify).....		
		Total Ha		
25	Do you also engage in livestock production?	1 yes 2. no		
26	What kind of livestock and how many per type do you rear?	Livestock	Number	
		cattle		
		goats		
		pigs		
		chickens		
		Others.....		
27	Has there been any difference in terms of your income for the past three years?	1. Yes 2. No		
28	How has been the difference in terms of the following:	1. Income..... 2. Investments..... 3. Savings..... 4. Others (specify).....		
29	What are your other sources of income?	1. Trading 2. Fishing 3. Beer brewing 4. Others specify		
30	How much do you make from your sources of income?	1. Less than K1000 2. K1000 K to 3000 3. Above K 3000		

Section 4: Farmers perceptions about FISP e-voucher

31	What problems do you encounter in the agricultural sector?	
32	How has FISP e-voucher affected your produce in the past?	
33	Have you received technical support from agricultural extensions?	
34	Is FISP e-voucher effective in improving agricultural growth?	1. Yes 2. No ‘

35	If Yes, what are some of the benefits?	
36	If NO Why?	

What would you advice on the following

1. Accessibility of FISP e-voucher system.....
2. Agricultural Extension Service.....
3. Crop Marketing.....
4. Agro dealers.....

What would you advice on the following

5. Accessibility of FISP e-voucher.....
6. Agricultural Extension Service
7. Crop Marketing
8. Agro dealers

Appendix 2 Focused Group Discussion

1. How have been maize crop yields before the voucher cards?
2. How have been crop yields after introduction of voucher cards?
3. Which is the best farming practice between conservation and conventional farming?
4. After receiving the cards what types of inputs are mostly redeemed by farmers?
5. Have farmers diversified in crop production?
6. Has the voucher system encouraged diversification?
7. Is voucher system satisfying farmers choice of inputs
8. What recommendation can you make regarding the voucher system

Appendix 3 Interview Schedule to Agriculture Officer

1. In what ways has the voucher system contributed to agricultural productivity among the beneficiary farmers
2. What is the maize yield production per hectare for farmer under conservation and conventional farming
3. What crops are farmers under voucher system growing apart from maize
4. Is voucher system the best strategy in improving agricultural growth and diversification