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Assessing the Factors Affecting Crop Diversification in Masaiti District of the Copperbelt Province of Zambia

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ABSTRACT

Crop diversification is an important issue in agriculture that has impact on both food security and farm incomes. The objective of this study was to assess the factors affecting crop diversification of smallholder farmers in Masaiti district. Data for the study were collected from a sample of 200 farmers selected using the clustered sampling method. A questionnaire administered by the researcher was used for data collection. Data were analysed using descriptive statistics and logistic regression. Crop diversification was estimated using the Simpson Diversification Index (SDI).

The results of the logistic regression model revealed that, farming experience and age of the farmers significantly influence crop diversification. The other variable namely household size, gender, labour cost, household income, FISP, number of field plots had no significant effect on crop diversification.

According to the findings of the study, age group, household size, extension contact, crop revenue, crop area group, FISP and monthly income had a positive influence towards crop diversification and crop production Education attainment, farming experience, and early supply of inputs have a negative impact on crop diversification and crop production. The research findings correlated with the reviewed literature and the research questions were answered. The mean crop diversification of 0.3650 showed that there was less diversification among the FISP beneficiaries and non-beneficiaries in Masaiti district.

KEY WORDS: ***Crop Diversification, FISP, Crop diversification Index, Herfindahl Index, Crop production, Logistic regression model***

1. Introduction

Agriculture is an important sector of the Zambian economy, on which around 48.9 percent of the population depend for their livelihoods and employment, primarily through smallholder production, and the sector is estimated to contributed 4.8 percent to Gross Domestic Product (GDP) in 2017 (Chapoto, Kabisa and Chisanga, 2018). Agriculture is among the three priority sectors of the Zambian economy as outlined the Seventh National Development Plan (2017).

The 7NDP pays attention to agricultural development, considering two major leverage ethics. First, increasing farmers' income directly to support rural demand which results in the development of new activities and the diversification of the local economy contributing to the overall development process of structural transformation. Secondly, increasing agricultural outputs leads to the development of both upstream and downstream activities, the consolidation of value chains and the expansion of agro-industries, which are significant sources of employment and present real opportunities for economic diversification (MONDP, 2017).

In addition to national efforts, Zambia like most countries in Africa is a signatory to the Comprehensive Africa Agricultural Development Programme (CAADP), Africa's policy framework for agricultural transformation, wealth creation, food security and nutrition economic growth and prosperity for all (Chapoto, Kabisa and Chisanga, 2018). This underscore the importance Zambia attaches to agriculture in the economyas one of the driving forces for improving economic growth that is required to reduce poverty.

Historically, Zambia is a copper dependent economy and its agriculture is dominated by maize production. Lessons from studies indicate that decline in world commodity prices create the need in Africa for diversification away from a few agricultural exports (Delgado, 1995). Zambia's agricultural policy recognises that crop diversification is a key strategy for achieving food and nutrition security and ultimately agricultural transformations among smallholder farm households (Mukuka and Hichaambwa, 2016). Crop diversification also improves food and nutritional diversity as it provides a broader

choice in the production of a variety of crops in a given area and lessens the risk of crop failure. This indicates that there is need for individuals to diversify in agricultural production of different crops. Crop diversification has greater benefits to the people in improving their livelihoods and food security.

In the year 2004 following a number of droughts cycles in Zambia, the government through the Ministry of Agriculture and Cooperatives introduced the programme of promoting crop diversification. This effort is also emphasised in The Seventh National Development Plan (MONDP, 2017) has also emphasised crop diversification. Crop diversification is the growing of two or more crops on a piece of land by a farmer. The crops that were included in the diversification programme included: Cassava, sweet potatoes, groundnuts, sunflower, soya beans, cow peas and others (Sichoongwe,K, 2014). The programme of diversification aimed at offering farmers alternative ways of generating income and increasing food security and nutrition status at household level and therefore improving their living standards.

However, numerous efforts are done by the government and other stakeholders to improve the status of agriculture so as to promote crop diversification. Some of these efforts aimed at improving crop diversification include provision of extension services, Farmer Input Support Programme (FISP) and skills training in crop production. Shifting to higher degree of diversification is generally associated with higher incomes. Diversification is driven by endowment and access to markets and finances (Bigsten and Tengstam, 2011).

The government's policy on agriculture as outlined in the 2016 second agricultural policy was to improve on agricultural production and performance. The shift and diversification of the economy from mining to agriculture requires more and consolidated effort in the agriculture sector. In an effort to achieve this diversification, government policies in agriculture are targeted at enhancing production of a wider variety of crops and reduced reliance on maize mono-cropping. Crop diversification can be used as a tool to argument farm income, generate employment, alleviate poverty and conserve soil and water resources (Mangaba, 2017).

Despite all these mentioned efforts, crop diversification has been slow to achieve in most parts of the country. There are few studies undertaken on this topic and existing studies have focussed mainly on Southern province and Central Province in Zambia. The Copperbelt Province is one of the upcoming areas for agriculture production following the decline in employment in the mining sector since the liberalization of the economy in 1991.

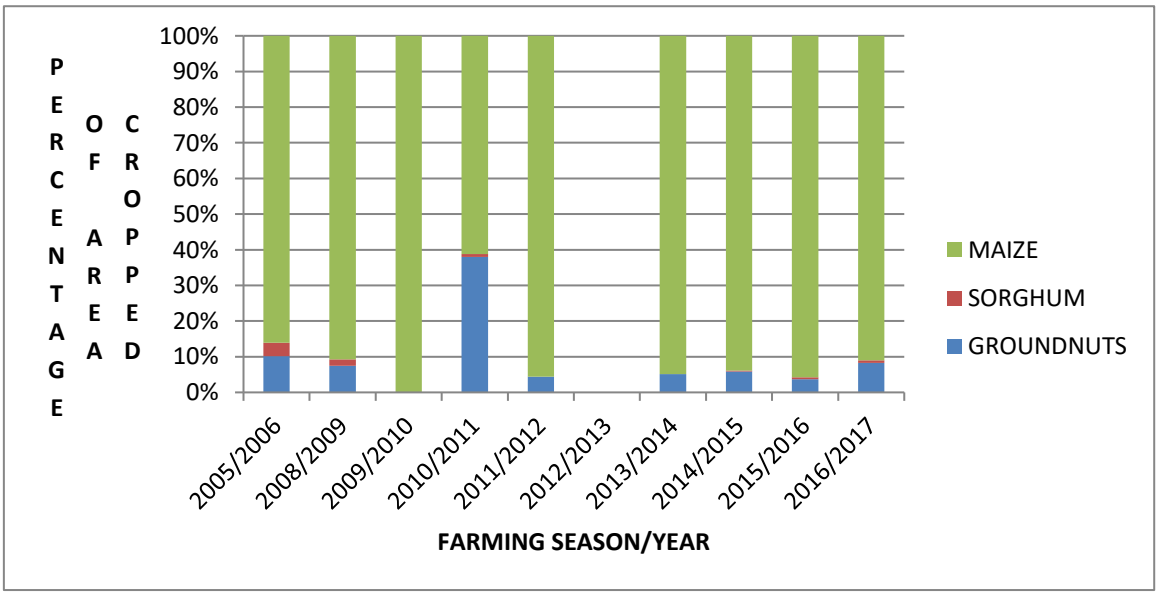
The majority of farmers in Zambia are smallholder farmers who cultivate less than 5 hectares of land and rely on rain-fed hoe cultivation and the use of unpaid family labor and focus much of their crop production on maize. Their production also is characterized by the low use of modern inputs (Chomba, 2004). It should be mentioned that most of the government programmes including crop diversification that aimed at improving agricultural production, farm incomes and food security have targeted smallholder farmers.

1.1 Background

Although many types of crops have been introduced to farmers under the crop diversification programme, diversification has been slow among majority of farmers in Zambia. An example of pattern of crop production from Masaiti district on the Copperbelt Province is presented in Figure 1.1 below.

The figure 1.1 shows that production of the three main crops (maize, sorghum and groundnut) varied from year to year depending on a number of factors such as availability of farming inputs to the farmers, and rainfall situation. It is clear that Masaiti district has challenges in terms of crop diversification, maize continues to dominate crop production, followed by groundnuts and sorghum has the smallest share of planted area. Other crops like cassava and other legumes (beans and soya beans) have very low acreage in the district.

Figure 1.1 Crop production from 2005 to 2017 in Masaiti district



Source: Secondary data, Crop forecasting, 2018

This kind of situation is common across the country and some studies have been undertaken to assess factors that affect crop diversification in Sothern province (Sichoongwe et al., 2014). That study found that determinants of crop diversification among smallholder farmers in Southern province of Zambia, were size of land holding, quantity of fertilizer, distance to market, tillage time and tillage using plough. A study by Dube etal. (2015) in Choma district found that crop diversification is positively influenced by the gender of head of household, the production of cash crops by the household and household investment.

It is clear that no research was done on the Copperbelt specifically in Masaiti district to address the problem of crop diversification. With the above background, it is clear that there is need for a study to be conducted on the Copperbelt specifically in Masaiti district on crop diversification.

1.1.1 Problem Statement

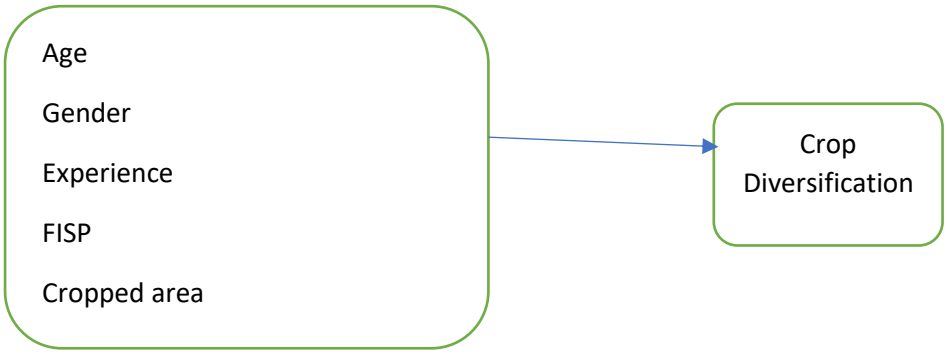
A number of efforts have been made including Farmer Input Support Programme E-Voucher (FISP), extension services and many more to address the issue of crop diversification by the government. This is also aimed at attaining national food security. The e-voucher was introduced particularly to widen access of farmers to inputs and hence a major facilitator of crop diversification. Despite all these past and present efforts, farmers have been experiencing difficulties and hardships in trying to increase crop production and diversifying. In fact, in some years farmers have experienced reduced crop production especially in the area of study. This leads to problems of household food insecurity and less crop diversification. It is thus important that a study be undertaken to improve our understanding of the factors affecting crop diversification in other parts of the country, in particular using Masaiti district the Copperbelt province being a relatively new farming area in Zambia, as a case study.

1.2. Conceptual Framework

The conceptual framework for the study is presented as follows:

Figure 1.1 conceptual framework

Independent variables Dependent Variable



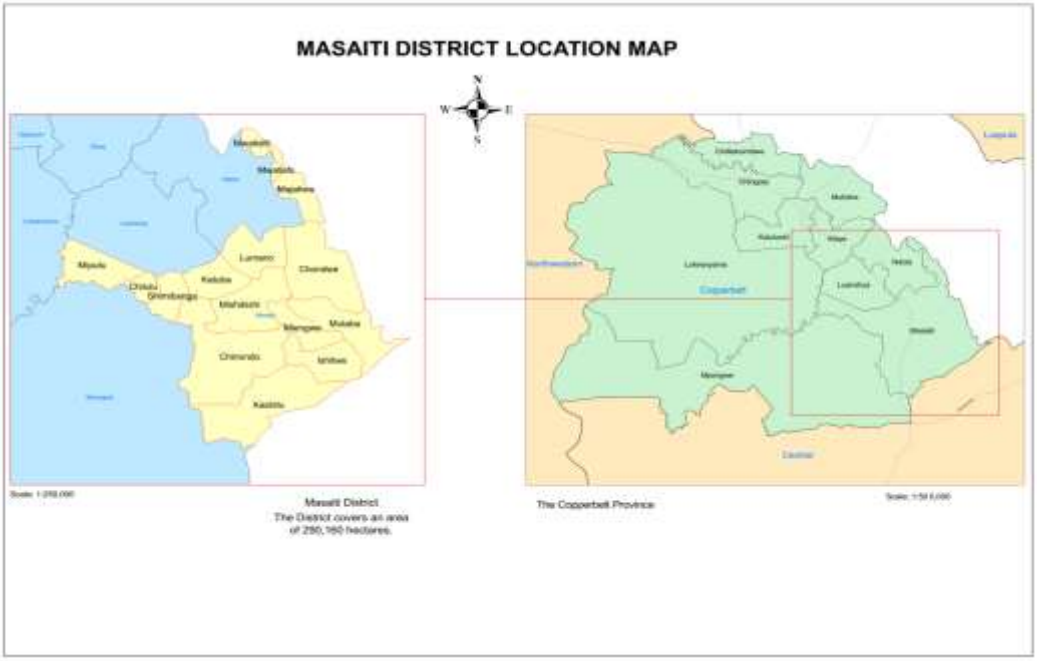
Source: Own production, this study, 2019

From the above diagram, the dependent variable is crop diversification and the independent variables are gender, education attained, farming experience, household size, number of field plots, access to extension services, age and crop area.

2. Material and method

The study was conducted in Masaiti district of the Copperbelt province of Zambia. Masaiti district is one of the rural districts on the Copperbelt with a total of 13,440 beneficiaries of the E-Voucher FISP. The following map shows the location of Masaiti district. The district's total population is about 103,857 of which 51% are male, 49% are female. The annual population growth rate is 0.8% and the district has 20,511 households of which 4,466 are female headed and the average household size being 5.1 persons per household (CSO: Census 2010).

Figure 1.2 Area and location map for Masaiti district



Source: Masaiti district investment profile, 2016

The sample used in this study was determined using the formula below.

P = a/m Adopted from Shahbaz et.al (2017).

Where: a is the beneficiaries and non-beneficiaries of FISP

P is the proportion or percentage of farmers selected

m is the number of farmers

$P = 400/[1+400(0.05)^2]$

$= 400/2$

$= 200$

The 0.05 represent the 5% level of significance which is used in the study.

Hence the sample size wasmade of 200 (100) beneficiaries and (100) non beneficiaries) from a population of 400 small scale farmers who are beneficiaries and non-beneficiaries of E-Voucher FISP and the sampling frame was all small and medium scale farmers who are beneficiaries and non-beneficiaries of the E-Voucher FISP in Masaiti district.

3. Results and Discussion

According to the above findings the most grown crop in Masaiti district is Maize having a share of 63% of the total cropped area. The lowest grown crops are Cassava and Beans with a 5% share of the total cropped area. The estimated mean crop diversification of 0.365, implies that there was low crop diversification among the farmers in Masaiti district. The mean diversification among the FISP beneficiaries of 0.39 was slightly higher than 0.34 for FISP non-beneficiaries, but there was no significant difference. Mangaba (2019) pointed that, the farmer Input Support Program has led to reduced crop diversification rates because of its biased towards maize production. In this study contrast to Mangaba (2019), FISP has no significant association with crop diversification.

Regarding age, it was found that majority of respondents in the age groups were non-diversifiers and minority were diversifiers. This indicates that there was no association between age and crop diversification. For experience, it was found that there was significant negative association with crop diversification, implying that more experienced farmers were more likely to be non-diversifiers than diversifiers.

Correlation analysis showed that there was significant association between crop diversification with farmer's gender (r=0.142, sig=0.045), education (-0.48, p=0.08), using oxen (r=-0.162, p=0.022), selling crops to millers (r=-0.218, p=0.002), and crop area (r=0.124, p=0.08).

The correlation results showed that gender has a positive relationship with crop diversification. The more the level of education the less likely the farmer is involved in agricultural activities in Masaiti district. Education has a negative impact on crop diversification. Farmer's use of oxen on crop production

has significant influence on crop diversification. In fact, it had a negative impact on crop diversification in Masaiti district. Crop area was found to have a significant impact on crop diversification. It was clearly found that crop area has a positive impact on crop diversification in Masaiti district. The research also revealed that there is a negative correlation between a farmer selling the produce to the millers and crop diversification. The more the farmers sold their produce to the millers the less likely they were involved in crop diversification.

Sichoongwe (2014) explain that the size of land holding, quantity of fertilizer, distance to the market, tillage time and tillage using plough were found to statistically determine crop diversification. On the other hand, the logistic regression results showed that only two out of ten variables in model had significant influence on probability of crop diversification. The significant variables were farming experience (P-value= 0.015), and farmers age (p=0.056).

Farming experience showed significant impact on crop diversification in Masaiti district. It had a positive influence on crop diversification. The more the number of years of experience, the more likely a farmer was involved in crop diversification. Diversification changed with farming experience. In addition, farmer's age group had a positive effect on crop diversification in Masaiti district. From the logistic regression results it can be seen that the more the farmer's age increased the more likely the farmer was diversifying.

Although, Mukuka and Hichaambwa (2016) disclose that a well-functioning and robust agricultural extension system disseminating appropriate productivity enhancing messages is important for encouraging crop diversification, this study found that extension has no significant effect on crop diversification. This could be attributed in part to the fact that majority of farmers (90%) did not have access to extension services. The widely used farming tool is the hand hoe. This also limits the farmers as they cannot grow more crops due to limited labour. The FISP programme disadvantaged some farmers from expanding their agricultural activities.

The correlation of crop area (r=0.124, p=0.08) with crop diversification was positive and thus this finding agrees with Mukuka and Hichaambwa (2016) who found that smallholder access to land and productive assets is positively and significantly related to crop diversification.

The other variables like education, household income, household size, crop area group, FISP, age of household head, and early input supply were found to have no significance on crop diversification. Household size has positive impact on crop diversification, education has negative impact on crop diversification, crop area group has a positive impact on crop diversification, FISP has a positive impact on crop diversification and age has a positive impact on crop diversification as shown on table 4.15 above. Dube (2016) points out that on a contrary, the age of household head, total farm size, access to agricultural markets and total area cultivated negatively influence crop diversification.

From the above findings we can conclude that selected socio-economic factors have significant effect on crop diversification among smallholder farmers in Masaiti district. On the other hand, there is a difference in crop diversification between E-voucher FISP beneficiaries and non-beneficiaries in Masaiti.

4. Conclusion and Recommendation

Having conducted the research, it can be concluded that crop diversification is significantly affected by farming experience and age group of the farmers in Masaiti district based on the logistic regression results. FISP, household size, gender, farmer's income, number of field plots has no significant influence on crop diversification. Crop diversification also depends on the crop area group. Maize has a larger share of crop production in Masaiti district and the least crops grown are cassava and beans. Farmers are adversely affected by other factors such as climate change and lack of access to large land holding in an effort to diversify their crop production. Correlation between crop area and crop diversification was positive and thus smallholder access to land and productive assets is positively and significantly related to crop diversification in Masaiti district.

Based on the logistic regression model was used to determine the factors gender, household income, farming, labour cost, extension services and other variables have no significant influence on crop diversification. The variables found to be statistically significant were age group and farming experience. These two variables affect crop diversification in Masaiti district.

The objectives of the study were achieved and extent of crop diversification was found to be 0.3650 whereas socio-economic factors affecting crop diversification include age of household head and farming experience. The significance of the study is to provide policy makers, non-governmental organizations fellow researchers with information regarding crop production and diversification. The research further suggests how best to improve and support the agricultural sector in terms of planning.

Recommendations

Based on main findings of this study the following issues were suggested for improving crop diversification in Masaiti district:

1. Increase farmers access to land for agriculture to enable them grows more crops and increase on diversification.
2. More extension officers to be recruited and stationed in almost every agricultural zone to improve on the extension officer to farmer ratio.
3. Training services to be given to the farmers at least in every zone so as to enable them to improve on their skills and production capacity.

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