FACTORS INFLUENCING CROP COMMERCIALIZATION AMONG SOYBEANS SMALLHOLDER FARMERS IN CHIPATA DISTRICT, EASTERN ZAMBIA

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Abstract
This study examined the socio-economic factors influencing household crop commercialization among soybeans smallholder farmers in Chipata District of Zambia. Purposive sampling was used to select four agricultural blocks. One agricultural camp was picked from each one of them based on the highest yields of the major crops. Farmer registers were used to develop a sampling frame in each camp. Then, random sampling procedure was used to select a total of 85 households. A semi-structured questionnaire was administered to the sample to collect the study data. Analysis used the Tobit model and focused on the four major crops produced in the area that included maize, soybeans, groundnuts and sunflower. The output Household Commercialization Index (HCI) was used to measure the level of orientation towards market-led crop production. Results showed that all households' crop activities were commercialized to an extent. Maize, soybeans, groundnuts and sunflower had 50, 89, 9, 7 percent commercialization indices respectively. Tobit model results revealed that ownership to livestock was very important for effective crop commercialization ($p<0.01$). Other factors included gender, land size, access to credit, household size, off-farm income and distance to markets which was significant at $p<0.05$. Although the influence was weak, membership to farmer's organizations was also significant in explaining crop commercialization. The study recommended policies and efforts to promote better understanding of gender roles in agriculture and improved access to labour saving technologies such as simple machinery for production, harvesting and processing. Other recommendations include development of policies to reduce transaction costs to enhance access to affordable credit services for smallholder farmers. There is also need to encourage establishment of new farmer organizations and to strengthen the existing ones to ensure that they operate efficiently.

Key words: Crop commercialization, maize, soybeans, sunflower, groundnuts, household, Zambia

1.0   Introduction
Zambia is among the countries with high poverty incidence and low crop productivity in sub-Saharan Africa. About 77 percent of the rural population live below the poverty line and that 60.8 percent of these are extremely poor (CSO/GRZ,

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2015). To a large extent (i.e. 70 percent) the rural economy is dominated by subsistent smallholder agriculture (UNDP, 2016). As a result, the agricultural sector holds immense opportunity of uplifting people out of poverty but this will require a transformation out of the subsistence oriented, low input and low productivity agricultural system. It entails a shift to commercialization of smallholder agriculture involving more intense use of productivity enhancing inputs and more market oriented patterns of crop production (Strasberg *et al.*, 1999).

Commercialization of the smallholder agriculture is an important element of Zambia's strategy to increase economic growth in an equitable manner as well as diversifying smallholder agriculture (World Bank, 2009). Within the broad agricultural development strategy, smallholder commercialization was envisaged to thrive on a diversified crop production system involving crops with comparative advantage and higher local and regional economic value (MOA/GRZ, 2012). The strategies are premised on the fact that even though input and output markets are persistently imperfect due to high transaction costs, coupled with huge risks and diseconomies of scale in sub Saharan Africa (World Bank, 2008), transformation of the smallholder agricultural system into a more commercialized system would still lead to better livelihoods due to improved incomes.

Although many definitions exist, agricultural commercialization may be broadly defined as the proportion of agricultural produce that is marketed (Aderemi *et al.*, 2014). Specifically, smallholder agricultural commercialization refers to small scale farmers that are more integrated into local, national and international markets (Dorward & Kydd, 2002). They produce crops mainly for sale, are oriented towards profit maximization and their objective is to satisfy consumer needs (Kibiringe, 2016). Commercialization is usually measured on a continuum from zero (full subsistence) to unity (100 percent commercialization) (Govereh *et al.*, 1999). In essence, it is anticipated that smallholder commercialization should act as a catalyst to increased productivity of crop value chains culminating into increased income and improved livelihood of the rural farmers (Ele *et al.*, 2013).

The Government of Zambia and development partners have made tremendous efforts to enhance smallholder farmer commercialization by encouraging crop enterprises with comparative advantage inclined to markets and exports. One such intervention is the Feed the Future (FtF) initiative under the auspices of the United States Agency for International Development (USAID) which was aimed at promoting adoption, production and commercialization of selected crop value chains with potential for commercialization (USAID, 2011). Soybeans was one of the main value chains with comparative advantage and higher local and regional economic value, selected by FtF initiative for adoption and commercialization in Chipata District, Zambia. Despite these efforts, agricultural commercialization, as revealed by nationally representative farm surveys, in the country has remained

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stagnant with only about 5% of Zambia's small and medium scale farmers producing half of the marketed surplus. It's further estimated that at least half of the smallholder farmers sell little or no crops and hence realize no cash income from agriculture (Hichaambwa & Jayne, 2012). It is as such evident from the foregoing that despite massive efforts and investments by the Zambian government to encourage smallholder crop commercialization, a larger proportion of farmers have failed to graduate from subsistence production.

Several studies have been conducted world over to understand the factors affecting crop commercialization with varying results across time and space. For instance, Kabiti (2016) investigated the factors affecting agricultural commercialization in Munyati resettlement scheme in Zimbabwe. The study found out that education attainment, availability of irrigation facilities, gross production value and the method of land cultivation significantly affected agricultural commercialization. Aderemi *et al.* (2014) in a study on determinants of output commercialization among farmers in Nigeria found that access to information, household size, farm size, farming experience and access to agricultural extension services significantly affected output crop commercialization.

Similar studies have also been done on the Groundnut, Rice and Sugar cane value chains in Zambia (Lubungu *et al.*, 2013; Moono, 2015; Kalinda & Chisanga, 2014). Although the studies were able to give insight about the status of smallholder crop commercialization in Zambia, the studies were either conducted at macro level or in other parts of the country making generalization of findings to eastern Zambia difficult. The studies were further focused on individual crops which failed to give a holistic picture of crop commercialization. This study therefore determined the factors influencing commercialization of soybeans among other crop enterprises produced by smallholder farmers. It identified other major crops soybeans farmers grow, evaluated their Household Commercialization Indices (HCI) and assessed the socioeconomic factors influencing their commercialization in comparison to soybeans enterprise in eastern Zambia. It is hoped that an understanding of these factors would help influence development of policies that would encourage soybeans commercialization among other crop enterprises within the framework of diversification.

2.0   Methodology
2.1   Study Area and Sampling
The study was conducted in Chipata District of the eastern province of Zambia. Eastern province has the   highest agricultural potential in the country due to relatively fertile soils and evenly distributed adequate rainfall throughout the growing season (Jain, 2007). The district is located in agro-ecological region II; an area that receives between 800mm – 1000mm of rainfall. The main economic activity in the district is agriculture. The district was selected because it has a high

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potential for commercialization. The cropping system in the district is highly diversified and has comparative advantage locally and regionally (MOA/GRZ, 2012). Also, it has the highest population within the province (Tembo *et al.*, 2013).

The study used primary data collected from 85 farming households using structured questionnaires. Four agricultural blocks were purposively selected from the district and one agricultural camp was picked from each one of them based on the highest yields of the major crops. A sampling framework of farmer households with diversified farming systems for the purposes of enhancing commercialization was developed from village registers. Then, the random sampling technique was used to select the study households. The Fisher's (1998) formula was used to compute the required sample size for the study.

2.2   Analytical Framework

The first step in the analysis was to ascertain the level of crop commercialization in the study area. Literature has utilized several approaches to contextualize crop commercialization. From the output side, it is viewed as Crop Commercialization Index (CCI) given as: the value of agricultural sales in markets divided by the agricultural production value. From the input side, it is viewed as Input Commercialization Index (ICI) given as: the value of inputs acquired from markets divided by agricultural production value. It is also contextualized wholesomely as commercialization of the rural economy; acquired through market transactions divided by total income or as the degree of integration into the cash economy; acquired by cash transactions divided by total income (Von Braun *et al.*, 1994). To ascertain the level of crop commercialization in this study, the household commercialization index (HCI) which acts as a proxy measure of the degree of participation in output markets was used as shown in equation (1). HCI is the ratio of the gross value of crop sales by household *i* in year *j* to the gross value of all crops produced by the same household *i* in the same year *j* expressed as a percentage. The index measures the extent to which a particular household's crop production is oriented towards the output markets. The closer to 100 the index value, the higher the intensity of commercialization. With this approach, agricultural commercialization is expressed along a continuum from no commercialization to full commercialization.

$$HCI_j = \frac{\text{Gross value of crop sales for household } \mathbf{i} \text{ in year } \mathbf{j}}{\text{Gross value of all crop production for household } \mathbf{i} \text{ in year } \mathbf{j}} \times 100 \quad .... \quad (1)$$

To determine the factors affecting crop commercialization as measured by the HCI, a Tobit regression, which is a form of a censored limited dependent variable regression model, was used. Several studies with censored dependent variables have used the Tobit regression model to empirically analyze data (Adesina, 1993; Martey *et al.*, 2012). The model was preferred because the dependent variable HCI

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is lower censored at 0 (farmers who do not sell any crop) and upper censored at 1 otherwise. The Tobit model was estimated as shown in equation 2:

$$Y = \max(Y^*, 0) \quad .... \textbf{(2)}$$

Where y* are latent variables generated by the linear regression model in equation 3:

$$Y^* = \beta_0 + X\beta_i + \mu \quad .... \quad .... \textbf{(3)}$$

Where: Y^* = latent variable of the dependent variable and that $Y = Y^*$ when $Y^* \geq 0$, and

Y = 0 when $Y^* = 0$

β= estimable parameter, μ = error term and X= explanatory variable.

Tobit parameters do not respond directly to changes in the dependent variable brought about by changes in the explanatory variable. Hence the marginal effect in the intensity of crop commercialization arising from changes in the explanatory variables will be given as in equation 4:

$$(\delta\varepsilon\,[y_i/x_i])\,/\,(\delta x_i) = \beta\varphi\,[\beta x_{ij}] \quad .... \quad \textbf{(4)}$$

Thus, given HCI as the dependent variable, the explicit form of the regression equation was stated as follows:

Y = f(age, gender, education, household size, livestock ownership by household, household off-farm income, size of land holding, access to extension services, access to credit services, membership to farmer Organizations, distance to markets, access to information).

3.0   Results and Discussion
3.1   Socio-economic characteristics of farm households

Table 1 shows a summary of the socio-economic and demographic characteristics of the respondents. On average respondents were 45 years old and had at least 25 years of farming experience. The results also showed that literacy levels were very low among the respondents with an average of 6.65 years of schooling and that each household had at least 6.21 members. Annual income from off-farm activities was Zambian Kwacha (ZMW) 265.27 indicating that some households accumulated a significant amount of income from other sources apart from farming. The results further showed that on average a household had 7.92 hectares of land which was used for agricultural production and that they harvested 1,595.26 kg ha-1 of soybean, 2574.82 kg ha-1 of Maize, 99.41 kg ha-1 of Groundnuts and 254 kg ha-1 of Sunflower.

Table 1: Socio-Economic characteristics of Households (N=85).

	Mean	Standard Deviation
Outcome Variable		
Age (Years)	45.01	12.69
Education (Years)	6.65	3.76
Household Size (number)	6.21	2.35
Farming Experience (Years)	25.95	11.66
Annual Off-farm Income (ZMW)	265.27	890.18
Land Size (Hectares)	7.92	8.42
Soybean harvested (kg)	1595.26	2140.71
Maize (kg)	2574.82	5486.52
Groundnuts (kg)	99.41	307.50
Sunflower (kg)	254	968.23
Time taken to walk to market (min)	56.23	98.19
Male headed (Yes)	0.76	0.45
Access to credit services (Yes)	0.2	0.4
Access to information (Yes)	0.85	0.35
Access to agricultural extension services (Yes)	0.94	0.24
Ownership to draught oxen (Yes)	0.52	0.5
Membership to farmer Organizations (Yes)	0.6	0.49

Source: Authors' Survey, April – May, 2017.

It was observed that 76 percent of the households were male headed while 20 percent and 85 percent had access to credit services and information respectively. The fact that access to credit was limited implied that the variable could have an influence on the crop commercialization status of the households. The majority (94 percent) of the households had access to agricultural extension services (which included government extension, parastatal organizations, non-governmental organizations and community based organizations), while another 52 and 60 percent owned livestock and were members of farmer organizations within the area respectively.

3.2   Descriptive Analysis of Main Crop Enterprises in the Study Area
Determination of the HCI and assessment of the socio-economic factors influencing the level of crop commercialization among smallholder farmers started by first identifying the key crops produced by the majority of the respondents in the study area. The analysis identified four (4) major crops (Figure 1) grown by each sample household and summarized them across all households. In addition, all horticultural crops were reported together under vegetables. It was observed that the crop mix

was not different among households in the four study sites. Hence they were merged to form one sample. The results in Figure 1 showed that the majority of the farmers grew Maize (67), Groundnuts (45) and Sunflower (46) in addition to Soybean which was grown by all the farmers as purposively and randomly sampled. The other crops such as Cotton, Beans, Cassava, Sweet and Irish potatoes including an assortment of vegetables were grown by less than 30 farmers. In particular, only 27 respondents indicated to have grown at least one type of vegetable on their farm. Maize, Groundnuts and Sunflower were grown primarily for consumption while the surplus crop was sold. Cotton and Soybean on the other hand were grown mainly for cash. Some of the Soybean was consumed by households with another portion reserved for seed. Descriptive statistics showed that the major crops of economic importance to the farming households were maize, soybean, groundnuts and sunflower. It was upon these crops that further analysis of the extent of commercialization was conducted.
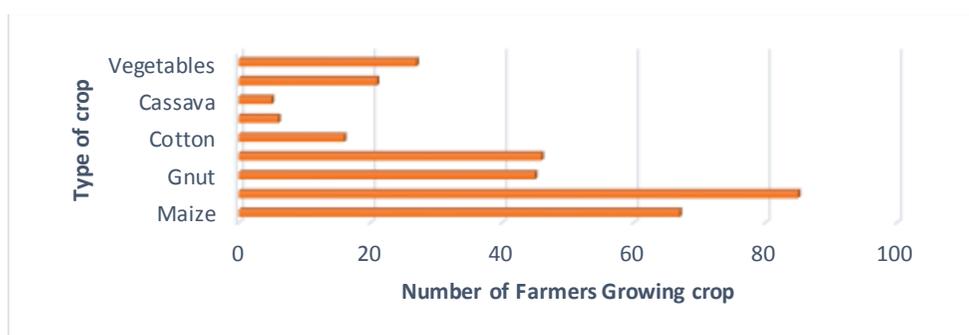

Figure 1: Crops Grown in the Study Area
Source: Authors' Survey, April – July, 2017.

After identifying the four (4) major crops grown in the area, the data was further analysed to assess the status of gender in production. Results in Table 2 showed that males dominated production of all the major crops. Thus, the number of males producing major crop enterprises were maize (74 percent), soybeans (74 percent), sunflower (62 percent) and groundnuts (58 percent). These results present a shift in production dynamics particularly in sub-Saharan Africa were legumes are particularly viewed as women crops.

Table 2: Distribution of crop production by Gender for the four major crops grown

Gender	Maize	Sunflower	Groundnut	Soybean
Females (%)	26	16	14	26
Males (%)	74	62	58	74

Non Growers (%)	0	22	28	0
Total (%)	100	100	100	100

Source: Authors' Survey, April – May, 2017.

Table 3 showed the computed crop commercialization indices for the main enterprises. The average commercialization index for the study area was found to be 76 percent, with an average gross crop sales value of ZMW 11,938.96 and average gross crop production value of ZMW 14,273.17. This indicated that on average, most of the crop production activities for the households were commercialized to some degree. Further, though soybean had the highest index of 89 percent, maize is the most frequently produced and marketed crop in the area as it is highly subsidized by government, is the staple food crop and is thus prioritized.

Table 3: Commercialization of the major crops in the study area

Crop	Gross Value of crop sales (ZMW)	Gross Value of all crop sales (ZMW)	Crop Commercialization Index
Maize	4,377.22	5,843.29	50
Soybean	3,628.8	3,813.67	89
Groundnut	401.24	644.81	09
Sunflower	329.82	541.29	07
Average for Households	11,938,96	14,273.17	76

Source: Authors' Survey, April – May, 2017.

3.3 Results of Factors affecting crop commercialization

The Tobit model results for soybeans, maize, groundnuts and sunflower showed that the Pseudo R^2 were 0.39, 0.29, 0.42 and 0.49 respectively. Overall, the household model had Pseudo R^2 of 0.28. The models for maize, groundnuts and sunflower were statistically significant ($p<0.01$) as well as that of soybeans ($p<0.05$). These results showed that the models fitted the data fairly well. The coefficient estimates and marginal effects showing the determinants of crop commercialization after the Tobit analysis are presented in Tables 4 and 5.

Table 4 and 5 indicated that gender, livestock ownership, land ownership and access to credit significantly affected soybean commercialization. Additionally, household size, livestock ownership, off-farm income and distance to output markets significantly affected maize commercialization. Gender and off-farm income significantly affected groundnut commercialization while gender, off-farm income, access to credit and distance to output markets significantly affected sunflower

commercialization. Finally, gender of the farmer and off-farm income significantly affected overall household commercialization.

Table 4: Factors affecting Household crop commercialization

Variable	Soybean					Maize				
	Coefficient	Std. Err.	P>t	dy/dx	Std. Err	Coefficient	Std. Err.	P>t	dy/dx	Std. Err
Age (Years)	0.0014	0.0024	0.557	0.00142	0.00241	0.0015	0.0038	0.686	0.00131	0.00323
Gender (M=1/F=0)	0.1390	0.0688	0.047**	0.13900	0.06878	-0.1069	0.1075	0.323	-0.09132	0.09154
Education (Years)	0.0013	0.0092	0.891	0.00126	0.00920	0.0107	0.0135	0.429	0.00915	0.01151
Household Size (Number)	0.0143	0.0142	0.319	0.01426	0.01420	0.0495	0.0206	0.019**	0.04232	0.01751
Ownership to Livestock (Y/N)	-0.1272	0.0718	0.081*	-0.12722	0.07181	0.3095	0.1058	0.005***	0.26447	0.08946
Off-farm income (ZMW)	-0.0001	0.0000	0.243	-0.00004	0.00003	-0.0001	0.0001	0.089**	-0.00008	0.00005
Land Size (Ha)	0.0130	0.0060	0.033**	0.01302	0.00601	0.0074	0.0063	0.248	0.00631	0.00541
Access to Extension (Y/N)	0.0307	0.1254	0.808	0.03065	0.12541	-0.0604	0.1964	0.759	-0.05162	0.16782
Access to Credit (Y/N)	-0.1641	0.0812	0.047**	-0.16411	0.08117	-0.1870	0.1259	0.142	-0.15977	0.10725
Membership Organizations (Y/N)	-0.0663	0.0710	0.353	-0.06633	0.07101	-0.0117	0.1019	0.909	-0.00997	0.08707
Time to walk to output markets (Min)	-0.0001	0.0003	0.718	-0.00011	0.00031	-0.0035	0.0014	0.014**	-0.00295	0.00112
Access to Information (Y/N)	0.0242	0.0878	0.784	0.02417	0.08779	0.1092	0.1351	0.421	0.09333	0.11519
Constant	0.7252	0.1902	<0.01***			0.0331	0.3158	0.917		
Prob > chi2	0.01					<0.01				
Pseudo R2	0.39					0.29				

Source: Survey Data, April – May, 2017

*, **, *** Significant at 10%, 5%, 1% respectively

Table 5: Factors affecting Household crop commercialization

Variable	Groundnut					Sunflower					Overall commercialization				Household
	Coefficient	Std. Err.	P>t	dy/dx	Std Err	Coefficient	Std. Err.	P>t	dy/dx	Std Err	Coefficient	Std. Err.	P>t	dy/dx	Std Err
Age (Years)	-0.0062	0.0120	0.606	-0.00003	0.00014	-0.0016	0.00759	0.835	-0.00004	0.00020	-0.0013	0.0013	0.304	-0.00126	0.00128
Gender	-0.4888	0.2874	0.093*	-0.00020	0.00903	-0.4837	0.20765	0.023**	-0.01264	0.01460	0.0780	0.0365	0.036**	0.07878	0.03680
Education (Years)	-0.0013	0.0390	0.974	-0.00001	0.00017	-0.0226	0.02928	0.442	-0.00059	0.00099	-0.0021	0.0048	0.653	0.00141	0.00480
Household Size (Number)	0.0336	0.0542	0.538	0.00001	0.00067	-0.0074	0.04045	0.855	-0.00019	0.00108	0.0021	0.0072	0.773	0.00179	0.00725
Ownership to Livestock (Y/N)	-0.0127	0.3207	0.968	-0.00001	0.00135	0.1435	0.23591	0.545	0.00375	0.00695	0.0483	0.0370	0.196	0.05361	0.03731
Off-farm income (ZMW)	0.0002	0.0001	0.044**	<0.0001	<0.0001	0.0002	0.00008	0.027**	0.00001	0.00001	-0.0001	<0.0001	0.04**	-0.00004	0.00002
Land Size (Ha)	-0.0199	0.0287	0.49	-0.00001	0.00035	-0.0249	0.02269	0.276	-0.00065	0.00081	0.0026	0.0023	0.264	0.00230	0.00231
Access to Extension (Y/N)	-0.0729	0.4869	0.881	-0.00003	0.00227	-0.1434	0.34493	0.679	-0.00375	0.00958	0.0461	0.0685	0.50	0.04747	0.06914
Access to Credit (Y/N)	0.4750	0.3131	0.134	0.00020	0.00824	0.3068	0.22900	0.185	0.00801	0.01078	-0.0322	0.0438	0.465	-0.03482	0.04423

Membership Organizations (Y/N)	2.6893	2.1839	0.222	0.0112	0.03919	1.0462	0.54931	0.061*	0.02733	0.02262	-0.0055	0.0353	0.877	0.00272	-0.03565
Time to walk to output markets (Min)	0.0050	0.0037	0.181	0.00002	0.00007	-0.0030	0.00115	-0.011**	0.00008	0.00007	-0.0001	0.0002	0.47	0.00011	-0.00016
Access to Information (Y/N)	0.4879	0.4219	0.251	0.0020	0.00906	0.3667	0.30487	0.233	0.00958	0.01296	0.0314	0.0466	0.502	0.03122	0.04703
Constraint	-3.3422	2.6209	0.206			-1.1694	0.77053	0.133			-0.6819	0.1031	<0.01		
Prob > chi2	<0.01					<0.01					0.06				
Pseudo R2	0.42					0.49					0.28				

Source: Survey Data, April – May, 2017

*, **, *** Significant at 10%, 5%, 1% respectively

Gender was significant (p<0.05) and positively related to soybean commercialization and overall household commercialization. Results showed that the soybean HCI increased by 13.9 percent for male headed households relative to female headed households. This finding was consistent with Cunningham *et al.*, (2008) who concluded that men produce and trade more as the profitability prospects of a particular crop improves. The probable explanation could be that since there is very little processing of soybean at household level, the crop is dominated by men who grow it as a cash crop. However, with Groundnuts and sunflower, though gender was significant (p<0.1 and p<0.05 respectively) the coefficient had a negative sign. This finding was in agreement with Okemute *et al.* (2014b) and Zamasiya *et al.* (2014) who concluded that gender negatively affects participation of male headed household particularly in Africa were generally legumes are culturally viewed as 'women' crops.

Livestock ownership was also significant (p<0.1) and negatively related to soybean HCI. The likelihood of soybean commercialization reduced by 12.7 percent for household with livestock. According to Jaleta *et al.* (2009), livestock ownership negatively affects crop production due to its ability to provide off-farm income and distract crop agricultural operations. The variable was also strongly significant (p<0.01) but positively influenced maize commercialization. This finding is consistent with Okemute *et al.* (2014) who during a study on the determinants of soybean market involvement by smallholder farmers in Zimbabwe observed that conditional on market participation, resource endowed households (owned livestock) can use the animals for traction and transport; a development which reduces production and market related costs.

The coefficient for access to credit services was significant (p<0.05) and negatively influenced soybean commercialization. A unit increase in access to credit reduced the soybean HCI by 16.4 percent. This finding contradicted with Agwu *et al.* (2013) but was consistent with Mitiku, (2014) who concluded that better access to credit improved the ability of farmers to purchase better inputs at critical times of the year. As such, the farmers tended to replace some crops for others whose market prospects are assured such as maize in Zambia.

Household size was significant (p<0.05) and positively influenced maize commercialization. Household size was used as a proxy measure of availability of labour which is a vital input in crop production. An increase in household members by one increased the maize HCI by 4.2 percent. This resonates with Kibiringe (2016) who found that households with more members had a higher likelihood of producing a larger market surplus.

Off-farm income positively influenced groundnut and sunflower household commercialization and was significant (p<0.05) for both crops. An increase in off-

farm income by ZMW 1,000 increased HCI by one (1) percent in both cases. A plausible explanation is that as farmers invest the income earned off-farm into production of the food crops also resulted in a larger marketable surplus. Similar results were also found by Agwu *et al.,* (2013) but contradicted Woldeyohanes *et al.* (2015) who found that off-farm income negatively affects marketable surplus as was the case with the maize and overall household commercialization.

The coefficient of membership to farmer organizations was significant (p<0.1) and positively influenced soybean commercialization. The results showed that household heads who had membership in farmer organizations such as agricultural cooperatives, farmer groups and women groups increased their sunflower commercialization index by 2.7 percent. Membership to organizations improved farmers' access to market information and input use but also increased farmer's bargaining power (Moono, 2015; Agwu *et al.*, 2013).

Distance to output markets as measured by the time taken to walk to the markets was also significant (p<0.05) and negatively influenced maize and sunflower commercialization. The more time it took the farming households to reach the output markets, the less the likelihood to commercialize their agricultural activities. Longer distances coupled with poor road infrastructure and increased transaction costs resulted in low profits. This result was consistent with the findings of Hailua *et al.* (2015) who while assessing crop commercialization in Tigray region of Ethiopia concluded that longer distances to input and output markets negatively affected crop commercialization.

4.0   Conclusion and Recommendation
4.1   Conclusion
This study determined the factors influencing crop commercialization among soybeans smallholder farmers in Chipata District, Eastern Zambia. Four major enterprises (maize, soybean, sunflower and groundnuts) were used in the analysis. The results showed that all the households had commercialized their crop production activities to some extent. In addition, Tobit model results revealed that ownership to livestock was very important for effective crop commercialization (p<0.01). Other factors which influenced crop commercialization included gender, land size, access to credit, household size, off-farm income and distance to the markets. Although the influence was weak, membership to farmer's organizations significantly (p<0.1) influenced crop commercialization.

A number of conclusions were drawn from the results. Firstly, even though past research evidence has shown that legumes are generally treated as a 'women' crop in sub –Saharan Africa, the trend is changing with improvement in the economic prospects of legumes for smallholder farming households. The study showed that men are taking over the production of major legume crops. Moreover, households

with a higher number of occupants had a higher likelihood to commercialize their crop just like households that owned livestock. This finding had a lot to do with labour availability among the households as households with more members or owning livestock had better access to labour for crop production activities.

Membership to farmer organizations, land size and access to credit were found to positively affect crop commercialization. This phenomenon could be highly related with the ease of access to production resources and output markets. Lastly, off-farm income affected crop commercialization both positively and negatively. Positive influence occurred when the farmers reinvested the income into agricultural activities while negative influence occurred when farmers getting more income off the farm decided to invest less in crop production.

4.2   Recommendations

This study made several recommendations in an effort to improve smallholder crop commercialization in Eastern Zambia. Firstly, the fact that households owning livestock or having more family members have a higher likelihood to commercialize due to production of a larger market surplus indicated the importance of labor availability on smallholder productivity. It is evident that intensification of production and commercialization will require investment in labor saving technologies. There is need to promote public-private sector partnership to improve farmer access to affordable farming technology. These could include simple farming equipment such as two-wheeled tractors as well as harvesting and processing equipment. The equipment would ultimately improve access to transport for better marketing of output.

Farmers affiliated to organizations had better access to agricultural inputs which enabled them to produce more marketable surplus. There is need to encourage formation of farmer organizations and strengthen existing ones to enhance their ability to improve access to inputs but also better crop marketing by improving their bargaining power. In addition, more effort is needed by extension providers to promote understanding of gender roles and ensure increased participation of women in agricultural production activities. Increased participation by women would entail a higher marketable surplus which would result in increased crop commercialization

Lastly, improved access to resources such as land and credit services is essential for farmers to effectively invest in better technology, improved inputs and more land. This will allow them to expand their production, increase marketable surplus and commercialize their crop enterprises. However, to enhance farmer access to social services such as agricultural credit and markets, there is need to improve the existing socioeconomic infrastructure such as roads. Other policy options would

entail development of deliberate policies to strengthen the existing savings & credit cooperatives and rural microfinance institutions.

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