Socio-Economic Determinants of Rural Market Participation for Smallholder Maize Farmers in Dodoma Region-Tanzania

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Abstract[1]

Like many other Sub-Sahara African countries, the contribution made by smallholder farmers in Tanzania's economy cannot be under estimated given the fact that, majority depend on them for food security and industrialization process. Unfortunately, most of these farmers are not performing well, hence having little contribution to the economic development of the country and eventually to their socioeconomic wellbeing. Socio-economic determinants have been associated with limiting these farmers to achieve their fully market participation potentials. This study therefore used binary logistic regression model to iron-out socio-economic determinants of smallholder farmers' market participation, taking a case of smallholder maize producers in Kongwa and Mpwapwa Districts in Dodoma Region. The aim of this study is to provide the insight for improving market participation, not only to smallholder maize farmers but also other crops farmers in the whole country. The study empirically found that, education level, household size, social capital, farm size, type of transportation facility, roads condition, and market guarantee were positively influencing farmers' choices to sell maize. While, higher ages, sex and market distance were negatively influencing their choice to participate in the market. The study concluded that, in order to increase market participation of smallholder maize farmers, the following has to be done; improving farmers level of education, at least at primary level, as it improves ability of farmers to grasp various agricultural technologies; encouraging gender balance and social networks in rural areas; emphasizing on market guarantee such as contract farming; improving rural infrastructures as well as creating more market places closer to villages and rural areas.

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1.0 Introduction

Like many other countries in sub-Saharan Africa, agricultural sector continues to be the backbone of the Tanzania economy, as it accounts for more than one-quarter of GDP, provides 85% of exports, and employs about 65% of the work force [Simbakalia, (2011); Sheila *at el.,* (2011); Pauw and Thurlow, (2010)]. Despite of its contribution to the country's economy, agriculture in Tanzania is facing many challenges including; inability of smallholder farmers to access and use inputs such as seeds and fertilizers; use of obsolete technologies such as the hand-hoe and inadequate investment in irrigation; poor infrastructure, especially roads; high postharvest crop losses caused by poor storage structures, and; inadequate access to market for both crops and livestock products (Mkonda and He, 2016).

The government of Tanzania together with various development partners and stakeholders have been trying to find the best ways to improve the performance of the sector in the country, such strategies including; promoting agro-processing and reducing post-harvest losses; increase access to inputs through use of various input vouchers systems; increasing investment in irrigation schemes and promoting rainwater harvesting; encouraging and supporting use of simple and less cost mechanization such as small tractors and power tillers; enhancing efficiency of the agriculture extensions service by, amongst other things, increasing the number of extension agents, and; attracting foreign investment in the agriculture sector (Amani, 2005; MAFAP, 2013).

However, given the fact that the sector employs large percent of the working force, failure to access the market for whatever is produced jeopardize the ability of farmers to increase their incomes by producing what provides the highest returns to land and labour, leading to increase inhousehold poverty (Timmer, 1997). Barret, (2008) explains the importance of enhancing smallholder market access for economic growth and reduction of poverty. Further, he argued that, just getting the price right is not enough to induce broad-based, welfare-enhancing market participation, rather these farming households must have access to productive technologies and adequate private and public goods in order to produce a marketable surplus.

There are number of factors affecting smallholder farmers' participation in markets developing countries including Tanzania. Literature has explored that, access to credit, access to input and output markets, poor marketing infrastructure, inadequate land tenure and management system, policy-related and institutional have huge impact on smallholder farmers market participation [Nyunza and Mwakaje, (2012); Chiara *at el.,* (2012)]. In Tanzania, all these dynamics are fuelled by lack of technical production skills as well as low level of basic education among smallholder farmers, which affect their production efficient and market information processing ability. Having that in mind, market participation in Tanzania is considered as a complex subject that needed to be thoroughly examined.

Given the complexities of smallholder market participation in a fragile economy like of Tanzania, this study identified and analysed the socio-economic determinants of rural market participation among smallholder farmers, taking maize producers in Kongwa and Mpwapwa District as a case study. Although most of smallholder farmers in Tanzania face almost the same problems of market participation, consideration was taken to smallholder maize farmers because the crop is the most important staple food crop grown by most of farming households, as well these farmers are the ones producing significant quantity of maize available in the country [Lyimo *at el.,* (2014); Makombe and Kropp, (2016)].

2.0 Literature Review

2.1 The concept of rural market and market participation

The rural market has been defined in various way but the most referred definition is basing on the activities undertaken by the marketers to encourage the people living in rural areas to convert their purchasing power into an effective demand for the goods and services and making these available in the rural areas, with the intention to improve their standard of living and achieving food security objective, as a whole (Musah, 2013)**.**

Rural market is now involving a two-way marketing process. There is inflow of products into rural markets for production or consumption and there is also outflow of products to urban areas. In respect to this, the concept of market participation also has been interpreted in various ways. Based on the works of Barrett (2008); Jagwe (2011) and Musah (2013),

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two basic interpretations can be inferred. They assert that, households can participate in the market either as sellers or buyers. However, both the decisions to enter the market as a seller or a buyer imply the engagement of these market actors, in the process of selling and buying products in the markets.

For small-holder farmers, market participation means transition from subsistence which involves changing production of food for home requirements to a market engagement mode, which involves farming for commercial purposes whereby frequent use of markets is made for the purpose of exchanging products and services, Food and Agriculture Organisation (FAO, 2013). This is similar to other past empirical studies which emphasized the seller side of market participation. Based on this side, [Bahta and Bauer (2007); Jagwe (2011); Onoja *at el.,*. (2012) and Musah (2013)] defined market participation, as commercialization of subsistence agriculture in terms of decisions to opt selling at the markets and not at farm gate. Market participation, is often used as a proxy for commercialisation or the two terms are basically used interchangeably. For example, Cazzuffi and McKay, (2012) asserted that, commercialization can be conceived of and measured in a number of ways and often understood in terms of market participation decisions. Makhura *at el.,* (2001) in consistency with Cazzuffi and McKay (2012) asserted that, commercialization of subsistence agriculture implies an improved ability, to participate in the output market.

For the purpose of this study, rural market shall involve a one-way marketing process which is inflow of maize into rural markets (Kibaigwa International Grain Market) by smallholder maize farmers and not outflow of maize to urban areas while market participation shall refer to any situation which involves the decisions of exchange of maize for money taking place at Kibaigwa International Grain Market.

2.2 Analyzing Determinants of Smallholder Market Participation

Market access is not uniform because every households may face different transaction costs to participate in the particular market [Fackler and Goodwin, (2001); Renkow *at el.,* (2004)]. However, since the decision to participate or not to participate is based on the individuals' choices, hence different choice models are employed. Normally two cases are involved; one is when the main objective is to identify and determine the behaviour of

independent variables given the dependent binary variable. In this case the analysis is a one-stage involving dependent variable with discrete values. Under this situation different types of Logit and Probit models are being used [Adeoye and Adegbite, (2018); Egbetokum and Omonona, (2012); Kgosikoma and Malopa, (2016); Mbitsemunda *at el.,* (2017). Two is when the objective is to go beyond knowing only determinants of farmers' market participation, and interested to as well know its extent or its impact on farming or farmers' livelihood. Usually in this case, the analysis is a two-stage involving at least one continuous dependent value in one of the equations among the stages. Under this situation a mixed of binary and censoring models such as Ordered Probit, Tobit and Heckman models are simultaneously employed [Barret, (2007); Mathenge *at el.,* (2010); Martuscelli *at el.,* (2012); Maziku *at el.,* (2015); Mmbando *at el.,* (2015); Muricho *at el.,* (2015)].

2.3 Socio-economic Determinants of Smallholder Market Participation

Past studies show that, there is a connection between socioeconomic determinants like age, education level, household size, transport facility, farm size, market distance, social capital, road condition, market guarantee and the decisions of smallholder farmers of either to sell at farm gate or at the market. The influence of these variables is either positive or negative depending on the nature and location of the research. For instance, age is found to have a positive relation with market participation [Tekana and Oladele, (2011); Asfaw *at el.,* 2012)]. According to Randela *at el.,* (2008), young aged farmers have high mobility ability to move around in search for market connections and networks hence are able to participate more in markets. However, he further highlighted that, at higher age relationship with market participation is parabolic in nature, this is because beyond a certain age, farmers' mobility ability is reduced which affect their production levels and in turn reduces their market participation. Generally, household size is assumed to positively enhance market participation. In majority of developing countries, larger household size guarantee availability of labour force, which can be used to produce more yields to surpass household food demand and have large volumes for selling to the markets (Makhura, 2001).

Education as an intellectual capital plays a positive role in influencing market participation. Farmers with high level of education are expected to have high ability of

processing market information and participating in various decisions at village level like participating in village farm groups (Heierli and Gass, 2001). Gender is also reported to influence market participation of smallholder farmers. Women in developing countries especially in Africa are disadvantaged because of unequal distribution of resources as well as cultural barriers (Chilundika, 2011).

Social capital captured as being a member in farm groups also enhance market participation. Dyer & Chu (2000) noted that, social networks provide trust to farmers. Through these farm groups, smallholder farmers can get loans from financial institutions that can help them to increase production and therefore use the surplus for business purposes. Furthermore, Minot and Hill, (2007) pointed the problems of poor road networks in rural areas as among major challenges facing rural population. Many produces in rural areas are wasted due to this problem of poor infrastructures. In addition, majority of smallholder farmers do not have reliable transportation facilities. This leads to high transportation costs due to high competition of hiring the transport facilities. Bachmann and Earles, (2000) jagged that inability to transport produces in time may result in produces spoilage and losses. It has been noted that, market guarantee has proved to contribute much in market participation. A study by International Fund for Agricultural Development (IFAD), (2010) explained that, households that produce for market are generally better off than those producing for self -consumption only if the market is guaranteed to them. Assurance of price and availability of buyers in the market can attract farmers to sell at the market and stop their traditional ways of selling at farm gate.

4.0 Methodology

4.1 Study Area

The research was carried out in six villages of Kongwa and Mpwapwa Districts (Three villages each) named: Hembahemba, Njoge, Makutupa, Tambi, Mwenzele and Mlembule in Dodoma region. These villages were selected based on two major reasons; one is the level of maize production and the nature of the farmers; and two isthe average distances of the villages from Kibaigwa International Grain Market.

4.2 Sample, Sampling and Data Collection

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In collaboration with the respective Village Extension Officers, list of small scale maize farmers in each village was developed. Using Yamane (1967) formula for sample size determination, a suitable and required sample was determined in each village. A total of 633 smallholder maize farmers were randomly sampled and interviewed using a semi-structured interview. The information from the respondents were complemented by a thorough review of documents at District, regional and country level as well as actual validation through observations to some of the variables such as household sizes and distances from villages to the market place.

4.3 Model Specification

Market participation of smallholder maize farmers is individual's decision choice that is based on probabilities of either choosing to participate in the markets or not. The easiest and most widely used discrete choice model is logit. Its popularity is due to the fact that the formula for the choice probabilities takes a closed form and is readily interpretable (Train, 2009; Bahta and Bauer, 2007). Furthermore, this model can allow a mix of predictor variables, for our case; continuous and categorical variables. Onoja *at el.,* (2012) have used the model effectively and they have documented the potential of using this model over the other choice models, one of them being fitness of the model even if data are not normally distributed. Several literatures have also explained the processes and theory behind this model (Train, 2009; Wuensch, 2006; Gujarati and Sangeetha, 2007, and; Greene, 2003). In this study, the response variable is 1 when the farmer participated in maize market (i.e. Kibaigwa international maize market) and 0 when the farmer did not participate. The functional form of logistic regression model is denoted in equation one (1).

$$ln\left(\frac{\omega_i}{1-\omega_i}\right) = \beta_0 + \sum_{i=1}^{K} \beta_i X_{ij} + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (1)$$

Where: *j* is the response category (1 or 0), *i* denote cases (1, 2, 3, ...K), βo is the coefficient of the constant term, β_i is the coefficient of the independent variable, X_i is the matrix of observed values of socio-economic variables; such as education level, market guarantee, type of transport facility, farm size, household size, social capital, road condition, age of

smallholder maize farmers, market distance and sex of smallholder maize farmers and ε_i is the matrix of unobserved random effects, $\frac{\omega_i}{1-\omega_i}$ is odd, and; $ln\left(\frac{\omega_i}{1-\omega_i}\right)$ is the logarithm of odds.

From the basic binary logistic question (1), we have:

$$\frac{\omega_i}{1-\omega_i} = Exp\left(\beta_0 + \sum_{i=1}^{K} \beta_i X_{ij}\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (2)$$

Equation (1) can be manipulated to give the odds ratio using equation (2) above. The probability that smallholder maize farmers from Hembahemba, Njoge, Makutupa, Tambi, Mwenzele and Mlembule villages households to participate in Kibaigwa international grain market can be calculated using equation (3) below;

$$\omega_i = \frac{Exp\left(\beta_0 + \sum_{i=1}^{K} \beta_i X_{ij}\right)}{1 + Exp\left(\beta_0 + \sum_{i=1}^{K} \beta_i X_{ij}\right)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Equation (3) is intrinsically linear since the logit is linear in X_i (Gujarati and Sangeetha, 2006); it indicates that probability lies between zero and one and vary non-linearly with X_i.

4.4 Variables and their Measurements

Table 1: Operationalization of socio-economic variables

SN	Explanatory variable	Measurement	Expected Sign	Description	Comment
1	Education level	Continuous	+	Highest level of education that a farmer achieved	The more educated, the better negotiation and information processing capacity
2	Market guarantee	Dummy	+	1; if market is guaranteed 0; if market is not guaranteed	More guaranteed market, more maize production
3	Type of transport facility	Categorical	+	0=Foot 1=Bicycle 2=Cart 3=Automobile	Ownership reduced transaction cost and increase volume of maize to be transported
4	Farm size	Continuous	+	Size of the farm under maize cultivation (hectares)	Large size increases maize production
5	Household size	Continuous	+	Number of household members	Large household size reflecting availability of more labour force to facilitation production and transportation of crops
6	Social capital	Dummy	+	1=if smallholder maize farmer belongs to association 0=if smallholder maize farmer does not belong to association	Belonging to farm organisations reduces search costs and exploitation of farmers
7	Road condition	Categorical	+	0=Very poor 1=Poor 2=Fair 3=Good 4=Very good	Improved road reduces transportation cost and increase market accessibility
8	Age	Continuous	+	Age of smallholder maize farmer in years	Old age means more experiences
9	Sex (Female)	Dummy	-	1=if the farmer in control of the farm is female 0=if the farmer in control of the farm is male	Less resources endowed
10	Market distance	Continuous	-	Average distance of the market from the farmers' village(kilometers)	Long distances decrease market participation

Source: Adopted and modified from empirical studies

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5.0 Results and Discussions

5.1 Logistic Regression Model Fitness Attributes

As a measure of goodness of fit, the Model Chi-Square was used and therefore, there should be no statistically significant difference between observed and predicted values if the model is a good one (Field, 2005). The Model Chi-Square statistic, which is the difference of the values of the two log likelihood functions (i.e. the null model -2 Log likelihood and the full model -2 Log Likelihood) is 614.185. If the P-value for the overall model fit statistic is less than the conventional 0.05 (p<0.001) indicating an evidence to show that at least one of the independent variables contributes to the prediction of the outcome. The latter is true for the fitted model, i.e. the overall model fit statistic (omnibus test of model coefficient) is less than 0.05 and highly significant at (P<0.001) with 10 degrees of freedom (χ^2 (10 d.f) 251.344, p < 0.001), indicating that at least one of the parameters in the equation is nonzero. The Pseudo R^2 is also positive and high approximately 0.44 (Cox & Snell R^2=0.328 & Nagelkerke R^2=0.44) indicating that variations in probabilities of participating in Kibaigwa international grain market in the surveyed sample of maize smallholder farmers in Kongwa and Mpwapwa districts was explained by about 44 percent of the covariates in the logistic regression model. The findings also indicate that the model with descriptors (PAC: 75.8) performs better than the null model (PAC: 56.9). Therefore, with reference to the results revealed in this study the null hypothesis (socio-economic factors have no significant enhance on decision of maize smallholder farmers to participate in market) was rejected in favour of the alternative hypothesis that socio-economic factors significantly influence decision of maize smallholder farmers to participation in market at 5% level of significance.

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Table 2: Results of binary logistic regression analysis for socio-economic determinants

Variable	β	S.E.	Wald	D.f	Sig.	Exp(β)
Sex (Female)	-.336	.246	1.868	1	.172	.715
Age	.008	.006	9.435	1	.037	1.012
Age squared	-.027	.128	17.894	1	.001	.973
Education level (Not attended)			8.581	2	.009	
Education level (Primary education)	.045	.332	7.867	1	.001	1.097
Education level (Secondary education)	.092	.032	6.778	1	.003	1.432
Household size	.207	.102	4.082	1	.043	1.230
Transport facility (Foot)			9.669	3	.046	
Transport facility (Bicycle)	.221	.108	4.206	1	.040	1.248
Transport facility (Cart)	.191	.935	2.349	1	.007	1.210
Transport facility (Automobile)	.848	.348	2.348	1	.018	2.335
Farm size	.450	.145	9.697	1	.002	1.568
Market distance	-.145	.014	109.12	1	.000	.865
Social capital (Belonging to group)	.384	.226	2.897	1	.089	1.468
Road condition (Very poor)			1.246	4	.024	
Road condition (Poor)	.181	.163	1.246	1	.001	1.199
Road condition (Fair)	.733	.355	4.273	1	.006	1.480
Road condition (Good)	.188	.373	10.137	1	.001	1.564
Road condition (Very good)	.345	.429	.663	1	.167	1.113
Market guarantee (Guaranteed)	.310	.359	.743	1	389	1.363
Constant	4.003	.897	19.922	1	.000	54.779

Decision of smallholder maize farmers to participate in Kibaigwa market depends on a number of socio-economic determinants. Binary logistic regression model was employed in the analysis of enabling or constraining determinants. The result shows that, among the ten covariates (sex, age, education level, household size, transportation facility, farm size, market distance, social capital, road condition and market guarantee) considered for the model, participation in Kibaigwa market is positively influenced to a great extent by the following seven (7) covariates: education level, household size, transportation facility, farm size, road condition, social capital and market guarantee. Consequently, the other three (3) covariates (age, sex and market distance) were found to influence in negative direction (Table 2). As it is shown in the table, all the variables showed signs that are in tandem with theoretical expectations except for age and household size. The following is the binary logistic regression equation developed from Table 2 of the socio-economic variables:

$$
\begin{aligned}
Logit\ (P) = {} & 4.003 - 0.336(SR) - 0.027(AR) + 0.092(Ed) + 0.207(HS) + 0.221(TF) \\
& + 0.450(FS) - 0.145(MD) + 0.384(SC) + 0.181(RC) \\
& + 0.310(MG) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)
\end{aligned}
$$

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Where: Logit (P) = Is a probability of market participation ranging from 0 to 1; SR = Sex of respondent was a dummy variable (0 = "female" and 1= "male"). AR = Age of respondent was recorded as a continuous variable. Ed = Education level of respondents recorded as continuous variable basing on number of years in schooling (1,2, 3, 4 …….n), HS = Household size, continuous variable in real number (1, 2, 3 , 4 and above), TF = Transport facility was recorded as a categorical variable (Foot = 0, bicycle=1, cart=2, motorcycle=3 and truck=4), FS = Farm size cultivated recorded as continuous variable in ha (1, 2,3, 4…n), MD = Market distance recorded as a continuous variable in kilometers. SC = Social capital recorded as dummy variable, 1= "Belonging to farm group at village, 0= "Not belonging to farm group at village"). RC = Road condition as categorical variable (very poor = 0; Poor=1; Fair = 2; Good = 3 and Very good = 4) andMG = Market guarantee recorded as dummy variable where 0 = Not guaranteed and 1=guaranteed

5.2 Socioeconomic Variables that Enabling Market Participation

5.2.1 Education level

This variable was found to significantly influence decisions of maize small-holder farmers to participate in Kibaigwa market services with p value less than 0.05 from p values (p =0.009 -not attended to school, p =0.001 -primary education, p = 0.003 -secondary education) developed from all three categories of education level, also, the logistic regression coefficients were found to be positive meaning that education level has a positive direction with market participation decisions of maize small-holder farmers. These findings indicate that, compared with small-holder farmers who have not attended to school (reference category), those with 'primary level of education' have 1.097 (odd ratio > 1) times higher odds (9.7%) for every additional in education level. Further, the results mean that compared to small-holder farmers who have not attended to school, those with secondary level of education have 1.432 times higher odds (43.2%) of increasing odds of opting to participate in Kibaigwa market. Generally, these results mean that if education level is raised, there is a possibility of improving negotiation skills and information processing ability and therefore small-holder maize farmers will more likely utilize effectively the market services offered by Kibaigwa international grain market (Table 2). This result is in line with (Heierli and Gass, (2001); Randela *at el.,* (2008); and Maro

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(1995). All these researchers concluded that education is an important tool to escape poverty and it plays a huge role in affecting small holder farmers to participate in market, with high level of education, farmers are expected to increase land utilization management, information processing and therefore increase production.

5.2.2 Market guarantees

The logistic regression coefficient was found to be positive and the odd ratio was 1.363, this indicates that, the odds of decisions to participate in Kibaigwa market can increase by a factor of 1.363 times (36.3%) for every unit increase in the market guarantees. This means that when market is more guaranteed by assurance of the availability of maize buyers, there is a possibility that maize production will increase and therefore, market participation will also increase (Table 2).This has also been stated by the recent poverty analysis studies byInternational Fund for Agricultural Development (IFAD) which confirmed that households that produce for market are generally better off than those producing for self -consumption only if the market are guaranteed to them IFAD, (2010). In a more explicit form IFAD noted in another study that the potential benefits of higher product prices due to commercialization are effectively transmitted to poor households when market for the products is guaranteed (IFAD, 2001). However, a $p>0.05$ means market guarantee is not a determinant of market participation.

5.2.3 Transport facilities

This variable was found to be a determinant of market participation decisions of maize small-holder farmers with p values ($p = 0.046$- foot, $p = 0.040$-bicycles, $p = 0.007$-carts and $p = 0.018$ - automobile) which are less than a conventional value 0.05. On the other hand, the logistic regression coefficient was found to be positive, meaning that transport facilities have a positive direction with market participation decisions. The findings generally indicate that, when compared to those who do not possess any means of transportation, those who own bicycles have 1.248 times higher odds (24.8%), small-holder farmers who owned carts have 1.210 times higher odds (21%) and those having automobile have 2.335 times higher odds to participate in the market. This means that if small-holder farmers are able to own improved transport facilities (bicycle to automobile), the transportation costs is expected to decrease and therefore, increase the volume of maize

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to be transported hence increase participation in the market(Table 2).However, majority of the maize smallholder farmers in the study area do not own improved facilities, this has for long make them unconnected from the market as they tend to hire unreliable transportation with high cost because of the competitions. This has also been noted by (Bachmann and Earles, 2000) who pointed that inability to transport produces in time may result in produces spoilage and losses. Zaibet and Dunn, (1998) also revealed that unavailability of reliable private transport may increase transport costs, which in turn reduces market participation.

Contrary to this study, results from other studies done in developed countries, found that it is common to meet farmers who use their own trucks to get to the market centers. Makhura (2001) pointed out those farmers with assets such as improved trucks are able to move around in search of better markets. Farmers who can move around are better informed about various buyers and are normally well-connected farmers. This implies that farmers with improved transport facilities can interact more effectively when compared to those who lack transport facilities.

5.2.4 Farm size

Farm size cultivated determines amount of maize produced per household hence contributing to smallholder farmers' participation to the market. In the model, farm size was found to have a positive + β of 0.450, odds ratio (Exp β) of 1.568 and p value of 0.002. This suggests that, farm size in the study area influence market participation of small-holder farmers with high statistical significant of ($p < 0.05$). Since the regression coefficient is positive, it also indicates that, an increase in one hectare (ha) of land cultivated will increase production of surplus maize and therefore, the odds of small-holder farmers to market participation will increase by 56.8%. It also means that an additional increase to one ha of maize cultivates will more likely increase the odds of the decisions to participate in market by odd factor of 1.568 times(Table 2).Past studies have provided empirical confirmation so frequently to almost become a stylized fact that there is a big connection between farm size, productivity and market participation. Eastwood *at el.*,, 2010 and Lipton (2009) found that agricultural production is characterized by constant economies of scale, implying that a wide range of farm sizes can coexist. Similarly, a study done by Masoku *at el.*,. (2001) confirmed and supports this finding by providing a positive

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significant relationship between land size and market participation in maize market. They pointed out that a farmer who has a large farm size would have a high probability to allocate more land for production. Their results show that an increase in farm size of household has the probability of increasing market participation if other factors are held constant.

5.2.5 Household size

An output of the model has found that, household size has +β of 0.207 and odd ratio of 1.230. The increase of odds of market participation decisions is statistically significant with p = 0.043 less than p alpha 0.05. This result indicates that, the odds of the decisions to market participation increases by odd ratio of 1.230 times for every increase in one member of the family. This means that an increase of one member in household will more likely increase the odds of the decisions to participate in market by 23%. The plausible explanation is that, households with many members have a high possibility of producing surplus maize to sell at market as compared to the household with a few members (Table 2). However, the theoretical expected sign of regression coefficient was negative meaning that, large number of members in household was expected to create more dependent members which is one among the characteristics of majority of rural households in Tanzania. The results are in tandem with Zamasiya *at el.,.,* (2012) and Alene *at el.,,.* (2008) who also pointed that the household size is an indicator of the amount of family labor that is available for production activities which is also explains the consumption levels for a household, this means that as the household size increases, production also increases and therefore surplus is expected to be taken to the market.

5.2.6 Social capital

Social capital is another variable which positively influence decision of smallholder farmers to participate in Kibaigwa market. However, positive beta value implies that market participation decisions of maize small-holder farmers are positively influenced by one being a member of the farmer group. These results indicate that, the odds of the decisions to participate in market of small-holder farmers who decided to belong to the farmer group can increase by odd factor of 1.468 times, which means 46.8% increase in odd of participating, compared with those who had opted not to join in farm groups. This is

because social capital tends to increase production and access to market information hence reduces search costs and exploitation of farmers (Table 2). It was revealed that, through farm groups, farmers can agree on the price to charge as collective decision. This can help them to reduce exploitation from the traders as well as the middlemen. The observations showed that, those smallholder farmers in groups have managed to organize themselves in such a way that, if price of maize is below their favorable price, they agree to store until the price stabilize. Those smallholder farmers who produce few bags of maize can organize themselves in groups to have large share to transport.Social networking also found to help to increase trust in financial institutions and increase lobbying and bargaining power of maize smallholder farmers. This is in tandem with (Matungul *at el.,.*, 2001 cited in Randela *at el.,* 2008) who emphasized that collective action strengthens farmers' bargaining power and facilitates obtaining institutional solutions to some problems and coordination.

In respect to this, the study found that, there is a positive connection between social capital and market information. Farmers who belong to farming association are more likely to have market information about price and arrival of buyers which increase the ability to participate in the market, this was also observed by Mango *at el.,* (2018) that, the odds of participating in the rural market for farmers who had access to transport information due to social capital were 5.7 times the odds of those without transport information access. The result was significant at the 1% level of confidence.

The study found that, the connection is probably due to the fact that transport information access has a huge bearing on marketing in general. Farmers with high social capital have access to transport information and more likely to secure means of delivering their produce in time to markets of their choice as compared to farmers without access to transport information.

5.2.7 Condition of the roads

Regarding to the enhancement of the condition of the roads on decision of smallholder farmers to participate at Kibaigwa market, it was found to determine the market participation decisions of maize small-holder farmers with different p values (p = 0.024-very poor road conditions, p =0.001-poor road conditions, p = 0.006-fair road condition and p = 0.001-good road condition) developed from all five categories. However, the last

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category 'very good road conditions' was found to have insignificant relationship with market participation decision, also the logistic regression coefficient was found to be positive meaning that road conditions had a positive direction with market participation decisions. The findings generally indicate that, compared with small-holder farmers who responded with 'very poor road conditions', those with 'poor road condition' responses have 1.199 times higher odds (19.9%), small-holder farmers responded with 'fair road conditions' have 1.480 times higher odds (48%), those responded with 'good road condition' have 1.564 times higher odds (56.4%) and small-holder farmers with 'very good road condition' responses have 1.113 higher odds (11.3%) to participate in the market. This means that when the roads are well improved, transportation costs are expected to decrease and therefore, increase volume of maize to be transported hence increase participation in the market (Table 2).This suggests that road condition in Hembahemba, Njoge, Makutupa, Tambi, Mwenzele and Mlembule villages is a determinant of market participation among maize smallholder farmers in these villages. The results of this variable fit with that of Minot and Hill (2007) in the study "Developing and Connecting Markets for Poor Farmers". They observed that smallholder farmers living in semi-arid areas of Vietnam tend to sell smaller shares of their outputs due to poor infrastructures. Regarding to the survey and analysis done in this study, majority of maize smallholder farmer households pointed that, the road infrastructures in six villages are not good enough to make them transport maize safely to Kibaigwa market this has much been contributed to the market participation problem to majority of villagers in the area of study.

It was also found that lack of improved and properly maintained roads in the study area make it very cost for farmers to transport their maize to the market and sometimes these transport costs are too high for farmers to get any meaningful benefits from their trading activities.Bachmann and Earles (2000) pointed that poor infrastructures have contributed to high transportation cost in sub-Saharan African and if the aim is to reduce transport costs in an effort to encourage commercialization of agricultural produce by smallholders, the road infrastructures have to be developed.

5.2.8 Ages of respondents

Younger ages in labour-intensive agriculture have been associated with quick adoption of different agricultural technologies as they are more energetic and risk takers, hence easy to realize high agricultural productivity given the production options they are making (Guancheng Guo *at el.,* 2015; Ngeywo and Shitandi, 2015; Zegeye *at el.,* 2001). However, being young is not a direct qualification to achieve higher yields without contribution of other key components, such as respective cropproduction knowledge and agricultural experience (Ainembabazi and Mugisha, 2014). In this study, there is a positive linear relationship between age and market participation decisions among the surveyed farmers. The findings indicate that, increase in age, increases the odds of participating in the market by 0.008.

Moreover, age was found to determine the market participation decisions of small-holder farmers as the relationship is significant at $0.037(P<0.05)$. The results of the study is in line with Mango *at el.,* (2018,), who found that, a one-year increase in age of the household head is associated with a 27% increase in the odds of participating in rural market. The result was significant at the 5% level of confidence. They observed that, this could imply that older farmers, due to numerous years of experience gained in marketing are more likely to realize the benefits of participating in markets than young, inexperienced farmers. Moreover, the results show that as farmers grow older, their physical energy declines. Hence, they take their produce to the market to compensate for their inability to produce other crops, and, consequently, they tend to have a better income.

5.3 Socio-economic Variables that Constraining the Market Participation

5.3.1 Age-squared of maize small-holder farmers

Literature suggests higher ages are not good index for improving productivity in labour-intensive agricultural production (Ugwoke *at el.,* 2005). Regarding to that, age was squared to find its parabolic relationship with market participation decisions of farmers. The findings have found age-squared of small-holder farmers to be statistically significant at p = 0.001 (P<0.01) with β value of -0.027 and odd ratio of 0.973 (odd ratio<1). In this case, the relationship between participation and age is parabolic indicating that beyond 57 years,

percentages of market participation diminish (Figure 2). This can be contributed by the fact that small-scale farmers grow old and became less energetic for farm production. This is supported by negative correlation which indicates that, age of the small-holder farmer above 57 years tended to weaken the individual decisions to participation in markets. This means that, the odds of the decision of maize small-holder farmers to participate in the market decrease by an odd factor of 0.973 times for every increase in one year of their age, which is a 97.3% discount. Meaning that, increase in one year above 57 years of small-holder farmer; decrease the odds of participation by 97.3% (Table 2). The results basing on this variable are in line with Randela *at el.*, (2008) who revealed that, relatively young farmers usually have higher socio-economic status that enables them to be faced by lower transaction costs. Young farmers are very mobile therefore they tend to participate in various markets before they select a permanent market to engage with.
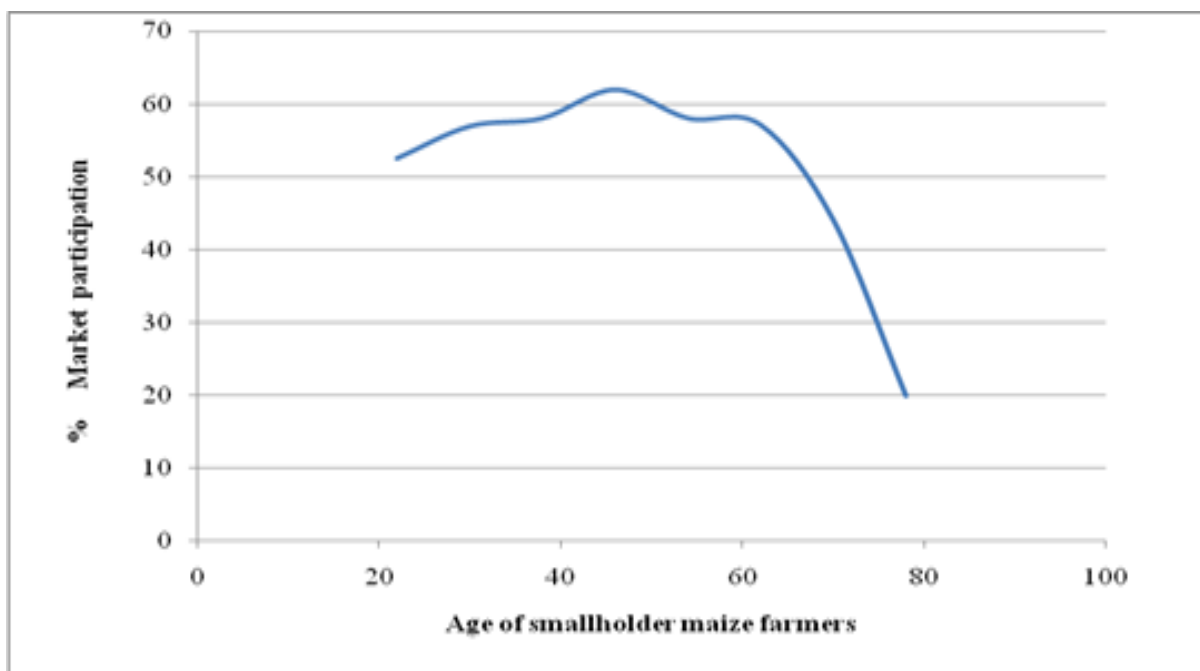

Figure 2: Farmers' age parabolic relationship with market participation

5.3.2 Sex of respondent

Model output revealed that, being a female negatively affect market participation decisions of small-holder farmers with β of -0.336 and odd ratio of 0.715. However, the influence was statistically not significant and was found to contribute negatively (sex was coded as

"1" for females and "0" for males) towards maize market participation decisions in the study. Female was used as a reference category and the negative influence of sex indicates that less market participation of female headed households as compared to male headed household. The result therefore implies that there is a higher probability of market participation if the head of the household is male. In other words, it seems males have more of a tendency to engage in maize marketing in the market than female. This further implies that any increase in household headed by female will result to the possibility of decreasing the odds of decisions to participate in market by odd ratio of 0.715 times, a 71.5% discount which means 71.5% decrease in odds of market participation. This is because increasing number of females in households means less resources endowment (Table 2).

These results are consistent with the findings of Cunningham *at el.,* (2008) in a study on gender differences in marketing styles in western Oklahoma. They posted that in many areas females own limited resources to influence them to participate in the markets. Contrary to this, a study by Adewale and Ikeola, (2005) pointed that women have a tendency to engage in fish marketing in the Niger Delta than men due to the possession of capitals. This study also found that, maize marketing systems is somehow free to the extent that it requires a lot to negotiations with middlemen, traders and transporters which automatically marginalized women. Discussion with women at the villages revealed difficulties they are facing to market their maize. In most cases, females tend to give authorities to males and in case of female headed household, female normally sell at farming areas or use middlemen. By using these untruthful middlemen who always undervalue quality of the maize in order to reduce selling price, females are mostly became a disadvantageous group in market participation process.

5.3.3 Market distance

Findings on the market distance show that, the market distance determines the market participation with a statistical significance of p = 0.001) less than conventional value 0.05 with β value of -0.145 and odd ratio of 0.865. The negative correlation indicates that, the increase in the distance between villages and market tends to weaken the individual decisions on market participation. This means, the odds of the decisions of maize small-holder farmers to participate in the market decrease by odd factor of 0.865 times (86.5%)

for every increase in one kilometer between households and market place Market distance was found to significantly reduce the percentage of maize sold in Kibaigwa market in various ways. First it increases transportation costs, secondly it weakens the connection between the buyer and the smallholder farmer and lastly it increases farmer's exploitations made by middlemen. The study by Onoja *at el.,* (2012) found that distance to the preferred marketing channel is negatively and significantly correlated to the probability of selling at market. They found that in every increase in (1km) in distance, the probability to sell is reduced by 1.23, meaning that smallholder farmers who are closer to market outlets are more likely to sell their produces than those smallholder farmers living further away.

6.0 Conclusion and Policy Implications

The study provides empirical evidence on determinants influencing small-holder maize farmers to participate in crop market. The study found that, if all socio-economic challenges related to market participation are removed, maize small-holder farmers have potential to remove rural poverties as well as increase country's economy at large.The results therefore shed light on the main agenda of improving standard of rural life. Therefore, to increase market participation of maize smallholder farmers, these factors need to be addressed in a right way like; improving farmers level of education, at least at primary level, as it improves ability of farmers to grasp various agricultural technologies; encouraging gender balance and social networks in rural areas; emphasizing on market guarantee such as contract farming;improving rural infrastructures as well ascreating more market places closer to villages and rural areas.It is also, important to note that the study used cross sectional data that do not capture changes over time.Consequently, a longitudinal study is needed to capture changes over time with regard to smallholder maize farmers' market participation.

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