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Factors Influencing Market Participation by Smallholder Farmers in Masvingo and Manicaland Provinces, Zimbabwe

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Abstract: Markets play a critical role in economic development and strengthening market participation by smallholder farmers in both input and output markets is critical for the development of smallholder agriculture in Zimbabwe. This study analyzes the determinants of output markets participation in Masvingo and Manicaland provinces using data from a random sample 479 smallholder farmers. Market participation is very low with only 19% of the sample farmers participating in output markets. Results of the binary logistic regression show that the variables that have a positive and significant effect on outputs market participation are age of the head of household, the size of the household, the level of education of the head of household, the household agricultural income, the degree of farm specialization, access to irrigation, access to draft power, on demand extension service, quality of extension support, distance of the farm from the nearest rural business centre and tenure. Gender of the head of household, the level of education of household members, farming experience, the block training approach, the level of dependency, the farmer to farmer extension approach and household members with off-farm employment significantly and negatively influence market participation. In order to enhance smallholder farmers' participation in output markets, the study recommends that policy intervention efforts must primarily focus on expanding access to irrigation and draft power as well as improving the quality of extension support services for the farmers.

Keywords: Smallholder Farmers, Market Participation, Binary Logistic Regression, Zimbabwe

1. Introduction

Commercialization of smallholder agriculture through increased participation of smallholder farmers in formal markets is a critical requirement for the economic growth and development for most developing countries relying on the agricultural [1-4]. According to the World Bank [5], improving productivity, profitability and sustainability of smallholder farming is the main pathway to reduce poverty in the developing countries. Markets play an important role in rural development, employment creation, income generation, food security, technology diffusion, enhancing resource use efficiency, and developing rural-market linkages. Markets availability and enhancing the ability of smallholder and resource- poor rural farmers to access market opportunities and diversify their links with markets is therefore a prerequisite for enhancing agriculture-based economic growth and increasing rural incomes [4, 6-7]. The recognition of the potential of markets to unlock economic growth and

agricultural development gave rise to market-led rural development paradigm during the 1980s [8].

In most developing countries, smallholder farmer participation in formal output markets is limited as most production is mostly for subsistence needs with little surplus production for marketing. Even in situations where smallholder farmers are producing a surplus, their participation in formal output markets is hampered by a number of challenges [7]. These challenges include unavailability of markets, poor marketing infrastructure, insufficient surplus production to cover marketing related costs, limited business and negotiating experience and collective bargaining skills, poor packaging of farm produce, and lack of access to marketing information and market intelligence among others.

In Zimbabwe, there has been a major shift for market-led agricultural development in recent years following the marked reduction of government spending in smallholder agriculture. In the past, the government used to play a pivotal

role in assisting farmers with the marketing of their agricultural produce through a number of commodity based statutory marketing boards. However, following the liberalization of the agricultural markets in the 1980s and the 1990s in an effort to create open market-led exchange aimed at boosting economic growth, most smallholder farmers are experiencing difficulties in participating in formal agricultural output markets. Understanding the factors that drive smallholder famers to participate in agricultural output markets is critical for developing measures to promote and enhance their participation and improving their livelihoods.

The major objective of this study is to assess the factors affecting market participation in output markets by smallholder farmers in Masvingo and Manicaland provinces of Zimbabwe. Specifically, the study provides responses to the following questions: What is the level of market participation in output markets by smallholder farmers in Masvingo and Manicaland provinces of Zimbabwe? What factors determine market participation in output markets by smallholder farmers Masvingo and Manicaland provinces of Zimbabwe?

2. Methodology

2.1. Study Area, Population and Sample

This study is based on survey data collected in March 2015 from the 6 districts that GIZ is implementing the Agricultural Innovation Support Project (GIZ AISP). The districts are Nyanga, Mutasa and Mutare districts in Manicaland province; and Chiredzi, Zaka and Bikita in Masvingo province. The sample was drawn from a total population of 30,000 farming households. Using the Raosoft sample size calculator (www.raosoft.com/samplesize.html), the minimum sample size target for the household survey was set at 350 farming households. This target sample size was based on achieving a 5% margin of error and a 95% confidence level.

479 sample farming households were selected using a multi-stage random sampling approach. The first stage involved randomly selecting two wards in each of the six districts. The second stage involved randomly selecting two farming household groups from each of the two randomly selected wards in each of the six districts. One group selected was for farming households who had benefitted from GIZ AISP support through improved extension services and the other group was for non-beneficiary farming households. Lastly, all available farming households in each selected group were interviewed for the study.

2.2. Data Analysis

The level of commercialization of a farmer is used as a proxy for market participation in this study [1]. Households who sell less than 60% of their produce are classified as non-market participant and those who sell at least 60% of their produce are classified as market participant. Thus market participation is measured as a binary variable where 1 represents a household participating in output markets and 0 otherwise [9, 10].

A binary logistic regression model is used for assessing the factors that affect smallholder market participation in output markets by the sampled farming households. The variables used in the model, their explanation and the a priori expectations are provided in Table 1.

Table 1. *Definition of Variables.*

Variable	Description	Variable Measurement	Hypothesis
DEPENDENT VARIABLE			
FMARKET	Farmer participates in output markets	Dummy: 1=yes, 0=otherwise	
INDEPENDENT VARIABLES			
HHGENDER	Gender of household head	Dummy: 1=male, 0=otherwise	-/+
HHAGE	Age of household head	Years	-
HHSEDUC	Head of households has at least secondary education	Dummy: 1=yes, 0=otherwise	+
HHSIZE	Household size	Number of people in a household	+
MEMOFFY	Household members employed off farm	Number of members	-
HMSEDUC	Household members with secondary education	Number of members	+
DRATIO	Dependency ratio	Ratio of those younger than 15 years plus those older than 64 years to the working age population (those with ages between 15 – 64 years)	-
YRSFARM	Farming experience	Number of years farming	
FARMGV	Farm gross value based on crop and livestock production (measure of farm productivity)	United States dollar value of total annual farm produce	+
FSPEC	Degree of farm specialization	Measured using the Herfindahl Index for area cultivated	+
IRRIG	Household access to irrigation	Dummy: 1=yes, 0=otherwise	+
DRAFT	Household access to draft power	Dummy: 1=yes, 0=otherwise	+
TENURE	Household has communal tenure	Dummy: 1=yes, 0=otherwise	-
EXT_{DEM}	Household has access to extension on demand over the past 12 months	Dummy: 1=yes, 0=otherwise	+
$EXTB_{TRAIN}$	Household participated in block extension training	Dummy: 1=yes, 0=otherwise	+
EXT_{QUAL}	Household has access to quality extension	Dummy: 1=yes, 0=otherwise	+
EXT_{F2F}	Household received farmer-to-farmer extension over the past 12 months	Dummy: 1=yes, 0=otherwise	+
EXT_{VISITS}	Extent of extension visits over the past 12 months	Number of extension visits	+
$ASSET_{INDEXT}$	Measure of household wealth or wellbeing	Measured using a Household Asset Index (1 – 100%)	+
$DIST_{GP}$	Distance from farm to nearest growth point	Distance in kilometres	-

3. Results and Discussion

3.1. Socioeconomic Characteristics of the Sample Households

The socioeconomic characteristics of the sample households are presented in Table 2 below. 61% of the sample households are male headed and the average age of the head of households is 50 years. 42% of the head of households have at least secondary education and the average household size is 5.87 members.

Table 2. Summary Statistics of the Sample Households.

Variable	Mean	Standard Deviation
FMARKET	0.19	0.396
HHGENDER	0.61	0.489
HHAGE	49.80	15.271
HHSEDUC	0.42	0.494
HHSIZE	5.87	2.390
MEMOFFY	0.33	0.472
HMSEDUC	1.69	1.521
DRATIO	3.41	2.536
YRSFARM	20.85	16.365
FARMGV	944.47	2207.499
FSPEC	0.54	0.221
IRRIG	0.11	0.319
DRAFT	0.70	0.459
TENURE	0.83	0.379
EXT_{DEM}	0.13	0.331
$EXTB_{TRAIN}$	0.23	0.418
EXT_{QUAL}	0.67	0.471
EXT_{F2F}	0.43	0.495
EXT_{VISITS}	26.50	26.150
$ASSET_{INDEXT}$	10.93	5.160
$DIST_{GP}$	13.03	11.765

On average 0.33 members were employed off-farm and the average household members with at least secondary education is 1.69. The dependency ratio for the sample households is 3.41. The average farming experience for the heads of households is 21 years.

The average agricultural income as measured by the gross value of farm output for the 2014/2015 agricultural season for the sample households is $944.47. The farmers are relatively specialized with an average herfindahl index of 0.54. A majority (83%) of the sample households have communal tenure while only 11% of the households have access to irrigation facilities. 70% of the sample households have access to draft power for their farming operations.

The sample households are receiving on average 26.5 extension visits per month and the proportion of farmers receiving extension support on demand is very low at 13%. 23% of the farmers have received training through the block extension approach. In this study, the block training approach refers to a training in which the farmers are trained all the agronomic practices in one continuous session. 67% of the farmers perceived the extension support they are receiving to be of good to high quality while 43% of the farmers indicated that they are receiving extension support from other fellow farmers.

The average distance of the farms from the nearest growth point (rural business centre) is 13 kilometres. The average wealth of the sample households as measured by the total assert index is 10.93.

3.2. Extent of Market Participation in Output Markets by Sample Households

Market participation is low as only 19% of the sample households participate in output markets. This result shows that a majority of the sample households are producing for subsistence purposes. A comparison by gender shows that market participation is almost similar for both female headed households and male headed households (Figure 1).
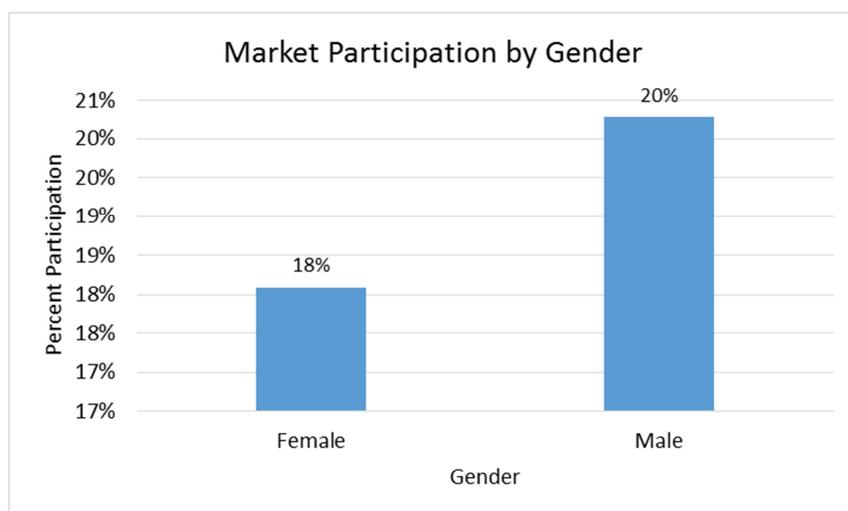
Figure 1. Market participation by gender.

An analysis of market participation by district shows that Chiredzi and Mutasa districts have the highest proportion of farmers participating in the output markets at 35% and 30% respectively while Nyanga has the lowest proportion at 10%
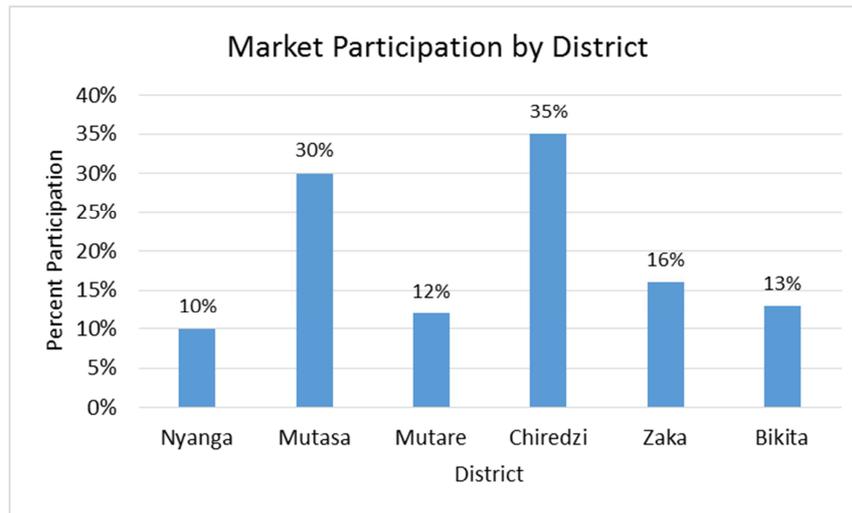
(Figure 2).

Figure 2. Market participation by district.

3.3. Determinants of Market Participation

The estimates of the binary logistic regression are presented in Table 3 below. All the variables significantly influence market participation except for the number of extension visits (EXT_{VISITS}) received by a farmer.

Table 3. Logistic regression estimates of the determinants of market participation.

Independent Variables	B	S. E.	Wald	Sig.	Exp (B)
HHGENDER	-5.528	2.074	7.103	0.008	0.004
HHAGE	0.070	0.035	4.031	0.045	1.072
HHSEDUC	3.307	1.424	5.395	0.020	27.292
HHSIZE	1.903	0.730	6.801	0.009	6.703
MEMOFFY	-2.599	1.184	4.823	0.028	0.074
HMSEDUC	-2.084	0.694	9.011	0.003	0.124
DRATIO	-2.286	0.889	6.610	0.010	0.102
YRSFARM	-0.098	0.038	6.584	0.010	0.907
FARMGV	0.006	0.002	10.878	0.001	1.006
FSPEC	6.896	3.105	4.931	0.026	987.830
IRRIG	11.289	3.535	10.196	0.001	79923.841
DRAFT	6.963	2.168	10.316	0.001	1056.594
TENURE	3.310	2.030	2.659	0.103	27.398
EXT_{DEM}	4.843	1.877	6.660	0.010	126.855
$EXTB_{TRAIN}$	-4.628	1.843	6.306	0.012	0.010
EXT_{QUAL}	4.775	1.725	7.662	0.006	118.497
EXT_{F2F}	-2.885	1.341	4.624	0.032	0.056
EXT_{VISITS}	0.021	0.017	1.538	0.215	1.021
$ASSET_{INDEXT}$	-0.315	0.151	4.346	0.037	0.730
$DIST_{GP}$	0.262	0.085	9.405	0.002	1.299
CONSTANT	-21.931	6.713	10.674	0.001	0.000

-2 Log likelihood=51.129.
Cox & Snell R Square=0.503.
Nagelkerke R Square=0.787.
Percent correct prediction=94.4.

Gender of the head of household (HHGENDER) negatively and significantly affect farmer market participation. The odds show that the probability of a male headed household participating in the marketing of farm output is 0.996 lower compared to that of a female headed household and this result is significant at 1% level of significance. Although this result is not expected, it is consistent with the findings of Onoja *et al.* [11] and Abu [12].

Female headed households are likely to participate in output markets as they have to shoulder the economic and social responsibilities as heads. The age of the head of household (HHAGE) positively and significantly influence market participation and the result is significant at 5% level of significance. A one-year increase in the age of the head of household increases the probability of the farmer's market participation by a factor of 1.072. This result is supported by

the findings of Matungul *et al.* [13], Randela *et al.* [14] and Adenegan *et al.* [15] who argue that old heads of households are more experienced in the markets and this helps them to overcome transaction costs.

There is a positive and significant relationship between market participation and the educational status of the head of household (HHSEDUC) and this result is significant at 5% level of significance. Head of households who have attained at least secondary level are 27.292 times more likely to participate in agricultural output markets when compared to their counterparts with no secondary education and this result is consistent with the finding of Adeoti *et al.* [7], Geoffrey *et al.* [16], Mengstu *et al.* [17] and Ahmed *et al.* [18]. Thus farmers with more formal education are more market-oriented as they have the knowledge and skills to be to be able to engage in marketing effectively. Household size (HHSIZE) was also found to positively and significantly influence market participation and the result is significant at 1% level of significance. An additional family member increases the probability of the farmer's market participation by a factor of 6.703. This result is consistent with the finding of Mengstu *et al.* [17], Onoja *et al.* [11], Nuri *et al.* [19] and Kassa *et al.* [20] and one explanation could be that bigger families have more family labour to produce surpluses for the market.

There is a negative and significant relationship between market participation and the number of household members employed off-farm (MEMOFFY) and this result is significant at 5% level of significance. An additional family member employed off-farm reduces the probability of the household's market participation by a factor of 0.074. This result is in line with Ahmed *et al.* [18] and it maybe because off-farm employment offers better incomes that agriculture. Household members employed off-farm also don't have enough time to engage in family farm operations. The results also show a negative and significant relationship between market participation and the number of household members with at least secondary education (HMSEDUC). An additional family member with at least secondary education reduces the probability of the household's market participation by a factor of 0.124 and this result is significant at 1% level of significance. This finding maybe explained by the fact that better educated household members tend to seek off-farm employment which is more paying than farming. Off-farm employment also reduces the amount of family labour available for farming activities.

A negative and significant relationship exist between market participation and the dependency ratio (DRATIO) and the result is significant 5% level of significance. Each additional dependent in the household decreases the probability of household market participation by a factor of 0.102. Households with higher dependents consume more of their agricultural output reducing marketable surplus and the dependents do not also contribute to farming labour [14, 17, 21].

Farming experience (YRSFARM) negatively and significantly influences market participation. An additional year of farming experience reduces the probability of a household market participation by a factor of 0.907 and this result is significant at 5% level of significance. This result is not expected although it is supported by Oparinde and Daramola [4] and Siziba *et al.* [22].

Agricultural income (FARMGV) has a positive and significant relationship with market participation and the result is significant at 1% level of significance. A unit increase in agricultural income increases the probability of household market participation by a factor of 1.006. Households earning high agricultural incomes can afford to cultivate large farm sizes and purchase productivity enhancing inputs leading to high output and then large marketable surpluses [10, 12, 23]. Farm specialisation (FSPEC) positively influences household market participation and the result is significant at 5% level of significance. A unit increase in the level of specialisation increases the probability of market participation by a factor of 987.830. This implies that highly specialized households are more likely to produce high marketable surpluses than relatively diversified households as they concentrate their labour and management skills towards a few enterprises.

Access to irrigation (IRRIG) positively and significantly influences market participation and the result is significant 1% level of significance. The odds indicate that the probability of a household with access to irrigation participating in output markets is 79 922.841 higher than that of a household with no irrigation. This result is supported by Temesgen [23], Hagos *et al.* [24], Seyoum *et al.* [25] and Tufa *et al.* [26]. Water is a very critical agricultural input and access to irrigation facilities allows farmers to increase productivity, produce all year round, induce shifts in farmers cropping mix and also to produce high value horticultural crops for the market. There is also a positive and significant relationship between draft power (DRAFT) and market participation. The probability of a household market participation increases by a factor of 1056.594 for households with draft power when compared to households without and this result is significant at 1% level of significant. Draft power is a critical input in in both production and transportation of marketable surplus to markets [14, 18, 27-29].

Tenure (TENURE) positively influences market participation and the result is significant at 10% level of significance. The probability of market participation increases by a factor of 27.398 for farmers with communal tenure when compared to farmers with other forms of tenure. This result is not expected as communal tenure is perceived to be the most unsecure tenure and development practitioners often argue that it constrains farmers' access to credit, farm investments, technology adoption and sustainable agricultural development and productivity [30]. A possible explanation for this result is that the government and development actors have been organising communal farmers into marketing groups and as a result this has improved the capacity of communal farmers to engage markets.

The probability of market participation increases by a

factor of 126.855 for farmers who receive on-demand extension support (EXT_{DEM}) when compared to farmers who receive the routine general extension support and this result is significant at 5% level of significance. Extension is a very critical input in improving agricultural productivity and farmers who receive extension on demand are more likely to receive extension support more relevant to their farming needs when compared to farmers who rely on routine general extension support. This result is supported by Mengstu *et al.* [17], Kassa *et al.* [20] and Zamasiya *et al.* [31]. Farmers trained using the block training approach ($EXTB_{TRAIN}$) are more likely not to participate in output markets by a factor of 0.010 when compared to farmers trained using other farmer training approaches and this result is significant at 5% level of significance. A possible explanation for this result could be that it is difficult for farmers to master all production and marketing aspects if the training is offered in one session instead of offering it stage by stage throughout the production cycle as it allows farmers to immediately apply what they would have been trained on.

The probability of market participation increases by a factor of 118.467 for farmers who perceive to be receiving good to high quality extension support (EXT_{QUAL}) when compared to farmers who receive extension support that they perceive not to be of good quality and this result is significant at 1% level of significance. Farmers are more likely to follow extension advice if it addresses their farming needs. The results also show that the odds of a household participating in output markets is 0.0944 lower for a household receiving extension support from other farmers (EXT_{F2F}) when compared to a farmers receiving extension support from other sources and the result is significant at 5% level of significance.

Household wealth ($ASSET_{INDEXT}$) reduces the probability of market participation by a factor of 0.730 and the result is significant at 5% level of significance. This result shows that the probability of a farmer participating in output markets reduces as the wealth of the farmer increases. This maybe because the wealthy households have enough non-agricultural assets to sustain their livelihoods without necessarily depending on income from sale of agricultural marketable surplus.

Distance from the nearest growth point (rural business centre) ($DIST_{GP}$) positively and significantly influences market participation. An additional kilometre away from the growth point increases the probability of a household's market participation by a factor of 1.299. This result supports the finding of Randela *et al.* [14]. This implies that farmers facing relatively longer distance to the nearest rural business centre are likely to be commercial farmers. Rural business centres offer opportunities for off-farm employment and incomes for those farmers who stay closer to these centres. As you increase distance from these centres, it becomes expensive for farmers to either rent accommodation or commute from their farms to work and as a result, they tend to concentrate on agriculture for livelihood.

4. Conclusion

This paper analysed the factors that influence participation in output markets by smallholder farmers in Masvingo and Manicaland provinces of Zimbabwe. The study found that the level of market participation was very low with an average of 19% of the sample households participating in output markets.

The variables that significantly and positively influence market participation by smallholder farmers are the age of the head of household, the size of the household, the level of education of the head of household, the household agricultural income, the degree of farm specialization, access to irrigation, access to draft power, on demand extension service, quality of extension support, distance of the farm from the nearest rural business centre and tenure. On the other hand, the variables that negatively and significantly influence market participation are gender of the head of household, the level of education of household members, farming experience, the block training approach, the level of dependency, the farmer to farmer extension approach and household members with off-farm employment.

In order to enhance smallholder farmers' participation in output markets, policy intervention efforts must primarily focus on expanding access to irrigation and draft power as these critical inputs have been found to have the greatest effect on market participation. Further there is need for the extension service to provide high quality targeted extension support which is tailor made to meet the requirements of the different stages of the production and marketing cycles of the various enterprises.

Acknowledgements

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