

# Contribution of Farmers' Organisations on Smallholder Farmers Market Access: A Case of MVIWATA in Morogoro District, Tanzania

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## Abstract

Farmers' organisations have been suggested as a tool to improve living conditions for farmers in poor countries by improving their market situation, productivity and access to information. This study examined the contribution of farmers' organisations on smallholder farmers market access in Morogoro district. The study used cross-sectional design whereby systematic random sampling technique was used to draw a sample of 204 farming households (102 MVIWATA members and 102 non MVIWATA members). Data were collected through interview, focus group discussion and observation and were analysed for descriptive statistics, Chi-square and probit model. The findings show that majority of farmers (79.4%) who were members of MVIWATA shifted from poor to average perception on market access while 18.6% shifted to good perception after joining MVIWATA. Probit model results showed that, Membership in MVIWATA increases farmer's market access, the model further indicated that, membership in MVIWATA increased significantly (coef = 0.47499,  $p < 0.01$ ) the probability of market access by 47.4%. Market access was also correlated with the initial condition related to household and farm characteristics ( $p < 0.05$ ). Access to credit was not found to influence significantly access to market ( $p > 0.05$ ). The study recommended that the government and other stakeholders should put more effort into supporting MVIWATA and mobilising more farmers to join farmers' organisations. Emphasis should also be made on marketing issues through policy intervention, as it appeared to be one of the main barriers to expanding market access.

## Keywords

Farmers' Organisations, Rural Farming, Market Accessibility, Tanzania

## 1. Introduction

Agricultural producer cooperatives and farmers organisations are of great significance to the development of agricultural productivity and can provide improved economic welfare benefits to farmers (Ma et al., 2023). Farmers' organisations have been suggested as a tool to improve living conditions for farmers in poor countries by improving their market situation, their productivity, and their access to information (Bachke, 2019). The importance of improving smallholder agricultural development has received more attention recently by development agencies and academics alike and therefore, there is consensus that improving market access for smallholders will lead to increased income and food security leading to poverty alleviation (Gyau et al., 2014). In recognition of this development practitioners have shifted their focus from supply based programs to demand driven one where farmers can produce for market and not try to market what they produce (Dethier & Effenberger, 2012). Despite this realignment, Minot and Vargas Hill (2007) argue that farmers in developing countries still face numerous market constraints, including those that raise market cost and those that increase risks associated with commercialisation.

Market interventions, such as collectives marketing through farmers organisations are often proposed as key strategy to deal with market failures (Amos et al., 2013). Farmers' organisations have been identified as a key factor in enhancing farmer's access to markets (Shiferaw & Muricho, 2011). In response, policy makers and development practitioners have focused on supporting small scale producers or farmers to associate, collaborate and coordinate in order to achieve economies of scale in their transaction with input suppliers and output buyers. The National Networks of Farmers' Groups in Tanzania literally *Mtandao wa Vikundi vya Wakulima Tanzania (MVIWATA)* is one of the organizations operating all over the country, founded in 1993 with aspirations to empower smallholder farmers through strengthening their groups and networks, facilitating communication and learning, capacity building events and, lobbying and advocacy so that they are capable defend their interests including markets of their produce (MVIWATA, 2011). With its existence for more than 30 years, MVIWATA has implemented various initiatives in rural areas including the construction of rural markets that were constructed through MVIWATA rural market development projects to promote smallholder farmers, but still, marketing of the smallholder farmers commodities is still a paradox (MVIWATA, 2011; Levard, 2014).

Theoretically, an endeavor of the group for fulfilling the group's purposes can be well explained by the concept of collective action. Mukundi et al. (2013) explain that collective action refers to action taken by a group either directly or indirectly in pursuit of members' perceived shared interest, and arises when people collaborate on joint action and decisions to accomplish an outcome that involves their common interest. Holahan and Rubell (2022) argue on the modern theory of collective action, that, it was developed as a means to overcome free-rider problems and design cooperative solutions for the management of common resources. In

recent years, the notion of collective action has been applied to group activities that directly or indirectly enhance the production and marketing of agricultural and food products and reflects a global trend caused by the increased market competition and integration, and marginalisation of minorities into modern markets (Hellin, 2012). In the marketing literature, collective action has been conceptualised to comprise of group training in production methods, negotiation skills, grading and sorting, and group dynamics which subsequently enhance bulk marketing of products by members of cooperatives or communities in order to reduce transaction costs and enhance economies of scale (Amos et al., 2013). Thus, collective action is operationalized as an action by members of a group or cooperative who come together to share market knowledge, sell together and develop business opportunities (Mukundi et al., 2013). The key marketing challenge in perfectly competitive markets where price taking producers and consumers are assumed to trade goods at publicly known prices, the allocations of goods in the economy is efficient (Gyau et al., 2014). The theory of collective marketing contradicts the reality of the African agricultural context which is characterized by information asymmetries amongst various actors. First, smallholder farmers, who are mostly in rural areas, often do not have access to information regarding prices in urban areas; they mostly sell at farm gate prices to local traders who on their part have access to price and market information prevailing in other markets. Second, most production systems in Africa are done on a small scale and, hence, farmers acting individually are not able to participate in new markets such as supermarkets where larger quantities and standardisation of products are often required. Some authors suggest that because individual farmers offer small quantities of produce for sale, they have little bargaining power with traders and most often accept almost any price offered. In contrast, large scale farmers produce in large quantities with consistent quality and, hence, are able to attract buyers willing to buy their products at true market prices (Gyau et al., 2014).

The status of market performance and participation among farmers is theoretically evidenced by the transaction cost economics model. According to Tadelis and Williamson (2012), the transaction cost economics model stipulates that information asymmetry is the main reason why markets perform poorly and why transaction costs are so high, in many cases, farmers have been introduced to commercial farming without much consideration given to the marketing of the products aside from the gain in productivity. Consequently, many producers are disconnected from the market and that can be attributed to problems such as high transaction costs, limited and asymmetric information, lack of coordination and lack of market power which continue to characterize smallholder agricultural production systems in Africa, market intervention strategies can assist smallholders to be more competitive, especially where the costs of accessing markets are high due to poor infrastructure, inadequate technology and information barriers. Sebatta et al. (2014) and Courtois and Subervie (2015) reported further that, smallholder farmers incur these costs when searching for trading partners; bargain,

monitoring, enforcement of contracts and transferring their produce to market. All these cost are said to be impediments to smallholder market participation for the poor resource farmers in the rural areas.

There are empirical evidences on the advantages of farmers' organisations to the agriculture and livelihood of the farmers. According to [Ferris et al. \(2014\)](#), there is growing interest in how farmers can benefit from emerging market opportunities. Farmer organisations are often seen as key factors in enhancing farmers' access to markets ([Hellin et al., 2009](#)). Farmer organisations can provide farmers with many services that are critical to their success in accessing markets, ([Hellin & Higman, 2003](#); [Wennink et al., 2007](#)). There are many ways in which farmers and their organisations can improve their access to research and advisory services. Farmers organise themselves with specific objectives in mind including lobbying for policy change, access to markets and access to finance. Smallholder access to markets for higher-value agricultural products is recognised as a vital opportunity to enhance and diversify the livelihoods of lower-income farm households and reduce rural poverty more generally ([World Bank, 2008](#)). The development of the Farmers' Organisations (FOs) enables the pooling out of the different resources such as credit, information, labor force, transportation means for selling the products or buying inputs and thus leads into economies of scale ([Bizikova et al., 2020](#)). These organisations can assume several functions in the commodity chain, such as collection, grading, post-harvest and storage ([Perret & Mercoiret, 2003](#)). Overall, farmer groups and organisations are important avenues through which farmers can access market and credit information as well as other important agricultural information like new agricultural technologies. In countries such as Tanzania and Ghana, farmer groups are at the centre of the poverty reduction strategy, extension delivery and crop marketing ([Salifu et al., 2010](#)). According to [Mwaura et al. \(2012\)](#), farmer groups are usually formed to facilitate access to better agricultural technologies, to improve access to better earning markets for produce, facilitate produce transport to markets, for financial security and household investments, access to credit where groups members acts as collateral for each other, to invest in agricultural value addition and in infrastructural development such as rural roads.

Considering the determinants of market participation among smallholder farmers, [Kyaw et al. \(2018\)](#) documented that market participation of farmers is both a factor and effect on economic development status among smallholder farmers, these aspects acts as major pathways for rural people in assuring better income and improving food security, it is therefore existence of markets and improved market access and framers participation are important for smallholder farmers since it can draw agricultural and economic development. Consequently, [El Mamoun et al. \(2013\)](#), on assessing the impact of the commodity development project found that improvements in smallholder market participation are influenced by project activities that focus on extension, training and demonstrations, and support to building up private agricultural productive assets. Market participation is

also correlated with initial conditions related to household and farm characteristics such as wealth, land size, asset ownership, and prevailing agro-ecological environment and membership in farmer's organisations. Further, access to credit was found to influence significantly access and participation to market. [Ismail \(2014\)](#) argued that the availability of the improved facilities, like buildings, parking area, weighing machine, warehouse and drying area attract smallholder farmers to participate in the market. Therefore, such findings indicate that market facilities significantly influence decision of smallholder farmers to participate in market services. Hence lack of market infrastructure and facilities added substantially to marketing costs of the traders ([Shilpi & Umali-Deininger, 2007](#)). Numerous interventions have been implemented to ensure strong farmers organisations and market participation and accessibility among smallholder farmers in the country including rehabilitation of warehouses; developing crop and livestock markets and developing marketing systems for cash products-receipt systems ([URT, 2017](#)). Therefore, this has initiated the need to carry out a thorough research to assess the contribution of agricultural development interventions of MVIWATA on market access.

## 2. Methodology

The study was carried in four randomly selected villages (*Tandai, Kifundike, Kalundwa and Tawa*) from two randomly selected wards in Morogoro district with two villages from each ward. The wards included were *Kinole and Tawa*. These wards are among the wards in the district with high number of farmers groups that are under MVIWATA ([MVIWATA, 2011](#)). Morogoro district is one of the districts in Tanzania whereby MVIWATA has implemented a number of projects in supporting the smallholder farmers including rural markets development project that aimed at improving smallholder farmers access to market of their produce. Under Rural Markets development project, MVIWATA has conducted a number of activities to improve farmers access to markets that includes: Facilitating farmers access to reliable markets through construction of market structures, access to market information through MAMIS and linkage of farmers, Construction and rehabilitation of rural infrastructures, including rural training centers, market structures, feeder roads and bridges to improve access to markets, provision of participatory training skills to network members through extension services and study tours, creating awareness to farmers who are in groups about the market conditions, capacity building to farmers under farmers groups on grades and standards of various crops in the market. It is the district which is most deprived, it has large number of small holder farmers as compared to other districts in the region that is about 82% of the rural population in the district. The District is located at North East of Morogoro Region between 6°00' and 8°00' Latitudes South of Equator also between Longitudes 36°00' and 37°35' East of Greenwich. The area is semi-arid, it rains from 600 mm in flat areas up to 300 mm in the mountainous areas. The dominant ethnic group is *Luguru* majority involved crop

production.

This study adopted a cross-sectional survey in the area as the researchers managed to collect data from the respondents at a single point in time. A sample of 102 were selected among smallholder farmers who were members of MVIWATA to be involved in the study. Sample size for the MVIWATA farmers (members/participants) was calculated as follows;

$$N_0 = (t^2 \times p \times q) / d^2 = (1.96^2 \times 0.075 \times 0.925) / 0.05^2 = 102.$$

Whereby:

$t = 1.96$  (By assuming 95% confidence interval);  $p$  = Proportion of households engaged in MVIWATA activities = 7.5% (based on districts records);  $q = 1 - p = 0.925$ ; and  $d$  = acceptable margin of error for the proportion being estimated = 5%

Furthermore, equal number of the non-MVIWATA members was taken for comparison purpose in some variables like market access hence the total number of household involved in this study was  $102 \times 2 = 204$ . Number of households as well as corresponding number of MVIWATA members and non-MVIWATA was chosen proportionate to the total number of household in the area. Systematic random sampling technique was employed in selecting respondents in each stratum, whereby the whole number of MVIWATA and non-members were known, the first respondent from each stratum was chosen randomly, then a specific interval was used to pick a sample from population list in each stratum to obtain 102 respondents.

In this study, data were collected through interview, focus group discussion and observation whereby, for interview, structured questionnaires were used and administered by data collectors whereas, checklists were used in focus group discussion and observation methods. Data collected from respondents included socio-demographic characteristics; information related to market access, years involved in MVIWATA groups, farming experience; household income from various sources; output sold per season; farmers' participation in the market: information related to market infrastructures; price and sales volume of different produce.

Market participation was used to measure smallholder farmer's market access. Whether farmers they were selling their produce at the market or at their farming areas was used to assess whether were participating in the market or not. Therefore, probit model was employed to determine factors that influenced farmers' participation in the market. Farmers perception on market access in general and their perception on market access after joining MVIWATA (i.e., whether 1 = good, 2 = average 3 = poor).

Data were analyzed through both descriptive and inferential statistics. Descriptive statistics analysed the frequencies, percentages and cross tabulations. Whereby STATA 13 computer software was used for this purpose. The software was further used for inferential statistical analysis through probit model to determine the contribution of MVIWATA on smallholder farmers market access by comparing the two groups (i.e. members of farmer groups under MVIWATA members' vs Non-

members) on various issues related to their access to markets (decision to participate into the markets constructed under MVIWATA projects) while Chi-square test was used for categorical variables. Therefore,  $p$ -value was used for decisions; it is a probability of observing the obtained value.

### Model Specification

Smallholders are assumed to make decisions based on the principle of utility maximization. Assume that market is indexed by  $m$ , where  $m$  is equal to one and refers to participation in markets, and zero for non-participation, or improved participation, in markets. Also, assume that a linear relationship exists between the utility derived from market participation, or non-participation, and a vector of observed farm/household-specific characteristics  $X_i$  such as land size, soil type, family size, level of education, etc., and a zero mean random disturbance term  $e_i$ :

$$U_{M_i} = X_i \gamma_m + e_{mi}, m = 1, 0; \text{ and } i = 1, \dots, n. \quad (1)$$

Under the above specification, smallholders are assumed to choose to participate in the markets if the utility derived is strictly higher than the utility of not participating in markets. In other words, farmers will participate in markets if  $U_{2i} > U_{1i}$ . If the decision is indexed by a qualitative variable such as  $M_i$ , the farmer's decision can be written as a binary outcome of the form:

$$M_i = 1 \text{ if } U_{2i} > U_{1i} \text{ and } M_i = 0 \text{ if } U_{2i} < U_{1i}$$

Therefore, the probability that the smallholders will participate in markets can be expressed as a function of farm, infrastructure and household-specific characteristics:

$$\begin{aligned} P_i &= Pr(M_i = 1) = Pr(U_{1i} < U_{2i}) \\ &= Pr(X_i \gamma_1 + e_{1i} < X_i \gamma_2 + e_{2i}) \\ &= Pr[e_{1i} - e_{2i} < X_i (\gamma_2 - \gamma_1)] \\ &= Pr(\varepsilon_i < X_i \alpha) = F(X_i \alpha) \end{aligned} \quad (2)$$

where  $Pr(\varepsilon_i < X_i \alpha)$  is a probability function,  $\varepsilon_i = e_{1i} - e_{2i}$ , a random disturbance term,  $\alpha = \gamma_2 - \gamma_1$  is a vector of coefficients, and  $F(X_i \alpha)$  is a cumulative distribution function for  $\varepsilon_i$  measured at point  $X_i \alpha$  (Lange & Ryan, 1989). Equation (2) stipulates that the probability that a smallholder will access a market is equal to the probability that the utility of non-participation is less than the utility of participation or the cumulative distribution function measured at  $X_i \alpha$ . The marginal effect of an independent variable on the probability of participating in markets can be expressed as:

$$\partial P_i / \partial X_{ij} = f(X_i \alpha) \cdot \alpha_j$$

where  $f(X_i \alpha)$  is the marginal probability density function at  $\alpha_j$ . The sign of the marginal effect will depend on the sign of  $\alpha_j$ , which in turn depends on  $\gamma_2 - \gamma_1$ . Therefore,  $\alpha_j$  will be positive if  $\gamma_2 > \gamma_1$ .

Assuming the transformation function  $F$  follows a probit function, therefore in order to assess the impact of membership or participation in MVIWATA activities,

the probit model was employed to determine the factors that affect smallholder farmers market access and those factors were the market participation indicators, therefore membership/participation in groups that are under MVIWATA was included as a dummy variable (1 = Member, 0 = non-member) among the dependent variables. Smallholder market participation is a proxy for market access (whether smallholder farmers were selling their produce at the market constructed under MVIWATA projects or otherwise), therefore the dependent variable is dichotomous/ limited dependent variable then probit regression analysis was applied to examine the impact of membership in MVIWATA on market access/participation. The probit model for farmers decision to participate or not to participate in the market or not is specified as

$$Y^* = \alpha + \beta X_i + \phi Z_i + \delta MM_i + \varepsilon_i$$

$$Y = 1 \text{ if } Y^* > 0. \text{ And } Y = 0 \text{ if } Y^* < 0$$

where:

$Y^*$  = is a dependent variable that has a value of 1 if a smallholder farmer participates in the market constructed by MVIWATA and 0 otherwise.

$X_i$  = is a vector for Farm and household characteristics (*farm size, household size, age, education, farming experience, social capital and wealth*).

$Z_i$  = is the vector for market and infrastructure development (*road infrastructure, market infrastructure, ownership of transport, distance to the market, transaction cost, grades and standards, contracts, and*

$MM$  = dummy variable for membership in farmers groups under MVIWATA (1 = Member, 0 = Non member).

And  $\alpha$ ,  $\beta$ ,  $\phi$  and  $\delta$  are predictors coefficients to be estimated.

$e$  = error term. The dependent variable is the natural log of the probability of participation in the market divided by the probability of no participation (1-P).

### 3. Results and Discussion

#### 3.1. Characteristics of Respondents

Socio-demographic characteristics of respondents are presented in **Table 1**. Distribution of respondents among age groups, sex and marital status varied significantly across groups (i.e. MVIWATA members vs Non-MVIWATA members) ( $p < 0.05$ ), and hence significance association between these variables and participation/membership in MVIWATA. In this regard, although majority of respondents in both groups aged at least 40 years, they were males, primary school educated and majority were married; however, proportion of respondents in these groups were somewhat higher for MVIWATA members compared to non-MVIWATA members. The implication of this is that membership in MVIWATA in the area was a predominantly male decision, and further it implies that MVIWATA members were relatively a younger and majority settled with family responsibilities (i.e. married); therefore, need to be to join various social networks (i.e. farming groups), so as to get services provided by those networks in order to increase their productivity, access the market for produce that will increase their income to

support families. Similar observations were noted by Daniel & Elifadhili (2013). Likewise, distribution of respondents in the two groups across various categories of household size considered in this study was not varied considerably. Proportion of respondents with large families for MVIWATA members (21.6%) was slightly higher than that for non-MVIWATA members (20.6%), the distribution of varied insignificantly, this implies that the likelihood of having large families or small families was almost the same in the area for both farmers (MVIWATA members vs non-MVIWATA members).

**Table 1.** Socio-demographic characteristics of respondents (n = 204).

Variable	Group						Chi <sup>2</sup> value
	Member (n = 102)		Non-member (n = 102)		Total (n = 204)		
	Freq.	Percent	Freq.	Percent	Freq.	Percent	
<b>Age</b>							
18 - 28 years	1	1.0	7	6.9	8	3.9	14.13*
29 - 39 years	23	22.5	36	35.3	59	28.9	
40 - 50 years	45	44.1	44	43.1	89	43.6	
51 and above	33	32.4	15	14.7	48	23.5	
<b>Sex</b>							
Male	53	51.9	52	50.9	105	51.5	0.0196ns
Female	49	48.1	50	49.1	99	48.5	
<b>Marital status</b>							
Married	97	95.1	82	80.4	179	87.7	15.65*
Single	4	3.9	3	2.9	7	3.5	
Others	1	1	17	16.7	18	8.8	
<b>Education</b>							
No formal education	2	2.0	32	31.4	34	16.7	33.26*
Primary school	95	93.1	69	67.6	164	83.4	
Secondary school	5	4.9	1	1.0	6	49.2	
<b>Household size</b>							
Less than 6	80	78.4	81	79.4	161	78.9	0.0296ns
6 and above	22	21.6	21	20.6	43	21.1	

ns = not significant, \* = Significant at  $p < 0.05$ .

Contradicting observations were revealed by the study conducted by Adong et al. (2013). Results from Table 1 show that majority (98.0%) of MVIWATA members had primary education and above compared to only (68.6%) of non-members of MVIWATA. Results from Table 1 indicate a significant difference in distribution

among respondents in the two groups on various categories of education level ( $p < 0.05$ ), implying there is association between these variables and membership in MVIWATA in the study area. In both groups highest education level attained by most of respondent was primary education with proportion of respondents with primary education for MVIWATA members (93.1%) and few for non MVIWATA members (67.6%).

### 3.2. Impact of MVIWATA on Market Access Perception between MVIWATA Members and Non-Members

The findings as illustrated in **Table 2** show that, market access perception among members and non members of MVIWATA is quite different whereby MVIWATA members perception on market access is relatively good as compared to non members. Results show that majority of members of MVIWATA (98.0%) perceive market access as average to good compared to only (40.6%) of non-members who perceived the same. Also results further indicate that majority (59.4%) of non members perceive poor market access as compared to very few (2.0%) members who perceived market access to be poor. The results are significant at  $p < 0.05$  with a Chi-square value of 81.84.

**Table 2.** Farmers perception on market access by membership in MVIWATA.

Variable	Group						Chi <sup>2</sup> value
	Member (n = 102)		Non-member (n = 102)		Total (n = 204)		
	Freq.	Percent	Freq.	Percent	Freq.	Percent	
<b>Farmers perception on market access</b>							
Poor	2	2.0	61	59.4	63	30.5	81.84*
Average	81	79.4	38	37.6	119	58.6	
Good	19	18.6	3	3.0	22	10.8	

\* = Significant at  $p < 0.05$ . Note: The percentage are based on percentage within membership in MVIWATA.

Therefore, the findings of this study revealed that market access for members is relatively good compared to non-members of MVIWATA. The implication drawn is that, the good perception of MVIWATA members might be attributed by the activities done by MVIWATA as an organisation to simplify market accessibility through information provision. The results coincide with Piabuo et al. (2020) and Nikam et al. (2022) who found that market information access is easy to reach the farmers though farmers' organisations are trusted and helps farmers access to reliable markets with high price of the produce. Additionally, information obtained during focus group discussion revealed that, market access in general is still very low due to poor road infrastructure. Road infrastructure condition hinders timely arrival and transportation of the produce to the market place, high price variation as compared to other markets outside the region, relatively low average price high transportation and transaction cost, lack of expertise on grades and

standards, low guaranteed market for the produce and poor access to up to date market information as majority were not aware of the market grades and standards of the produce.

Further results on FGD indicated that, this perception of MVIWATA members on improved market access has been attributed due to the construction of local produce market through the rural market development projects that was financed by the French government between 2002 and 2004, through the constructed markets, MVIWATA members are provided with market information for the inputs and their produce. The information system was simplified with the establishment of a market information system (MAMIS SMS Trading) enabling farmers and traders to access information on prices and available crops via a short messaging service (SMS). In which all these has attributed into an increase in the quantity of output sold and increase in the price of output as a result of increased competition among traders and use of standard weighing scales. Before the markets were constructed the trading system was based on unstandardised units such as bags and tins. The markets have increased transparency in price determination. Statistics available at Tawa and Tandai market indicates that since 2010, the number of trucks arriving at the market to fetch for various crops has increased from 20 to over 200 per year.

### **3.3. Impact of Membership in Farmers Groups under MVIWATA on Market Access/Market Participation**

In order to assess empirically how membership in MVIWATA influenced market access/participation probit regression analysis was applied to the entire set of survey data. Household and farm characteristics contributing significantly to the model were added on the basis of the resulting goodness of fit measured by the log likelihood Chi-square 190.31 with a  $p$ -value less than 0.05. These variables were added to control the confounding effect of these variables on market access. Results from **Table 3** show that Marginal effects of variables included in the probit model are non-zero values, which implies that there is interaction between dependent variable (market access) and independent variables.

Results from **Table 3** show that Marginal effects of variables included in the probit model are non-zero values, which implies that there is interaction between dependent variable (market access) and independent variables. The marginal effects measure the change in the probability of dependent variable (market access) being 1 due to one unit change in an independent variable, therefore the marginal effects being non-zero indicates that the change in the independent variables are associated with changes in the probability of the outcome variable (Market Access). The non-zero marginal effects of the independent variables mean that each independent variable has a statistically significant impact on the probability of accessing the market. Therefore, this suggests that the relationship between the independent variables and market access is meaningful and statistically significant.

**Table 3.** Probit model estimates for market participation (Coefficient are based on marginal probability effects).

Variable	Marginal effects	Std. err	$p >  z $
Age of head of household	-0.00145	0.03989	0.024*
Sex of head of household (1 = male, 0 = female)	0.00766	0.05099	0.092
Education level (1 = formal, 0 = no formal education)	-0.02278	0.05901	0.700
Membership in MVIWATA (1 = Yes, 0 = No)	0.47499	0.06003	0.000*
Marital status (1 = married, 0 = otherwise)	-0.05764	0.06514	0.182
Household size (number of persons)	0.08484	0.04208	0.044*
Farming experience (years)	-0.00963	0.01903	0.613
Household income (Tsh)	0.02634	0.04235	0.086**
Distance from home to the road (km)	-0.09096	0.05534	0.100
Distance from home to the local input shop (km)	-0.56174	34.2812	0.987
Distance from home to extension service (km)	0.64824	34.2812	0.985
Distance from home to the local market (km)	-0.20558	0.04281	0.000*
Availability of transport (1 = Yes, 0 = No)	-0.03482	0.08431	0.680
Road condition (1 = good, 0 = poor)	-0.01138	0.09843	0.083*
Transportation cost (tsh)	-0.07381	0.04539	0.104
Awareness on grades and standards	0.00636	0.05797	0.913
Presence of contract for produce (1 = yes, 0 = No)	0.06089	0.08273	0.462
Transaction cost at the local market (Tshs)	-0.14750	0.05171	0.004*
Farm size ( acres)	-0.03790	0.04372	0.043*
Tenure type (1 = own land, 0 = otherwise)	0.01060	0.08867	0.905
Location ward (1 = Kinole, 0 = Tawa)	0.12307	0.05106	0.016*
Number of obs			204
LR Chi <sup>2</sup> (25)			206.68
Prob > Chi <sup>2</sup>			0.0000
Pseudo R <sup>2</sup>			0.6965

Note: \* and \*\* significant at  $p < 0.05$  and  $p < 0.1$  respectively.

Overall, membership in MVIWATA had a positive impact on market access/participation. A positive and significant relationship was found between market access and membership in MVIWATA as members has higher predicted probability of market access compared to non-members (coef = 0.47499,  $p = 0.000$ ). That is being member of MVIWATA increases the likelihood of market participation or market access by 47.4%. This result underlines, once more, the importance of extension services and training for dissemination of knowledge, technology such as new crop varieties, and farm practices which are easily obtained through farmers groups that are under MVIWATA. This impact might have been due to the fact that participation in MVIWATA or membership in MVIWATA is

associated with provision of extension services and training on various modern production techniques, market oriented production and other necessary market participation indicators like prices, production, processing and marketing skills, quality enhancement, reputation, business formalization, new product development, risk and financial management. Similar results were noted by [El Mamoun et al. \(2013\)](#) whereby their study found that farmer participation in the commodity development project has improved their access to both input and output market. [Ismail \(2014\)](#) documented that there is interaction between market participation and being member of farmers groups the other variables influenced market participation were presence of weighing machine, parking area, drying area, and warehouse at the market.

The other variables that revealed to influence farmer market access or participation include, Household income in which wealthy and better endowed smallholders are likely to benefit from MVIWATA project activities and further raise their level of market integration, male farmers had higher probability of participating in the market as compared to their female counterparts, Age of the household head suggesting MVIWATA interventions tend to benefit younger farmers, in terms of gains in market participation, than older ones. Farm size which show that the higher the farm size the lower the probability of participating in the market. According to information obtained through focus group discussion, this inverse relationship has been revealed due to the fact that gains in land productivity and market sales were not large enough to offset the costs associated with the increase in production. The further implication of the result is that efforts to expand farm size should be accompanied by similar efforts to raise land productivity. Similar results were displayed by ([Maziku, 2015](#)).

#### 4. Conclusion and Recommendations

Results from both descriptive analysis and Probit model showed that membership in MVIWATA increases farmer's market access. This implies that MVIWATA projects addressed some market access/participation capacity indicators that contributed to strengthening market linkages. Market access was also correlated with the initial condition related to household and farm characteristics such as wealth (income), land size, geographic location, soil fertility, market availability. Access to credit was not found to influence significantly access to market. Market linkage, accessibility and participation among farmers are beneficial to them as they help sell their produce at good prices, which in turn, improves the living conditions of their households. The study recommended that government and other agricultural development practitioners should put more effort into supporting MVIWATA and mobilising more farmers to join farmers' organisations. Policy interventions need to put the emphasis on marketing issues, which from the study data appeared to be one of the main barriers to expanding market access. For the poorest category of smallholders, priority should be given to activities that build up private productive assets and the preservation of natural capital, so that poorly

endowed smallholders are able to accumulate assets necessary to sustain a commercially oriented farming strategy for better market access. This can be achieved through the transfer of technology, better market linkages, and access to credit and financial services. Investments in institutional and physical infrastructures, such as roads, wholesale markets, financial services, and energy plants, are necessary requirements for greater market access. Improving the ability of smallholders to manage risks associated with production and market access.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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