Market Participation in Formal Agricultural Output Markets: A Case Study of Small-scale Tomato Producers in Limpopo Province, South Africa

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ABSTRACT This paper examined factors affecting small-scale tomato farmers to participate in agricultural output markets in Greater Letaba Municipality of Limpopo Province, South Africa. The paper used primary data collected from 60 purposively sampled small-scale farmers of which 30 were participants in agricultural output markets and the remaining 30 were non-participants. The Logistic regression model was used to analyse variables which were considered to have an effect on the likelihood of participation in agricultural output markets. The results of the paper revealed that the level of education, farming experience, and market infrastructure had a positive significant effect on the likelihood of participation in agricultural output markets. In contrast, age of the farmer and distance to agricultural output market had a negative significant effect. Based on the findings of the paper, it is recommended that government improve existing market infrastructures in order to increase participation in output markets. The results also present an opportunity for training of uneducated farmers and promotion of youth participation in agriculture.

INTRODUCTION

Agriculture in South Africa has been identified as a sector that could contribute towards reducing high poverty and unemployment rates (Thindisa 2014). Agricultural economy in South Africa is dual in nature with well developed commercial farmers, and less resourced and less developed small-scale and subsistence farmers (Sebopetji and Belete 2009; Thomaga-Chitja and Morojele 2014). Similarly, the agricultural industry in Limpopo Province is dualistic with a small number of commercial farming system and large smallholder farming system. This dualistic nature of agriculture in the Province is due to past policies introduced under the apartheid regime of the previous government. Despite this, agriculture remains the main source of employment and income for most small-scale farmers in the Province. Smallholder farmers in the Province produce a wide variety of agricultural produce. These include; fruits (banana, mangoes), cereals (maize and wheat), and vegetables (toma-

toes, onions and potatoes) (Oni et al. 2004). Meanwhile, Greater Letaba Municipality is renowned for tomato production and is considered as the largest producer of tomatoes in South Africa and the Southern African region. The largest share of commercial production of tomatoes in the Municipality is attributed to ZZ2 (MOPANI 2006). The Limpopo Department of Agriculture has in the past years, put in place several mechanisms to ensure smallholder farmers' participation in output markets, however, a number of these farmers still fails to secure the markets for their produce.

The ability of small-scale farmers to make contribution to economic growth continues to be locked. This is attributed to the fact that most small-scale farmers in South Africa sell their farm produce locally, with only a slight amount being exported. In general, small-scale farmers sell their produce exclusively in local markets and occasionally sell in international markets through market intermediaries. The main difficulties hindering small-scale agricultural growth are closely related to lack of marketing knowledge and opportunities. This calls for market oriented interventions (Carter and May 1999).

A number of challenges face small-scale farmers in market participation. For most African small-scale farmers, markets are difficult to access (Makhura 2001). Small-scale farmers and manufacturers in the Greater Letaba Local Mu-

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nicipality have limited access to the larger markets outside of the Municipal area. This forces them to sell their products to the local communities and further prevents them from expanding their businesses (GLLM 2011).

Kirsten and Van Zyl (1998) defined a small-scale farmer as a farmer whose scale of operation is too small to attract the provision of the services that he\she needs to be able to significantly increase his/her productivity. In this paper, small-scale farmer is defined as a farmer who is involved in small-scale farming usually involving households producing agricultural products on a relatively small plots of land (less than 5 ha) and is more labour intensive and results in small amounts of products being produced to the markets (Oettle et al. 1998).

Staal et al. (1997) stated that a relatively low product sold in the market is a reflection of limited market participation. For, Latt and Nieuwouldt (1988) market participation can simply be referred to as commercialisation. This paper defines market participation as the ability of the farmer to sell their produce to formal agricultural output markets.

There are typically two types of agricultural output markets for small-scale farmers in South Africa, namely formal market and informal market. The formal market comprises of Johannesburg fresh produce market and supermarket chains with Shoprite, Pick 'n Pay, Spar, and checkers being the four largest supermarket chains in South Africa. According to Baiphethi and Jacobs (2009) informal markets are common across the food value chains for majority of small-scale farmers to participate. In the informal market, relatives, friends, street vendors, hawkers, neighbours use small-scale farmers as their source of supply to meet their demand for fresh produce. However, the paper is concerned with participation by small-scale farmers in the formal market only.

On the other hand, Johannesburg Fresh Produce Market (JFPM) is the largest agricultural fresh produce market in Southern Africa. The market is an important formal market for small-scale farmers in Limpopo Province and the rest of the country. For example, the market conducts training programmes for extension officer to capacitate them to improve transmission market information (such as prices, packaging, quality, storage and delivery times, market agents, etc.) to farmers in their localities. In addition, the market often undertake open days for small-scale farmers and informal traders to visit the market facilities for them better understanding of the operations of the market and how they can use the market for their benefit (Baiphethi and Jacobs 2009).

In general, supermarkets focus on supplying niche products of relatively high value to targeted group of customers. In Limpopo Province, supermarkets chains often depend on small-scale farmers in their locality for supply of fresh produce demanded by their customers (Baiphethi and Jacobs 2009). Louw et al. (2007) reported that small-scale farmers supply up to 30 percent of their produce to Spar, one of the the largest supermarkets in Limpopo Province.

According to Dorward et al. (1998), Freeman and Silim (2001), IFAD (2003), Jayne et al. (2002), Kherallah and Kirsten (2002), Killick et al. (2000), the problem of the market participation is linked to farmers' inability to meet market standards, low volumes of produce, wide dispersion of producers, presence of middlemen and perceived low prices in the formal tomato market. On the other hand, Delgado (1998) indicated that formal market participation is a problem for small-scale farmers in rural areas because of a wide range of barriers and constraints. These barriers include lack of assets (for example, tenure and collateral), market information, appropriate training, limited access to services necessary for crop production and the high costs involved in production and marketing (Makhura 2001; Matungul 2002; Machethe 2004).

A study by Mthembu (2008) identified factors that cause small-scale farmers to have difficulties in acquiring the market. The results of the study revealed that lack of access to land for farming, limited access to productive land, lack of provision of and access to water, lack of access to markets illiteracy and related problems, minimal access to financial assistance, high transaction costs, poor infrastructure, such as roads, minimal access to co-operatives and marketing organizations hinders small-scale farmers to acquire markets for their produce. The study further revealed that small-scale farmers are located far away from the markets and have poor access to infrastructure.

There are numerous small-scale farmers in the study area who produce tomatoes but fail to participate in profitable markets for their produce. As such they are often forced to sell to the potential buyers at whatever price those buyers dictates due to several factors related to par-

ticipation in agricultural output markets. Recommendations derived from general small-scale farmers cannot provide a policy response to accommodate the special needs of tomato producers since they are a unique unit of analysis. It is on this basis that this paper strives to identify those factors that affect small-scale farmers who are producing tomatoes to participate in output markets. An identification of those factors could assist policy makers to formulate policies that would increase small-scale farmers' participation in formal agricultural output markets.

RESEARCH METHODOLOGY

Study Area

The study was conducted in the Greater Letaba Municipality of Limpopo Province in South Africa. In terms of its location, the Municipality is situated in the North-Eastern part of the Limpopo Province. The Municipality borders Greater Tzaneen to the South, Greater Giyani to the East, Molemole to the West, and Makhado to the North. Agricultural activities for both small-scale and commercial farming are numerous in the Municipality and contribute about 16 percent to the Agricultural sector of the District, but most contributions are attributed to commercial farming because the small-scale are more constrained and their contributions is very limited (Greater Letaba Local Municipality 2011).

Data Collection

The paper used primary data which were collected in 2012 through face to face interviews using structured questionnaires. It was not possible to collect data on all crops grown by small-scale farmers; hence it was necessary for the study to target its analysis to one of the commonly produced crops (that is, tomatoes) in the paper area. The study employed purposive sampling in its data collection strategy due to the fact that the study targeted only small-scale tomato farmers. A total sample size of 60 small-scale farmers were interviwed. Out of these total, 30 small-scale farmers were participants while the other 30 were non-participants of the agricultural output markets.

Data Analysis

The Logistic regression model was used to analyse variables which were considered to have an effect on the likelihood of participation in agricultural output markets. The model is suitable to determine the effect of multiple independent variables presented simultaneously to predict outcome one or other of the two dependent variable categories. The model is also suitable to use when the dependent variable is binary and thus, it was necessary to use in this paper. In this paper, logistic model is used to estimate the likelihood that farmers would participate in agricultural output market. In addition, logistic regression model is easier than discriminant analysis when there is a mixture of numerical and categorical independent variables, because it includes procedures for generating the necessary dummy variables automatically, requires fewer assumptions, and is more statistically robust.

The analysis in this paper focuses on the probability of small-scale farmers to participate in agricultural output market. The logistic regression model is based on the probability that Y equals to one, that is P=P1. The value of Y is assumed to depend on the value of explanatory variables, $X_1 \ldots \ldots X_k$. The logistic model representing the relationship between the dependent variable (Y) and explanatory variables (Xs) is given by:

General Model

$$\text{Log}[p/(1-p)] = \beta 0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_K X_K + U_i$$

Where: Pi = Market participation; 1-Pi = No market participation; β_0 = intercept; $\beta 1 \ldots \beta_K$ = Regression coefficients; $X_1 \ldots X_K$ = explanatory variables; U_i = Disturbance term

Model Specification

Market participation = $\beta 0 + \beta 1$Age + $\beta 2$ Gender + $\beta 3$education + $\beta 4$ marital status + $\beta 5$market information + $\beta 6$household size + $\beta 7$distance + $\beta 8$extension + $\beta 9$ market infrastructure + $\beta 10$farming experience + $\beta 11$marketing costs + $\beta 12$ farmer organisation + $\beta 13$credit access Ui .

A detailed description of independent variables and their units of measurements are explained in Table 1.

RESULTS

This section presents the empirical results from logistic regression analysis (Table 2). The

Table 1: Description of variables

Variable	Description	Unit of measurement
	Dependent variable	
Market participation	1, if a farmer sold tomatoes in agricultural output market in the last cropping season, 0 otherwise	Dummy
	Independent variables	
Age	Age of the farmer	Years
Gender	1, if a farmer is a male, 0 otherwise	Dummy
Marital status	1, if a farmer is married, 0 otherwise	Dummy
Level of education	1, if a farmer passed grade 12, 0 otherwise. n years	Dummy
Access to market information	1, if a farmer has access to market information,0 otherwise	Dummy
Credit access	1, if a farmer has access to credit,0 otherwise	Dummy
Household size	Farmer's household size	Number
Distance to output market	Distance of farm to output market	Hours
Access to extension services	1, if a farmer has access to extension services, 0 otherwise	Dummy
Farm size	Size of the farm	Ha
Market infrastructure	1, if a farmer states that infrastructure to output market is good, 0 otherwise	Dummy
Farming experience	Farming experience of the farmer	Years

Table 2: Binary Logistic regression results

Variable (s)	$\hat{A}$	S.E.	Wald	Exp(B)	Sig
Age	-2.528*	1.824	1.920	0.080	0.061
Gender	-1.440	1.676	0.738	0.237	0.821
Education	5.521*	3.107	3.158	2.250	0.076
Marital status	0.122	1.560	0.006	1.130	0.938
Market information	-1.702	1.967	0.748	0.182	0.387
Credit access	1.079	2.114	.260	2.941	.610
Household size	0.387	0.355	1.187	1.472	0.276
Distance to output market	-1.775*	0.969	3.357	5.897	0.067
Extension services	0.730	2.251	0.105	2.074	0.746
Farm size	-0.741	0.668	1.231	.477	0.267
Market infrastructure	1.524**	1.932	2.633	.218	0.040
Farming experience	0.431**	0.310	1.931	1.539	0.016
Model chi-square				17.791	
-2log likelihood				20.4	
Pseudo R square				69.9%	
percent cases correctly predicted				66.7%*	
Significant at 10%** Significant at 5%					

Source: Survey (2012)

section specifically focuses on discussing the factors affecting small-scale farmers to participate in formal agricultural output market. In this paper, it is assumed that to assess all the factors affecting the likelihood of participation in agricultural output market of the individual farmer would be impossible. Therefore, only the variables which were considered as the most important influencing factors in the study area were measured. The logistic regression analysis was used to explain the various factors that affect farmers to participate in output market.

A positive sign on the variable's coefficient implies that, a unit increase in the independent variable will lead to an increase in market participation and the negative significance implies that a unit increase in the independent variable may lead to a decline in market participation. The results also reveal that the model correctly predicted 66.7 percent of the sample correctly. The Pseudo R^2 has a value of 69.9 which implies that the 13 independent variables in the logistic model together account for 69.9 percent the explanation for why tomato farmers participate or not participate in the agricultural output market. Generally speaking, the higher the pseudo R-squared statistic, the better the model fits our data. In

this case, we would probably say that the model we have built "above average" fits the data. In other words, although the model accounts for a significant amount of the variation in whether or not small-scale farmers participate in agricultural output, there are also some of other variables not in our model which influence this decision.

The results of the paper indicated that the level of education, farming experience and market infrastructure had a positive significant effect on the likelihood of small-scale farmers' participation in agricultural output markets. This implies that for every one unit increase in farmer's education level farming experience and market infrastructure, the likelihood of farmers' participation in agricultural output market increases by 2.250, 1.539 and 0.218 times respectively, after controlling for the other factors in the model (Table 2). These results provide an opportunity for training of uneducated farmers, increasing their knowledge base and improving existing market infrastructure in order to increase participation in output markets.

On the other hand, the age of the farmer and distant to market had significant negative influence on the likelihood of participation in agricultural output markets. The implication for this is that chances of farmers participating in output markets would decrease with age of the farmer and longer distance to output markets. The logistic regression results are presented below.

DISCUSSION

Age of the Farmer

The age of the farmer was statistically significant at 10 percent and was found to have a negative effect on the likelihood of participation in output market. The negative sign of the coefficients implies that when the farmer's age increases, the likelihood of participation in output market decreases. As farmers grow older, the capacity to execute marketing activities decreases and as a result participation in output market declines. The results of the paper contradicts with Makhura (2001) who pointed out that older farmers have well established social network and are well informed about the marketing system and therefore would be more likely to participate in agricultural output market.

Level of Education

Level of education of the farmer was significant at 10 percent level and was found to have a positive effect on the likelihood of participation in output market. This implies that participation in output market increases with the level of education of the farmer. Small-scale farmers who are educated are able to read, write, interpret market information and therefore are in a better position to sell their produce in agricultural output markets than their uneducated counterparts. These results provide an opportunity for training of uneducated farmers in order to increase their knowledge base and thus increase participation in output markets.

Distance to Output Market

Distance to output market was significant at 10 percent level and was found to have a negative effect on the likelihood of participation in output markets. The implication for this is that participation in output markets will decrease with more distance travelled to output markets. Thus, the more distant the farmer is to the market, the less likely they are to participate in the output market. These results are in line with findings from a study by Zamasiya et al. (2014) on soybean in which distance negatively influenced market participation by small-scale farmers.

Market Infrastructure

Mthembu (2008) indicated that poor infrastructure such as roads hinder smallholder farmers to acquire markets for their produce. Market infrastructure variable was significant at 5 percent level and has a positive effect on the likelihood to participation in output market. This implies that participation in agricultural output market would increase with provision of good market infrastructure. Improved infrastructure is crucial for small-scale farmer development since it increases and unlocks variety of market opportunities to small-scale producers, and improves linkages between producers and final consumers (Peacock and Jowett 2006).

Farming Experience

Farming experience was significant at 5 percent level of significance and has a positive effect on the likelihood of participation in output markets. This implies that participation in agricultural output market would increase with the number of years the farmers have been involved

in farming. A farmer with more years in farming is assumed to have knowledge on prices, market location and standard requirements and would therefore make a better decision to sell their produce compared to those with fewer years in farming.

CONCLUSION

The results of the paper provide an opportunity for policy makers to formulate policies that would increase small-scale farmers' participation in formal agricultural output markets in rural areas. Although the study was based in Greater Letaba Local Municipality and targeted small-scale tomato producers, the context of the analysis could be used in the whole Province and could be appropriate for small-scale farmers with similar socio-economic characteristics.

Access to credit and extension services variables were found to be insignificant. These results are not as expected since it is believed that access to extension services and credit has the potential to increase participation in output markets by small-scale farmers. The reason for these findings could be that credit was used for non-farming purpose and that farmers were provided with information that is not relevant to marketing of their tomatoes.

RECOMMENDATIONS

Based on the findings of the paper, it is recommended that government improve existing market infrastructures. The results also present an opportunity for training of uneducated farmers and promotion of youth participation in agriculture. The fact that distance to output markets has a negative significance effect suggest that small-scale farmers should consider collective marketing as an approach to participate in formal agricultural output markets. This can be achieved through farmers working together to sell their tomatoes in a group while reducing the costs of transport to output markets.

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