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SOCIOLOGY | RESEARCH ARTICLE

Socio-economic factors influencing smallholder farmers' decision to participate in agro-processing industry in Gauteng province, South Africa

TM Khoza^{1*}, GM Senyolo², VM Mmbengwa¹ and P Soundy³

Abstract: Smallholder farmers in South Africa have not been linked successfully to sustainable agro-processing value chains. This study aimed to identify factors influencing smallholder farmers' decision to participate in the agro-processing industry, as well as the extent of their participation in the Gauteng Province. Data was collected through a structured questionnaire that was administered face-to-face to respondents in a randomly purposive selected sample of 102 smallholder farmers. A double-hurdle model was used to analyse factors influencing the decision to participate and the level of participation in agro-processing. The results show that very few (19%) smallholder farmers participate in the agro-processing industry of the Gauteng Province. The results also revealed that factors such as educational level, land tenure, agro-processing training and information have a positive influence on the decision to participate. Distance to market and off-farm income negatively influence the decision to participate. The level of participation is

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PUBLIC INTEREST STATEMENT

Smallholder farmers have been marginalised in the past, thus they might not possess the necessary skills to participate in the mainstream agro-processing value chain. As a result, their participation in the commercial agro-processing industry seems to be minimal and insignificant. This study revealed that the number of smallholder farmers participating in the agro-processing industry is insignificant—a situation that could have been caused by several challenges such as lack of access to agro-processing-related training and information, as well as distance to the agro-processing market. This study also identified socio-economic factors influencing smallholder participation and the extent of the farmers' participation in the agro-processing industry in the Gauteng Province. These factors would allow informed and better targeted policy responses and customised farm support initiatives. It is vital for policy interventions to prioritise smallholder participation in agro-processing in order to yield better results in terms of increased farm income generation and employment.

influenced by socio-economic factors such as age, household size, level of education, grain and livestock producers, farm size and access to training. The study recommends that smallholder agro-processing policy instruments be adjusted to facilitate effective participation in the agro-processing industry and participation in other high market value chains. There is a need to build up local agro-processing plants as a strategy of lowering the costs of transportation and storage when farmers take their farm produce to distant manufacturers or processors.

Subjects: Sustainable Development; Economics and Development; Economics; Business, Management and Accounting

Keywords: agro-processing industry; smallholder farmers; double-hurdle model; participation

1. Introduction

South African agriculture is highly dualistic, characterised by a small number of commercial agricultural operations that are managed mainly by successful commercial farmers and a large number of smallholder agricultural enterprises consisting mainly of black struggling farmers (DAFF [Department of Agriculture, Forestry and Fisheries], 2012). Smallholder farmers are confined to economic participation within the informal sector with a focus on primary agriculture, whereas commercial farmers are located within the formal economy with footprints along the agriculture and agro-processing value chain (Fan, Brzeska, & Halsema, 2013). Agro-processing is commonly known to contribute significantly to the alleviation of socio-economic challenges, improvement of income, employment, food availability and nutrition, and social and cultural wellbeing, which enhances the sustainability of smallholder farmers' livelihoods (Mhazo, Mvumi, Nyakudya, & Nazare, 2012). In a nutshell, the agro-processing industry plays a considerable role in the socio-economic development. Hence, it is among the sectors identified by the Industrial Policy Action Plan (IPAP), the New Growth Path and the National Development Plan (NDP). The involvement of smallholder farmers in agro-processing has the potential to contribute significantly to sustainable livelihoods (Thindisa, 2014; Wilkinson & Rocha, 2008). According to Sharma (2016), smallholder farming participation in the global value chains is perceived as of prime importance for their inclusion in the agricultural development in the developing countries.

Currently in South Africa, commercial agriculture is the main player in the agro-processing industry, whereas smallholder farmers play a limited role despite receiving support from the government (Mmbengwa et al., 2011). This limited role results from the fact that smallholder farmers have not been linked successfully to sustainable value chains. According to Mapiye et al. (2007), despite the developmental efforts initiated in most rural areas of South Africa, there has been little or no effort to add value to the existing primary agricultural products. It is a matter of concern that smallholder farmers have been marginalised and they seem to find it difficult to process their farm produce and also to participate in the commercial agro-processing value chain (Mmbengwa et al., 2012). This fact is an indication that there is a gap that requires an in-depth investigation and understanding, especially to respond to the following overarching question: "What are the factors influencing smallholder farmers' decision to participate or diversify into agro-processing in the Gauteng Province, and the extent of participation?" The results of this study have a probability of influencing the development of a theoretical framework for the smallholder farming participation in the agro-processing sector. The expectation is that the information from the investigation would be crucial for planning by the key actors within the agro-processing industry, including policymakers in promoting and enacting strategies or policies for the inclusion of smallholder farmers in the mainstream agro-processing value chain. This may put farmers in a position to contribute towards the alleviation of the socio-economic challenges of South Africa.

2. Factors influencing participation and the extent of participation

Efforts to identify factors influencing diversification in agriculture have been made by researchers all over the world including sub-Saharan Africa. Such studies identified the role of socio-demographic, economic and institutional factors as main determinants of choice to participate. Demographic factors often highlighted include gender, age, educational level, and size of the household; economic factors/farm characteristics include level of income, farm size, type of farming enterprise, experience in farming, and number of labourers; and institutional factors include land tenure, access to training, access to information, and distance to market. This section provides an overview of the socio-economic factors affecting participation in agro-processing, drawing from the limited available literature.

In their study, Kuwornu, Bashiru, and Dumayiri (2014), Simtowe's (2010) and Oluwatayo (2009) found that male smallholder farmers are less likely to participate in agro-processing activities than their female counterparts. Marchetta (2011) also reveals that agro-processing activities are believed to be done by women alone. Alwang, Jansen, Siegel, and Pichon (2005) indicate that better educated households are more likely to diversify into agro-processing. In addition, Sisay (2010) provides empirical evidence from rural Ethiopia that the determinants of participating is influenced by household size and level of education.

Past studies maintain that larger farm sizes are often associated with specialization in agriculture. Kuwornu et al. (2014) reveal that larger farm sizes are associated with smallholder farmers' diversification into agro-processing activities. Regarding experience in farming, Khatun and Roy (2012) report that experience on livelihood options and the desire to diversify increase with age. Warren (2002) reports that rural enterprise development requires the availability of labour to diversify. Income of households positively has an influence on diversification into agro-processing (Kuwornu et al., 2014).

Institutional factors play an important role but have been reported to have a mixed effect on diversification. Empirical studies measured this, using different indicators such as land tenure, access to training, access to information, and distance to market. Evidence of the effect of institutional factors on diversification has been demonstrated access to land (Ogeto, Cheruiyot, Mshenga, & Onyari, 2013; Tarawali et al., 2012), access to training and information (Asmah, 2011) and distance to market (Wanyama et al., 2010). Tarawali et al. (2012) report a negative effect between land ownership and participation. Asmah (2011) however, finds no significant relationship between access to information and diversification. Wanyama et al. (2010) provide a strong evidence of positive effect of distance to market on diversification while Eneyew (2012) reports a negative effect, thus bringing to the fore the inconsistency of evidence about the relationship between distance to market and diversification. It is clear from the foregoing discussion that different factors influence livelihood diversification in different study areas. These factors among other things include those related to household demography, economic and institutional factors. However, the effect of these variables differs in magnitude and direction at different locations with a different livelihood. Besides, the fact that none of these empirical studies is conducted in South Africa creates the need to undertake this study.

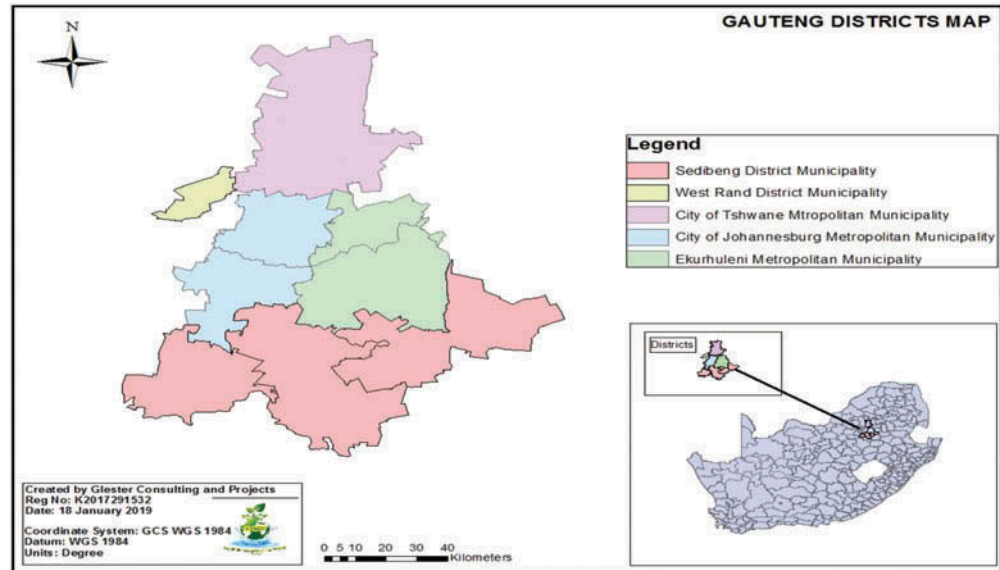
3. Materials and methods

3.1. Study design, study area and sampling

A cross-sectional quantitative study was conducted in the Gauteng Province of South Africa. The study was conducted in two district municipalities (West Rand and Sedibeng) and three metropolitan municipalities (City of Johannesburg, City of Tshwane and City of Ekurhuleni) of the Gauteng Province. A purposive sampling technique was used to sample smallholder farmers who are linked to the Gauteng Department of Agriculture and Rural Development (GDARD). Figure 1 below shows

Figure 1. Map for Gauteng Province showing the districts and metropolitan municipalities.

Source: Glester Consulting and Projects (2019)



the map of Gauteng Province with metropolitan municipalities (Glester Consulting and Projects, 2019).

3.2. Data collection

Data were collected in 2017 from a sample of 102 smallholder farmers across the Gauteng Province using a pre-tested structured questionnaire. The questionnaire included three categories of socio-economic information; demographic characteristics (gender, age, household size, level of education, and off-farm income), farm characteristics (type of farm enterprise, size, farming experience, number of workers and land tenure) and support services (distance to market, access to agro-processing training, and access to information). Farm visits were conducted for face-to-face interviews.

3.3. Analytical model used in the study

Descriptive statistics by way of means and standard deviation were used to summarise the data using Software for Statistics and Data Science (STATA 15). In addition, a double-hurdle model proposed by Cragg (1971) was used to analyse the socio-economic factors influencing smallholder farmers' decision to participate in the agro-processing industry, and the extent of such participation. The idea behind the hurdle formulations is that a binomial probability model governs the binary outcome of whether a count variate has a zero or a positive realisation (Mullahy, 1986). A study by Jones (1989) found that the logic of the double-hurdle model is that individuals must pass two separate hurdles before they are observed with a positive level of participation.

The first hurdle is to decide whether or not to participate and corresponds to a probit model. The model hypothesises that there is some probability of an incidence (participation in the agro-processing industry) at any given circumstance of socio-economic variables within smallholder farmers in the study area. In this study, the participation of smallholder farmers in the agro-processing industry means whether they process or send their produce to processors, or do not process or send their produce to processors. The dependent variable considered takes the form of a binary variable (i.e. either 1 or 0), where 1 denotes that a farmer participates in agro-processing and 0 denotes that a farmer does not participate.

The second hurdle is to decide on the extent/level of participation. In this study, the extent of participation was measured by the percentage of produce processed or sent to processors.

The second hurdle corresponds to the tobit model developed by James Tobin in 1958. This model assumes that the choice of participation and the level of participation are determined by the same variables, assuming that a variable that increases the probability of participation also increases the level of participation (Greene, 2008; Mathebula, 2015; Matshe & Young, 2004).

The model integrates the probit and the truncated normal model to simultaneously estimate the probability of participation and the level of participation. The model assumes the existence of two latent variables: y_{i1}^* associated with the individual's decision to participate in agro-processing, and y_{i2}^* associated with the level of participation in agro-processing.

If we observe the farmers participating in the agro-processing industry, there is an indication that it must have been decided on a positive level of participation, which is expressed as:

$$\begin{aligned} y_{i1}^* &= \mathbf{w}_i' \boldsymbol{\alpha} + \mathbf{v}_1 && \text{decision to participate} \\ y_{i2}^* &= \mathbf{X}_i' \boldsymbol{\beta} + \boldsymbol{\mu}_1 && \text{participation level} \\ y_i &= \mathbf{X}_i' \boldsymbol{\beta} + \boldsymbol{\mu}_1 && \text{if } y_{i1}^* > 0 \text{ and } y_{i2}^* > 0 \\ &= 0 && \text{Otherwise} \end{aligned}$$

where y_{i1}^* a latent variable describing the farmers' decision to participate in agro-processing, y_{i2}^* a latent variable describing farmers' participation level in agro-processing, \mathbf{w}_i' a vector of factors explaining the participation (Yes/No) decision, \mathbf{x}_i' a vector of variables explaining the participation level decision, and \mathbf{v}_1 and $\boldsymbol{\mu}_1$ are the respective error terms assumed to be independent and distributed as $\mathbf{v}_1 \sim N(0,1)$ and $\boldsymbol{\mu}_1 \sim N(0, \sigma^2)$. Table 1 shows the description of the variables used in both the participation decision model and the level of participation model.

4. Results and discussion

4.1. Characteristics of smallholder farmers in Gauteng province

The results revealed that participation in agro-processing by smallholder farmers in the Gauteng Province is minimal. Only 19% of the respondents participated in the agro-processing industry and the average processed produce was 59.37% of the total volume produced. Table 2 shows the descriptive statistics of continuous variables used in the study by participation. The results show that a typical smallholder farmer participating in agro-processing is younger than a non-participant, however, in average, they both consist of six people. The results show large land holdings for participants compared to non-participants implying that the intensive nature of agro-processing is such that participators have to operate large land, while the non-participants need to put less land under production with an average farming experience of over 19 years as compared to non-participants (17 years), employing an average of two permanent workers, travelling an average distance of 18 km as compared to non-participants (25 km).

Table 3 shows the descriptive statistics of categorical variables used in the study. Men play a dominant role in both participation and non-participation in agro-processing, as shown by percentages presented in Table 3, with a secondary education and received off-farm income. In terms of the main farming enterprises, 20% of the sampled respondents were producing cash crops, 10.9% were producing grains and 17.6% were rearing livestock. The findings also revealed that few farmers had access to agro-processing training facilitated by their local agricultural advisors who are the most common source of training to smallholder farmers, among other private institutions such as agricultural commodity organisations. Access to information was a major concern to the farmers, attributed by the low number (20.6%) of respondents who had access to information.

Table 1. Definition of variables included in the analysis of both models

Variable	Unit	Description	Expected Sign	
			Participation decision model	Participation level model
Dependent variables				
PARTCI	Binary	1 if a farmer participates in agro-processing, 0 otherwise		
LEVPART	%	Percentage of products processed or sent for processing		
Independent variables (Xi—Xn)				
GEND	Binary	1 if male, 0 otherwise	+	+
AGE	Years	Age of the farmer	-	-
AGE ²	Years	Age squared	-	-
HHLS	Number	Number of people in the household	+	-
EDUC	Binary	1 if the farmer has secondary education, 0 otherwise	+	+
OFFINC	Binary	1 if the farmer receives non-farm activities, 0 otherwise	+	
CRPF	Binary	1 if the farmer is producing crops, 0 otherwise	+	+
GRAF	Binary	1 if the farmer is producing grains, 0 otherwise	+	+
LIVF	Binary	1 if the farmer is producing livestock, 0 otherwise	+	+
FSIZ	Ha	Total area under production	+	+
FEXP	Years	Farmers' farming experience	+	+
LABO	Number	Total number of permanent workers	+	+
LANT	Binary	1 if the farmer owns the land, 0 otherwise	+	+
DISM	Km	Distance to the agro-processing market	-	-
TRAI	Binary	1 if agro-processing training received, 0 otherwise	+	+
INFO	Binary	1 if there is access to agro-processing information, 0 otherwise	+	+

4.2. Factors influencing smallholder farmers' decision to participate in the agro-processing industry and the extent of such participation

Table 4 shows the maximum likelihood estimates of the double-hurdle model in terms of the decision to participate in agro-processing and the extent of participation. The value of the log-likelihood (-104.340) and the LR Chi² (significant at the 1% level) indicate that the specifications of the two models provided a good fit to the data. The results show that five factors influenced the participation decision, while seven influenced the level of participation. Factors that only influenced the participation decision but not the level of participation were socio-economic factors (OFFINC), farming characteristics (FEXP and LANT) and support services (DISM and INFO). Moreover, factors that only influenced the extent of participation but not the participation decision were demographic factors (AGE, AGE², HHLS), farming characteristics (FSIZ, LABO and GRAF), and support service (TRAI). Factors that influenced both the participation decision and the extent of participation were EDUC and LIVF.

Table 2. Comparison of continuous variables between participants and non-participants in agro-processing

Variable	Participants (N=19)		Non-participants (N=83)		Total (N=102)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
AGE	48.89	17.486	53.14	13.397	52.35	14.247
AGE ²	2680.37	1733.357	3001.65	1450.349	2941.80	1503.018
HHLS	5.84	3.9195	5.86	2.741	5.85	2.973
FSIZ	73.32	266.752	23.49	89.905	32.77	140.085
FEXP	19.53	13.188	16.86	18.903	17.35	17.950
LABO	2.37	3.715	1.42	1.835	1.60	2.309
DISM	18.05	14.393	25.01	15.908	23.72	15.805

Source: Survey 2017

Table 3. Categorical variables description of participants and non-participants in agro-processing

Variable	Category	Participants (N=19)	Non-participants (N=83)	Total (N=102)
GEND	Male	73.68	56.63	59.80
	Female	26.32	43.37	40.20
EDUC	No education	5.26	10.84	9.80
	Primary	0.00	18.07	14.71
	Secondary	73.68	50.60	54.90
	Tertiary	21.05	19.28	19.61
	Other	0.00	1.20	0.98
OFFINC	Yes	78.95	90.36	88.24
	No	21.05	9.64	11.76
CRPF	Yes	26.32	19.28	20.59
	No	73.68	80.72	79.41
GRAF	Yes	15.79	9.64	10.78
	No	84.21	90.36	89.22
LIVF	Yes	36.84	13.25	17.65
	No	63.16	86.75	82.35
LANT	Lease	21.05	15.66	16.67
	Own	57.89	44.58	47.06
	PTO	10.53	27.71	24.51
	Other	10.53	12.05	11.76
TRAI	Yes	31.58	7.23	11.76
	No	68.42	92.77	88.24
INFO	Yes	36.84	16.87	20.59
	No	63.16	83.13	79.41

Source: Survey 2017

The results indicate that the relationship between the age of the farmer (AGE and AGE²) and the decision to participate is non-linear, meaning that with the increasing age of the household head, up to a certain age, he or she is more likely to increase the level of participation. However, after the farmer reaches a particular age, the level of participation is less likely to increase. Therefore, the younger age group could be the target group for competitiveness in the agro-processing industry

Table 4. Parameter estimates of the double-hurdle model for agro-processing participation in Gauteng Province, 2017

Variables	Participation				Level of participation			
	Coef.	Std. Err.	z	P>z	Coef.	Std. Err.	z	P>z
GEND	0.150	0.437	0.34	0.731	-3.465	8.751	-0.4	0.692
AGE	-0.028	0.021	-1.33	0.184	10.472***	3.506	2.99	0.003
AGE ²					-0.103***	0.033	-3.11	0.002
HHLS	-0.031	0.081	-0.39	0.697	5.774***	1.312	4.4	0.000
EDUC	1.353***	0.518	2.61	0.009	-42.979***	12.093	-3.55	0.000
OFFINC	-2.190**	0.710	-3.09	0.002				
CRPF	0.460	0.586	0.79	0.432	-17.285	13.183	-1.31	0.19
GRAF	0.250	0.663	0.38	0.706	65.425*	36.451	1.79	0.073
LIVF	1.334**	0.591	2.26	0.024	20.642*	10.982	1.88	0.06
FSIZ	0.000	0.002	-0.24	0.807	0.084**	0.034	2.48	0.013
FEXP	0.033*	0.017	1.91	0.056	-0.242	0.491	-0.49	0.622
LABO	0.066	0.091	0.73	0.468	2.622**	1.303	2.01	0.044
LANT	1.386**	0.547	2.54	0.011	-8.367	9.875	-0.85	0.397
DISM	-0.037**	0.017	-2.16	0.031	-1.347	0.903	-1.49	0.136
TRAI	0.982	0.598	1.64	0.1	39.859**	15.860	2.51	0.012
INFO	1.268**	0.581	2.18	0.029	14.104	14.474	0.97	0.33
_cons	-0.133	1.241	-0.11	0.915	-161.126	72.603	-2.22	0.026
sigma					12.819	2.114	6.06	0.000
Number of obs				102				
Wald chi ² (15)				18.46				
log likelihood				102-104.340				
Prob > chi ²				0.239				

***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Source: Survey 2017

as they could be able to acquire more business techniques. These findings concur with those of Alam, Hoque, Khalifa, Siraj, and Ghani (2009) who found that age has a negative relationship with participation, although Kuwornu et al. (2014) did not find any relationship between age and participation in agro-processing.

The household size variable (HHLS) was also found not to influence the decision to participate in agro-processing, yet it influenced the extent of participation. This finding implies that larger households are more likely to process or send more products for agro-processing as compared to smallholder farmers with fewer numbers of people in their household. These findings concur with those of Agrawal and Gupta (2005) who found that household size also has a strong statistically significant relationship with levels of participation—meaning that smallholder farmers with a high number of people in their household are most likely to increase their extent of participation and the adoption of value-addition approaches.

Empirical studies explain that the level of education represents household human capital endowment; an increase of which will strengthen the ability of engaging in other livelihood options (Eneyew, 2012; Asmah, 2011). The results reveal that the level of education influenced both the decision to participate in agro-processing (significantly positive) and that of the level of participation (significantly negative), which implies that smallholder farmers with secondary education are more likely to participate in agro-processing. However, they were less likely to increase the extent of participation in agro-processing. This implies that households with more years spent at school are more likely to diversify their livelihood from production to agro-processing.

Income of households was also observed to have a significant influence on participation/diversification. The results show that the effect of the off-farm income of households is negative and significant at 5% for agro-processing activities. These results are not consistent with Simtowe (2010), and Babatunde and Qaim (2009) who found that high-income earners can easily mobilize productive resources and are more diversified than low-income earners. However, Beyene (2008) argues that the majority of farmers receiving off-farm income uses the income for their consumption, while very few farmers use the off-farm income for investment in farms.

The grain producers (GRAF) variable did not influence the decision to participate in agro-processing; however, this variable did influence the extent of participation. This finding implies that smallholder farmers producing grains were more likely to increase the amount of produce processed or sent for processing. Furthermore, the variable livestock producers (LIVF) variable were associated with both the decision to participate and the extent of participation in agro-processing, meaning that smallholder farmers rearing livestock were more likely to participate and increase the level of participation in agro-processing. Montshwe (2006) found that producing cattle increases the probability of participation. Thus, households who produce grains and livestock will have to augment their incomes from alternative livelihood activities.

The area under production (FSIZ) variable did not influence the decision to participate in agro-processing but influenced the extent of participation. This finding implies that smallholder farmers with a larger production area are more likely to increase the extent of their participation in agro-processing. This result is somewhat inconsistent with Eneyew (2012) and Kuwornu et al. (2014) who found strong evidence of the negative effect of farm size on livelihood diversification. In this case, smallholder farmers with large farm sizes tend to move their objectives towards participation/diversification into agro-processing.

Regarding the farming experience (FEXP) variable, the results show that smallholder farmers with more farming experience were more likely to participate in agro-processing, but with no influence on the extent of participation in agro-processing. These findings concur with those of Okoye et al. (2009) and Tarawali et al. (2012) who found an experience that farming experience influences participation.

The total number of workers (LABO) employed permanently on the farm did not affect the participation decision but influenced the extent of participation. This finding implies that smallholder farmers with more permanent workers were more likely to increase the number of products to be processed or sent for processing.

The land tenure (LANT) variable had a significant influence on the decision to participate at 5% in agro-processing. The results indicate that smallholder farmers with title deeds are more likely to participate in agro-processing compared to their counterparts. This implies that land ownership increases the possibility of farmers investing in their farming land, which also increases the probability of participating in agro-processing. This may be probably due to expected returns from the agro-processing activities.

Distance to market (DISM) was associated with a decreasing probability of the decision to participate in agro-processing only. This finding implies that a 1 km increase in distance to agro-processing markets will decrease the probability of smallholder farmers participating in the agro-processing industry. This negative relationship implies that if the distance between the farm and the market area is greater, the farmers will be discouraged to diversify into agro-processing value addition in their primary production. The results concur with Eneyew (2012) who reports a negative effect between distance to market and participation.

Access to agro-processing-related training (TRAI) only influences the extent of participation. Khatun and Roy (2012) also found the evidence of the positive effect of training by extension agents on participation to other livelihood options. Finally, access to information (INFO) was found to have a significant positive influence on the decision to participate in agro-processing but not the extent of participation. This implies that smallholder farmers with access to information were more likely to participate in agro-processing. However, Kuwornu et al. (2014) found no relationship between group membership which is mostly a source of information and diversification to agro-processing.

Consequently, government policies and educational programs lack their much-needed impact in ensuring the participation of this important stakeholder in the agricultural industries of South Africa.

5. Conclusions and recommendations

This study used a double-hurdle model to determine socio-economic factors influencing the decision to participate in the agro-processing industry and the extent of such participation. The results revealed a very small proportion of smallholder farmers participating in the agro-processing industry in Gauteng province. The decision to participate is influenced by a number of factors. Evidence from the study suggest that households who are likely to participate in agro-processing are educated operating in livestock production, with farming experience. Furthermore, they are land owners situated closer to the market and having access to information. A number of socio-economic factors also influence the level of participation. The study also suggests that smallholder farmers who are likely to increase the level of agro-processing participation are grain farmers and livestock farmers with a large farm size and access to agro-processing training.

The study makes the following contributions to the theoretical and empirical literature, as well as to providing insight into smallholder farmers' participation in the agro-processing industry. First, though this study is focused on Gauteng province in South Africa, it has implications for developing countries as well, with the agenda of improving smallholder farmers' livelihood using agro-processing activities. Thus, the factors revealed in this study could be explored in formulating the planning strategies and implantation processes for development programs aimed at improving smallholder farmers' livelihood through participation in agro-processing activities. Second, this study provides an empirical contribution to the existing literature. To the best of our knowledge literature on factors influencing participation in agro-processing in South Africa are not explored.

Hence, by identifying factors significantly influencing smallholder farmers' choice to participate in agro-processing, this study provides an empirical contribution to the existing literature.

The study recommends that the proponents of agro-industrial development in Gauteng should intensify and implement educational campaigns and assist smallholder farmers to acquire training since they are the determinants of participation and the extend thereof in agro-processing. Second, grain and livestock smallholder farmers should be the main target for agro-industrial development programs in Gauteng as they have the potential to participate. This study also identified the need to encourage, create a conducive environment for, and build up local agro-processing plants as a strategy of lowering the costs of transportation and storage when farmers take their farm produce to distant manufacturers or processors.

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