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Factors affecting smallholder farmers' participation in agro-processing industry

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Abstract:

The aim of the study was to identify smallholder farmers participating in agro-processing and factors influencing their choice of participation. The study was conducted in Gauteng Province on a randomly purposive selected sample of 102 smallholder farmers. Data was collected through a structured questionnaire that was administered face-to-face to respondents. A probit regression model was used to determine factors influencing farmers' participation in agro-processing. The results show that only 19% of the sampled respondents are participating in the agro-processing industry of Gauteng Province. The results also revealed that factors such as educational level, land tenure, agro-processing training and information have a positive influence on agro-processing participation. Yet, distance to market and off-farm income negatively influence the decision to participate in agro-processing. However, there are challenges that need to be addressed in order for them to participate to their potential (i.e. lack of access to infrastructure, transport, poor knowledge on agro-processing norms and standards, poor finance and high cost of production). The study recommended for development of strategies that could realistically increase access of friendly investment capital to potential smallholder farmers to start their own small-scale agro-processing businesses, intensification of awareness of farmers on micro-financing institutions, and building local agro-processing plants.

Keywords: Agro-processing industry; Smallholder; Probit regression; Challenges



Factors affecting smallholder farmers' participation in agro-processing industry: A Probit regression analysis

Abstract

The aim of the study was to identify smallholder farmers participating in agro-processing and factors influencing their choice of participation. The study was conducted in Gauteng Province on a randomly purposive selected sample of 102 smallholder farmers. Data was collected through a structured questionnaire that was administered face-to-face to respondents. A probit regression model was used to determine factors influencing farmers' participation in agro-processing. The results show that only 19% of the sampled respondents are participating in the agro-processing industry of Gauteng Province. The results also revealed that factors such as educational level, land tenure, agro-processing training and information have a positive influence on agro-processing participation. Yet, distance to market and off-farm income negatively influence the decision to participate in agro-processing. However, there are challenges that need to be addressed in order for them to participate to their potential (i.e. lack of access to infrastructure, transport, poor knowledge on agro-processing norms and standards, poor finance and high cost of production). The study recommended for development of strategies that could realistically increase access of friendly investment capital to potential smallholder farmers to start their own small-scale agro-processing businesses, intensification of awareness of farmers on micro-financing institutions, and building local agro-processing plants.

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Introduction

Agro-processing coupled with primary agricultural activities are known to contribute significantly to the alleviation of the socio-economic challenges in developing countries. In South Africa, agro-processing industry is generally of strategic importance to the economy due to its high positive effect towards job creation and also its backward linkage with primary agriculture. Hence, it is among the sectors identified by the Industrial Policy Action Plan (IPAP), the New Growth Path and the National Development Plan. Agro-processing is commonly known to contribute significantly to the alleviation of the socio-economic challenges. Its activities can contribute to sustainable livelihoods through improved incomes, employment, food availability and nutrition, social and cultural well-being (Mhazo *et al*, 2012).

Currently, commercial agriculture is the main player in the agro-processing industry, whereas the smallholder farmers are playing a limited role despite receiving support from government (Mmbengwa *et al*, 2011). This is resulting 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 efforts to add value to the existing primary agricultural products. Commercialisation of agricultural and food systems are increasing worldwide and the agro-processing industry is one of the main sectors dominating to the increasing food industry (Vermeulen *et al*, 2008). However, the influence of the farmer, small traders and neighbourhood stores is declining. Yet, the farmers' participation is an important factor for sustainable agriculture (Botlhoko & Oladele, 2013).

Thindisa, (2014) records that participation by smallholder farming entrepreneurs in agro-processing activities is likely to contribute to increased profitability and sustainability of enterprises. Moreover, the exploitation of agro-processing business opportunities has the potential to enhance competitive advantage of farming enterprises. The potential for agro-processing industries in South Africa is enormous since agricultural economy is largely based on primary production of horticulture and livestock (Machethe, 2004). Musvoto *et al*. (2015) suggests that the agricultural sector is robust and if linked to markets, this would expand agro-processing opportunities. It is a matter of concern that smallholder farmers have been marginalised and they seems to find it difficult or possess a necessary requisites to process their own farm produce and also to participate in the commercial agro-processing value chain (Mmbengwa *et al*, 2012), i.e. to sell their produce to manufactures or processors who are the big role players in the value chain. This is an indication that there is a gap that requires an in-depth investigation and understanding, especially to respond to the following overarching questions 'What are the socio-economic factors influencing smallholder farmers to participate in agro-processing in Gauteng Province.

Methodology

Study area and data

The study was conducted in the three District Municipalities (Ekurhuleni, Sedibeng and West Rand) of Gauteng province, from a sample of 102 smallholder farmers under Gauteng Department of Agriculture and Rural Development (GDARD). A structured questionnaire was used. A purposive sampling technique was used.

Analytical technique

The appropriate model to analyse such types of decision problems is the qualitative response model, which is also known as the binary or discrete or dichotomous model. For this study the multivariable probit model is used. The main advantage of the probit model is that it is bounded between 0 and 1, hence the problem of predicted values being outside the probability range is overcome. Furthermore, it compels the disturbance term to be homoscedastic because the form of the probability function depends only on the distribution of the difference between the error terms associated with one particular choice and another (Domenich & McFadden, 1975 and Hill & Kau, 1973).

The probit model specified in this study to analyse smallholder farmers' decisions about whether or not to participate in agro-processing can be expressed as:

$$P_i = P_i (Y_i=1) = Q (X_i, e) \quad (i=1, 2, \dots, n)$$

The model assumed that the probability of i^{th} smallholder farmer participating in the agro-processing market $P_i (Y_i=1)$, is a function of explanatory or independent variables, X_i shown and the unknown parameter vector. The functional specification is as follows:

$$\text{Participation in the agro-processing market} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots \beta_i X_i + e_i.$$

Where $\beta_0 \dots \beta_k$ = coefficient of the explanatory variables (Independent) and e_i = the disturbance term

The independent variables featured on the probit model are described in Table 1.

Table 1: Description of variables used in the probit analysis

Variables name	Description	Expected sign
Dependent variable		
Participation	1 if the farmer participate, 0 otherwise	
Independent variables		
GEN	1 if the famer is male, 0 otherwise (dummy)	-
AGE	Age of the famer (years)	-
HHS	Total Household size (Number)	-
EDU	1 if the famer has secondary education, 0 otherwise (dummy)	+
TFARS	Total farm size (ha)	+
PFARS	Total area of production (ha)	+
PWORK	Number of permanent workers (N)	+
LAND	1 if farmer uses own land, 0 otherwise (dummy)	+
DISM	Distance to the market (km)	-
TRAIN	1 if the farmer received training in agro-processing, 0 otherwise (dummy)	+
FINANCE	1 if farmer has access to finance, 0 otherwise (dummy)	+
INFO	1 if farmer has access to information, 0 otherwise	+
OFFINC	1if farmer receives off-farm income, 0 otherwise(dummy)	+
INFR	1 if farmer has access to agro-processing infrastructure, 0 otherwise(dummy)	+

Results and discussion

Table 2 shows the descriptive statistics of smallholder farmers in the study area. The results show that only 19% of the sampled smallholder farmers were participating in agro-processing. Out of the participants 73.7% were males. The results also show that 59.8% of the total sampled respondents were males. The mean age of the sampled respondents is 52 years with an average household size of 6 people. 73.7% of the participants and 50.6% of non-participants had secondary education. The average total farm size is 70ha with an average production area of 32.8ha and they were employing at least 1 permanent worker to perform the daily activities of the farm. This study acknowledged that approximately half (47.1%) of the sampled farmers were farming on their own land. The results reveals that 57.9% of the participants and 44.6% non-participants had their own private land.

The average distance to market is 23.7km. The findings reveal that few (11.8%) farmers had access to agro-processing training facilitated by their local agricultural advisors who are the common source of training to smallholder farmers, amongst other private institutions such as agricultural commodity organisations. Access to finance and information was a major concern to the farmers accounting 39.2% and 20.6% respectively. Majority (88.2%) receives off-farm income. Access to agro-processing infrastructure proved to be a big challenge to smallholder farmers in the Gauteng Province with only 7.8% having access.

Table 2: Descriptive statistics of variables used in the analysis

Variable	Participants	Non-Participants	all
GEN	.7368421	.5662651	.5980392
AGE	48.89474	53.14458	52.35294
HHS	5.842105	5.855422	5.852941
EDU	.7368421	.5060241	.5490196
TFARS	127.0526	57.20482	70.21569
PFARS	73.31579	23.49398	32.77451
PWORK	2.368421	1.421687	1.598039
LAND	.5789474	.4457831	.4705882
DISM	18.05263	25.01205	23.71569
TRAIN	.3157895	.0722892	.1176471
FINANCE	.0526316	.0361446	.0392157
INFO	.3684211	.1686747	.2058824
OFFINC	.7894737	.9036145	.8823529
INFR	.1052632	.0722892	.0784314

The results from the probit estimates for determinants of smallholder farmers' participation in agro-processing industry is shown in table 3. The variable educational level was significant at 5% level. This implies that farmers with secondary education are more likely to participate in agro-processing. The relatively high number of farmers with secondary education is acknowledged that they could have the ability to access information, especially that originating from the print and electronic media. Randela *et al*, (2008) conducted a study in Mpumalanga, and have argued that intellectual capital is captured by education. Another study by Alam *et al*, (2009) revealed that educated farmers are not only advanced in the adoption processes, but also better-off in terms of applying business techniques than their counterparts.

Land tenure was found to have a positive association with participation of smallholder farmer in the agro-processing industry at 5% significant level. The results implies that smallholder farmers with private land ownership are more likely to participate in the agro-processing industry. The lack of private land ownership reduces the possibility of farmers to invest on their farming land, which also reduces the probability of participating in agro-processing. Mingxuan *et al*, (2011) noted that growth in agribusiness sectors is affected by weaker ownership of land. These authors identified the need to accelerate the land titling process and build up the capacities of relevant land administration agencies. This can assist in the facilitation of land availability for farming that could increase the degree of commercialization in agro-processing industry.

Table 3: Probit estimates for determinants of agro-processing market participation

Variable	Coef.	Std. Err.	z	P>z
GEN	0.206	0.396	0.52	0.602
AGE	-0.004	0.013	-0.33	0.738
HHS	-0.056	0.064	-0.87	0.383
EDU	0.876**	0.428	2.05	0.041
TFARS	-0.006	0.005	-1.09	0.274
PFARS	0.011	0.010	1.12	0.263
PWORK	0.077	0.083	0.93	0.352
LAND	0.932	0.462	2.02	0.044
DISM	-0.027*	0.015	-1.82	0.069
TRAIN	1.001**	0.513	1.95	0.051
FINANCE	0.296	0.927	0.32	0.749
INFO	1.095**	0.487	2.25	0.024
OFFINC	-1.669**	0.602	-2.77	0.006
INFR	0.175	0.593	0.29	0.768
_cons	-0.175	1.038	-0.17	0.866

Note: *** 1% significant level, **5% significant level, *10% significant level
Survey, 2017 (n= 102 smallholder farmers)

The study found that distance to market affect smallholder farmer participation in agro-processing and was negatively significant at 10% level. In other words, the further the distance to the market the less likely the farmers are to participation in agro-processing. This predication supports the descriptive statistics that many of smallholder farmers were located or practicing farming in a distanced area. Therefore, a lot need to be done with the development of local agro-processing units, not only in Gauteng Province, rather throughout the country where agricultural activities are taking place.

Access to training was found to have a positive association, i.e. smallholder farmers having access to training are more likely to participate in agro-processing industry. This variable was significant at 10% level. If a farmer receives agro-processing training, this will increase the knowledge and skills of the farmer, which increases the likelihood of the farmer to participate in agro-processing. A study conducted by Olaoye (2014) revealed that training of farmers, especially in the rural areas, on technological skills acquisition is vital for smallholder farmer development. Another study conducted by Worku (2016) supported the provision of training to farmers as a critical tool to smallholder commercialization. Therefore, potential farmers need to be trained on issues relating to agro-processing markets.

The variable access to information was positively significant at 5% level. The results implies that smallholder farmers who have access to information are more likely to participate in agro-processing. The lack of access to market information is one of the constraining factors towards transformation of smallholder agriculture and intensity of commercialization (Hailua *et al*, 2015). In a study done by Khapayi and Celliers (2016) many farmers did not have access to market information and were unlikely to participate in the market because they were not well informed about what is happening in the markets.

The variable, Off-farm income, is statistically significant (at 1% level) and has a negative influence on the agro-processing participation. This means that farmers who receive non-farm income are less likely to participate in agro-processing. The reason could be that social grants are not enough to invest in agro-processing. This concur with Sinyolo (2016) that access to social grants have a negative relationship with participation in agriculture.

Conclusion and recommendation

The government and other development partners should develop and facilitate models that will realistically increase access of friendly investment capital to the young generation to start their own small-scale agro-processing businesses. This could also assist the elderly aged farmers to benefit on such businesses that are nearest to their farming activities. Furthermore, this will make agriculture attractive to the youth and help create self-employment for the jobless majority. Agricultural extension officers need not only focus on credit finance, also in terms of disseminating relevant knowledge regarding agro-processing industry, in particular, knowledge of norms and standards that majority of smallholder farmers are not aware of. There is a need to encourage, create conducive environment and building up of local agro-

processing plants as a strategy of lowering costs of transportation and storage when farmers take their farm produce to far distanced manufactures or processors.

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References

- Alam, G.M., Hoque, K.E., Khalifa, T. B., Siraj, S.B., and Ghani, M.F.B. A., 2009. The role of agriculture education and training on agriculture economics and national development of Bangladesh. *African Journal of Agricultural Research*, 4(12), pp.1334-1350.
- Baloyi, J. K. (2010). An analysis of constraints facing smallholder farmers in the Agribusiness value chain: A case study of farmers in the Limpopo Province (Doctoral dissertation, University of Pretoria).
- Botlhoko, G.J. & Oladele, O.I. 2013. Factors Affecting Farmers Participation in Agricultural Projects in Ngaka Modiri Molema District North West Province, South Africa. *Journal of Human Ecology*, 41(3), 201-206.
- Hailua, G., Manjure, K. and Aymutic, K., 2015. Crop commercialization and smallholder farmers` livelihood in Tigray region, Ethiopia. *Journal of Development and Agricultural Economic*, 7(9), pp. 314-322.
- Machethe, C.L. 2004. Agriculture and poverty in South Africa: Can agriculture reduce poverty. In Paper presented at the Overcoming Underdevelopment Conference held in Pretoria (Vol. 28, p. 29).
- Khapayi, M. & Celliers, P.R., 2015. Issues and constraints for emerging farmers in the Eastern Cape Province, South Africa. *African Journal of Agricultural Research*. 10(41), pp. 3860-3869.
- Mapiye, C., Chimonyo, M., Muchenje, V., Dzama, K., Marufu, M.C., & Raats, J.G. 2007. Potential for value-addition of Nguni cattle products in the communal areas of South Africa: a review. *African Journal of Agricultural Research*, 2(10), 488-495.
- Mhazo, N., Mvumi, B. M., Nyakudya, E., & Nazare, R. M. (2012). The status of the agro-processing industry in Zimbabwe with particular reference to small-and medium-scale enterprises. *African Journal of Agricultural Research*, 7(11), 1607-1622.
- Mingxuan, P.L., Donaldson, J.A. and Zhang, Q.F., 2011. The transformation of China's agriculture system and its impact on Southeast Asia. *International Journal of China Studies*, 2(2), pp.289-310.
- Mmbengwa, V. M., Ramukumba, T., Groenewald, J. A van Schalkwyk, H. D., Gundidza, M. B. and Maiwashe, A. N., 2011. 'Evaluation of essential capacities required for the performance of farming small, micro and medium enterprise (SMEs) in South Africa', *African Journal of Agricultural Research*, Vol. 6(6): 1500–1507.

Mmbengwa, V.M., Ramukumba, T., Groenewald, J.A., van Schalkwyk, H.D., Gundidza, M.B. & Maiwashe, A.N., 2012. Analysis of the socio-economic factors that contribute to land and agrarian reform which initiated and supported small, micro, medium farming enterprises (SMMES) in South Africa. *African Journal of Business Management*, 6(24), p.7158.

Mmbengwa, V.M., Khoza T.M., Rambau K., & Rakuambo J., 2018. Assessment of the participation of smallholder farmers in agro-processing industries of Gauteng Province. *OIDA International Journal of Sustainable Development*, Ontario International Development Agency 11:02. ISSN 1923-6654 (print) ISSN 1923-6662 (online).

Musvoto, C., Nortje, K., De Wet, B., Mahumani, B.K., & Nahman, A. 2015. Imperatives for an agricultural green economy in South Africa. *South African Journal of Science*, 111(1-2), 01-08.

Olaoye, O.A., 2014. Potentials of the agro industry towards achieving food security in Nigeria and other Sub-Saharan African countries. *Journal of Food Security*, 2(1), pp.33-41.

Poon, K. and Weersink, A., 2011. Factors affecting variability in farm and off-farm income. Structure and performance of agriculture and agri-products industry network. Available at http://ageconsearch.umn.edu/bitstream/102064/2/SPAA_Variance_of_farm_incomes_01.pdf. Accessed 28 June 2018.

Randela, R., Alemu, Z. G., & Groenewald, J. A. (2008). Factors enhancing market participation by small-scale cotton farmers. *Agrekon*, 47(4), 451-469.

Thindisa, L.M.V. 2014. Participation by smallholder farming entrepreneurs in agro-processing activities in South Africa (Masters Dissertation).

Vermeulen, H., Kirsten, J., & Sartorius, K. (2008). Contracting arrangements in agribusiness procurement practices in South Africa. *Agrekon*, 47(2), 198-221.

Worku, A., 2016. Agricultural advisory service access among rural women in male-headed households: Constraints and prospects in Ethiopia. *Journal of Poverty, Investment and Development*, 20, pp.35-39.