Agricultural Economics

Determinants of small farmers access to agricultural markets in South Africa

A.I. Agholor[1]*, K. Ogujiuba[2], I.N Shongwe[3]

[1]Department of Agricultural Extension and Rural Resource Management, University of Mpumalanga, PMB X11283 Nelspruit, South Africa
[2]Department of Development Studies, University of Mpumalanga, PMB X11283 Nelspruit, South Africa
[3]Department of Agricultural Extension and Rural Resource Management, University of Mpumalanga, PMB X11283 Nelspruit, South Africa

Abstract. Restricted access to markets and complex rules remain a global barrier to growing small enterprises. A randomized sample of 200 farmers were carefully selected for the study. The study assessed farmers methods of linking to markets in Mbombela South Africa and analyse the determinants of engaging in specific types of markets. Structured and semi-structured questionnaires divided into sections were applied. The descriptive statistics and logistic regression methods were used for data analysis. The results showed that majority of smallholder farmers used informal markets and linkage to market information is through cell phone. Some of the major challenges farmers faced when accessing markets were transportation and inadequate market information. The empirical results of the study showed that the variables that positively influenced the choice of specific types of markets by farmers were gender (P<0.030), age (P<0.007), distance to markets (P<0.057), easiness of accessing markets (P<0.007), challenges with accessing markets (P<0.042) and access to extension services (P<0.003). The study concluded that the smallholder farmers in the Mbombela Local Municipality have difficulties in accessing formal markets and rely on informal markets to sell their farm products. The study recommended that farmers should be trained on the use of social media channels in accessing agricultural markets. Government should support to improve infrastructures like roads to assist farmers in accessing market. The study concluded that transport costs should be managed through shared and collective transportation arrangement with other farmers to convey farm produce to the markets for sale.

Introduction

Market plays a crucial role in enhancing the rural economy of South Africa, but the informal markets are restricted from having transactions access to trade (Ferris et al., 2014). The marketing businesses of smallholder farmers occurs at the farmgate, retail markets, markets spots, urban wholesales and by physical contact directly with customers (Sikwela and Mushunje, 2013). The South African smallholder farmers who are poorly resourced are excluded from mainstream agriculture and marketing. They usually practice labour intensive farming with low yields and this does not allow them to grow into strong commercial farmers (Kirsten and van Zyl, 1998). Smallholder farmers face different market access challenges such as inadequate market information, stringent standards

*e-mail: Isaac.agholor@ump.ac.za

for entering formal markets, poor road infrastructure, markets located far from farmers, inadequate municipal services, transportation, and storage systems (Khapayi and Celliers, 2016). These challenges limit them from participating in lucrative markets. GII Network, (2021) asserted that the farmer's production initiatives can be hampered by inadequate access to market, technology, capital, and extension services.

Smallholder farmers are overpowered by commercial farmers who appear stronger than smallholder farmers in the mainstream formal markets (Michelson et al., 2010). Formal markets can assist smallholder farmers' economic growth and poverty alleviation. The livelihoods of smallholder farmers are fraught by lack of market access and entrepreneurial skills to add value to their products (Seville et al., 2011). The South African agricultural trade reform transition which includes deregulating the agricultural markets was aimed at stimulating the economic growth and increase market performance within the agricultural sector, but the deregulation benefited the commercial farmers in revenues and increased investments as compared to smallholder farmers (Vink and Kirsten, 2000). Despite the bountiful results of deregulating the markets, the poorly resourced farmers did not gain enough from deregulated markets (Magingxa and Kamara, 2003). Before the introduction of democratic governance in South Africa, marketing issues were resolved by the creation of cooperatives, which mostly served commercial farmers. Smallholder farmers, on the other hand, did not have access to these cooperatives' services (Ortmann and King, 2006). The South African agricultural trade reform polarized the growth of commercial and small-scale farmers. The consequences of this disparity are still visible among smallholder farmers in the form of inadequate infrastructure development, insufficient marketing skills and poor product quality amongst rural farmers (Mdlalose, 2016). Smallholder farmers continue to contribute to rural economies and the labour market by reducing unemployment (Chikazunga and Paradza, 2013). The South African agriculture is based on race and is unequal in nature which separates commercial farmers and smallholder farmers thus cascading to inadequate market access for smallholder farmers (Beharielal, 2017). Twenty-seven years into democracy in South Africa, smallholder farmers still face massive challenges in accessing high-end markets which can sustainably enhance their livelihoods (Mdlalose, 2016).

The ability of farmers to participate in high-end market is limited by the high standards set by the formal markets'

operators (Ferris et al., 2014). Smallholders' effort in accessing markets has been exacerbated with challenges attributable to technical restrictions such as high transport costs, insufficient physical infrastructure, inadequate storage facilities and high transaction costs (Yamanaka et al., 2019). The existence of free access to markets provides the opportunity to have financial gains which will allow smallholder farmers to remain in the farming business. Informal markets have been able to sustain the majority of smallholder farmers' livelihood, but it has limited them in participating and synergizing their capabilities within the formal markets. Against this backdrop, this study seeks to evaluate smallholder farmers methods of linking markets, challenges of farmers in linking markets and analyse the determinants of the use of specific types of markets, in the study area. The study hypothesised ($H0_1$) that there is no relationship between selected socio-economic variables and determinants of choice of specific types of markets used by farmers in the area.

Materials and methods

The study was undertaken in the Ehlanzeni district, Mbombela Local Municipality, South Africa. The Ehlanzeni district has four local municipalities which are Nkomazi Local Municipality, Mbombela Local Municipality, Thaba Chewu Local Municipality and Bushbuckridge Local Municipality. The Mbombela Local Municipality is in the Ehlanzeni district of South Africa, in the north-eastern section of Mpumalanga (Municipalities of South Africa, 2019). Six communities were selected for the study which include: Kayamazane, Mpakeni, Kabokweni, Jerusalema, Malekutu, and Mahushu. Mbombela has transitional biome zones of grassland and savannah. The area has mild winters and summer rainfalls with subtropic climate. The area receives an average rainfall of 300mm – 500mm per year. The municipality covers a total surface area of 5 394 km^2 and is geographically located in 25° 25' 30", 30° 55' 0" E. (Mbombela, 2011). The municipality has a population of approximately 588,794 which is dominated by 89.4% Africans. The minority racial groups include Afrikaans whites, Indian/Asians with a percentage of 0.9%, 8.7% and 0.7%, respectively. Swati is the predominantly spoken language (78.7%) followed by Afrikaans (6.8%), English (4.6%), Tsonga (4.1%) and other languages (5.8%) (Integrated Development Plan, 2019).

Method of data collection and analysis
This study adopted quantitative research technique.

The sample size was calculated using Slovin's Formula. The advantage of using this sampling size technique is that it allows the researcher to estimate the sample size required to assure reasonable accuracy of the results and to sample the population with the appropriate precision (Jeffry and Punzalan, 2012).

Slovin's Formula: $n=\frac{N}{1+Ne^2}$

n= sample size
N= total number of populations
e= margin of error (0.05)

$n=\frac{1742}{1+1742(0.05)^2}$ n=325.30

Therefore, the sample size of the study adopted was 325 respondents. Upon conducting the study, the targeted number of farmers could not be reached. This was due to community protests, COVID-19 regulation that did not permit direct contact with farmers in August 2021. We therefore, collected information from 200 respondents. Prior to data collection, a pre-test of the questionnaire was done with 20 respondents with the assistance of trained enumerators. The study used structured and semi-structured questionnaires divided into sections: the first section covered the demographic information of participants; the second part covered the challenges of farmers and methods of linking to markets while the third part covered the determinants to market-based access in the study area.

Farmer's method of linkage with markets was assessed using the descriptive statistics of frequency and percentages. Farmers were asked to choose from a list of linkages preferred in assessing markets for their products. The challenges faced by farmers when accessing markets were evaluated using a 5-point Likert scale. Farmers were asked to choose from a list of challenges and were asked to rank these challenges in order of severity on a scale of 1-5 as follows: Highly severe-1, Very severe-2, Severe-3, Less severe-4 and Not severe-5. Since there is heterogeneity of markets and farmers were not definite but used a variety of markets depending on time and circumstances, a scale of 1-5 was used to evaluate the level of effectiveness of a various type of market. Farmers were asked to rank the effectiveness as follows: Highly effective-5, Very effective-4 Effective-3, Less effective-2, Not effective-1.

The adopted model for the study

The binary logistics model was used to analyse the factor influencing smallholder farmers' specific choice of types of market accepted for use. Binary logistic regression is a statistical technique for predicting the association between independent and dependent variables, where the dependent variable is binary. The binary logistic regression method assists to estimate the probability of events as a function of a set of independent variables that are hypothesized to influence an outcome. When just one set of predictor variables is known, the logistic regression model is used to classify individuals into one or two groups and identify which features or qualities best predict choice making (Agresti and Kateri, 2017). However, in respect to the distribution of the predictor variables X, there are no assumptions made, and X variables may be continuous (Fernandez et al., 2019). In empirical research it is ideal to identify the characteristics that influences smallholder farmers' decision making by employing the logistic regression model (Agresti and Kateri, 2017). In keeping with Fullerton and Xu (2016): let R_i represent a dichotomous variable that would be equal to 1 if smallholder farmers decide to adopt the marketing strategies and zero (0) otherwise. Table 1 summarizes the hypothesised predictor variables with their description, measurement and expected signs. It identified specific variables and gives a prediction of whether the variable will have a positive (+) or negative (-) influence on the choice of the types of market.

The likelihood of the choice to adopt marketing type, is thus: $Pr (R_i=1)$, or not $Pr (R_i=0)$ is derived as follows:

$$Y = \beta_{0} + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots + \beta_{11} X_{11} + \mu \ldots\ldots\ldots\ldots$$

Where:
Y = desire to adopt marketing strategy (Farmers adopt marketing strategy = 1, 0 = otherwise)
X_1 X_9 = independent variables demarcated as: (demographics)
X_1 = Sex (Female = 1, Male = 2)
X_2 = Age (years)
X_3 = Level of education (Never attended school = 0, Primary school = 1, High school = 2, Tertiary = 4)
X_4 = Farm experience (years)
X_5 = Size of farmland (numerical)
X_6 = Farm location (number in km)
X_7 = Access to market information (Poor = 1, Fair = 2, Good = 3)
X_8 = Access to Extension services (Yes = 1, No = 2)
X_9 = Access to markets (Yes = 1, No = 2)
β_0 = constant
$B_1 - \beta_9$ = Regression coefficients
μ = error term

Table 1. Summary of hypothesised predictor variable with their description, measurement and expected signs

Variables and code	Description	Unit of measurement	Expected sign
Gender	Household: Male or female	1= Male 2 = Female	+
Age	Number of years participant has lived	(18-30years) = 1, (31-49years) = 2, (50-69years) = 3, (≥70 years) = 4	+
Marital status	Marriage status of participants	Single = 1, Married = 2, Divorced = 3, Widow = 3, Widower = 4	-
Household members	Number of family members	≤ 4 members = 1, 5 – 10 members = 2, 11-20 members = 3, ≥ 21 members = 4	-
Education level	Level of education achieved	No formal education = 1, Primary school = 2, High school = 3, Tertiary level = 4	+
Farm experience	Number of years in farming	(< 5 years) = 1, (6 – 10 years) = 2, (11 – 19 years) = 3, (≥ 20 years) = 4	+
Distance to markets	Distance to the nearest town	(< 1km) = 1, (1 – 5km) = 2, (6- 10km) = 3, (11 – 15km) = 4, (16 – 20km) = 5, (21 – 25km) = 6, (≥ 26km) = 7	+
Extension access	Participant access to agricultural extension officer	Yes = 1, No = 2	+
Market information	Access to market information	Yes = 1, No = 2	+
Road condition	Condition of road infrastructure	Very bad = 1, Bad = 2, Undecided = 3, Good = 4, Very good = 5	-
Market type	Type of market participant accesses	1 = formal markets, 2 = informal markets, 3 = Both formal and informal markets	+
Transporting produce	Does the participant transport goods to market	Yes = 1, No = 2	+

Source: Own field survey 2021

Results and discussion

Table 2 shows the routes available for smallholder farmers in linking markets. Cell phone calls, through word-of-mouth, through directly approaching new markets and customers approaching farms was the most used method of linking with markets (Table 2). The linkage channels recorded a percentage of 66.4% (cell phone), 56.2% (word-of-mouth), 54% (informal markets) and 41.5% (farmgate), respectively. The least used method of linking with markets was through farming cooperatives, extension officers, domestic traders, and retail markets with a percentage of 2.9%, 2.2%, 0.7% and 0.7%, respectively. This finding is in contrast with DAFF (2012) which asserted that retail markets were mostly used by smallholder farmers. However, the results obtained indicated that farmers prefered to use informal rather than formal markets.

Table 2. Farmer's methods of linking with markets

Methods of linking with market	Frequency	Percent (%)
Extension officers	3	2.2
Cell phone calls	91	66.4
Social media	25	18.2
Word-of-mouth	77	56.2
Informal market	74	54.0
Farming cooperatives	4	2.9
Advertisement	13	9.5
Farmgate	57	41.5
Retail market	1	0.7
Domestic traders-local traders	1	0.7

Source: Own field survey 2021

Figure 1 displays the challenges faced by smallholder farmers when accessing markets. The major challenges farmers faced when accessing markets were transportation (57%), water shortages (40%), inadequate agricultural extension services (38%), distance to markets (31.4%), technical issues (25.6%), theft (21.5%) and inadequate market information (20.7%), fewer farmers viewed storage (19.8%), transactional costs (9%), competition (3.3%) inadequate markets (1.7%), COVID-19 (1.7%), markets withdrawing once produce is ready (1.7%) and insufficient finances (1.7%) as challenges that they face when accessing markets. Bad roads (0.8%), inability to penetrate formal market (0.8%), plant diseases (0.8%), and fuel hikes (0.8%) were the least stated challenges. This finding is collaborated by the study of Khapayi and Celliers (2016) who found that challenges that limited smallholder farmers in accessing markets were physical infrastructure such as poor roads, transportation, lack of marketing skills and information, poor market infrastructure, and high transaction costs.
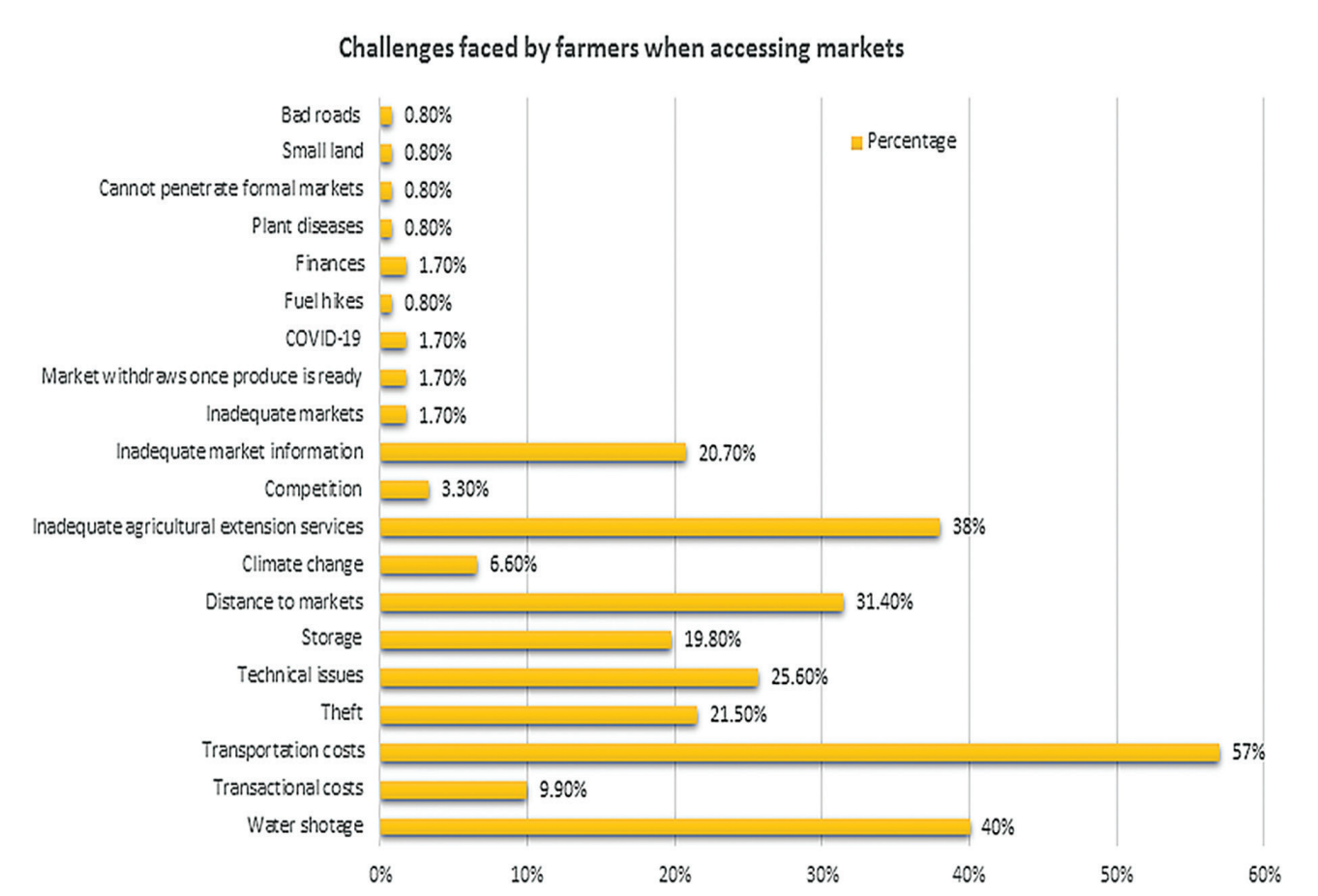

Figure 1. Challenges faced by farmers when accessing markets in the study area.
Source: Own survey 2021

The empirical results of the determinants of the choice of markets is presented in Table 3. The Goodness-of-fit test was analysed, and the results revealed that the model was ideal as follows: Chi-square = 0.329, Cox and Snell = 0.233, Nagelkerke = 0.349 which implied that the model was suitable for the study. In the logistic regression model, twelve variables were considered which included gender, age, marital status, level of education, farm size, farming experience, distance to markets, access to market information, ease of accessing markets, challenges with accessing markets, road conditions and access to extension services.

The results indicate that gender, age, distance to markets, ease of access, challenges of accessing markets and access to extension services were variables that had a significant influence on the specific types of markets used by farmers. Marital status, level of education, farm size, farming experience, access to market information and road conditions were found to be negatively associated with determinants of the specific types of markets used in the study area.

Table 3. The determinants of specific types of markets used by respondents

Independent variables	B	S.E.	df	Sig.(p-value)	Exp (B)	Remarks
Gender	-1.056	.487	1	.030*	.348	Significant
Age	.603	.222	1	.007*	.547	Significant
Marital status	-.182	.377	1	.630	.834	Non-significant
Level of education	-.151	.246	1	.538	.860	Non-significant
Farm size	.017	.160	1	.914	1.017	Non-significant
Farm experience	.077	.220	1	.724	1.080	Non-significant
Distance to market	3.103	1.633	1	.057*	22.263	Significant
Access to market	-.230	.484	1	.634	.794	Significant
Ease of access to markets	1.037	.384	1	.007*	2.821	Significant
Access to extension services	2.638	.886	1	.003*	13.979	Significant
Road conditions	-.244	.229	1	.287	.784	Non-significant
Constant	2.827	2.427	1	.244	16.896	-
Goodness of fit: Chi-square Cox & Snell Nagelkerke	.329 .233 .349					

Source: Own field survey 2021
Significant variables influencing specific types of markets used by respondents at p<0.05 (*), <0.01 (*) levels of significance.

The age of smallholder farmers was significant with a $P<0.007$ and positively influenced decision making to adopt a specific type of market with $\beta = 0.603$. This result implies that the probability of adoption of local marketing strategies decreases 0.603 times with an increase in age of respondents when all other variables in the study are held constant. These findings differ from Mdlalose (2016) who found a positive and significant related association of respondents' age and their participation in markets. In a similar study, Agholor and Kanayo (2021) found that age was significant and negatively related to the adoption of ICT amongst smallholder farmers. The result from this study suggests that younger famers are more likely to adopt and take risks associated with marketing strategies compared to older farmers. Furthermore, because young farmers are new to the agricultural sector, they are driven to employ marketing strategies for their farm growth. Morris and Venkatesh (2006) demonstrated that the chance of adopting agricultural technology reduces as age increases.

Distance to markets was found to have a significant relation with $P<0.057$ and positively influenced decision to adopt a specific type of market with $\beta = 3.103$. This result suggests that as the distance from farm to markets increases, the adoption of local marketing strategies increases 3.103 times. It was hypothesised in the study that the distance to markets would have a positive relation to the farmers' adoption of the marketing strategies. The finding was substantiated by Sebatta et al. (2014) who found that distance to markets positively influenced the farmers' decision to participate in markets. However, Agholor (2021) shows that distance to markets had a significant coefficient and a positive influence on the decision to participate in local markets. The findings show that the farther the farmers are from the markets, the less chances of adopting marketing strategies.

Ease of accessing markets had a positive relation with $P< 0.007$ and positively influenced the decision to adopt a specific type of market with $\beta = 1.037$. This result suggests that the probability of adopting any marketing strategy by respondents increases 1.037 times when markets are easily accessible, provided that all other variables are held constant. The findings corroborate

those of Sikwela and Mushunje (2013) who found that ease of accessing markets plays a significant role in smallholder farmers engaging in marketing activities. The study reveals that as farmers have more ease of accessing markets, they are more likely to adopt marketing strategies. Farmers who find it difficult to access markets will likely not adopt the marketing strategies due to the risks and mobility processes that may be associated with implementing the strategy.

Access to agricultural extension services showed a significant relationship with a positive influence on decision to adopt a specific type of market with $P<0.003$ and $\beta = 2.638$. This implies that for every unit increase in the accessing of agricultural extension services, there is a 2.638 time increase in the probability of adopting marketing strategies. The findings are supported by Nyangena and Juma (2014) who found that extension services were positively related to farmers' participation in farming support programmes initiated by government.

Conclusion

The objectives of the study were to assess farmers' methods of linking to markets and to analyse the determinants of the use of specific types of markets by farmers. The results showed that the majority of smallholder farmers use informal markets and linkage to markets were through cell phone calls contact. Some of the major challenges faced by farmers when accessing markets were transportation and inadequate infrastructure. The empirical results of the study showed that the variables that significantly influenced the use of specific types of markets by farmers were gender (P<0.030), age (P<0.007), distance to markets (P<0.057), ease of accessing markets (P<0.007), challenges with accessing markets (P<0.042) and access to extension services (P<0.003). The study concluded that the smallholder farmers in Mbombela have difficulties in accessing formal markets and rely on informal markets. The study recommended that farmers should be trained on the use of social media channels in accessing markets. Government should support and improve infrastructures like roads to assist farmers to access market. Transport cost should be reduced through shared transportation arrangement with other farmers.

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