Determinants Of Production And Market Participation Of Small-Scale Groundnut Farmers In Legodi, Ramphele And Mokgohloa Villages In Polokwane Municipality, Limpopo Province

Segage K¹, Nkoana M¹, Cholo M¹

¹University of Limpopo

Corresponding author email: kamogelosegage@gmail.com

Abstract:

This study relied on small-scale groundnut farmers aiming to analyse the factors affecting their production and market participation under Polokwane Municipality. A purposive simple random sampling technique and probability proportional to sample size were used to collect primary data from 50 small-scale groundnut farmers using semi-structured questionnaires. The results depicted that 42% (21) of the small-scale groundnut farmers participated in the market whilst 58% (29) did not participate. Multiple Linear Regression and Logistic Regression model were employed to determine factors affecting production and market participation of small-scale groundnut farmers. The empirical results showed that factors such as age, educational level, marital status, credit access, land size, market distance and groundnut yield were found to be significantly influencing production and market participation in the study. This raise immediate necessities for government interventions to successfully uplift the livelihood of the sampled participants. In support of these empirical results, policy makers need to put more effort in the facilitation of access to credit, access to arable land and improved farmer support programs that will supply small-scale groundnut farmers with production inputs and awareness about effective market availability in rural and urban areas.

Keywords: Market participation, Production, Logistic regression model, multiple linear regression model
DETERMINANTS OF PRODUCTION AND MARKET PARTICIPATION OF SMALL-SCALE GROUNDNUT FARMERS IN LEGodi, RAMPHELE AND MOKGOHLOA VILLAGES IN POLOKWANE MUNICIPALITY, LIMPOPO PROVINCE

Abstract

This study relied on small-scale groundnut farmers aiming to analyse the factors affecting their production and market participation under Polokwane Municipality. A purposive simple random sampling technique and probability proportional to sample size were used to collect primary data from 50 small-scale groundnut farmers using semi-structured questionnaires. The results depicted that 42% (21) of the small-scale groundnut farmers participated in the market whilst 58% (29) did not participate. Multiple Linear Regression and Logistic Regression model were employed to determine factors affecting production and market participation of small-scale groundnut farmers. The empirical results showed that factors such as age, educational level, marital status, credit access, land size, market distance and groundnut yield were found to be significantly influencing production and market participation in the study. This raise immediate necessities for government interventions to successfully uplift the livelihood of the sampled participants. In support of these empirical results, policy makers need to put more effort in the facilitation of access to credit, access to arable land and improved farmer support programs that will supply small-scale groundnut farmers with production inputs and awareness about effective market availability in rural and urban areas.

Keywords: Market participation, Production, Logistic regression model, multiple linear regression model
1. Introduction, problem and opportunity statement

Groundnuts are one of the most important subsistence agricultural crops in South Africa that contributes significantly to human health by providing proteins; crude vegetable oil that contributes greatly to the country’s economy and its capacity to enhance the soil with one with one of the most essential minerals nitrogen through crop rotation. According to the study conducted by Fischer and Qaim (2014), for small-scale farmers to thrive in competitive global economy, it is necessary to create an entrepreneurial culture in rural communities where farmers produce for markets rather than trying to market what they produce. One of the suggested ways to achieve market participation is to support farmer organizations to allow small-scale farmers to realize economies of scale in service access and delivery (Corsi et al., 2017).

A greater number of studies conducted (Barret, 2009; Sigei et al., 2014; Baloyi, 2010; Chilundika, 2011) outlined that the incapability of small-scale groundnut farmers in rural communities to produce high quality and quantity groundnut peanuts and to engage in markets is a clear indication of a hindrance to rural development. Small-scale farmers in rural communities lack the necessary sufficient resources and information on how to enhance their production while incurring less cost. They allocate most of their resources to agricultural production; nevertheless, their returns are relatively low (Barret, 2009). In addition, small-scale farmers become reluctant to participate in the market; subsequently, the problem of lower market participation of these farmers is even deteriorated. Small-scale farmers depend on the production of agricultural commodities for sustainable livelihood, however, agricultural policies and market conditions are not making it easy. According Baloyi (2010), the extent to which small-scale farmers participate in the market depend on the location, socio-economic and institutional factors. However, little is still known about how small-scale groundnut farmers can produce more and effectively participate in the market particularly, in rural communities of Polokwane Municipality of Limpopo Province. As a result, information about how the groundnut can effectively and efficiently be produces and marketed is not well-established amongst small-scale groundnut farmers for improved returns and livelihood. Therefore, it was imperative for this study ascribing to identify, describe and determine factors influencing groundnut production and market participation of small-scale groundnut farmers being conducted in Polokwane municipality of Limpopo Province. The following
section will provide scope of the study and subsequently, followed by methods of data collection and sampling procedures used in the study.

2. **Scope of the study**

2.1 **Aim of the study**

The aim of the study is to identify and analyse the determinants of production and market participation of small-scale groundnut farmers in Polokwane Municipality.

2.2 **Objectives of the study are:**

i. To profile the socio-economic characteristics of small-scale groundnut farmers in Polokwane Municipality.

ii. To determine factors affecting production and market participation of small-scale farmers in Polokwane Municipality.

2.3 **Research hypothesis**

Socio-economic factors do not affect production and market participation of small-scale groundnut farmers in Polokwane Municipality.

3. **Materials and empirical methods**

**Study area**

The study was conducted in Ga-Ramphele, Mokgohloa and Legodi villages of Polokwane Local Municipality in Capricorn District, Limpopo Province. Limpopo Province is found in the northern part of South Africa. Polokwane municipality is one of the five local municipalities found in Capricorn District. The municipality comprise of 63 villages and divided into 14 wards with a geographical area of 18881km². It is the fourth densely populated municipality within Capricorn District and has a population of 131 164 and total of 33 918 households with average household size of 4 persons per household (Statistics South Africa, 2011). More than 80% of people in Polokwane Municipality speak Sepedi as their first language. Polokwane area receives summer rainfall with very dry winters.

**Sampling and sample size**

Data was collected over a period of four weeks from March to April 2018 using a team of five enumerators who speak the local Pedi language. Local agricultural extension officers,
councillors and traditional leaders assisted in identifying small-scale groundnut farmers in the selected areas (Ga-Ramphele, Mokgohloa and Legodi). A list of small-scale groundnut farmers and permission for data collection were gathered through traditional local leaders therein, respective identified villages. The study used purposive simple random sampling technique to select the respondents in the three selected villages of Ramphele, Legodi and Mokgohloa. This random sampling technique is appropriate since it gives an equal opportunity for all parts of the population to be selected. Only small-scale groundnuts farmers that are residing within the new settlements of the three selected areas were considered for the purpose of this study.

The study employed probability proportional to size to collect data from 50 small scale groundnut farmers. Semi-structured questionnaires were pre-tested, administered and used in order to gather relevant data on groundnut production and market participation by the small-scale farmers. Groundnut farmer was used as the unit of analysis and data on the production and market participation was gathered in order identify different factors that that affect small-scale farmers in these villages.

The total number of small-scale groundnut farmers (sampling frame) in the three selected areas was 89, with Ramphele consisting of 31, 39 Mokgohloa and Legodi of 19 households. Based on probability proportional to size, 35%, 44% and 21% of the total number of the selected areas were interviewed from Ga-Ramphele, Mokgohloa and Legodi respectively (see Table 1). This implies that 18 small-scale groundnut farmers from Ga-Ramphele, 22 from Mokgohloa and 11 from Legodi were interviewed to form the targeted sample size of 50. More than a 10% proportional sample size was collected from the three selected areas. This sample represents 56% of the total number of small-scale groundnut farmers in the selected areas. Table 1 below shows the sample size in the respective areas of Moletjie community.

Table 1: Sample size in the respective sites of Moletjie community, Polokwane Municipality, Limpopo Province

<table>
<thead>
<tr>
<th>Villages</th>
<th>Population</th>
<th>Small-scale groundnut farmers in the selected areas</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramphele</td>
<td>813</td>
<td>31</td>
<td>18(35%)</td>
</tr>
<tr>
<td>Mokgohloa</td>
<td>1300</td>
<td>39</td>
<td>22 (44%)</td>
</tr>
<tr>
<td>Legodi</td>
<td>729</td>
<td>19</td>
<td>11 (21%)</td>
</tr>
</tbody>
</table>
Empirical data analysis

Descriptive statistics was employed to identify and describe socio-economic characteristics of small-scale groundnut farmers in Polokwane Municipality. Data was analysed using the IBM Statistical Package for Social Science (SPSS) software version 24. The analysis was made through the computer programming, there after conclusion was reached, and further recommendations to policy makers.

Logistics Regression Model was used to determine factors influencing the market participation of small-scale groundnut farmers in Polokwane Municipality. This model was used to estimate the probability of market participation in response to one or more explanatory variables such as age, distance to market, vehicle ownership, marketing experience, information about the price etc. The selection of explanatory variables in relation to dependent variable (Market participation) were relatively based on the economic theory, data availability and literature.

\[ Y = \ln \left( \frac{P_i}{1-P_i} \right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_n X_n + U \]

Market participation = \beta_0 + \beta_1 (Age) + \beta_2 (Gender) + \beta_3 (Marital status) + \beta_4 (Education Level) + \beta_5 (Household size) + \beta_6 (Distance to market) + \beta_7 (Land size) + \beta_8 (Vehicle ownership) + \beta_9 (Access to extension) + \beta_{10} (Groundnut yield) + \beta_{11} (Occupation) + \beta_{12} (Access to credit)

The Multiple linear regression model was also used to determine the factors affecting groundnut production by smallholder farmers. In Multiple linear regression model the dependent variable is predicted by multiple explanatory independent variables. The form Multiple linear regression model equation is as follows:

\[ Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots + \beta_n X_n + U \]

Groundnut output (in Kg) = \alpha + \beta_1 (number of labour) + \beta_2 (seed variety) + \beta_3 (fertilizer) + \beta_4 (Education Level) + \beta_5 (pesticides) + \beta_6 (farming experience) + \beta_7 (Land size) + \beta_8 (grant) + \beta_9 (machinery) + \beta_{10} (Source of labour)
4. Descriptive results and discussions

This section mainly focuses on the analysis and discussions of the descriptive results of the field survey on the socio-economic characteristics collected from the 50 sampled groundnut farmers in Polokwane Municipality. The first objective of the study was achieved using the descriptive results that are presented in the form of figures and are discussed in terms of mean values, maximum, minimum and percentages.

Figure 1: Gender of the small-scale groundnut farmers

Source: Own survey data (2018)

Figure 1 indicates that the most interviewed groundnut small-scale farmers are females than males as depicted above. The descriptive results have revealed that from 50 sampled farmers, 32% were males and 68% were females that implies that females are more active in the production and marketing of groundnuts as opposed to males.
The age of farmers was categorized into three classes. The descriptive results display that from the interviewed farmers 24% of them had ages between 30 to 49 which is 12 small-scale farmers. Majority of the respondents with 58% (29 farmers) were found to be in the age group of between 50 to 69 and lastly only 18% (9 farmers) were found to be older with ages above 69 years. This implies that 76% of the interviewed farmers in this study were old people and 24% were middle-aged people.
Source: Own survey data (2018)

Market participation denotes the amount of groundnuts that the small-scale farmers take to the market. Figure 3 depicts that 42% of the small-scale groundnut farmers participates in the market whereas 58% farmers did not participate in the market. Hence, most small-scale groundnut farmers under Polokwane Municipality did not sell their commodities after harvesting only few generated incomes from groundnuts.

![access to extension](image)

Figure 4: Access to extension
Source: Own survey data (2018)

In this study of factors affecting production and market participation of groundnut farmers in Polokwane Municipality, out of 50 farmers interviewed, 100% of the farmers had no access to extension, meaning that all farmers in the study area do not have access to extension services.

Table 2: Frequency table of variables

<table>
<thead>
<tr>
<th>Frequency of:</th>
<th>Mean</th>
<th>Std. deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>62.38</td>
<td>11.984</td>
<td>30</td>
<td>81</td>
</tr>
<tr>
<td>Household size</td>
<td>4.50</td>
<td>1.776</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Groundnut yield (kg)</td>
<td>437.60</td>
<td>350.338</td>
<td>120</td>
<td>1840</td>
</tr>
<tr>
<td>Output sold (kg)</td>
<td>451.00</td>
<td>203.699</td>
<td>80</td>
<td>1200</td>
</tr>
<tr>
<td>Market distance (km)</td>
<td>26.84</td>
<td>1.4881</td>
<td>24</td>
<td>29</td>
</tr>
<tr>
<td>Land size (ha)</td>
<td>1.020</td>
<td>0.519</td>
<td>0.4</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Source: Own survey data (2018).
5. Empirical model results

Logistic regression model results

This section presents the logistic regression results and discusses the variables (age, education level, marital status, access to credit, market distance, land size and groundnut yield) that were found to be significant at 1, 5 and 10% level. The estimated coefficients (B), standard errors (S.E.), t-ratios and significance values of the respective independent variables are presented in table 3. The table provides the logistic regression empirical results showing socio-economic factors and other contextual variables influencing the market participation of groundnut farmers.

**Table 3: Logistic regression empirical results**

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>S.E.</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-1.439**</td>
<td>0.456</td>
<td>3.158</td>
<td>0.051</td>
</tr>
<tr>
<td>Credit access</td>
<td>2.528**</td>
<td>0.523</td>
<td>4.834</td>
<td>0.027</td>
</tr>
<tr>
<td>Education</td>
<td>0.766**</td>
<td>0.252</td>
<td>3.043</td>
<td>0.052</td>
</tr>
<tr>
<td>Groundnut yield</td>
<td>0.756**</td>
<td>0.261</td>
<td>2.896</td>
<td>0.050</td>
</tr>
<tr>
<td>Household size</td>
<td>-23.717</td>
<td>47.245</td>
<td>0.502</td>
<td>0.460</td>
</tr>
<tr>
<td>Land size</td>
<td>1.159*</td>
<td>0.077</td>
<td>15.022</td>
<td>0.061</td>
</tr>
<tr>
<td>Marital status</td>
<td>12.628*</td>
<td>3.428</td>
<td>3.685</td>
<td>0.055</td>
</tr>
<tr>
<td>Market distance</td>
<td>-1.532**</td>
<td>0.497</td>
<td>3.084</td>
<td>0.021</td>
</tr>
<tr>
<td>Occupation</td>
<td>0.856</td>
<td>0.804</td>
<td>1.065</td>
<td>0.302</td>
</tr>
<tr>
<td>Vehicle ownership</td>
<td>0.992</td>
<td>0.980</td>
<td>1.012</td>
<td>0.243</td>
</tr>
<tr>
<td>Model chi-square</td>
<td>24.187</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-2 Log likelihood</td>
<td>21.884</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cox &amp; Snell R Square</td>
<td>68.7%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: *, **, *** means statistically significant at 10%, 5% and 1% respectively
* , **, *** represent significance at 10%, 5% and 1% respectively.

Source: Own survey data (2018).

The choices of the explanatory variables were based on data availability, economic theory and the literature. The Cox and Snell R square of the model is 68.7%, which is statistically adequate since it shows goodness-fit, meaning 68.7% as of the variation in the dependent variable is explained by independent variables whereas the remaining 31.3% is
unaccountable. This may be as a result of incomplete or bias information provided by the respondents during the time of data collection. The likelihood of 21.884 entails that there was 22% probability of not predicting variables correctly.

The model was tested for multicollinearity and heteroscedasticity. Multicollinearity was checked by examining variance inflation factors. An OLS model was run to test for multicollinearity using the variance inflation factor (VIF). The VIFs for all variables are less than 10 with an average of 4.65, indicating that multicollinearity is not a serious problem in this model (Gujarati and Porter, 2009). An OLS model was also run to test for heteroscedasticity using the Breusch-Pagan/Cook-Weisberg test. There was no heteroscedasticity since the calculated $\chi^2$ value (1.87) was smaller than the tabulated $\chi^2$ value (3.38) at the 5% significance level and one degree of freedom.

**Table 4: Results for multiple linear regression model**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Standardized coefficient (Beta)</th>
<th>Standard error</th>
<th>t-ratio</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>3.838</td>
<td>4.352</td>
<td>0.882</td>
<td>0.397</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>15.201</td>
<td>3.304</td>
<td>4.601</td>
<td>0.023**</td>
</tr>
<tr>
<td>Number of labour</td>
<td>0.890</td>
<td>14.127</td>
<td>0.063</td>
<td>2.124</td>
</tr>
<tr>
<td>land size</td>
<td>1.159</td>
<td>0.077</td>
<td>15.022</td>
<td>0.000***</td>
</tr>
<tr>
<td>Source of labour</td>
<td>-1.85</td>
<td>1.744</td>
<td>1.084</td>
<td>0.298</td>
</tr>
<tr>
<td>Machinery</td>
<td>6.332</td>
<td>1.096</td>
<td>5.775</td>
<td>0.006***</td>
</tr>
<tr>
<td>seed variety</td>
<td>-0.086</td>
<td>0.028</td>
<td>3.070</td>
<td>0.044**</td>
</tr>
<tr>
<td>Grant</td>
<td>0.316</td>
<td>0.364</td>
<td>0.868</td>
<td>0.352</td>
</tr>
<tr>
<td>farming experience</td>
<td>-0.072</td>
<td>0.019</td>
<td>3.802</td>
<td>0.082*</td>
</tr>
</tbody>
</table>

Adjusted R Square: 0.70
Dependent variable: output amount of groundnuts per season

* **, *** represent significance at 10%, 5% and 1% respectively.

**Source:** Own survey data (2018).

Table 4 reflects results from the model (MLR) and the coefficients of factors affecting groundnut production by small-scale groundnuts farmers, the significance level, t-ratio and standard error of estimates. The adjusted $R^2$ obtained from the model results is (Adj $R^2=0.70$). According to the adjusted R square it shows that the model fit is good. About 70% of
the variation in the dependent variable is explained by the independent variables and the remaining 30% are unexplainable or are explained by the unknown variables. Significance level shows the importance of the independent variables in the model, standardized coefficient shows the amount of change on the dependent variable when an independent variable changes, positively or negatively change.

6. Discussion of Factors affecting production and market participation of small-scale groundnut farmers

Significant variables

The age of farmers was significant at 5% level with a negative coefficient representing the opposite relationship existing between age and market participation. This may be as a result that as farmers grow older, they become weak and susceptible to risks such as being exploited by spiteful traders, which reduces their likelihood of participating in the market. The results of this study is complementing that of Chilundika (2011), who studied the market participation of bean farmers in Zambia however the author found age to be significant at 5% level.

Level of education was also significant at 5% with a positive coefficient that represents the positive relationship with the dependent variable. This means that the unit increase in the number of years in school increases the probability of farmers to participate in the market. This is in line with the findings of Sigei et al., (2014) and Astewel (2010) who illustrated that if a pineapple producer is educated, the pineapple supplied to the market increases. This suggests that the higher level of education provides a greater opportunity to participate in the market.

Marital status and market participation are positively related since the marital has a coefficient of 12.628 at the significance level of 10%. This means that the marital status of the small-scale farmer increases the chances of them participating in the market of groundnuts.

The groundnut yield refers to the amount of groundnut that is produced by small-scale farmers measured in kilograms. The variable was found to be significant at 10% level with a positive coefficient towards market. This implies that a unit increase for groundnuts produced
will increase the likelihood of small-scale farmers to participate in the market. Hence, it makes economic sense because when small-scale farmers produce surplus products they are likely to sell their output in the market.

Land size of small-scale groundnut farmers

Small-scale farmers who own less land be likely to produce particularly for household consumption than those who own more hectares of land. Small-scale farmer refers to an individual who grows crops on a small piece of land for household consumption (Lininger, 2011). Land size in the study was found to be significant at 1% level with positive coefficients for market participation. The results propose that small-scale farmers with large land sizes produce more groundnuts and have to sell the excess to the market. This study complements the study conducted by Sikwela (2013) on the impact of farmer support programmes on market access of small-scale farmers in the Eastern Cape and KwaZulu-Natal provinces that also found land size being significant.

Insignificant variables

The variables occupation, household size and vehicle ownership were found to be insignificant. According to economic theory, these variables may be insignificant to market participation; however, it does not mean they are irrelevant as they have an impact on the dependent variable. Even though the results indicated these variables being insignificant, there is no enough evidence to show how they influence market participation.

7. Conclusions, recommendation and implications for policy

The study had one hypothesis that stated that the socio-economic factors do not affect the market participation and production of small-scale groundnut farmers in Polokwane Municipality. The first hypothesis was rejected as the logistic regression proved that socio economic factors such as credit access, marital status, level of education and more positively influenced market participation. Other factors such as age, distance to market, price of commodities etc. makes it difficult for small-scale groundnut farmers in Polokwane Municipality to participate in the market.

The second that there are no factors affecting groundnut production of small-scale farmers in Polokwane Municipality negatively has been rejected as multi-linear regression model proved
that variables such as source of labour, seed variety and farming experience decreased the amount of groundnut output by small-scale farmers.

The following recommendations are made as part of corrective measures to improve market participation by small-scale groundnut farmers. The study calls for an improvement in the extension services provided as all interviewed farmers had no access. Extension services provide farmers with training on production strategies, risk management and marketing strategies that will enable small-scale farmers to produce at higher levels and participate more in the market. Providing farmers with extension services can assist them in market and technical information. The government also need to consider the issue of access to quality education in rural places as it was found statistically significant. Adult education can be a way forward to allow small-scale groundnut farmers to learn hands-on at the field. It is very imperative that small-scale groundnut farmers are supported and intensified with knowledge based on production and marketing of groundnuts in the study area to persuade and encourage them to participate fully in the market. In addition, this will eventually lead to creation of employment, equality, equity, food security, poverty alleviation amongst rural dwellers for sustainable development.

8. Recommendations for further research

The study primarily focused on the factors influencing the production and market participation of small-scale groundnut farmers in Polokwane municipality. The groundnut yield was found to be significant in affecting the market participation of small-scale farmers which indicates that farmers who produce more are likely to sell their commodities to the market. Hence, the implication is it’ imperative that government should assist small-scale groundnut farmers to increase farm size as the size of land result in one-unit increase in output amount. Farmers should also sell their produce in groups to lower the costs of transporting their produce to far located markets. Furthermore, more research studies relevant to the discipline of agricultural capacity are needed to investigate factors affecting the choice of market outlets by small-scale groundnuts farmers of developing countries.

9. References


