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Citation:

Mango, N., Makate, C., Francesconi, N., Jager, M. and Lundy, M. (2018) Determinants of market participation and marketing channels in smallholder groundnut farming: A case of Mudzi district , Zimbabwe, African Journal of Science, Technology, Innovation and Development. 1-11 p.

Publisher's DOI:
https://doi.org/10.1080/20421338.2018.1457274

Access through CIAT Research Online:
http://hdl.handle.net/10568/92494

Determinants of Market Participation and Marketing Channels in Smallholder Groundnut Farming: A case of Mudzi District, Zimbabwe

1. **Nelson Mango*.** Social Scientist. International Centre for Tropical Agriculture, P.O. Box MP 228, Mt. Pleasant, Harare, Zimbabwe. Tel: +254 722270913. nelsonmango16@gmail.com

2. Clifton Makate, Socio-economist, International Centre for Tropical Agriculture, P.O. Box MP 228, Mt. Pleasant, Harare, Zimbabwe. Tel. +263772658514. ruumakate@gmail.com

3. Nicola Francesconi, Senior Technical Advisor, Technical Center for Agricultural and Rural Cooperation (CTA), Agro-business Park 2, P.O. Box 380, 6700 AJ Wageningen, The Netherlands. +31 (0)317-467121. francesconi@cta.int

4. Matthias Jager, Senior Scientist, International Centre for Tropical Agricultural (CIAT), Apartado Aereo 6713, Cali, Colombia. +572 445 0000, m.jager@cgiar.org

5. Mark Lundy, Senior Scientist, International Centre for Tropical Agricultural (CIAT), Apartado Aereo 6713, Cali, Colombia. +572 445 0000, mlundy@cgiar.org

* Corresponding Author

Acknowledgements

The authors would like to acknowledge the financial assistance of the International Fund for Agricultural Development and International Centre for Tropical Agriculture (CIAT). They are also grateful to the language editor, Janine Thorne, for editing the article

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Abstract

This paper concerns the factors that are associated with market participation and choice of marketing channel by smallholder groundnut farmers in a semi arid district of Zimbabwe. It contributes to the existing body of knowledge on groundnuts, especially the marketing aspect. Data was derived from literature review and cross-sectional household baseline survey. We apply simple logistic regression framework to determine the factors associated with market participation and choice of marketing channel. Our study findings show that land size, access to transport information, distance to the nearest town, age and education of the household head were among the important factors influencing the decision to participate or not to participate in selling of groundnuts. Choice of a particular marketing channel is influenced by distance to the nearest town, education level of the farmer, access to remittances, and market information. In conclusion these findings suggest that an adjustment in each of these significant variables can influence the probability of market participation and an informed choice of marketing channels. In terms of policy, this implies that technological changes, infrastructural improvements, agricultural institutional developments, and capacity building of smallholder farmers can help to improve farmers' market participation and informed market channel choice.

Key Words: Capacity building; Institutional Development; Marketing; Smallholder Farmers; Technological Change; Zimbabwe.

1. Introduction

After staple cereals, legumes are the most important complementary food and income crops in smallholder farming systems. Legumes (e.g. groundnuts, soybeans, pigeon peas, cowpeas and beans) are relatively more drought-tolerant than cereals (e.g. maize, millet and wheat). They represent a good crop adaptation strategy against the effects of climate variability and change, particularly in semi-arid zones such as Mudzi district of Zimbabwe. Because of its high aridity, the district is not well suited to the cultivation of the country's staple food crop, maize, and its maize yield is only about 0.5 tonnes/ha (GoZ 2012). Given their drought tolerance, groundnuts (*Arachis hypogea*) are one of the most important crops for the district's farmers. This high-value crop has significant potential to sustain production in smallholder farming systems, and plays multiple roles in terms of cash income, food, and soil fertility improvement in cereal–legume rotations. Since groundnuts might be produced at a lower opportunity cost than cereals, growing groundnuts might assist farmers in Mudzi in alleviating poverty. They could benefit from trade with areas where suitable agro-climatic conditions create a comparative advantage in cereal production (e.g. natural regions I, II and III) (Zamasiya et al. 2014).

However, better access to markets is needed if the production and sale of groundnuts, and hence higher incomes for farmers, are to be facilitated. With better market access, the production of and income from grain legume production could be improved significantly. Markets offer farming households the opportunity to benefit from trade, according to their comparative advantage, as they can sell their surpluses and purchase the goods and services they need (Boughton et al. 2007; Barrett 2008). Market linkages have been identified as key to the successful integration of legumes into the smallholder farming systems of southern Africa. Market participation could be an effective route for rural smallholder farmers to move out of abject poverty and increase their income (IFAD 2003; Omiti et al., 2009). Low market

participation by smallholder farmers in developing countries has hampered agriculture-driven economic growth and exacerbated poverty, since farmers could not benefit from the associated welfare gains and income growth. For agriculture to make a meaningful contribution to economic growth, smallholder farmers have to commercialise their farming activities to produce marketable surpluses (Pingali, Khwaja and Meijer 2005). The question why smallholder farmers, who constitute the majority of the poor in developing countries, self-select out of the remunerative markets remains largely unanswered. It is therefore necessary to assess the key factors that influence their participation in groundnut markets in order to identify key entry points and interventions that might increase such participation and, hence, household income.

1.1. Groundnuts Production in Zimbabwe

Groundnuts are an important legume crop in most parts of the world. In Malawi and Senegal, for example, they account for 25–60% of households' agricultural income (Diop, Beghin, and Sewadeh, 2003). The crop is also widely cultivated in Zimbabwe, mainly by women, and smallholder production is estimated to account for 60–65% of national groundnut output (Rukuni and Mutungamiri 2000). Groundnuts provide a range of benefits to smallholder farmers. In addition, it fixes atmospheric nitrogen in soils and thus improves soil fertility and reduces the fertiliser needs of subsequent crops. This is particularly important given the rising prices of inorganic fertilisers, which make them hard for farmers to afford. Groundnuts are also an important component of both rural and urban diets, providing valuable protein, edible oil, fats, energy, minerals and vitamins. They are usually consumed as is, roasted or processed into oil. In Zimbabwe, however, peanuts are not usually crushed into cooking oil but are mainly grown for direct consumption and for processing into peanut butter (Esterhuizen, 2011).

During the 23 years from 1990 to 2012, the production of groundnuts in Zimbabwe was irregular. Table 1 and Figure 1 below show the total land area harvested in hectares, total production in tonnes, and yields in hectograms per hectare (hg/ha) in this period.

Table 1: Groundnut production in Zimbabwe, 1990–2012

Year	Production (tonnes)	Yield (hg/ha)	Area harvested (ha)
1990	119 094	6 107.38	195 000
1991	107 040	5 352.00	200 000
1992	34 032	2 268.80	150 000
1993	66 795	5 874.67	113 700
1994	66 361	4 945.52	134 184
1995	52 300	3 198.78	163 500
1996	80 250	5 451.77	147 200
1997	156 290	7 586.89	206 000
1998	59 700	3 142.11	190 000
1999	113 250	5 067.11	223 500
2000	190 890	7 120.10	268 100
2001	171 740	6 605.38	260 000
2002	120 000	4 649.92	258 069
2003	146 727	6 113.63	240 000
2004	64 157	4 811.57	133 339
2005	57 754	2 879.18	200 592
2006	83 170	4 720.31	176 196
2007	125 000	4 543.80	275 100
2008	80 000	4 444.44	180 000
2009	78 570	4 621.76	170 000
2010	106 147	4 143.02	256 207
2011	85 700	4 285.00	200 000
2012	92 850	4 220.45	220 000

Source: FAO, 2012

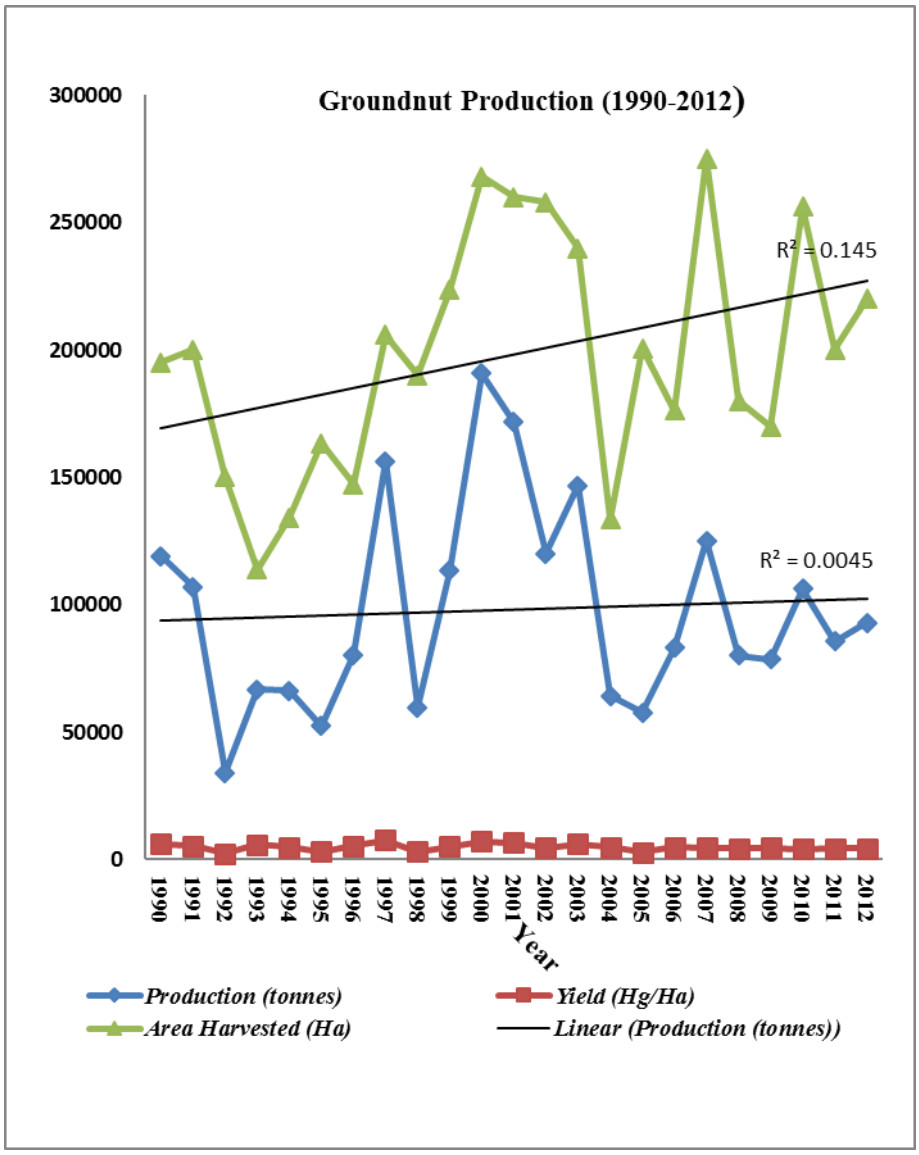

Figure 1: Groundnut production trends in Zimbabwe, 1990–2012

In 1990 a total of 195 000 ha of groundnuts were harvested, producing 119 094 tonnes at average yields of 6107.38 hg/ha. The next year, even though the total area harvested increased from 195 000 ha to 200 000 ha, total production and the average yield declined to 107 040 tonnes and 5352 hg/ha respectively. In 1992 the land area harvested dropped by 50 000 ha and both production and the average yield fell sharply (by over 68% and 57%

126 respectively). Between the 1992/93 and the 1995/96 seasons, the trends were similarly
127 unpredictable. In 1997 the total area harvested rose from 147 200 ha to 206 000 ha, while
128 average yields rose sharply (from 5452 hg/ha to 7587 hg/ha), as did production (from
129 80 250 tonnes to 156 290 tonnes). The next year saw a slight (7.8%) fall in the area
130 harvested, but an unexpectedly sharp fall in production (61.8%) and average yield (58.6%).
131 The numbers resumed an upward trend until 2000, when yield reached 7120 hg/ha and total
132 production peaked (for these 23 years) at 190 890 tonnes. The variability in production in the
133 decade to 2000 was caused in part by the drought of the 1990s (Munro, 2006), a poor choice
134 of varieties, and the cobweb theory of decision-making at time of production. The cobweb
135 theory is an economic theory that explains the reason why agricultural commodity prices may
136 be subject to periodic fluctuations in markets. It describes cyclical supply and demand in
137 markets where amount of produce must be chosen before prices are observed (Ezekiel, 1938).

138 Subsequently, the area under groundnuts increased to 260 000 ha in 2001, 258 000 ha in
139 2002, and 240 000 ha in 2003. However, production fell by over 10% in 2001 and by over
140 37% in 2002 (to 171 740 tonnes and 120 000 tonnes respectively). Yield likewise fell to
141 6605 hg/ha in 2001 and 4650 hg/ha in 2002. The irregular trend continued until 2012, due in
142 part to variable rainfall; low levels of technology; the post-2000 land resettlement
143 programme, which increased the proportion of land under smallholder farming; the harsh
144 macroeconomic environment, which paralysed the input and output markets; and possibly the
145 cobweb theory of decision-making.

146 The absence of a production pattern for the 23 years under review is confirmed by a slightly
147 upward linear trend line with a very poor goodness of fit ($R^2 = 0.45\%$). It is therefore
148 impossible to judge whether groundnut production has been increasing or decreasing; the
149 trend was simply irregular and characterised by large fluctuations. Studies suggest that this
150 irregular trend was caused by low adoption rates of improved varieties, soil infertility, the

151 continuous use of retained seed, and marketing problems (Esterhuizen, 2011). Of interest to
152 this paper is the limited market participation among smallholder groundnut producers, which
153 affects their ability to increase their production and, hence, incomes.

154 ***1.2 Groundnut Marketing in Zimbabwe***

155 In the history of sub-Saharan African countries, the governments used to play a crucial role in
156 assisting farmers with the marketing of agricultural produce. During the 1980s and 1990s, the
157 majority of these countries liberalized their economies in an effort to create open market-led
158 exchanges, aimed at boosting economic growth (Dorward et al., 2005). Whereas some
159 countries have removed government controls, some countries still assist farmers in marketing
160 through the use of Marketing Boards. Zimbabwe, amongst other countries, has reduced
161 government control in agricultural markets. The main reason for Zimbabwe embarking on
162 liberalization programs was due to the general failure of parastatal marketing boards and
163 donor pressure. Because of the liberalization of agricultural produce markets, smallholder
164 farmers have been faced with a variety of possible marketing channels for their produce. In
165 Zimbabwe, for example, farmers can sell their produce through the following channels: the
166 Grain Marketing Board (GMB), at farm gate, through private traders, agro dealers in distant
167 or local towns, or through other informal channels e.g. by the road side.

168 Although marketing is important, smallholder farmers still do not participate in markets,
169 especially when faced with pressures from market liberalization. The questions of whether or
170 not to participate in markets and which marketing channel or channels to follow are an
171 important part of smallholder farmers' decision making processes. Decisions on market
172 participation have implications for smallholders' returns and the livelihood security of their
173 households. Therefore, this research theme warrants further study. Studying factors that
174 influence market participation behavior can be a positive move in trying to answer the

hanging questions such as whether to participate in markets, and which marketing channel or channels to follow.

According to IFAD (2003) and Omiti et al. (2009), market participation can be an effective route for rural smallholder farmers to move out of abject poverty and increase income. Studies show that market participation by smallholder farmers in developing countries is very low, a development which has slowed down agriculture driven economic growth and exacerbated poverty levels. Moreover, choice of an appropriate marketing channel is considered one of the key ingredients for the successful marketing of both agricultural and non-agricultural products, as different channels are characterized by different benefits (profitability) and costs. According to Tsourgiannis, Errington and Eddison (2008), the marketing channel used when selling the product has a bearing on the profit farmers may make. Therefore, marketing channel choice decisions are very important, especially in a liberalized market economy like Zimbabwe where sellers can choose from a range of market channels.

Understanding factors that influence smallholder farmers' choice of a marketing channel for their produce is of paramount importance as findings can be useful in helping smallholder farmers to reap maximum benefits from the markets. In addition, such studies are even more vital in legumes because the legume sub-sector (groundnut, soybean, cowpea, and beans) has high potential to help diversify the economy, eliminate nutrition problems, improve food security status and therefore alleviate poverty in rural communities (Pokhrel, 2013; Zamasiya et al. 2014).

According to Barker (1981), marketing management should be of utmost importance to the individual farmer. If the aim is to make a profit from transactions, marketing considerations should be included in all decision-making processes; from short-term storage versus

immediate sale considerations, through to long-term planning of the structure of farming enterprises (Barker, 1981).

Smallholder farmers often face difficulties in both input and output markets. They usually face difficulties in enforcing contracts and meeting stringent food safety norms. They lack professional marketing skills, and some are located in remote areas and mostly rely on middlemen (Barret, 2008). Furthermore, they frequently have to deal with poor physical infrastructures and weak institutions in markets (Kherallah and Kirsten, 2001; Makhura, 2001). Understanding such challenges for the production and sales process of smallholder farmers is important in identifying areas that need focus and direction for improvement. In the light of these challenges, suggestions can be made on how to improve smallholder farmers' participation in output markets. Marketing literature argues that aiming to increase market participation through trade and price based market interventions is not enough to provide the necessary conditions to induce improved participation. In addition to these policies, households need to have access to productive assets, adequate private and public investment, and institutional and physical infrastructure to access remunerative markets. As such smallholder farmers with access to productive assets, private and public sector goods, properly functioning institutions and well-developed physical infrastructure tend to actively participate in markets, contrary to their counterparts.

The main objective of this study is to identify and assess those factors (technical, socioeconomic and institutional) influencing agricultural market participation behavior and choice of marketing channels amongst smallholder groundnut farmers in the Mudzi district of Zimbabwe. The study focuses on the factors that compel smallholder farmers to make certain marketing decisions. Thus, it considers factors that guide farmers in deciding whether or not to sell produce, and also focuses on those factors that influence the choice of marketing channels when selling groundnuts.

The rest of the article is arranged as follows. Section 2 deals with the research methodology which includes the description of the study area, sampling and data collection, and econometric model and data analysis. This is followed by results and discussion in section 3. Section 4 then presents the conclusions and policy implications of the study findings.

2. Research Methodology

2.1. The Study Area

The study was conducted in Mudzi district, which is in Mashonaland East Province of Zimbabwe, see Figure 2 below. The district is linked to the main groundnuts market (Harare) by a 250 kilometre tarred road. The study sites lie in natural farming zone IV, which is a semi-arid zone at an altitude of 500-900 metres above sea level. This natural farming region is an agro-ecologically low potential zone with high incidence of droughts and frequent long mid- and in-season dry spells. The mean annual rainfall in Mudzi district ranges from 450 to 500mm while the mean annual temperature is 23^0C. The predominant soil type is the Ferric Luvisols, which is ideal for groundnuts. Due to the high aridity, maize (the country's staple food crop) yield in Mudzi district is about 0.5 tonnes/ha which is better than the national average of 0.45 tonnes/ha (GoZ, 2012). Groundnut (*Arachis hypogea)* is one the most important legume crop grown in the area and the bulk of the population depends heavily on it for survival.

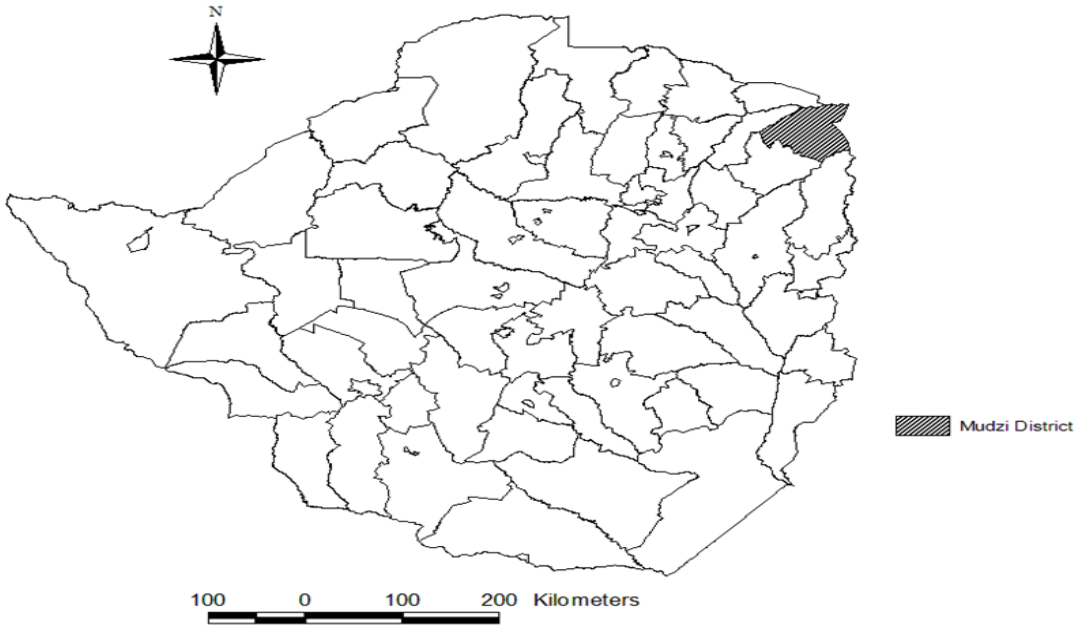

Figure 2: Map of Zimbabwe showing Mudzi district (Mango et. al 2014)

2.2 Sampling and Data collection

This study uses cross-sectional household data from a baseline survey that was conducted through structured interviews under the auspices of the ‘‘Increasing smallholder farm productivity, income, and health through widespread adoption of Integrated Soil Fertility Management (ISFM) in the Great Lake Regions and Southern Africa” project, and data from the “Putting Nitrogen to work for smallholder farmers in Africa” project. Simple random sampling was used to select the wards from a list of wards obtained from Mudzi district, while the households for interviewing were selected from lists that were provided by resident agricultural extension officers. A total of 120 households were selected for in-depth interviews. Data collection for this study was done in December 2011 through face-to-face administration of questionnaires.

The data collection involved a household survey that was conducted by using a questionnaire with semi structured and structured questions. Two focus group discussions were conducted separately with smallholder groundnuts farmers who sold their groundnuts and those who did not sell, in order to establish the factors that affect their market participation. We support findings from our regression with notes from the focus group discussions. Through the survey, information was collected on household demographics and socioeconomic characteristics, transaction costs, groundnut production and marketing, problems encountered with buyers, and household asset ownership.

2.3 Econometric modeling and Data analysis

2.3.1 Conceptual framework

We developed a simple model of market participation for groundnut farmers in Mudzi district of Zimbabwe. Apart from growing groundnuts, each farmer studied also grows other crops for both consumption and sales. However, in this paper, we placed our focus on the production and sales of groundnuts. Each farmer is considered a utility maximizer, that is, he or she derives some utility from either selling or not selling crops. We think of the decision making process as taking place in two stages. At the first stage, the farmers decide whether to sell or not sell their groundnuts. If they decide not to sell, we assume that there is some utility associated with holding on to their groundnuts, i.e. they may either consume their groundnuts, or give them to their relatives as gift, or use them as seed for the next season. Without loss of generality, we normalized this utility associated with not selling to zero. In the second stage, conditional on deciding to sell, the farmer chooses the type of market to sell to. They either choose to sell at the farm gate, or local village roadside market, or local town or a combination of the markets mentioned. We summarize this decision making process in Figure 3:

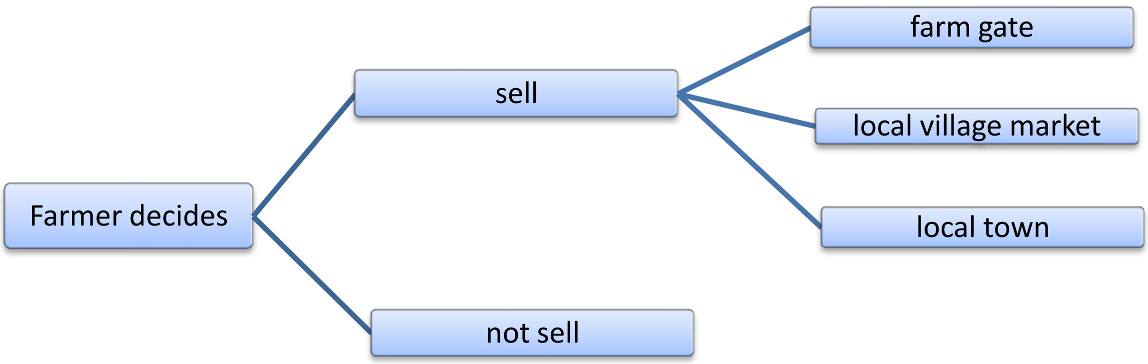

Figure 3: Farmers' decision making process

2.3.2 Econometric model

We modeled the decision to sell groundnuts, and choice of market in a simple logistic regression and report the odds ratios. Our empirical specification takes the following form:

$$S_i{}^* = \beta X_i + \varepsilon_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where $S_i{}^*$ is the unobserved probability that the farmer either sells or not sells his or her groundnuts. If the farmer decides to sell groundnuts, $S_i{}^*$ also measures the propensity or likelihood of selling either at the farm gate, local village roadside market or nearby town (local town). The vector X_i controls for the household and farmer related characteristics and ε_i is an error term that follows a logistic distribution. The farmer sells whenever $S_i{}^* > 0$. Since $S_i{}^*$ is not observable, the data we use asks the farmers whether they sold or did not sell their produce, as well as to which market they choose to sell. The farmers sampled were asked a specific question on market participation, to which they could answer whether they sold their groundnuts or not with yes or no. We constructed an indicator variable to represent this decision:

$$S_i = \begin{cases} 1 \text{ enters market} \\ 0 \text{ otherwise} \end{cases} \quad \text{.....(2)}$$

299

300 Additionally, the farmers were asked where they had decided to sell their groundnuts with the
301 following possible responses; farm gate, local village roadside market and local town. We
302 also constructed individual indicator variables to represent these choices as formalized below:

303

$$S_i^j = \begin{cases} 1, \text{ if farmer sold to the market j} \\ 0, \text{ otherwise} \end{cases} \quad \text{.....(3)}$$

304

305 Where $i = 1.....,120$ farmers, and market choices are represented by
306 $j = \{\text{farm gate, local town or local market}\}$. One of the reasons why farmers might decide to
307 sell to either the local town or local village roadside market or at the farm gate might be the
308 distance to that particular market, the quality of their product (whether graded or ungraded,
309 clean or sorted), the prevailing market prices per kg, and the availability of customers, among
310 others. We treat the three available markets as independent. This we did because farmers
311 could sell produce to more than one marketing channel in the same season. It therefore,
312 suggests that certain factors could influence the farmer's decision to sell to each of the
313 markets without necessarily making reference to other markets available. This study was
314 therefore interested in identifying such factors. For example, what influence the farmer to sell
315 groundnuts at the farm gate, at the local town or local roadside market without necessary
316 making other available markets as reference points? In other words our aim is to estimate the
317 individual probability for each category (marketing channel). We therefore adopt separate
318 logit models to explain this phenomenon. An alternative technique could be adopting the
319 multinomial logit model, but according to Agresti (2007) if the objective is to find individual

probabilities for each category (marketing channels) using individual binary logit models is justified.

We ran four different logit specifications. The first specification models the decision to sell groundnuts with age, agesq, male, hsize, landsize, markinfo, remit, d2town, transpinfo, hybmaize, educ, ownstorage as explanatory variables (see Table 2 for a description of these variables). In model 2, 3 and 4 we made an attempt to determine the factors associated with selling at the farm gate, local village roadside market or local town respectively. Different combinations of the explanatory variables were utilized to determine the factors associated with the choice of the market. We further make use of the Variance Inflation Factor (VIF) command in STATA to detect possible multi-collinearity (correlation between predictors) problems in our logistic regressions. We found no to minimal collinearity as the variance inflation factors ranged between 1 and 4.

3. Results and Discussion

3.1 Socioeconomic attributes of the sample

Table 2 displays the general socioeconomic characteristics of the sampled population. Statistics show that about 46% of the sampled groundnut producers participated in the groundnut market at the time of the survey. Mainly three channels were reported to be used as destination for groundnut output for those who participated in the market at the time of the survey: farm gate, local village/roadside market, and local town (Kotwa or Mutoko). In terms of marketing opportunities information, survey results show that only 34% of the sampled groundnut producers had access to marketing opportunities information. Access to transport information was very low as well with only 26% of the groundnut producers noted to have access at the time of the survey. Another important observation was that most of the

groundnut producers had access to storage facilities. About 92% of the groundnut producers either rented or owned a grain storage facility at the time of the survey.

Generally the sample was composed of middle aged farmers with an average of 52.2 years of age. In terms of education, about 86% of the groundnut producers had attained at least primary level education at the time of the survey. Important to note as well is that the sample was dominated by male household heads who have influence on decision making concerning groundnut production and marketing. Furthermore, survey results show that on average each household had about six family members at the time of the survey.

Table 2: Definition of variables

Variable	Variable definition	Mean	Std dev	Min	Max
sellgnut	Indicator variable: market participation; 1=sell, 0=otherwise	0.46	0.50	0	1
fgate	Indicator variable: sold groundnuts at the farm gate	0.23	0.42	0	1
lmarket	Indicator variable: sold groundnuts at local village roadside market	0.06	0.23	0	1
ltown	Indicator variable: sold groundnuts in local town	0.17	0.37	0	1
age	Age of household head	52.23	14.94	23	99
agesq	Age squared	2950.77	1676.29	529	9801
male	Indicator variable for male farmer	0.78	0.42	0	1
hsize	Household size	5.91	2.42	1	17
landsize	Total land size	2.98	2.10	0	13
markinfo	Indicator variable: market opportunities information access	0.34	0.47	0	1
remitt	Indicator variable: farmer receives remittances	0.40	0.49	0	1
d2town	Distance to nearest town	133.21	103.75	3	290
transpinfo	Indicator variable: availability of transport information	0.26	0.44	0	1
hybmaize	Indicator variable: grew hybrid maize during 2010/11 season	0.94	0.23	0	1
educ	Household head education: 0=none;1=primary;2=secondary or higher	1.32	0.71	0	2
ownstorage	Indicator variable: farmer owns or rents groundnut storage facility	0.92	0.28	0	1
gnutcons	amount of groundnuts kept for consumption	267.75	368.49	0	1800

Generally landholding per household was very low in the area. On average each household owned 2.98 acres (1.2 hectares) of land. Apart from growing groundnuts, most farmers also grew hybrid maize, though maize yields were reported to be dismally low (below 0.5 tonnes/ha) contrary to the one reported by the government (GoZ 2012) as 0.5tonnes/ha. In terms of off-farm income sources, some groundnut farmers in Mudzi (40%) were reported to have access to remittances. Another important observation was that on average, farmers travelled 133 km to reach the nearest town. More information on the statistics means, standard deviations, minimum and maximum is shown in Table 2.

3.2 Market participation and Marketing channel choice

Table 3 presents logit regression results on groundnut marketing decisions by smallholder groundnut producers in the Mudzi district of Zimbabwe. As previously stated, Model I, Model II, Model III, and Model IV are four separate logistic regression models for groundnut market participation (sell or not sell), sell at farm gate, sell at local village roadside market or sell at local town respectively. The models II, III, and IV present results on factors influencing choice of the available marketing channels (farm gate, local village roadside market and local town).

Table 3: Logit Regression results: Groundnut marketing decisions in Mudzi District

	Model I	**Model II**	**Model III**	**Model IV**
Independent variables	(market participation)	(sell at farm gate)	(sell at local village roadside market)	(sell at local town)
age	1.265**	0.937	1.124	1.156
	(0.09)	(0.12)	(0.21)	(0.14)
agesq	0.998**	1.000	0.999	0.999
	(0.00)	(0.00)	(0.00)	(0.00)
male	0.725	2.853	0.229	
	(0.24)	(2.02)	(0.19)	
hsize	1.104	0.821*	0.817	1.395***
	(0.07)	(0.08)	(0.15)	(0.13)
landsize	1.445***	0.840	0.717	1.256**
	(0.12)	(0.08)	(0.13)	(0.11)

markinfo	1.039	2.122	0.0583**	1.195
	(0.39)	(1.34)	(0.06)	(0.71)
remitt	0.580	8.604***	0.194	0.401
	(0.18)	(4.74)	(0.17)	(0.19)
d2town	0.995**	1.007**	0.987**	0.995*
	(0.00)	(0.00)	(0.00)	(0.00)
transpinfo	5.690***	0.209*	5.856	1.257
	(2.55)	(0.14)	(5.68)	(0.80)
hybmaize	0.761	0.352		
	(0.41)	(0.33)		
_Ieduc_1	3.082*	0.286		
	(1.50)	(0.26)		
_Ieduc_2	2.998*	0.0410**		
	(1.66)	(0.05)		
ownstorage	1.341			
	(0.70)			
gnutcons		0.999*		
		(0.00)		
N	351	159	159	159

Notes: Exponentiated coefficients; Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

We report and discuss model results in detail in the succeeding subsections. Precisely, market participation and marketing channel choice results are interpreted and discussed in separate sections. Reported in the four (4) logistic regressions are Odds ratios as our main thrust was to reveal chances of households making those decisions. Odds ratios estimates the changes in odds of membership in the target group for a single unit increase in the predictor.

3.2.1 Market participation

Results in Table 3 show that for the logistic model (I), transport information access, education, age, land size and distance to town were significant in influencing groundnut market participation.

The odds of participating in the groundnut market for farmers who had access to transport information were 5.7 times the odds of those without transport information access. The result was significant at 1% level of confidence. This is probably due to the fact that transport information access has a huge bearing on marketing in general. Households with access to transport information are more likely to secure means of delivering their produce in time to markets of their choice as compared to farmers without access to transport information. According to Barret, (2008), access to such information reduces smallholder farmers risk perceptions and improves the likelihood of participating in the groundnut market.

The odds of participation in the groundnut market for farmers who had attained either primary or secondary school level were approximately three times as high as the odds of farmers who had not attained either of the two education categories. The result was significant at 10% level of confidence. This can be explained by the fact that formal education enhances managerial competence and the successful implementation of improved production, processing and marketing practices. Furthermore, a higher level of education has an implication for the ability to understand and interpret extension information. Thus, education levels affect the interpretation of market information and hence, the market participation level of farmers (Jari, 2009). These results are consistent with the findings of Jari (2009) on institutional and technical factors influencing agricultural marketing channel choices amongst smallholder and emerging farmers in the Kat river valley.

In terms of age, a one year increase in age of the household head is associated with a 27% increase in the odds of participating in the groundnut market. The result was significant at 5% level of confidence. Age of the household head has been shown to be synonymous with farming experience in some studies (Matungul, Lyne and Ortman, 2001). This observation could imply that older farmers, due to various years of experience gained in groundnut farming, are more likely to realize the benefits of participating in markets than young

406 inexperienced farmers. Moreover, the results show that as farmers grow old, their physical
407 energy reduces. Hence, they will take their produce to the market to compensate for their
408 inability to produce other crops, and consequently they tend to have a better income.
409 However, results show a controversy with findings of Randela, Alemu and Groenewald
410 (2008) who in general concluded that older farmers tend to be more subsistent, and take
411 farming as a way of life rather than as a business. Consequently, they face low market
412 participation.

413 Land size also significantly influenced farmers' decision to participate in the groundnut
414 market. One acre increase in land size of the household is associated with a 45% increase in
415 the odds of participating in the groundnut market, upshot significant at 1%. A possible
416 explanation is that, the larger the size of arable land a household uses, the higher the
417 production levels are likely to be, and the higher the probability of market participation.
418 Results are consistent with findings of Randela, Alemu and Groenewald, (2008) on factors
419 enhancing market participation by small-scale cotton farmers who also found land to be a
420 significant factor of market participation decisions.

421 Distance to the nearest town also had a significant influence on market participation. An
422 increase in the distance to the nearest town by 1 kilometer is associated with a 0.5% decrease
423 in the chances of farmers participating in the groundnut market, upshot significant at 5%
424 level. This is probably due to the fact that an increase in the distance travelled to the market
425 increases marketing transaction costs. As a result farmers are discouraged to participate in
426 distant markets. Although prices for shelled and unshelled groundnuts are higher in Harare
427 (distant market) compared to Mudzi, the high transport and marketing costs make it
428 unattractive to sell in distant markets. These results are consistent with the findings of Alene
429 et al. (2008) and Omiti et al. (2009) who also argued the same with regards to the effects of
430 increased transaction costs associated with more distance travelled to access produce markets.

3.2.2 Choice of Marketing Channel

a) Selling at farm gate

Logit model (II) results shown in Table 3 demonstrate that access to remittances, education level attained by head of household, distance to nearest town, household size, transport information access, and amount of groundnut kept for consumption bear a significant influence on farmers' decision to sell at farm gate.

Conditional on selling groundnuts, results confirm that the odds of selling at farm gate are 8.6 times higher for households that receive remittances as compared to those who do not. Result was found to be significant at 1%. This could imply that households who receive remittances are less motivated to bring their produce to distant markets so that they earn more, since they have remittances as an additional source of income and direct cash.

Given that the groundnut farmer sells his crop, results reveal that the odds of a groundnut farmer selling produce at farm gate are about 5 times less likely if he or she has access to transport information, as compared to a scenario where the farmer has no access to transport information. The result was significant at 10%. This could imply that farmers without transport information face challenges in finding ways of delivering their produce to distant markets. As a result, they are forced or it becomes convenient for them to sell their produce at farm gate. Moreover, access to market information reduces transaction costs for the farmer. This encourages participation in distant markets at the same time as it discourages selling at farm gate.

Results also show that conditional on selling groundnut, the odds of selling groundnut produce at farm gate for farmers with at least secondary education are approximately 24 times less likely as compared to those farmers with a lower level of education. The result was

found to be significant at 5%. People with higher educational levels are more able to interpret information than those who have less education or no education at all (Mather and Adelzadeh, 1998). Thus, education levels affect market information interpretation, and hence, marketing channel choice by farmers. Highly educated farmers seem to realize that selling to more lucrative markets results in higher profits, and therefore tend to rely on distant (more lucrative) markets than the less educated *ceteris paribus*.

Furthermore, results reveal that conditional on selling groundnuts, an increase in distance by one kilometer to the nearest town increases the odds of selling groundnut produce at farm gate by about 0.7%. Result to be significant at 5%. This could be explained by the fact that an increase in distance travelled to the nearest town raises marketing costs incurred by the farmer. This could discourage the farmer from selling produce in distant markets, and therefore he or she opts to sell at farm gate. These results are consistent with findings of Dorward et al. (2003) who also argued for transactions costs associated with distance to markets as important covariates of marketing decisions.

Household size also significantly influenced farmers' choice to sell at farm gate. Results reveal that an increase in household size by one member decreases the odds of selling at farm gate by 18%. The result was found to be significant at 10%. Household size has an influence on marketing, since it affects consumption and production patterns (Randela, 2005). A larger household size discourages selling because the household needs to supply household consumption first. Alternatively, this could be explained by the fact that as household size increases, more profitable options by the household head should be explored to sustain the added family responsibility. As a result, farmers tend to search for more profitable output markets than selling at the farm gate, so as to increase earnings from the sale of groundnut.

The amount of groundnut kept for consumption was found to influence decision to sell at farm gate as well. Logit regression results reveal that a kilogram increase in the amount of groundnut kept for consumption by the household decreases the odds of selling output at farm gate by 0.1% *ceteris paribus*. This implies that as the amount of groundnut produce kept for the household own consumption increases, less produce is left for sale and the household is discouraged from selling surplus at farm gate. Results comply with findings of Sunga (2011), who found that farmers left with small quantities of produce have little opportunity to sell, and are more likely to sell to other households within village than to private traders.

b) Selling at local village roadside market

Model (III) results reveal that the decision to sell to local village roadside markets was influenced by market information access and distance to the nearest town.

Conditional on selling, results reveal that for farmers with access to market information the odds of selling groundnut produce at local village roadside markets ("musika[1]") are 17 times lower than for farmers without access to market information. The result was found to be significant at 5%. This could imply that well informed farmers tend to rely less on local village roadside markets as they know they can benefit from more lucrative markets. With market information farmers can weigh the pros and cons of the available market options, and as result make well informed choices on which markets they rely on. These results are consistent with findings by Jari (2009) in his study on the analysis of institutional and technical factors influencing agricultural marketing amongst smallholder farmers in the Kat River Valley, Eastern Cape Province, South Africa.

Given that the farmer sell his/her groundnuts, results also reveal that a kilometer increase in distance to the nearest town decreases the odds of selling groundnut produce at local village

[1] Musika is the Shona translation word for local village markets

roadside markets by 1.3%. Result was significant at 5%. This result could imply that farmers sold their produce at distant markets e.g. at the local town market maybe in search for better marketing margins or at farm gate to reduce cost associated with transporting their produce to the available roadside markets relative to selling at farm gate .

c) Selling at local town

Model (IV) results, as shown in Table 3, reveal that the decision of farmers to sell their groundnut output in the nearest town was conditioned by household size, land size and distance to the nearest town.

Logit regression results show that an increase in the household size by one member raises the odds of selling groundnut produce to the nearest town by 40%. A possible explanation is that with the household head facing increased responsibility, he or she is more likely to search for competitive prices for his/her groundnut produce in nearby towns, so as to meet the demands of his/her growing family. In other words, this implies that an increase in the size of the household and the consequential need to feed more mouths enhances farmers' dedication to marketing their produce for higher profits. Hence, the farmers strive to fetch competitive prices in distant markets. Alternatively, the result could imply the importance of family labour in promoting selling at distant lucrative markets. Labour availability is also an important and necessary variable that influences farming decisions including marketing (Wollni and Zeller, 2007).

The results also show that an increase in land size by one acre increases the odds of selling groundnut output in nearby towns by 26%. The more arable land the household has, the higher the production levels are likely to be, which tends to lead to a higher probability of participating in distant markets. With an increase in land size, considering the suitability of the groundnut in drier areas as compared to other crops, farmers might devote more land to

groundnut production, leading to a higher produce. More surpluses in groundnut output encourage farmers to sell their produce in more competitive markets, so that they earn more. Considering the increase in production costs with large area grown to groundnuts, farmers will tend to approach competitive markets in order to get higher returns that will cover their production costs. These results are consistent with findings of Machethe, Jagwe and Ouma, (2008). The major conclusion in their paper was that larger land sizes raise the probability of market participation for sellers, since land is a critical production asset having a direct bearing on production of a marketable surplus, *ceteris paribus*. This implies that those farmers with large tracts of land are more likely to participate in markets, especially in larger ones.

Finally, an increase in distance to the nearest town by one kilometer was found to decrease the odds of selling groundnut output to the nearby town by 0.5 %, upshot significant at 10%. In general, farmers are discouraged to go to distant markets due to an increase in marketing costs associated with increased travelling distance. For farmers in very remote rural areas, e.g. in Mudzi, geographic isolation through distance creates a wedge between the farm gate and market prices. This discourages farmers to participate in distant markets. These results are consistent with findings by Gebremedhin and Jaleta (2010) who also found distance to be an important determinant of farming households' marketing decisions.

4. Conclusion and Policy Implications

In this paper, we have attempted to identify factors influencing groundnut marketing decisions amongst smallholder farmers in the Mudzi district of Zimbabwe. The paper gave an overview of identified factors that influence groundnut market participation (sell or not sell), and factors that influence marketing channel choice. Only 45.8% of those smallholder farmers that cultivated groundnuts sold part of their harvest. We found that for those that sold

their groundnut produce mainly three channels were used: the farm gate (50.9%), local village roadside markets (36.4%), and markets in nearby towns (12.7%).

The econometric analysis suggests that statistically significant variables influencing market participation are land size, transport information access, distance to nearest town, age of household head, and level of education of household head. Age of household head, land size, transport information access, and level of education of household head were found to have a positive influence on the likelihood of households participating in the groundnut market, whilst distance to the nearest town had a negative influence on the likelihood of households participating in the groundnut market.

Conditional on selling groundnuts, factors influencing marketing channel (farm gate, local village roadside market or local town) choice were found to be as follows:

Household size, access to remittances, distance to nearest town, access to transport information, education level of household head, and amount of groundnut kept for household consumption were found to influence the farmer's decision to sell his/her groundnut produce at farm gate. Household size, access to transport information, level of education of household head, and amount of groundnut kept for household consumption were found to have a negative influence on the likelihood of farmers opting to sell at farm gate, whilst access to remittances and distance to nearest town were found to have a positive influence on the probability that farmers sell groundnut produce at farm gate.

Factors influencing the likelihood of smallholder farmers selling their produce in local village roadside markets, e.g. village markets, were found to be access to market information and distance to nearest town. Both factors were found to have a negative influence.

570 Household size and land size were found to have a significant positive influence on the
571 likelihood of the farmer selling his/her groundnut output in the nearest town. However,
572 distance to town had a negative influence.

573 These findings suggest that an adjustment in each of the significant variables can influence
574 the probability of market participation and an informed choice of market. That is to say,
575 deliberate focusing or targeting by agricultural development practitioners of strategies that
576 directly improves the noted variables will improve marketing decisions amongst groundnut
577 producers in Mudzi. Improving market linkages of the farmers, groundnut market upgrading,
578 access to information (transport, extension and market), amongst other things could help in
579 improving marketing decisions in groundnut farming.

580 Considering that smallholder farmers generally cannot individually compete with commercial
581 farmers on the market, and that it is difficult for them to get individual contractual
582 agreements because of their small marketable surpluses, beneficial institutional
583 improvements can be implemented in the form of cooperatives or marketing groups. We
584 would recommend farmers, possibly with the help of local extension personnel, to form
585 marketing groups based on trust and commitment in order for them to compete with
586 commercial groundnut producers on the market. Through farmer marketing groups, social
587 capital is likely to be widened, and farmers will be linked to other market chain actors. This
588 development will raise market participation, and stimulate farmers to make informed choices
589 on marketing their output.

590 In terms of policy we do recommend that the Zimbabwean government can support the
591 smallholder groundnut producers as well, mainly through technical innovations.
592 Improvement in public investment facilities could lead to improved roads, transport systems,

593 and telecommunication systems that will eventually lead to better access to lucrative market
594 places.

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