

The degree and determinants of smallholder commercialization in two rural provinces of South Africa

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Abstract: The shift of smallholder agriculture from subsistence to commercial oriented farming manifest itself at various levels of production. Yet many existing studies in South Africa are biased. In these studies, commercialization is only assessed at one level, market output. In addition, in the marketed output dimension, focus is placed on crop production, ignoring livestock production despite its importance to rural households' livelihoods. To expand this literature, this study takes a multifaceted approach and assesses smallholder commercialization at three levels, considering livestock production. Using the Crop Commercialization Index (CCI) and the Livestock Commercialization Index (LCI), we find that on average potential emerging farmers sell 30 per cent of their live animals and 70 per cent of their crops per season. This is an indication that smallholder farmers participate in informal output markets. However, output market participation is stronger on crops than in livestock. Results of the Tobit model shows that determinants of commercialization differ between livestock and crop activities. Participation in formal markets remains a challenge. The article ends with market integration and land redistribution recommendations.

Keywords: commercialization; market participation; Smallholder; South Africa

Introduction

The role of smallholder agriculture in rural economic growth and development has been widely recognized and well documented [see: 1; 2; 3; 4]. Most notable is the evidence from Asia's Green Revolution, which has shown that agriculture can be used as a vehicle to drive rural economic growth and development [5]. Rural economic growth through smallholder agriculture can be achieved along many avenues, one of which is increasing rural incomes. This is because agriculture creates a demand for non-farm goods and a supply of food which improves food security. However, one of the necessary conditions for this role to be realised is a shift of smallholder agriculture from subsistent orientation to commercial orientation and thus commercialization [6].

In South Africa, as is the case in Asia, a trajectory of smallholder from a continuum of subsistence to commercial orientation exist. Between these extremes is a group of so-called 'emerging smallholders' who are semi-commercial orientated in the sense that they at least sell part of they produce and aspire to fully commercialise their production [7;8;9]. However, how much does 'at least' quantifies and what are the driving forces behind their commercial behaviour? This article focusses on emerging smallholder farmers and seeks to shed light on this hiatus.

While smallholders across the globe share similar features, they do not; however, operate in the same policy environment. Similarly, while many studies elsewhere [10; 11;12;13] have investigated the commercialization of smallholder agriculture and determinants of commercialization, their findings may not necessarily be true in the South African case. As von Braun and Kennedy [14] argued that influence and impact of commercialization depend on local context and policy environment. Although other studies have focused on South African context [e.g., 15; 16; 17], these studies only focused on crops (mostly on one specific crop) and ignored livestock and only looked at one dimension (output market participation).

To address the shortfalls of the previous studies, this study takes a multifaceted approach. We assess smallholder commercialization at three levels, firstly, we look at market orientation (of both crop and livestock), secondly, we look at the extent of hired labour use, and thirdly we look at market participation in terms of output. Further, this study covers two provinces which according to Statistics General Household Survey [18], houses more than 40% of smallholders in the country. In the existing literature, there are very few, if any studies that have extensively assessed smallholder commercialization jointly according to all the above-mentioned levels.

In addition, increasing understanding in this knowledge gap is motivated by the important role that semi-commercial and commercial smallholders are expected to play in rural economic growth as envisaged in the National Development Plan. According to chapter six of the National Development Plan (NDP), agriculture is one of the industries that has the highest potential for job creation. It is envisaged that emerging farmers will create 165 000 primary jobs and 82 500 jobs in secondary employment [19]. Moreover, Machete [1] and Pauw [20] contend that for small-scale agriculture to play a role in reducing rural poverty there has to be some degree of commercialization. Given the above mentioned role of smallholder agriculture, as Vink [21] suggests, we need to know more about different modes of production and how they are changing in order to make informed policy decisions. Therefore, there is a need to better understand the “at least” commercial oriented smallholders and their determinants, especially that part of them (emerging and commercial smallholders) has been identified as land redistribution beneficiaries [22]. The article unfolds as follows: in the subsequent section we provide a summary of literature. This is followed by a description of the study methodology, then we present the study results and finally conclude with policy recommendations.

The process of smallholder commercialization: a review of literature

The concept and definition

It is commonly accepted that agricultural commercialization is the shift from subsistence production towards commercial orientation and is regarded as an indispensable path to rural economic growth [10; 23; 4]. However, there is no consensus on the definition of commercialization and this lack of consensus stems from the way authors perceive how agricultural commercialization should be measured. One stream of thought, views agricultural commercialization as the degree to which the agricultural households produce output for the market [e.g.,24]. Conversely, the other stream of thought adds to this view by combining both the proportion of marketed output and the extent of using purchased inputs in relation to total value of production rather than using own non-tradable inputs [e.g.,25].

Different from the above views, is Pingali and Rosegrant’s [10] view, and asserts that, agricultural commercialization is more than just selling a proportion of output to the market, but goes beyond that and looks at the production decisions of agricultural households. They assert that commercial oriented agricultural households base their production decisions on principles of profit maximisation and comparative advantage, unlike subsistence households who base their production decisions on meeting subsistence requirements and sell only surplus from their production.

The process of commercialization stimulates employment creation as the production intensifies and expands, the more labour will be required [11]. In addition, as more production occurs, household incomes are increased. The demand for non-farm goods and service such as fertiliser, seeds and veterinary services etc., also [4]. These benefits are the motivation behind the NDP’s emphasis on the potential of smallholder agriculture. Furthermore, several development initiatives have been put in place to promote commercialization of smallholders by the South African government and non-government organisations. These include, among others, the Land Redistribution policy which attaches emphasis on redistributing land for commercial agricultural production, the Massive Food Production Programme that was implemented in the Eastern Cape [26], and the National Commercialization of Indigeneous Goats Project implemented in various parts of the country [27]. The recent initiative is the DAFF “commercialization of Black Farmers” which targets 50 farmers in each province to receive support including market access [28]. However, because the process of commercialization is not static it is not clear, how successful these initiatives were. Lastly, commercialization is assessed in various ways and one of which is the choice of production inputs.

Input product choice as a sign of smallholder commercialization

The transition from subsistence to commercial production systems among smallholders entails a change in the choice of inputs and services used in the production. Pingali [10;11] have noted changes in Asian smallholder farmers transitioning to commercial production systems. In terms of crop inputs, kraal manure is replaced with mineral fertiliser, traditional seed varieties are replaced with hybrids or high yielding varieties, animal power is replaced with mechanical power (tractors), and reduced reliance on family labour to hired labour. This entails moving from reliance on non-tradable inputs to tradable inputs. This can also be related to livestock production systems, where the use of traditional non-descriptive breeds is replaced with specialised, high yielding breeds and reduced reliance on ethno-veterinary medicines to treat livestock diseases is replaced with conventional commercial vaccines. While commercialization is assessed by the choice of input use, it is also influence by various factors.

Determinants of smallholder commercialization

Using evidence from Latin America, Asia and Africa, von Braun and Kennedy [4] identified two broad groups of factors driving or determining commercialization, namely exogenous and endogenous factors into the household. Exogenous factors are mainly factors over which the household or farmer has no control over. These include,

population growth, globalisation, and technological change, rising per capita income, changes in consumer preferences, increased awareness of nutrition and changes in macroeconomic policies. While endogenous (farm level) factors are related to the farm and farm characteristics such as asset holdings, household size, age and gender and risk attitude of the household head.

Several studies both international and local have confirmed some of these variables in their influence on agricultural household commercialization. For example, [12] using panel data from Kenya, found that the age of the household head and household size were negatively related to vegetable commercialization and they related this to risk aversion among farmers who are older and have a large household size. They further found that livestock ownership was positively related to vegetable commercialization. Bekela and Alemu [29] in Ethiopia found that age land size, livestock holding, and household size determine household commercialization.

In Mpumalanga, South Africa [16] found that age, ability to speak English, dependence ratio, trust, land size and livestock ownership had a positive influence on cotton farmers' commercialization and the last four variables influence commercialization negatively. Most recently Kibirige [30] found that household size, source of irrigation water and social capital had a positive influence on household maize commercialization in the Eastern Cape's irrigation schemes Qamata and Tyhefu, while off-farm income and social values had a negative influence on household maize commercialization. The findings from these studies shows that farm level commercialization and its determinants differ from region to region and depends on which crop is evaluated for commercialization. Lastly, commercialization does not happen by chance, but is enabled by a conducive policy environment.

Enabling conditions for smallholder commercialization

While commercialization of smallholders is widely acknowledged to be an indispensable path to rural economic growth and development, a conducive environment¹ is required to facilitate the process. In support of this view,[11] argued that commercialization should not be expected to be a frictionless process and emphasised the need for implementing appropriate policies. Through a review of literature, a summary of the most important conditions in relation to the local context is given.

The first condition which is a prerequisite for smallholder commercialization is market access. There is substantial empirical evidence both locally and elsewhere showing that where there is a lack or limited access to market, rural households tend to direct their production decisions to subsistence production [e.g. 31]. Likewise, when there are well functioning markets agricultural households responds well and direct their production decision to sales. For an example, the earlier generation of black commercial farmers in 1860s and 1870s who have responded well to new farming methods, and directed most of their production to market [32]. Moreover, [17] in KwaZulu-Natal found that market access is one of the incentives for increasing smallholder participation in agricultural activities.

Further, market access has to be accompanied by infrastructure development to reduce the negative impact of transaction costs. In relation to these two points, in South Africa a large body of literature has revealed that there is a lack of both a limited access to market and high transaction costs among smallholders [see: 33 ; 34; 35]. Many smallholders only penetrating to informal and loose value chain markets [36]. Given the above argument, a slow process of commercialization can be expected.

The second condition is access to production assets. The important production assets include (but are not limited to) land with secure property rights, human capital, credit and farm implements [16]. Empirical evidence has shown that agricultural households who own these assets tend to be more commercialised than those who lack or own very few production assets [16;37]. Chipfupa and Wale [38] in KwaZulu-Natal, has shown that ownership of production assets and market access influence willingness to expand irrigation production, thus leading to more commercialization.

In relation to the above factors, in the context of this study, there is a general agreement from these [39; 40; 18] that the majority of smallholders in South Africa are found in the former homelands. Characterised by households farming in communal land with weak property rights that mostly deny them access to credit, as they are unable to use their land as collateral in applying for credit. Barrett [41] has argued that in southern and east Africa, in order to induce commercialization of smallholders, institutions, resource endowment and prices have to be 'right' and this view is also shared by [43] in the local context.

The third important factor is access to agricultural extension together with research and development [23; 44]. Agricultural extension service is important in facilitating the process of commercialization, as farmers in transition

¹ This is based on evidence from Asia, where commercialization was a success due to appropriate policies implemented [see 42].

move away from traditional methods of production e.g. animal traction to mechanical power, manual control of weeds to herbicides, use of traditional low yielding seed varieties to high yielding seed varieties, moving from use of informal markets to formal markets [45]. This transition will also need to be accompanied by effective and appropriate research and development that will also enhance policy design and implementation. However, there is under investment in research and development to agriculture [46]. The public agricultural extension service in the country is also under a lot of criticism and is regarded as weak and ineffective [47].

Measuring smallholder commercialization

There are various methods used to measure agricultural household commercialization, although very few studies have used all of them. The dimension of these methods mainly focus on proportion of marketed output in relation to total produced output [14;12;48;49]. This accounts for many smallholder commercialisation studies. The second, is the total input acquired in the market in relation to total value of agricultural production. This is mostly theoretically explained, for example [6], but few studies actually applied the method.

The other is the extent of hired labour use in relation to total labour use. This is also theoretically explained, for example in [23], but rarely applied. The extent of activity diversification versus specialisation is widely cited [see: 11;6] and applied, an example of this is by [12]. Lastly, following [14] suggestion, econometrics models are used to capture the determinants of commercialization [see: 16; 45;29;50;51]. However most studies have only focused on crop production, among others including these: (52; 12; 51), but very few have looked at livestock, for example, [53]. Methods employed in this study will be described in the next section.

Data and method

Study area, sample size and data

This study was conducted in rural areas of three provinces of South Africa namely, Eastern Cape, Kwa-Zulu Natal and Limpopo. These provinces were chosen because jointly they house the majority (61%) of smallholders in the country according to the Statistics South Africa's Community Survey of 2016. Therefore, they arguably offer a large pool of smallholders in the country. Within these three provinces, district municipalities and local municipalities which have high density of smallholders were chosen purposively through key informant interviews with extension officers, smallholder farmers organisation such as AFASA, NGO serving small-scale farmer such Lima Rural Development and commodity organisation such BKB and a review of literature. While at a village level a list of villages with agricultural household was obtained from Statistics South Africa and villages selected randomly as well as at household level.

According to [40] analysis of Income and Expenditure Survey and the Labour Force Survey, the following districts: in the Eastern Cape, Amathole, Chris Hani, and Oliver Tambo district municipalities, have high density of smallholders, hence they were chosen for this study. While in KwaZulu Natal, Umkhanyakude, King Cetshwayo and Harry Gwala districts also appeared as high density of smallholder regions [40], hence they were chosen for this study. In Limpopo province, Vhembe is the main hub of smallholders (40;18) and was chosen for this study.

The number of smallholders and specifically commercial oriented is highly contested in South Africa, therefore we have limited grounds to declare that this is a representative sample although we argue that it is big enough to give a detailed picture. **Table 1** below presents a summary of the study areas and sample size in each selected districts and provinces.

Table 1: Study areas and sample size distribution

KwaZulu-Natal	(n)	Limpopo	(n)
Umkhanyakude	125	Vhembe	89
King Cetshwayo	80		
Harry Gwala	56		
Zulu Land	104		
Total	365	Total	89

Regardless of the commercial orientation degree, commercial oriented farmers were randomly selected and interviewed in each district. A semi-structured questionnaire compiled in English and translated in local languages spoken in the study areas was used for the interviews with farmers.

Estimation strategy

Following similar studies both international (54;12;29;49) and local [16;50] this study employ Household Commercialization Index for measuring the degree of commercialization . We have aggregated major crops sold, maize, cabbage and potatoes to construct a crop commercialization index (CCI) as specified in **Equation 1** below.

$$CCI_j = \begin{cases} 1, \frac{\text{Aggregated seasonal total quantity sold}_j}{\text{Aggregated seasonal total quantity produced}_j} \geq 0.5 \\ \text{and } 0, \frac{\text{Aggregated seasonal total quantity sold}_j}{\text{Aggregated seasonal total quantity produced}_j} < 0.5 \end{cases} \quad (1)$$

The CCI was calculated on aggregated crop output in kilograms, for maize, cabbage and potatoes, whereby the seasonal total quantity sold is divided by the total production. Thus, the greater the CCI value, the greater the degree of commercialization with a value of 1 indicating that all produce was sold. A CCI of 0.5 is viewed as the transition point between subsistence and emerging commercial farmers [54;5;45;55]. Similarly, [23] suggests, we use the same approach to measure commercialization of livestock output. Since most of the respondents, mostly sell live non-breeding stock (ox, wether), we used the ratio of the non-breeding stock to the number of total sales per annum to measure the livestock commercial index (LCI) output as specified in Equation 3. All livestock numbers i.e. herd size and sold livestock were converted into total livestock units and aggregated to construct a LCI. We assumed all number of livestock were adult animals and used LSU of 0.7 for cattle, 0.1 for both goats and sheep.

However, some (very few) farmers have sold part of their breeding stock such as heifers for various reasons (e.g. culling or controlling the herd/flock size), but in our analysis we have ignored such sales and only taken into account sales of non-breeding stock. Because we did not have similar variables (e.g. opening and ending balance), the measure of LCI is different to how other similar studies such as the one by [53], who have measured livestock commercialization in the form of off-take as specified in Equation 2. Where they calculated the Gross off-take as follows:

$$\text{Gross off-take} = 0 \frac{\text{outgoing} - \text{incoming}}{0.5 (\text{opening balance} + \text{ending balance})} \times 100 \quad (2)$$

$$LCI_j = \begin{cases} 1, \frac{\text{total non-breeding animals sold (TLU)}_j}{\text{total non-breeding animals in a farm (TLU)}_j} \geq 0.5 \\ \text{and } 0, \frac{\text{total non-breeding animals sold (TLU)}_j}{\text{total non-breeding animals in a farm (TLU)}_j} < 0.5 \end{cases} \quad (3)$$

To determine the factors influencing commercialization this study make use of Tobit regression. The range of the commercialisation index variable calculated using Equations 1 and 3 vary between zero to one. It was computed for crops and livestock as a ratio of the value of total sales to total production. This ratio varies from zero and one as if it is censored from above and below. Since this outcome variable behaves like those partially observed outcome, censored regression techniques. This implies left and right censoring of outcome variable and suggests the use of the Tobit model, which estimates the outcome variable to be within a specified range as shown in equation 4. This model has been adopted in similar studies concerned with smallholder commercialisation [e.g.50;51]. Estimation of the model parameters is done through maximization of the log likelihood function.

Tobit framework

$$Y_i^* = \mathbf{x}_i^* \beta + \sigma \epsilon_i \dots \dots \dots \dots \dots \dots \dots \dots \dots (4)$$

Where Y_i^* represent a latent dependant variable and x_i^* is a vector of independent variable. σ is scale parameter that is identified in censored and truncated regression models and will be estimated along with β . Since the errors are normally distributed in a Tobit model and therefore the observations of a dependant variable are assumed to be given by:

$$y_i = \begin{cases} 0 & \text{andif } y_i^* \leq 0 \\ y_i^* & \text{andif } y_i^* > 0 \end{cases}$$

In words, this means that all negative values are recorded as zero. This is termed left censoring at zero. It is needless to say that this is different from truncated regression model where y_i^* values below zero are completely removed from the sample. The tobit model also allows for left and right censoring at randomly selected limit points so that:

$$y_i = \begin{cases} \underline{c}_i & \text{if } y_i^* \leq \underline{c}_i \\ y_i^* & \text{if } \underline{c}_i < y_i^* \leq \bar{c}_i \\ \bar{c}_i & \text{if } \underline{c}_i < y_i^* \end{cases}$$

where \underline{c}_i and \bar{c}_i are fixed numbers representing the left and right censoring points, respectively. Removal of left censoring implies left c_0 to be negative infinity while removal of right censoring automatically sets right c_i at positive infinity.

Empirical model estimation

The relationship between commercialisation for both crops and livestock and factors that influence it was expressed using the following model in equation 5:

$$\widehat{COM}_i = \alpha + \widehat{\beta}_1 AGE_i + \widehat{\beta}_2 EDUC_i + \widehat{\beta}_3 RISK_i + \widehat{\beta}_4 agTRAIN_i + \widehat{\beta}_5 EL_i + \widehat{\beta}_6 FamerType_i \dots \dots \dots (5)$$

Where \widehat{COM}_i is the predicted value of the farmer's commercialisation level, AGE_i is the age of the famer in years, $EDUC_i$ is the number years of formal education completed by the farmer, $RISK_i$ is the dummy variable representing the risk profile (low, medium, high²), $agTRAIN_i$ is a dummy variable representing whether or not agricultural training was received, EL_i is number of external labour employed, $TypeFamer_i$ is a dummy variable representing whether a farmer is pursuing agricultural business full time, α and β_i are regression coefficients to be estimated. The parameter estimates of the factors that affect commercialisation of both crops and livestock were estimated on R software. However, unlike other studies, the models for crops and livestock were estimated separately since factors that affect commercialisation of crops were assumed to be different to those that affect livestock commercialisation.

Results and discussion

This section presents the results of the study achieved through the described methods in the preceding section. We start by presenting descriptive statistics of market orientation and descriptive results of the variables used the analysis of the determinants. Later we finally, present Tobit model results of estimating determinants of crop and livestock commercialisation.

Market orientation

While some studies make a distinction between food and cash crops, [23] and [6] have argued that this approach lacks strong footing and have suggested looking at the primary purpose of the household to engage in agricultural

² As adapted from [56] respondents were asked to rate their willingness on a scale from 0 to 10, where 0 denotes totally unwillingness and 10 fully willing. For the purpose of this study we have created dummies from this variable, where, 0-3 represents low risk, 4-7 moderate risk and 8-10 high risk

production. Characterisation of smallholders by the primary reasons of engaging in farming have been widely adopted even in South Africa, an example is the Statistics General Household Surveys and in [40;20] among others.

Further, [6] makes a distinction between market orientation and market participation. These authors argue that market orientation is basing production decision on market signals while market participation is the actual selling of produce or buying inputs to the market. Gebremadhin and Jaleta's approach was followed in this study and the results from the survey are summarised in **Figure 1** below. The results show that respondents keep livestock for as an extra source of income (46%) and a main income (36%). While about more than two thirds, grow crops mainly for attaining main and extra income sources.

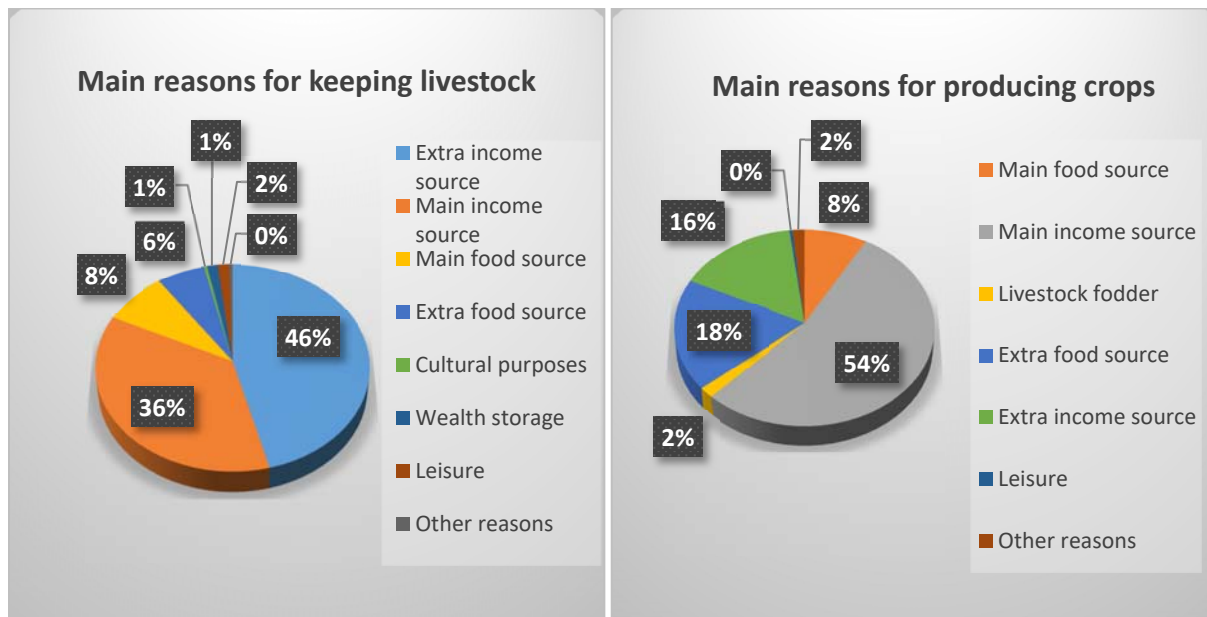


Figure 1: Level of market orientation

Source: Authors compilation from survey data

This suggest that farmers in our sample are generally commercial oriented (i.e. the initial decision to produce is directed towards market) but the commercial orientation is stronger in crops than in livestock. A possible explanation for this, may be linked to the fact that most grown crops are often grown where there is irrigation thus making it a more reliable source of income, while livestock is only sold once or twice a year, therefore one may rely on livestock as an extra income source rather than a main income source. This may be particularly true in our sample since most farmers owned small to medium herds/flocks and few relied on livestock and livestock products such as dairy but rather relied on wool that is sold once a year. However, although market orientation is the first step in the commercialization process it does not always translate to market participation. In the following section, market participation results are presented and discussed.

Descriptive statistics results

Market participation in addition to market orientation reported above was measured. Table 3 presents the descriptive results of the explanatory variables used later in the Tobit model. Analysis of variance (ANOVA) was performed to test the statistical significance of these results. The mean commercialisation index for the dependent variable was 0.7 for crop and 0.3 for livestock. Generally, crop commercialisation explanatory variable mean score are much higher those for livestock. These might be attributed to the fact that crop production activities, especially vegetables are much riskier than livestock activities. Further, selling of crops occur is more fuelled by their high nature of perishability compared to livestock which in this case are sold as live animals to be consumed in feasts and funerals [57], implying less risk of perishability.

In the explanatory variables of livestock commercialisation, gender and agricultural training were statistical significant. The mean score of gender commercialisation implies that females are more commercialised in livestock

i.e. they sell more percentage of their livestock than their men counterparts and is statistical significant. While this does not necessarily mean women keep more livestock than men, but mean they keep livestock mainly for the purpose of selling. The low commercialisation among men might be due to their eagerness to maintain social status. Other variables depicts a moderate commercialisation ranging between 2 and 3, implying that on average the households sell between 30 to 40 per cent of their livestock. Farmers who have received agricultural training have higher commercialisation than those who did not and this is statically significant.

Descriptive statistics

Table 3: Analysis of variance among explanatory variables

Variable	Mean	F-value
Livestock		
Male	0.156	23.711***
Female	0.406	
LowRisk	0.222	1.358
ModerateRisk	0.300	
HighRisk	0.346	
Received agric. training	0.324	4.51**
Did not receive agric. training	0.216	
Full time farmer	0.281	1.254
Part time farmer	0.226	
Crops		
Male	0.672	0.077
Female	0.659	
LowRisk	0.708	4.664**
ModerateRisk	0.626	
HighRisk	0.388	
Received agric. training	0.638	1.364
Did not receive agric. training	0.692	
Full time farmer	0.711	9.917***
Part time farmer	0.56	

Notes: level of statistical significance * $P < 0.1$, ** $P < 0.05$, *** $P < 0.01$

Unlike the explanatory variables for livestock commercialisation, in the crop commercialisation variables, risk and being full time farmer are the statistically significant variables. The mean scores range between 4 and 7, indicative of higher percentage of produce that is sold that consumed. Moderate risk takers sell on average 60 per cent of their crop produce and statistically significant. Moderate risk taking seems to be the risk minimising strategy for smallholder farmers, who have low or no buffer against shocks such as adverse weather conditions. Crops cultivation requires more attention than animals kept in extensive rangeland farming system, and this might be attributable to the higher commercialisation in full time crop farmers being statistically significant. Further, it is highly likely that full time farmers depends much in crop income than part time crop farmers.

Determinants of commercialisation

Table 3 and 4 present the results of the Tobit model as specified in the methods section for both livestock and crop, respectively. In the evaluating the factors associated with livestock commercialisation, four out of six variables included in the model are found to be statistically significant- gender, risk profile, agricultural training and external labour.

Table 3: Tobit regression output of the determinants of livestock commercialisation among smallholders

Variable	Estimates
INTERCEPT	0.493** (0.198)
AGE	-0.004 (0.003)
GENDER	-0.342*** (0.079)
Farmer Type	-0.087 (0.081)
Moderate Risk	0.147* (0.081)
HighRisk	0.158 (0.189)
agTRAIN	0.160** (0.080)
EL	-0.017** (0.007)

Notes: level of statistical significance * $P < 0.1$, ** $P < 0.05$, *** $P < 0.01$

Figures in parenthesis are standard errors

Source: Author's computation

However, the sign in the gender variable does not conform with previous studies (e.g. Rubhara and Mudhara, 2019) for it suggests that a male farmer sells less than a female farmer by an amount equivalent to 0.342, holding all other factors constant. This difference was visible from the Chi-square test presented above and it is still evident even when other variables have been controlled. Farmers with moderate risk were found to be selling more livestock (LCI) than low risk profile farmers, holding other factors constant. Implying that a unit increase per livestock unit increase commercialisation by 0.147, holding other factors constant. However, there was no statistically difference in selling of livestock between low and high risk farmers when other factors held constant. For livestock, hiring of additional of external labour decreased the amount of sold produce (LCI) by the farmer by 0.017, holding other factors constant. This could be attributed to the fact that for livestock labour is not varying in proportion with gross margin. There is often a predetermined amount of labour required per herd. While for crops hiring more external labour increases likelihood of commercialisation. Similar results were also reported in similar studies [e.g.50].

Table 4: Tobit regression output of the determinants crop commercialisation among smallholders

Variable	Estimates
INTERCEPT	0.527*** (0.131)
AGE	-0.05 (0.07)
GENDER	0.115 (0.096)
FarmerType	-0.087 (0.081)
MediumRisk	-0.093 (0.104)
HighRisk	-0.447* (0.242)
agTRAIN	-0.144** (0.096)

EL	0.003** (0.005)
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Notes: level of statistical significance * $P < 0.1$, ** $P < 0.05$, *** $P < 0.01$

Figures in parenthesis are standard errors

Source: Author's computation

The determinants of crop commercialisation, presented in Table 4 above, depicts that only three out of the six variables were statistically significant from zero, when the crop commercialisation index was regressed with a set of determinants. On the positive note, hired labour or external labour (EL) predicts a positive impact on crop commercialisation, keeping other factors constant. This implies that one additional hired labourers increase CCI by 0.003 holding other factors constant. However, as smallholder households willingness to take risk sores declines by one unit, both moderate and high risk, commercialisation increase, keeping other factors constant. These findings resonates with the assertion that smallholders are generally risk averse [e.g.58], but contradict the beliefs that smallholders who are risk takers are likely to commercialise their production. This could rather be taken as an indication that smallholders are only willing to take calculated minimum risk in order to commercialise. Having not received agricultural trainings reduces crop commercialisation, holding other factors constant.

Discussion

While previous studies [35] have also found some degree of market participation among smallholders in South Africa, they have also noticed that smallholders only penetrate informal markets. [34] have argued that smallholders have very little chances of success in penetrating formal markets, which are largely occupied by supermarkets, through market forces. This due to nature of their production (producing inadequate quantities to meet the demand for supermarkets) and this among other factors put them at a disadvantage position compared to their commercial counterparts. The same authors have said that only through intervention can the smallholders successfully linked to formal markets because supermarkets are not development practitioners (whom their goal is to integrate smallholders to the market), they are profit driven businesses and therefore, there is no attractive incentive to buy from smallholders. In this regard, among the initiatives that have been implemented, there is limited success in linking smallholder farmers to formal markets.

With regards to what [10] observed in Asian smallholders that they tended to move away from traditional input use to commercial inputs as their production become commercialised, at least this trend was evident in the sample studied here. Most were using hybrid seed varieties especially irrigating farmers, thus investment in inputs was largely determined by the intensity of production. However, in terms of livestock breeds, we observed that those who supplied local markets used traditional non-descript breeds. While those who aimed at supplying abattoirs kept commercial breeds such Bonsmara in cattle and merino sheep.

Further, as farmers move away from subsistence production, they tend to hire outside labour [11]. In the study sample, we observed that hired labour accounted for 68 per cent of the total labour. The general and average cost of each unit labour for crop activities was R50 per day hired on a seasonal basis, while for livestock herding it was R1500 per month mostly hired for the whole year. The employment creation via smallholder agriculture resonates with the vision of chapter six of the National Development Plan [see 19].

Conclusion and policy recommendations

This study sought to contribute to the existing body of literature on smallholder commercialization by taking a multifaceted approach. Using a specific household commercialisation for aggregated crops and aggregated livestock units, smallholder commercialization was assessed though participation. Market orientation and extent of external labour use were also looked. The study went further to look at factors influencing smallholder commercialization both in crop and livestock activities using Tobit regression.

The findings of this study shows that smallholders studied were market oriented in general as most farmed primarily to attain main source of income. However, market orientation was more on crops compared to livestock. The same trend was observed when assessed in terms of market participation, where on average, crop farmers sold 70 per cent of their produce compared to 30 per cent of live animals sold. Determinants of commercialisation differ between livestock and crop activities. Livestock commercialisation is determined, by gender, moderate risk taking, receiving agricultural training and employing more hired labourers. While not being a high-risk taker, without agricultural training and employing more hired labourers determine crop commercialisation.

These findings provide some signals to the design of land redistribution policies on matters that require more attention to effectively link smallholders to the commercial sector through the Land Redistribution policy. Smallholder agricultural activities have different determinants of commercialisation, therefore, policies and strategies used to enhance commercialisation should be aware of such factors and different levels of commercialisation dimensions.

Relevant extension service for potential emerging farmers will also require attention and it should be tailored with their needs in order to ensure smooth transition to the commercial sector as envisaged in the NDP. However, ability of the current public agricultural extension to provide this kind of service is highly contested and alternatives such as NGO support for example Lima rural development must be sought to improve the service. Finally, longitudinal studies will go a long way in giving a more detailed picture on smallholder commercialization because this is a process and therefore it is not static.

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