

## Article

# Evaluating Factors Affecting Performance of Land Reform Beneficiaries in South Africa

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**Abstract:** The ability of farmers to operate redistributed farms in a profitable and sustainable manner is crucial for both successful integration into agricultural value chains and sustainable production systems. The performance of redistributed farms is becoming increasingly important as the number of redistributed farms increases in light of correcting previous anomalies in land ownership in South Africa while ensuring continued food security. Although much has been done to assess the impact of land reform on macro variables, little has been done to unpack factors associated with the success of redistributed farms. Using a sample of 1956 redistributed farms across the nine provinces of South Africa, the current study employs an ordinary least square regression as well as a generalised logistic regression model to identify factors associated with the success (measured by net farm income and probability to operate at commercially viable scale) of the sampled farms. The results show that infrastructure, support (both technical and financial), and type of market used are significantly associated with the performance of redistributed farms. In addition, the results reveal disparities in performance across provinces and across gender categories. The study provides valuable insight to programme managers on the factors that needs to be enhanced in order to increase the odds of success for redistributed farms.

**Keywords:** farmer performance; profitability; value chain integration; land reform beneficiaries



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## 1. Introduction

One of the main pillars of growth and sustainability in any farming business is financial profitability [1]. Profitability is an indication of optimal resource allocation to strengthen the capability to generate positive net income over time. Productivity is also a measure of performance in agriculture, particularly dealing with the efficiency of the business. Given the aims of South Africa's land reform program, both of these performance measures cannot be overlooked in ensuring the sustainability of farming businesses. Maximizing income while maintaining a constant or increasing stock of capital is one approach to sustainable development [2]. Sustainable development, which ensures that meeting the needs of current generations does not compromise the potential of meeting the needs of future generations, should also be incorporated in the design of development projects such as the land reform programme of South Africa. Land reform without consideration of economic, environmental, and social sustainability is unlikely to succeed [3]. One of the main purposes of land reform, in the context of South Africa, is to ensure that previously disadvantaged black farmers develop into sustainable commercial farmers [4]. Therefore, much effort has gone into supporting beneficiaries through farmer support programs such as Settlement Land Acquisition Grant (SLAG), Land Redistribution for Agricultural Development (LRAD), Comprehensive Agricultural Support Programme (CASP) and more recently, the Proactive Land Acquisition Strategy (PLAS).

The PLAS was launched in 2006 and focuses on addressing challenges identified in previous land reform initiatives, such as poor beneficiary selection and support, slow land acquisition, and sub-optimal land use on acquired farms. Beneficiary selection criteria defined in the PLAS implementation manual of 2007 emphasise a pro-poor approach accompanied by a skills audit and wealth assessment. However, it has emerged that these are not sufficient, or adhered to, because many of the beneficiaries lack the required traits for successful farmers. In addition, there are other factors that affect the performance of farmers beyond these characteristics. Getting into the right markets and effectively integrating into the value chain is a major contributor to the success of a commercial farmer.

A major hurdle to the success of the South African agricultural sector is the failure of smallholder farmers, including land reform beneficiaries, to transition to commercial levels. According to Ferris et al. [5], 50–70% of African farmers are failing to transition to commercial level. Challenges faced by these farmers hamper both production and marketing and thus limit their development, as is well documented in literature. These farmers often have poor access to infrastructure, inputs, and markets which makes them vulnerable and leads to low production volumes and incomes [6,7]. They particularly experience high transaction costs, which are largely attributed to poor infrastructure [8] and lack of access to storage facilities, which constitutes a barrier to marketing. This lowers a farmer's flexibility in selling and their bargaining power [9] depending on the enterprises on the farm.

In many countries, land reform failure has been a recurring theme for different reasons, such as flaws in implementation, poor post settlement support, and poor beneficiary participation in project identification and design [10]. A particular failure, dealt with in this paper, is the poor process of selecting beneficiaries for development initiatives. In South Africa, specific studies have evaluated the performance of the agricultural sector and farmers in general. In addition, other studies [11] analysed the participation of land reform beneficiaries in relation to land use without unpacking economic aspects such as profitability. These studies lack a detailed farm assessment of a large sample of land reform farms in South Africa, yet it is apparent that in that direction lies the possibility of discovering the missing link between land reform initiatives and success (profitability and ability to attain commercial viability) of the farms. As such, this paper targets beneficiaries of the land reform programme with a specific focus on their profitability and probability of attaining commercial viability. This study also involves a sufficiently large number of land reform beneficiaries involved in different farming enterprises in South Africa.

Against this background, the paper seeks to determine the factors associated with the performance of farms under the PLAS land reform initiative, using net income as a measure of performance. This study assumes that regardless of the location of the farm and whatever farm enterprise they are involved in, farmers operate the farm as a business as aligned with the PLAS objectives; to commercialise these farms. The results of this study are useful in at least four dimensions of the programme: firstly, in informing the establishment of coherent beneficiary selection criteria; secondly, in pinpointing factors that need to be altered or enhanced in order to increase the performance of farms already enrolled in the programme; thirdly, in proposing a monitoring and evaluating system for the different types of farmers that are part of land reform programmes; and fourthly to formulate strategies to link different categories of farmers to relevant value chains.

The remainder of the paper is organised as follows. Section 2 presents the literature review. Since the central objective of the land reform programme is productive and sustainable use of land, Section 3 is devoted to the data and methodology used to assess factors associated with net farm income as well as assessing the likelihood of farmers operating at a commercially viable scale. Section 4 reports results and discussion. Section 5 concludes and provides policy implications.

## 2. Literature Review

The section presents the theoretical framework of the study, provides a brief account of existing empirical evidence on land redistribution, and highlights the nature of PLAS farmers' markets.

### 2.1. Theoretical Framework

For a few decades now, land reform has been a significant process throughout Southern Africa that is rapidly unfolding on ever-shifting ground. This section seeks not only to illustrate the different theories on which land is administered, but also to shed light on the rationale or motivations around land reform. The description provided is neither all-encompassing nor definitive but is presented to illustrate the continuum of options used and to describe some of the dominant schools of thought behind land reform theories.

Firstly, it is worth highlighting that, for generations, customary land tenure has been the broad African view of land [12]. Equally noteworthy is that hardly any truly indigenous tenure system remains, and that current/modern versions of customary tenure are contaminated with traits of colonial, and in the South African case, apartheid administration and, it is argued, an associated feudal, anti-democratic version of customary land right, tenure, and administration [13]. This alleged contamination forms the basis for land reform in most parts of southern Africa, including South Africa. Hull et al. [12] describe three main land reform theories. On one end, there is conservative theory and on the other end is replacement theory, while adaptation theory is the hybrid of the two extreme cases. The three theories are briefly explained below:

The conservative theory emphasizes the preservation of customary tenure. Traditional leaders play a central role in both land allocation and administration. This theory is only applicable when the existing land rights or allocations were implemented under fair circumstances, hence, its usefulness or applicability is limited in the South African case since fairness in allocation of land was in short supply during the apartheid era.

The adaptation theory consists of three variations: the democratic adaptation theory, the hybrid theory, and the incremental theory. The democratic adaptation theory is built on the assertion that current customary tenure systems carry little to no resemblance to pre-apartheid customs rendering them anti-democratic and unconstitutional [14]. The hybrid adaptation theory leans towards a participatory approach where communities decide which rights are important and should be registered. The incremental theory is premised on the notion that land titling is a long-term objective and asserts that customary land tenure does not limit land development [12].

Replacement theory also has variations; however, the central view is that customary land tenure is prohibitive to development by preventing individual tenure security thus failing to stimulate private investment [15]. As such, this theory asserts that private property rights are necessary to increase credit opportunities and the development of the land market [16–18].

Land is either viewed as a primary economic asset or a primary social asset. Where the former view prevails, individual titling (replacement theory) becomes dominant and where the latter view prevails, communal land ownership (conservative theory) becomes dominant. The South African idea of land reform perceives land as a primary economic asset, thus rendering it inclined towards replacement theory. Furthermore, land reform in South Africa is aligned with the neoclassical economics school of thought, which asserts that land is one of the critical factors of production. As such, land redistribution policies are not only necessary but also hold promise for poverty reduction and wealth creation among the rural populace [19].

### 2.2. Empirical Literature

According to Weiner and Levin [20], a lion's share (86%) of total agricultural land in South Africa before democratization was owned by a paltry 10.9% of the population with about 89.1% of the population occupying subsistence-oriented rural land. However,

recent papers indicate that the distribution of land in South Africa no longer fits this simple description as the State, traditional authorities, and urban expansion constitute a large percentage of land in South Africa [21]. Since 1994, the government of South Africa has been increasingly intensifying efforts towards agriculture land reform policies to address the imbalances of past land ownership in a bid to improve the welfare of the South African rural population in particular [22]. It is of paramount importance that productive land, including that in the hands of previously disadvantaged South Africans, remains productive to ensure that the land reform programme does not negatively impact the agriculture sector's performance and food security. The importance of empirical evidence in shaping the land reform policy agenda has long been acknowledged [23] and several strides have been made by a plethora of researchers in a bid to provide the much-needed input for policy formulation [22,24,25]. A significant share of existing literature focuses on evaluating the impact of land reform [19,22,24,26].

Mukarati et al. [19] applied the computable general equilibrium model to investigate the impact of land redistribution policies on welfare, in the short and long-term. Findings from their study reveal that rural land distribution increases rural households' income by, on average, a factor of 0.828. However, the results of their study also show that at a macro level, the impact of land redistribution is negative in the short run with a gradual increase in the long run. Similarly, ref. [27] assessed the link between land reform and poverty reduction in South Africa. Some of the few studies that assessed performance of redistributed farms include [24,28–30]. However, the bulk of studies that assessed the performance of redistributed farms applied a case study approach (looking at specific provinces) [28,30,31].

Kirsten et al. [30] found that farming experience, availability of funds, access to markets, and level of technical and financial management skill, among other factors, have a bearing on overall performance of redistributed farms. By the same token, [28] found that technical support is significantly associated with the performance of redistributed farms. The current study seeks not only to increase the study area, by conducting a national study (including all nine provinces), but also substantially increase the sample size (1956 redistributed farms) in order to increase the variation in the dataset and enhance the reliability of the results. Moreover, [29] also focused on level of production (increasing, stable, decreasing, and no production) as an outcome variable. Although it is important to measure production (level of output), it can only be comparable across farms if the produce is offloaded at the same market (or when farmer get the same price in the different markets that they used).

However, both anecdotal and empirical evidence suggest that farmers offload their output in different types of markets, where different prices prevail. As such, the current study, instead of using production as an outcome variable, uses net farm income as an outcome variable in order to neutralise the effect of different prices and post-harvest losses, both of which have a bearing on net farm income. Building on the notion that income is one of the critical factors associated with welfare and that empirical evidence has demonstrated that land reform does have a bearing on beneficiaries' income levels, the current study seeks to assess the factors associated with net farm income. Such information is key not only when selecting beneficiaries but also in designing training programmes and strategies to bridge resource and/or capacity gaps.

### 2.3. Nature of PLAS Farmers Markets

Commercialisation is a driver of agricultural development and economic growth for less developed countries [32]. However, the apparent problem is how to transform agriculture from a highly subsistence level to a highly market-oriented level. Among other structural problems, the nature of markets used by farmers is important to consider. Land reform beneficiaries use different forms of marketing channels depending on the type of enterprises they are operating on the farm. The mix of enterprises on PLAS farms differ per province but extensive livestock production is the main enterprise on 60% of the PLAS

farms evaluated among other enterprises such as dry land, irrigated crops, and fruit and vegetable production. The majority of PLAS farmers (93%) sell through different marketing channels instead of a single marketing channel. Roughly 50% use formal market channels only, while a further 24% use a combination of formal and informal channels.

Formal market access is often a major challenge for emerging farmers in South Africa. However, PLAS farmers in all provinces appear to have successfully penetrated formal marketing channels, albeit mainly for products where extensive grading is not used. PLAS farmers prefer formal market channels because they are transparent, secure, organised, efficient, and accessible, and offer fair prices. Prices are normally higher than at informal markets. Formal markets are also preferred because they offer contracts and export opportunities, and purchase produce in bulk and at any time of the year. Sales are guaranteed and prices do not change as often as with informal market channels where prices and sales are not guaranteed. About 19% of PLAS farmers trade mainly through informal market channels. Of these, 5% use both formal and informal market channels while the remaining 14% do not have any form of contact with formal markets. Informal market channels used include selling at the farm gate, at the roadside, to local communities, hawkers, traders, speculators, and at informal auctions.

PLAS farmers sell at informal markets because these are often closer to their farms and farmers can therefore minimise transport costs. In the absence of own transport facilities and inhibitive transport costs, informal market channels become the only reasonably affordable and accessible option. Lack of storage capacity for highly perishable products such as vegetables forces some farmers to sell their produce at the farm gate and as such avoid post-harvest losses. Some farmers choose to trade through informal market channels because they have some bargaining power and can negotiate prices, to a larger extent than they can at formal market channels. Most farmers highlight that informal market channels are a quick source of cash and they offer high prices especially for older livestock. In addition, farmers choose informal markets because informal markets are easier to access than formal markets. Farmers highlight that there are no barriers to entry into informal markets as there are no regulations, taxes, or requirements such as those required in formal markets.

Buyers often enter into contract arrangements with farmers to get access to a regular supply of good quality produce as and when needed. As a result, contracts are likely to be settled with farmers located on highly productive, well-resourced farms able to deliver the required quantity and quality of produce at the agreed times [33]. In South Africa, contract farming is used extensively to supply diverse agricultural produce to local and international markets. It accounts for 70% of fruit and vegetables processing industry purchases, 70 to 100% of fresh produce purchases by retailers, 50% of pig purchases by large abattoirs, 50% of chicken purchases by major broiler processing companies, and 25% of egg purchases by major companies [34]. Often buyers will engage contract farmers for produce requiring specialised processing including industrial enterprises such as sugarcane [33]. Due to its widespread use across commodities, contract farming offers opportunities for the integration of emergent farmers into formal market value chains and to increase incomes [32].

Nationally, only 22% of PLAS farmers have a contract farming engagement, being most common among industrial crop farmers (83%). They are also used with irrigated field crop (57%) and fruit farmers (57%) and least used with extensive livestock (14%). The highest proportion of contracts is evident in Gauteng (33%), for intensive enterprises such as pigs and poultry. KwaZulu-Natal (28%) has contracts mainly in sugar cane. These trends are in line with existing literature showing that market participation is a limiting factor towards the transformation of farming systems in sub-Saharan Africa. Knowledge of and access to both output and input markets are instrumental in the pathway to transform smallholder agriculture [35] but other factors will also contribute to this transformation process. This necessitates an investigation into the performance of farmers and the drivers according to their different performance levels.

### 3. Data and Methods

Both quantitative and qualitative methods were used in this study. Cross-sectional data were collected from 1956 land reform beneficiaries through a formal survey, followed by expert panel analysis. The farm assessment process involved interviews with beneficiaries using a structured questionnaire, which mainly focused on the performance of the farms from an environmental, economic, social, and sustainability perspective. Data were collected from farmers throughout the nine provinces of South Africa. A proportional stratified random sampling technique was used to group the population of the PLAS farmers from the nine provinces of South Africa into strata. Afterward, a random sampling method was used to select respondents from each stratum. Table 1 shows the distribution of farmers by province.

**Table 1.** Number of farmers by province.

Province	Frequency	Per Cent
Eastern Cape	252	12.8
Free state	284	14.5
Gauteng	199	10.1
KwaZulu Natal	259	13.2
Limpopo	135	6.9
Mpumalanga	365	18.6
Northwest	258	13.1
Northern Cape	139	7.1
Western Cape	65	13.3
Total	1956	100

Following the farm survey process, a panel of experts assessed the potential of the farms and estimated net farm income based on reported farm income figures from the farm survey. Focus group discussions by transdisciplinary experts were used to assess the potential of these farmers. Various factors were included in this assessment including demographic information, land capability, commodity options, beneficiary capability, infrastructure quality and availability, risks, and limitations. Based on this analysis, farmers were grouped into commercially viable, medium scale, livelihood scale, and vulnerable categories. Table 2 shows the different categories, net farm income thresholds, and sample sizes under each category.

**Table 2.** A categorisation of PLAS farmers, based on potential net income.

Category	Definition	Net Income Threshold	Viability
Vulnerable farms	Insufficient productive land and funds, little production.	<ZAR 150,000	Vulnerable or supplemental
Livelihood farms	Sufficient land for production supplementing other income, but not sustainable surplus production above household needs.	ZAR 150,000–ZAR 349,999	Livelihood
Medium-scale farms	Family-supporting commercial, with sufficient resources to support surplus, but limitations for optimal production.	ZAR 350,000–ZAR 699,999	Medium scale

Table 2. Cont.

Category	Definition	Net Income Threshold	Viability
Commercial farms	Sufficient, quality land able to support commercial enterprises.	>ZAR 700,000	Commercial

Source: Adapted from Department of Rural Development and Land Reform, 2019.

Using the above net income thresholds, farmers were categorised into a typology with four performance levels, based on net farm income. The net income thresholds were based on literature and verified with expert opinion from key informant surveys [36]. This panel of experts’ assessment of the farms was instrumental in the categorisation of farmers according to their performance measured by net income generated on the farm.

*Analytical Framework*

An OLS regression model was employed to determine the factors that affect the performance of the farmers, regardless of income level. A multiple regression model was employed where the continuous dependent variable (net farm income) was regressed against a set of regressors. The relationship between net farm income and the set of covariates is specified as follows:

$$\ln Y_i = \beta_0 + \beta_1 X_i + \dots + \beta_n X_n + \varepsilon_i \tag{1}$$

where  $\ln Y_i$  = log of Net farm income;  $X_i$  to  $X_n$  are exogenous (explanatory variables of the model;  $\beta_0$  is the intercept;  $\beta_i$  to  $\beta_n$  are parameters to be estimated; and  $\varepsilon_i$  = Random Error term.

Following the multiple regression, a generalised logistic regression (GOlogit) model was used to determine the likelihood of the farmers in the different viability categories producing at commercially viable income levels. A generalised logistic regression model is used for a response variable that has a number of ordered categories and a variety of explanatory variables. The advantage of a generalised ordered logistic regression model is that it permits analysis across more than two categories such as farmers classified according to their performance, yet they are less restrictive than the proportional odds model and the partial proportional odds model estimated by the ordered logit model whose assumptions are often violated [37].

$$P(Y_i > j) = g(X\beta_j) = \frac{\exp(\alpha_j + (X_i\beta_j))}{1 + (\exp(\alpha_j + (X_i\beta_j)))}, j = 1, 2, \dots, M - 1 \tag{2}$$

$M$  is the number of categories of the ordinal regressand. From Equation (2) above, the probabilities that  $Y$  takes on each of the values  $1 \dots \dots, M$  are equal to;

$$P(Y_i = 1) = 1 - g(X_i\beta_j) \tag{3}$$

$$P(Y_i = j) = g(X_i\beta_{j-1}) - g(X_i\beta_j) \quad j = 2 \dots M - 1 \quad P(y_i = M) = g(X_i\beta_{M-1}) \tag{4}$$

$$Y_i = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \dots \dots \dots \beta_n X_n + \varepsilon_i \tag{5}$$

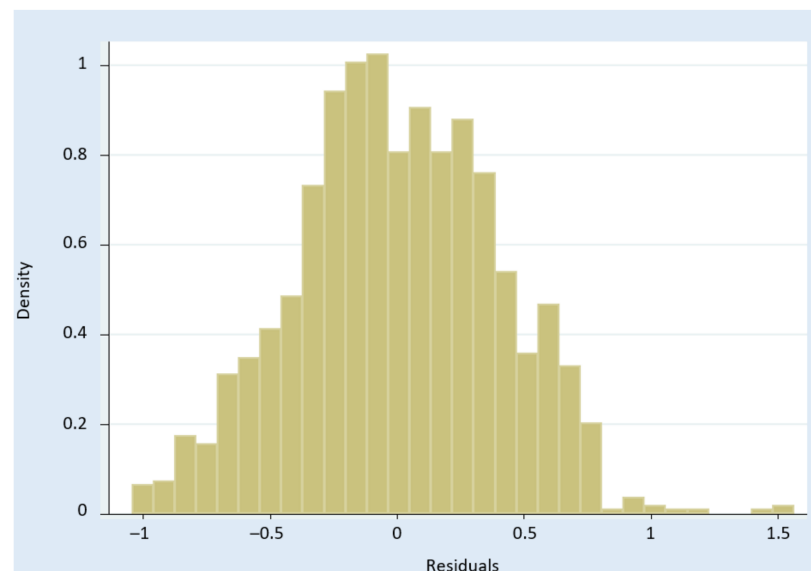
The dependent variable  $Y_i$  is the level of income outcomes 0 (vulnerable), 1 (livelihood), 2 (medium scale), and 3 (commercially viable), recorded in  $y$  and the explanatory variables  $X$  the 4 outcomes, set of coefficients,  $\beta_1, \beta_2$  to  $\beta_j$ , and  $\varepsilon_i$  the error term. Table 3 shows the variables included in the model and their expected signs.

**Table 3.** Explanatory variables used in the Gologit model.

Variable	Description	Expected Sign
Gender	Male/female (dummy)	+/-
Infrastructure score	Infrastructure condition score out of 12 points (categorical)	+
Market used	Type of markets used (dummy)	+
Perform price surveys before selling	Market survey (yes or no)	+
Province	Geographic location (categorical)	+/-
Access to finance	Ability to access financial services	+
Education	Level of education (categorical)	+
Limited skill/expertise	Assessment of current level of skills and expertise	-
Limited support	Difficulty in accessing support	-
Storage facility	Availability of storage facility	+
Number of enterprises	Total number of enterprises	+
Intensive area	Portion of farm (ha) used for intensive farming (continuous)	-
Potential income	Continuous variable	+

#### 4. Results and Discussion

The data were subjected to a number of tests to ensure that the OLS assumptions were not violated. One such assumption was the normality assumption, for which the Jarque-Bera test [38] was employed. Furthermore, a box plot was used to identify extreme values in the dependent variable. After removing extreme values, the hypothesis that the errors are normally distributed could not be rejected ( $p > 0.05$ ), which was also corroborated, visually, by a histogram (see Figure 1).

**Figure 1.** Normality test.

##### 4.1. Factors Associated with Net Income

The performance of PLAS farmers is associated with a combination of factors as shown in the results of the OLS regression results shown in Table 4.



**Table 4.** Ordinary least square (OLS) regression results: factors associated with net farm income.

Model Variables	Coef. (Std. Err.)
Gender	0.228 (0.065) ***
Infrastructure score:	
Medium/fair	0.067 (0.068)
High	0.496 (0.121) ***
Potential net income	0.314 (0.031) ***
Province:	
Free State	−0.112 (0.096)
Gauteng	−0.255 (0.115) **
Kwazulu-Natal	0.126 (0.101)
Limpopo	−0.373 (0.124) ***
Mpumalanga	−0.168 (0.096) *
North West	0.089 (0.097)
Northern Cape	−0.418 (0.120) ***
Western Cape	−0.143 (0.197)
Water equipment condition	−0.043 (0.049)
Limited support	−0.071 (0.040) *
Limited access to finance	−0.155 (0.036) ***
Limited skills/expertise	−0.242 (0.043) ***
Perform price surveys before selling	0.156 (0.063) **
Number of enterprises:	
Two	0.155 (0.061) **
Three	0.224 (0.088) **
Four	0.125 (0.164)
Five	0.502 (0.464)
Availability of storage facilities for produce	0.123 (0.064) *
Intensive area (ha)	0.018 (0.007) **
Constant	7.731 (0.490) ***
$R^2$	0.27
$n$	1321

\*\*\*, \*\*, \* Significant at 1%, 5%, 10% probability level, respectively.

The results show that the quality of infrastructure is positively associated with actual net farm income. In the same vein, [39] found that developing farms before redistributing them increases the odds of success. This finding echoes the conclusion made by [21] that infrastructure (both on-farm and off-farm) is crucial for the success of redistributed farms. The effect of potential income is best explained by aspiration literature, which argues that exposure (which in the case of redistributed farms is synonymous to the farmer having knowledge that their farm has high or low potential) has a bearing of aspiration, which in turn affects actual performance [40–42]. Intuitively, price surveys provide the beneficiaries of redistributed farms with the necessary ingredients not only to set the price but also to choose the best market option, and hence realise relatively higher net farm income. The results further reveal gender disparities in net farm income with male farmers having a better chance of realizing larger net farm income compared to female farmers. Gender disparities are not unique to land reform and [43] argues that decreasing gender inequality in agriculture is key to eradicating hunger. According to [44], the gender inequality gap is wider in rural areas compared to urban areas. Furthermore, farmers who perform price surveys before selling realise better net farm income compared to those that do not. This is not surprising since through such an exercise, farmers are able to get the best price for their product. Moreover, since one of the main objectives of any commercial entity is to maximize profit [45,46], to realise that goal, price, among other factors, should be set correctly [47]. Conducting a price survey might necessitate storage of product while gathering information necessary for a decision model (where to sell the product). As such, farmers with storage facilities for their produce realised higher net farm income compared to those that did not have storage facilities. The results also support the notion of diversification, a risk management strategy in agriculture given price and yield variability.

This finding is in line with existing literature [48–50], which shows that farmers diversify into a combination of enterprises to reduce the variability of farm income. This study however suggests that beyond three enterprises the benefits of diversification are not significantly different from those realized from a single enterprise. This implies that as much as farmers endeavour to diversify, they should guard against spreading resources too thinly, which then undermines the gains from diversification. To this end, there is no empirical study that has attempted to estimate the optimal number of enterprises for land reform beneficiaries in South Africa.

The results also underscore the importance of both technical and financial support, which was reported by [28] to be one of the significant factors associated with success of redistributed farms. The importance of post-settlement support is emphasised by [51] in their assessment of the impact of recapitalisation and development programmes on the performance of land reform beneficiaries in KwaZulu-Natal. Farmers who reported limited support, limited access to finance, and limited skills and expertise on average realised lower net farmer income compared to farmers that did not contend with these challenges. This is in line with [52] which argues that redistributed farms fail to meet statutory obligations owing to insufficient post-settlement support, among other factors.

The study reveals a variation in net farm income across provinces. The variation of performance or effects of the same variables across different clusters warrants in-depth analysis for each cluster. One of the critical steps, perhaps, would be to empirically determine the clusters of redistributed farms—which future empirical work could potentially focus on. As a step in this direction, the current study employs a generalised ordered logit (Section 4.2) to unpack factors associated with different categories of actual viability.

#### 4.2. Generalised Ordered Logit Model Results

Table 5 shows that good infrastructure (infrastructure score) increases the odds of commercial viability across all outcome categories. This link between infrastructure performances in agriculture is also documented in [21,53,54]. Similarly, the availability of a strategic partner increases the odds of attaining commercial viability at all levels (vulnerable through to medium scale). On the other hand, farmers in the category “vulnerable” who are using informal market are less likely to achieve commercial viability. However there is insufficient evidence that those using formal market in the same category (vulnerable) are better placed to operate at commercial viability. However, the use of formal marketing channels increases the odds of attaining commercial viability for farmers in the category “livelihood”.

**Table 5.** Factors associated with net farm income.

Model Variables	Coef. (Std. Err.)		
	Vulnerable	Livelihood	Medium-Scale
Gender	0.607 (0.161) ***	0.387 (0.195) **	0.329 (0.278)
Infrastructure score:			
Medium/fair	0.541 (0.136) ***	0.304 (0.172) *	0.092 (0.267)
High	1.364 (0.232) ***	1.375 (0.239) ***	1.501 (0.318) ***
Type of market:			
Both formal and informal	−0.138 (0.292)	0.104 (0.358)	0.197 (0.527)
Formal only	−0.135 (0.285)	0.221 (0.349)	0.694 (0.541)
Informal only	−0.779 (0.343) **	−0.487 (0.466)	1.066 (0.718)
Education level:			
Primary	0.789 (0.362) **	−0.258 (0.445)	−1.593 (0.678) **
Secondary	1.066 (0.346) ***	−0.138 (0.417)	−0.684 (0.589)
Tertiary	1.270 (0.351) ***	0.212 (0.417)	−0.170 (0.581)

Table 5. Cont.

Model Variables	Coef. (Std. Err.)		
	Vulnerable	Livelihood	Medium-Scale
Strategic partner availability	0.103 (0.208)	0.751 (0.213) ***	0.171 (0.277)
Potential net income	0.727 (0.081) ***	0.759 (0.097) ***	1.568 (0.162) ***
Province:			
Free State	−0.381 (0.234)	−0.009 (0.286)	−0.069 (0.395)
Gauteng	−0.093 (0.272)	−0.046 (0.336)	−0.275 (0.490)
Kwazulu-Natal	−0.131 (0.250)	0.072 (0.301)	0.303 (0.405)
Limpopo	−0.990 (0.311) ***	−0.291 (0.384)	0.435 (0.559)
Mpumalanga	−0.678 (0.225) ***	−0.306 (0.280)	−0.459 (0.395)
North West	−0.113 (0.230)	−0.014 (0.280)	−0.645 (0.429)
Northern Cape	−0.989 (0.285) ***	−1.360 (0.436) ***	−1.219 (0.685) *
Western Cape	0.108 (0.507)	0.069 (0.487)	−0.320 (0.588)
Constant	−12.189 (1.239) ***	−13.730 (1.489) ***	−25.399 (2.542) ***

*n* = 1284; \*\*\*, \*\*, \* Significant at 1%, 5%, 10% probability level, respectively.

The results of the study show that, for categories “vulnerable” and “livelihood”, male beneficiaries are more likely to achieve commercial viability compared to female beneficiaries. As alluded to above, gender inequality literature has long identified disparities in performance across gender categories in the agriculture sector. This underscores the need to strengthen gender equity in the land reform programme of South Africa. The results of the study also show that infrastructure is positively associated with the probability of achieving commercial viability. Specifically, farmers in the categories “vulnerable” and “livelihood” with fair or high infrastructure scores are more likely to achieve commercial viability compared to farmers in the same categories, with poor infrastructure. This result is in line with the findings of [39], which argues that the Australian approach of developing land before redistributing it holds promise for land reform programmes. With regards to markets, farmers in the category “vulnerable” who sell the product through the informal market only are unlikely to achieve commercial viability.

Education level increases the odds of achieving commercial viability for the category “vulnerable” while decreasing the odds for “medium scale” farmers, whereas for the category “livelihood”, education showed no significant association with net farm income. Such results are evidence of non-parallel slope (violation of the proportion odds assumption), hence the need for a generalised ordered logit model. For PLAS programme pioneers, this means that it is paramount to consider education level when allocating farms that are vulnerable but not important to consider education level when allocating farms that are in the category “medium-scale”.

Another noteworthy finding is that farmers in the “livelihood” category that have access to a strategic partner have a higher probability of becoming “commercially viable”. These results are aligned with the findings of [29] which reported that the failure of redistributed farms in the North West Province could be attributed to lack of technical skills, among other factors. The results also show that, on average, farmers strive to live up to expectations as evidenced by the positive and significant association between potential and actual net farm income. The results reveal that the probability of achieving commercial viability differs across provinces. Specifically, farmers in the category of “vulnerable” in Limpopo, Mpumalanga, and Northern Cape Province are less likely to achieve commercial viability compared to farmers in the Eastern Cape Province.

In a land reform comparison between Colombia, South Africa, and Brazil, [55] concluded that land reform in rural environments is unlikely to be a success without additional support systems to counter multiple market imperfections. Similarly, [56] argued that redistribution of land alone is a necessary but insufficient condition for previously disadvantaged rural dwellers to participate in meaningful agriculture activities.

## 5. Conclusions

The paper sought to identify factors that need to be altered or enhanced in order to improve the performance of farms under the PLAS programme. To this effect, the paper evaluated different factors associated with the commercial viability of farms redistributed under the PLAS project. A log-linear regression was used to identify factors associated with net farm income. The results from the OLS regression show that gender, infrastructure score, potential income, location (province), equipment condition, availability of support, access to finance, skill/expertise, number of enterprises, price survey, availability of storage facilities, and intensive area are significantly associated with net income. With regards to the association between gender and net farm income, there is a need for programme implementers to consider gender mainstreaming in both the design and implementation of the programme.

The complexity of policy decisions based on the different farmer performance categories is addressed by the GOlogit regression. The results show that the impact of factors differ across the difference performance categories. For instance, gender is significantly associated with probability of attaining commercial viability for farmers in the categories “non-viable” and “livelihood”, but not for farmers in the category “medium-scale”. In the same vein, the results reveal significant performance disparities across some provinces. This is a reliable indicator that intervention should be tailored to meet the needs of farmers in each category—a “one size fits all” approach is unlikely to yield desired results. As such, there is a need for researchers, project managers, and other members of the supporting professions to explore, in detail, other factors associated with commercial viability. To increase the odds of commercial viability for vulnerable farms, intensive support to support programmes should be put in place.

A large part of existing literature focused on the impact of land reform—in essence answering the question, “did land reform deliver the expected or desired results?” It is clear that some aspects of the land reform programme objective are being met while others are not. The results of the current study answer the question “what does it take to make redistributed farms work?” As such, for the current beneficiaries, the results pinpoint the capacity gaps that need to be bridged in order to improve performance of redistributed farms. It is important to note that by design, land reform programmes are likely to benefit individuals or groups that do not have the capacity necessary for the successful management of commercial farms. Therefore, one of the most important pieces of information to programme implementers is not only how best to select beneficiaries but also how best to capacitate beneficiaries after they have been recruited into the programme. This is where the results of the study become useful—for future beneficiaries, the factors identified by the study will serve as a “check-list” for the elements that should be in place for the beneficiary to make the most out of the farm.

The results of the study suggest that policy makers should consider using different policy instruments to nudge farmers in different categories. To programme implementers, the results provide useful information on the type of support that beneficiaries of different types of farms might need in order to meet the objectives of the land reform programme. For researchers and academia, the results pinpoint the need to intensify efforts to understand the needs of specific clusters of different farmers.

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