

## Determinants of Performance of Land Redistribution for Agricultural Development (LRAD) Projects in the Ngaka Modiri Molema District, South Africa

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**KEYWORDS** Land Reform. Demographic. Beneficiaries. Socio-economic. Sub-programme

**ABSTRACT** The fundamental objective of this study was to analyse the effects of socio-economic factors on the performance of Land Redistribution for Agricultural Development (LRAD) projects in the Ngaka Modiri Molema district of the North-West Province. Random sampling technique was used to select 47 projects with 244 beneficiaries under LRAD sub-programme. Qualitative and quantitative analyses were performed on the data collected using a structured questionnaire. The Tobit model was fitted to the data to analyse the effects of the socio-economic factors on the projects' performance. Sixteen explanatory variables found to be statistically significant included: years of project operation (+NYR:  $p < 0.05$ ); number of project beneficiaries (-NBNOW:  $p < 0.10$ ); number of project beneficiaries with less than matric education (+EDLM:  $p < 0.05$ ); number of project beneficiaries with matric level of education (+EDM:  $p < 0.05$ ); number of project beneficiaries with tertiary level of education (+EDT:  $p < 0.10$ ); number of beneficiaries employed outside the project (-NBEBP:  $p < 0.10$ ); availability of project business plan (+AVBP:  $p < 0.05$ ); average number of trainings attended by project beneficiaries (+AVTR:  $p < 0.05$ ); number of conflicts per project (-NCONF:  $p < 0.001$ ); adoption of new technologies by the projects (+ADTECH:  $p < 0.05$ ); proportion of women with children per project (+PROW:  $p < 0.05$ ); households of beneficiaries' food security status (+HHFSD:  $p < 0.05$ ); net farm income of project (+NFI:  $p < 0.001$ ); project savings (+SAVINGS:  $p < 0.001$ ); farm records keeping (+FRK:  $p < 0.05$ ); and number of established relevant linkages of projects (+LINKAGES:  $p < 0.05$ ). Policy decisions to improve the performance of the LRAD projects in the study area should focus on: improvement of education and skills training of the beneficiaries; introduction of new production technologies; encouragement of savings culture among the beneficiaries; and establishment of relevant linkages for the projects in the study area.

### INTRODUCTION

There seems to be a general consensus that improving agriculture and enhancing agricultural productivity through land redistribution will remain a key strategy for rural poverty alleviation in most of the previously disadvantaged low income areas of South Africa including the study area, where the majority of the rural poor depend directly or indirectly on agriculture. Nevertheless, most of the LRAD projects in South Africa including those in the study area have performed poorly and have not delivered on their development objectives of improving rural livelihoods through sustainable crop and livestock production for food security and poverty alleviation. The general problem is the low performance and the non-functioning of some of the LRAD projects in the study area. For a long time, uneconomic farm sizes and poor farm infrastructure were viewed as the major cause of the poor performance of the previously disadvantaged farmers and the government invested huge sums of money towards redistribution of pur-

chased functioning White commercial farms with infrastructure and distributed to the poor. Consequently, research and expenditure tended to focus on farm infrastructure, but often this proved fruitless (Fanadzo et al. 2012). Other factors such as socio-economic and demographic factors may have a major role regarding the success of the LRAD projects. The extent to which a farmer is performing or efficient in his or her work can to a large extent be determined by the socio-economic and demographic variables. The fundamental objective of this study was to analyse the effects of socio-economic and demographic factors on the performance of LRAD projects in the Ngaka Modiri Molema district of the North-West Province, South Africa. Many studies have proved that socio-economic and demographic factors of agricultural projects' beneficiaries influence the performance of agricultural projects (Deere and León 2001; Owens et al. 2003; Leite et al. 2004; Okon et al. 2010). Ugwumba (2010) examined the effects of socio-economic and demographic factors on farm income and found that farm income was signifi-

cantly influenced by years of experience, educational level and utilization of fish pond waste as organic manure in crop farm. Oluyole and Sanusi (2009) established that educational level as well as farm size significantly affected the level of cocoa production in the study area ( $p \leq 0.05$  and  $p < 0.01$  respectively). Oboh and Ekpebu (2011) state that factors that significantly ( $p \leq 0.005$ ) affected the rate of credit allocation to farmers include age, education, farm size, household size, length of loan delay and visitation by bank officials.

### METHODOLOGY

The desktop information and data analysis indicated that approved and transferred land reform projects in the District Municipality from 1997 to March 2009 were ninety. Out of this, 5 were Settlement Land Acquisition Grant (SLAG) projects; 3 were Commonage projects; 72 for LRAD sub-programme; and 10 for Proactive Land Acquisition Strategy (PLAS) sub-programme. Under the ownerships of LRAD beneficiaries, the majority of the projects undertake combinations of livestock, grains and vegetable production. Based on the number of LRAD projects in the district, random sampling was performed and 47 projects constituting 65% of all the active projects under LRAD sub-programme which is the focus of this study were selected. Typological stratification was not considered since over ninety percent of the projects have common farm enterprises combinations namely cattle, maize, goats, vegetables and poultry. Qualitative and quantitative analyses were performed on the cross-sectional data collected (2009/2010 season) using a structured questionnaire. The Tobit model was fitted to the data to analyse the effects of the socio-economic and demographic factors on the projects' performance. The performance of the projects were assessed with the following indicator variables: project infrastructure, community/beneficiaries participation, enhanced beneficiaries/community voices, leadership and key players up skilled, beneficiaries' skills training, conflicts managed, technology adoption, increased resources, environmental care aspects, organizational, financial, institutional support, sustainability aspects, IT capacity, communication capacity, technology adoption, transport capacity, project planning and regular assessment. The dependent variable of

the study,  $Y_i^*$  is limited and measured as the level of project performance defined as:

$$\frac{\text{Total frequency of indicator variables obtained by a project}}{\text{Total of indicators frequency expected}} \times 100$$

$Y_i$  was left censored hence the Tobit regression model provided estimates which were asymptotically consistent and efficient as expressed in equation 1 following Gujarati and Sangeetha (2007).

$$Y_i = \begin{cases} y_i^* = \beta X_i + u_i & \text{if } y_i^* > 0 \\ = 0 & \text{if } y_i^* < 0 \end{cases} \quad (1)$$

$$y_i^* = \beta X_i + u_i \quad N(0, \sigma^2) \quad (2)$$

Where:  $i$  = number of respondents or projects i.e. (1, 2, ...)

The observable variable  $Y_i$  is defined to be equal to the latent variable whenever the latent variable is above zero and zero otherwise.

$y_i^* > 0$  implies that  $y_i^*$  is observed

$y_i^* \leq 0$  implies that  $y_i^*$  is not observed (a or 0 = limit).  $X_i$  is a vector of explanatory or independent variables.  $\beta$  is a vector of unknown coefficients and  $u_i$  is an independently normally distributed error term.

The Limdep Version 4.1.0 Statistical Programme was used to analyse the limited dependent variable model and the parameter estimates for the effects of the socio-economic factors on the projects' performance were determined. The iterations were "Normally exited". The parameters estimated included the intercept, the estimates (coefficients), standard error, t-values and approximate  $pr > t$ . The independent variables or socio-economic and demographic factors of the projects considered in the model are defined in Table 1.

### RESULTS

The general information about the project and beneficiaries are presented in Table 2. The majority (54%) of the beneficiaries of the projects included in the study were men, 46% were women while 41% were youth. The majority of the project beneficiaries (52%) were married while 44% were not married with 4% as co-habitation. The educational background shows that 46% of the beneficiaries had attained education level of less than matric and 28% had attained matric while about 26% of the beneficiaries have attained tertiary level education. The study estab-

**Table 1: Variable labels and their expected effects**

<i>Independent variables</i>	<i>Variable label</i>	<i>Expected sign</i>
NYR	No. of years of project operation	Positive
NBNOW	No. of project beneficiaries	Negative
EDLM	No. project beneficiaries with less than Matric education	Negative
EDM	No. project beneficiaries with Matric level of education	Positive
EDT	No. project beneficiaries with tertiary level of education	Positive
NBEBP	No. of beneficiaries employed outside project	Negative
AVBP	Availability of project business plan. 0 = Not available; 1 = Available	Positive
AVTR	Average number of trainings attended	Positive
NCONF	No. of conflicts per project	Negative
ADTECH	Adoption of new technologies by the projects 1=Adopted, 0=not adopted	Positive
TOTALJOB	Total jobs created per project	Positive
PROWC	Proportion of women with children per project	Positive
PROPY	Proportion of youth per project	Positive
HHFSD	Households of beneficiaries' food security. If % beneficiaries $\leq$ 50% classify the group on the project as, Not secured =0; otherwise Food secured=1.	Positive
PCFS	Project contribution to household food security of beneficiaries. 1 = Nil; 2 = 1-50%; 3 = >50%;	Positive
NFI	Average annual net farm income of the project. 1=<R50000; 2 = R50000-R200000; 3 = >R200000;	Positive
SAVINGS	Does project has savings? 0=Have no saving; 1 = Have savings	Positive
FRK	Does project keeps farm records? 0=No record keeping; 1 = Keep farm records	Positive
LINKAGE	No. of established linkages per project	Positive
VISITSE	Number of extension visits per season. 1 = <3 visits; 2 = 3-7 visits; 3= >7 visits;	Positive
Y	Level of performance of projects	

**Table 2: Project information (n=47)**

<i>Item</i>	<i>Percent</i>
<i>Total Number of Direct Project Beneficiaries</i>	244
<i>Gender</i>	
Females	46
Males	54
<i>Educational Background of Beneficiaries</i>	
Less than matric level	46
Matric level	28
Tertiary level	26
<i>Marital Status</i>	
Co-habitation	04
Not married	44
Married	52
<i>Youth Participation</i>	
>35 years	59
$\leq$ 35 years	41
<i>Membership Turnover</i>	
Still with project	65
Left project	35
<i>Years of Operation of Projects</i>	
>10 years	03
6-10 years	50
1-5 years	47
<i>Household Sizes</i>	
1-5 members	57
6-10 members	43
<i>Size of Land</i>	
1-300ha	66
301-600ha	23
601-900ha	09
>900ha	02

lished that the majority (57%) of the beneficiaries' households had a size of 1-5 members while 43% had sizes of 6 to 10 people. The sizes of the land at the disposal of the beneficiaries range between 5 and 1600 hectares. The sizes of land of the majority (66%) of the projects lie between 1 and 300 hectares. The study established that the majority (53%) of the projects have been in operation for 6 to 10 years. The number of beneficiaries on all the 47 projects involved with the study was 244. The average numbers of direct beneficiaries per project in the study sample was five with a range of 1 to 11. The results of the analysis show that 35% of the beneficiaries who started on the various projects have left the projects due to the very poor net cash-flows on the projects. About 65% of the initial beneficiaries are still with the projects.

The Tobit estimates for the effects of the socio-economic factors on the projects' performance are presented in Table 3.

The assumption that the Tobit model's error term has a normal distribution was confirmed as the sum of the deviations of the observed Y and the predicted values of XbetaY was approximately zero signifying the model fit. The Akaike Information Criterion (AIC) and the finite AIC which are measures of trade-off between bias

**Table 3: Regression results for Tobit model specifications when modeling the effects of socio-economic and demographic determinants ( $x_i$ ) on levels of project performance/success ( $y_i$ )**

Variable	n=47	Coefficient	Standard error
CONSTANT		20.316**	8.496
NYR		0.746**	0.343
NBNOW		-7.089*	3.582
EDLM		8.254**	3.626
EDM		7.557**	3.562
EDT		7.983*	4.059
NBEBP		-6.634*	3.858
AVBP		7.793**	2.938
AVTR		3.684**	1.440
NCONF		-9.867***	1.841
ADTECH		8.206**	3.493
TOTALJOB		-0.012	0.104
PROW		0.659**	0.276
PROPY		-0.019	0.148
HHFSD		6.473**	2.771
PCFS		1.422	1.756
NFI		8.081***	2.221
SAVINGS		8.213***	2.099
FRK		6.999**	2.665
VISITSE		1.140	1.072
LINKAGE		4.820**	2.316
Iterations	Normal exit		
Log likelihood		-133.1526	
Info. Criterion:	AIC	6.60224	
Finite Sample: AIC		7.49940	
BIC		7.46826	
HQIC		6.92813	
Observations > 0		47	
Conditional mean at sample point		58.4957	
Scale Factor for Marginal Effects		1.0000	
R <sup>2</sup>		0.4189	
Sigma		4.11276498	

Note: \*\*\*, \*\*, and \* indicates statistical significance at 1%, 5% and 10% respectively.

and variance in a model construction or accuracy and complexity of the model were both minimal and not of much difference (6.60234 and 7.49940 respectively). The Bayesian Information Criterion (BIC) which penalizes the number of parameters strongly than the AIC was 7.46826, not significantly different from the value of the finite AIC. The value of the ancillary statistic or sigma (4.113) which is analogous to the square root of the residual variance in OLS regression is very minimal.

## DISCUSSION

Most of the estimates or coefficients associated with the explanatory variables have the ex-

pected parameter signs and sixteen of the twenty independent variables were found to be statistically significant at 1%, 5% and 10% levels of significance. The Tobit coefficient estimate associated with the years of operation of the project (NYR) is positive (0.746) and statistically significant ( $p < 0.05$ ) indicating that performances of the projects increase as the years of operation increases. This may be due to the fact that the beneficiaries have been making good use of experience acquired over the previous years in various aspects of the projects including production, financial, marketing, socio-economic and group dynamic issues. The result is consistent with that of Yeamkong et al. (2010) in Thailand who found that dairy farms that have experienced participants, had higher farm milk yield (MYF) and farm milk revenue (MRF) ( $p < 0.05$ ) than those with less experience. The study established that the majority (53%) of the projects have been in operation for 6 to 10 years. Most of the project beneficiaries might have acquired some farming experience through skills training organised by the programme implementers and their participation in the various production, marketing and financial activities of the farm. The coefficient associated with the number of members per project (NBNOW) is negative (-7.089) and statistically significant ( $p < 0.10$ ) indicating that other factors held constant, the performances of the projects decrease as the members per project increases. Most of the projects have experienced conflicts and other group dynamic problems which can normally be attributed to a large numbers of participants per project.

The estimates associated with the number of members having tertiary education, matric or less than matric levels of education per project (EDLM, EDM and EDT respectively) are positive and statistically significant (8.254:  $p < 0.05$ , 7.557:  $p < 0.05$ , and 7.983:  $p < 0.10$  respectively) indicating that the performance of the projects increase as the members per project with the various types of educational background increases (Table 3). The results of this study suggests that formal education improves productivity since the estimates associated with education of the project members are positive; therefore, investment in rural LRAD beneficiaries' education may make extension much more cost-effective by allowing much use of written materials. Over the long run, education may increas-

ingly substitute for extension by enabling farmers to acquire information and skills from a wider range of sources. Education should therefore be empowering in the sense that, first it equips people to make effective decisions about their own lives and second, it must furnish people to go about commonly desired change. The estimates associated with the average number of skills training in agriculture received by the project participants (AVTR) is positive (3.684) and statistically significant ( $p < 0.05$ ). This implies that other factors held constant, the more relevant training is provided to the project participants, the better the performance of the projects. The result is similar to that of van den Berg et al. (2004). They analysed the impact of skills training in Integrated Pest Management (IPM) in six farming villages in Sri Lanka. It was discovered that the IPM was associated with a yield increase of 23 percent. If relevant training in the areas of finance, record keeping, production and marketing are provided to the beneficiaries of the LRAD projects, it would greatly impact positively on the performance of the participants. The importance of business plans for agricultural projects can not be over-emphasised. It normally contains the baseline plans of the projects and serves as implementation guide. The results in Table 3 show that the estimates associated with projects that have business plans (AVBP) is positive (7.793) and statistically significant ( $p < 0.05$ ). This implies that all things being equal, projects with business plans perform better than those without business plans. This may be due to the proper use of the business plans during project implementation as well as translation of the perceived strong interest into actual contribution by the members to the implementation of the projects.

The results of the analysis show that the estimate for women participation (PROW) is positive (0.659) and statistically significant ( $p < 0.05$ ) indicating that the projects with more women in the study sample perform better than the ones with less or no women. The result of the study is consistent with Okon et al. (2010). This study, using stochastic frontier analysis, found men to be less technically efficient than women. The study identified farm size and gender as the major determinants of technical efficiency. This underscores the need to increase women participation in the LRAD projects. Since many of the households in the study area are

headed by women, including those on the study projects, they put in maximum effort in the projects' activities which serve as the only source of food security for the majority of the project beneficiaries.

From the results of the functional analysis in Table 3, the estimates associated with the number of conflict per project (NCONF) is negative (-9.867) and statistically significant ( $p < 0.01$ ) indicating that the performance of the projects decrease with an increase in the number of conflicts within the projects. Due to large numbers of project beneficiaries on many LRAD projects, conflicts may be very prevalent in most of the projects. All the projects in the study sample indicated that they have incorporated conflict resolutions processes in their project constitutions. However, this has not been effectively applied in most of the conflicts that have plagued the projects.

The study established that some of the members of the respective projects not only work on the LRAD projects but are also engaged in other income generating activities beside the LRAD projects. The estimates associated with the number of beneficiaries employed outside the projects (NBEBP) is negative (-6.634) and statistically significant ( $p < 0.10$ ) indicating that the performances of the projects decrease with increases in the number of beneficiaries employed outside the projects (Table 3). This may be due to the fact that those having jobs outside the projects may not be able to give much attention or contribution to the project. There may also be high levels of absenteeism on the part of such participants which can affect the contributions of the other project members who do not have jobs outside the projects. They may be using the incomes earned from the jobs outside the project to ensure their food security. This result is not consistent with that of Owens et al. (2003) who identified that, access to remittances and household's participation in off-farm activities has a positive impact on farm productivity. This could reflect the fact that extra sources of income relax liquidity constraints. This is also confirmed by Savadogo et al. (1998) who established that in Burkina Faso, non-farm income indirectly determines farm productivity via its effect on adoption of traction power.

The results of the functional analysis indicated that the estimate for the project beneficiaries who are food secured (HHFSD) is positive

(6.4723) and statistically significant ( $p < 0.05$ ) indicating that increase in the number of members with secured food security will result in the increase of the performance of the projects (Table 3). This may be attributed to the fact that some of the food secured households might have achieved it via the projects. The analysis also showed that as the contribution by the LRAD projects to food security increases, the performance of the projects also increases. Thus, the estimate for the contribution of projects to food security (PCFS) is positive (1.422). It is expected naturally that if projects are doing well and contributing more to food security, then participants will be motivated to put in more effort to sustain and improve the performance of the projects. The results of the functional analysis show that the estimates for both Net Farm Income (NFI) and savings (SAVINGS) of the projects are positive (8.081 and 8.213 respectively) and statistically significant ( $p < 0.01$  and  $p < 0.01$  respectively) indicating that increases in both variables will result in the increase of the performance of the projects (Table 3). Deininger et al. (2008) using state-level variation in reform implementation, also maintain that the land reforms had a significant and positive impact on income growth and accumulation of human and physical capital in the reform households. The study found that the majority (77%) of the projects have  $< R1000$  Annual Average Net farm income. The results also indicate that the majority of the projects (62%) do not save part of the annual net incomes from the projects. Bank savings and other savings investments by the projects will go a long way to help the beneficiaries to secure loans from commercial entities for farm improvements, services and skills development. The estimate for farm record keeping (FRK) is positive (6.999) and statistically significant ( $p < 0.05$ ) indicating that increase in record keeping by the project participants will increase the performance of the projects (Table 3). The study also discovered that the majority (89%) of the projects keep farm records which are very good practices. This result is similar to that of Yeamkong et al. (2010) that dairy farms that kept records had higher farm milk yield (MYF) and farm milk revenue (MRF) ( $p < 0.05$ ) than those without records. Record keeping is an important tool in farm enterprises management. Records help the produc-

er to follow up the performance of an enterprise e.g. sheep and goat enterprise and assist in making decisions based on concrete facts. It is a tool that enables the producer to take timely corrective measures based on monitoring progress.

The results of the analysis show that the estimate for established linkages (LINKAGE) by the projects is positive (4.820) and significant ( $p < 0.05$ ) indicating that increases in the establishment of linkages with important organisations, institutions and individuals by the projects will increase the performance of the projects (Table 3). According to the results of the study, about 94% of the projects had established at least five linkages while 6% of the projects have established six or more links with other organisations and institutions such as the Department of Labour, the Department of Social Development, Municipalities, the Provincial Department of Agriculture, GWK and Pannar. The results is similar to that of Deere and de Medeiros (2007), which states that, Brazil agrarian reform beneficiaries, besides a plot upon which to grow part of their subsistence requirements, also gained access to a range of other benefits from which they had previously been excluded such as; the establishment of dialogues and linkages with the different agencies of the state and financial agents or other intermediaries, notably the Bank of Brazil, whose personnel begin to frequent long-neglected areas, in turn stimulating the demand for local services. The increased productivity in the Taiwan agrarian reform was attributed to strongly promoted linkage of Sino-American Joint Commission on Rural Reconstruction. The results of the analysis show that the estimate for use of modern technology on the project (ADTECH) is positive (8.206) and statistically significant ( $p < 0.05$ ) indicating that increases in the use of improved technologies will increase the performance of the projects (Table 3), other factors held constant. Deere and de Medeiros (2007) stated that the increased productivity in the Taiwan agrarian reform was attributed to factors such as; improved rice varieties, greater application of fertilizer and pesticides, and more advanced technologies. Most of the projects in the study area use various types of technologies including among others: chemical fertilizers, improved seeds, sprinkler irrigation systems, tractors and accessories.

### CONCLUSION

The study performed functional analysis using the Tobit limited dependent model to determine the effect of the selected independent variables on the performance of the LRAD projects in the study area. Policy decisions to improve the performance of the LRAD projects in the study area should be informed by the identified significant indicator variables of the study which included: use of modern technology, relevant linkages established, farm record keeping skills, encouragement of savings from project income, measures to reduce conflicts on the projects, increasing women participation in the projects, preparation and use of project business plans, more relevant skills training for the beneficiaries, improvement of literacy levels (education) of the project beneficiaries and reduction in the number of direct beneficiaries per project in future.

### RECOMMENDATIONS

There should be increased site visits and interaction between the Department of Rural Development and Land Affairs (DRDLA) managers and project participants to assist in management and problem solving since the number of conflicts on projects was found to have negative impact on the performance of the projects. The DRDLA should evaluate the conflict management plans of the projects to ensure that they are properly designed and effectively implemented. It is very important for all conflict management plans to cover the various aspects of conflict viz conflict care, conflict identification, conflict handling and conflict cure. The DRDLA should encourage individual ownership of projects where sustainability and impact are shown to be high. The DRDLA should continue the monitoring and evaluation of projects during and beyond the funding of the projects as an after-care programme that can contribute to sustainability. The transition from small scale and communal farming to commercial farming for most emerging farmers requires giving farmers the necessary management skills and technical know-how. This was further underscored by the fact that all the projects (100%) indicated that they need more skills training to improve

their productivity. The areas that training is required include: livestock breeding; including animal health, herd composition management, breeding systems, livestock grading and animal nutrition; financial planning and management skills; the nature of credit has to be explained to beneficiaries; practical skills in water-point maintenance, basic mechanics and construction have to be developed; irrigation management; crop production; environmental management; wildlife and game management. An integrated agrarian reform support programme will go a long way in improving productivity of the projects if it consists of a package in support services, rural infrastructure and co-operatives. There should be the extension of a special grant to support government's efforts. Furthermore, the agrarian reform development support project should primarily involve the establishment of Farmer-Support centres for the acquisition and distribution of agricultural equipment to agrarian project beneficiaries. These farmers support centres will provide the necessary services and support to the agrarian reform project beneficiaries.

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