

THE CONTRIBUTION OF LAND USE CONSOLIDATION PROGRAM TO THE ECONOMIC DEVELOPMENT OF FARMERS IN NYAMAGABE DISTRICT, RWANDA

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Abstract

This study dealt with the contribution of Land Use Consolidation Program to the Economic Development of Farmers in Nyamagabe district, Rwanda. The main research problem is that poor productivity of Nyamagabe farms does not allow farmers to have food crop surplus to sell to market for revenues. The specific objectives wanted to assess land use consolidation in Nyamagabe district, find out the economic capacity of Nyamagabe farmers before the introduction of LUC, and highlight the contribution of LUC to the economic development of farmers. This study used descriptive and correlational research design. It described independent variable and dependent variable and also looked for the relationship between independent and dependent variables to stress on the contribution of land use consolidation to the economic development of farmers in terms of percentages. To determine the extent to which the above variables are related, the researcher made recourse to a survey to record data. A systematic random sampling was used to sample 100 respondents. The majority of them were married and household heads. The data collection tools were the questionnaire and the interview. The former was addressed to farmer household heads while the latter was addressed to six sector agronomists. After the analysis of data and interpretation, results showed indeed that land use consolidation program not only increased farmer's arable land in the range of one Are to 7 Ares but also increased land productivity and crop yields by 3.5 times which brought food crop surplus to sell to market for money. The sale of the latter brought a considerable income to Nyamagabe farmers. The raise of income positively affected farmers' livelihood and their economic development as well.

Keywords: Land use consolidation, economic development, farmers

1. Introduction

Land Consolidation is generally considered as putting together small plots with the aim of making them viable and more productive per unit of investment, through economies of scale. These need not change the amount of land controlled by individuals, and is therefore not necessarily an instrument for social justice (Zhou, 1999). It is believed that land consolidation was practiced around 1060 B.C.in China and 300 B.C. during the Roman Empire. There has been considerable land consolidation in Eastern European countries after the reform from socialist productions systems that had resulted in fragmented property rights (Vitikainen, 2004).

Western Europe's farmland was considered to need consolidation in the 1950s, a time when Europe had pressing needs of reconstruction after the Second World War. Land consolidation had been also implemented in Central and Western European countries since 1989 as part of an overall strategy of transition from centrally planned agriculture to privatization and market development in order to increase farmers' revenues. It was also implemented in Latin America

and Asia to mitigate land fragmentation (Mackenzie, 1993).

In Africa, land consolidation was introduced in some countries during the colonial period to mitigate for land fragmentation. Proper use of the land is the foundation of the economic outlook both of the Protectorate as a whole and of the individual peasant (Topham, 1993). After the independence period, land reform was ubiquitous all over Africa for various purposes such stopping further fragmentation in Kenya (Mackenzie, 1993) and reorganizing fragmented farmlands in order to improve yields in Ghana (Abubakri, 2015).

While in Europe and other parts of the world such as Asia, Latina America and Africa, land consolidation was for multiple purposes, in Rwanda the scope of land consolidation is limited to specific agrarian outcomes. It was borne out of concrete conditions and a context forged out of recent policy developments. The driver of land reform in Rwanda can largely be the need to improve land use management and to reverse the adverse effects of land fragmentation and related problems especially in the period after the 1994 genocide. The pillars of land reform in Rwanda have been the Land Policy of

2005 and Land Law of 2005 (Musahara and Huggins, 2005).

In Rwanda, Land Use Consolidation (LUC) Policy was enunciated in 2004 by the Government after the presidential visit in Malawi where real benefits of consolidated lands were seen and it was implemented in 2008. Though LUC is one way of stopping land fragmentation, a major obstacle to agricultural development as it hinders agricultural mechanization; it causes inefficiencies in production, and involves large cost to alleviate its effects (Thomas, 2006). The situation of land fragmentation in Rwanda and in Nyamagabe in particular and the introduction of land use consolidation policy as its solution attracted the researcher.

According to the third EICV, the mean size of land cultivated per household in Nyamagabe district is 0.51 ha. More than a half (57%) of the households in Nyamagabe cultivate under 0.3ha of land while FAO estimates that on average, a Rwandan household requires at least 0.9ha to conduct sustainable agriculture. This scarcity and tiny size of agricultural holding are the result of both of the population pressure and land fragmentation practice backed by a long

and old cultural and traditional practice where by parents used to inherit their children by dividing their land among their sons. Coupled with traditional farming practice and the recurrent soil erosion on steep hillsides, and soil acidity, the above factors make Nyamagabe farms less productive. This poor productivity of farms does not allow farmers to have sufficient food crop production which can allow them to have food surplus to sell for revenues. This corroborates with the EICV3 which classifies Nyamagabe district at the lower level (20 %) than the national average for staple crops 20.9% in the overall commercialization of crop production as measured by the share of harvest sold (including households selling zero crops). This agricultural situation concurs to the problem of poverty of Nyamagabe farmers. The third EICV shows that Nyamagabe is the district with the highest percentage of extremely poor and poor population categories. This category represents 73.3% for both extremely poor and poor in Nyamagabe district. This research study aims to find out the contribution of land use consolidation program in the economic development of

famers since its inception till the end of season B 2015 in Nyamagabe District.

2. Method

This study used descriptive and correlational research design. The population of this research was made of 30,433 farmer household heads that make up private households distributed in six administrative sectors of Nyamagabe district namely Gasaka, Cyanika, Mbazi, Tare, Kitabi and Buruhukiro. The sample size of $99.8 = 100$ was derived from population 30,433 household heads using Sloven's formula at a confidence interval of 90% and margin of error of 10%. A two-stage sampling technique was used to select the sample. The researcher collected primary data using a survey and a face- to -face interview. These questionnaires were self administered amongst the respondents in order to collect the completed responses within a short time possible. A reliability test revealing a cronbach alpha of .892 which is greater than .750 allowed the research to go on. After data collection, processing started by editing the data. It consisted in reviewing the data to ensure maximum accuracy and unambiguity, and then followed coding of all non numerical data into numbers. Based on the data

processed the research established patterns and relationships between the study variables using SPSS whereby frequencies were adequately established. Descriptive statistics and Chi-square were used as analysis techniques.

3. Results and Discussions

In regard to demographic characteristics of respondents, it was seen that most of the population engaging in land use consolidation in Nyamagabe District are male (64%). , 73% of respondents belonging to the active age group 31-50, not very highly educated as none of the sampled respondents did university studies. Nevertheless, sampled farmers do have enough knowledge concerning agricultural activities they are required to carry out in Land Use Consolidation program. It was also seen that 82% of respondents possess land titles while 18% do not. It has been found out by Musahara (2006) that the possession of land titles helps to improve land tenure security and makes land owners feel confident to make long-term investments in their land which in turn may enhance their productivity and technical efficiency. Nyamagabe district is divided into 2 agro-climatic zones, Bunyambiriri or Rukiga (mountainous with much rainfall)

and Bufundu (less mountainous with less rainfall). This study shows that the number of households which belong to Bufundu zone is a little bit higher than that of Bunyambiriri; that is, 52 and 48 respectively.

The first objective of this study wanted to establish a kind of mid-term evaluation of LUC in Nyamagabe district. It intended to find out among other elements whether Nyamagabe

farmers involved in land consolidation grow crops indicated by Crop Intensification Program (CIP), whether those crops are adapted to their micro-agricultural zones, whether farmers have noticed the advantages of consolidating land and the kind of incentives farmers get once they embrace land use consolidation program. With this regard table1 presents results as indicated

Table 1: Perceptions of Respondents on LUC in Nyamagabe District

	Attributes	Frequency	Percent
Awareness of LUC program	Yes	100	100.0
	No	0	0.0
	Total	100	100.0
Participation in LUC	Yes	100	100.0
	No	0	0.0
	Total	100	100.0
Type of crops selected	Maize	27	27.0
	Wheat	20	20.0
	Irish potatoes	11	11.0
	Beans	42	42.0
	Total	100	100.0
Compatibility of the chosen crop	Yes	89	89.0
	No	11	11.0
	Total	100	100.0
Conducive area for LUC	Uphill	31	31.0
	Valley	69	69.0
	Total	100	100.0
Preference to return to intercropping mode	Yes	5	5.0
	No	95	95.0
	Total	100	100.0

Source: Primary data, 2015

With this objective the study shows that:

- All respondents confirm without doubt that they are aware of LUC

program and the benefits they will enjoy once they embrace it. Moreover, they testified that thanks to sensitization seminars and meetings by sector and district administrators and agronomists they knew practices and procedures of land use consolidation.

- During season B 2015, the grown crop was in a descending order of beans (42%), maize (27%), wheat (20%) and Irish potatoes (11%). This list of crops not only coincides with the one given by all the six sector agronomists but also all names of crops fall among the selected and prioritized crops by the Ministry of Agriculture and Animal Husbandry. Beans emerged as the most grown crop because it adapts to both micro-climatic zones of Nyamagabe district whether in marshlands and up hills. According to Kathiresan (2012) the priority food crops in Rwanda include maize, wheat, rice, Irish potato, cassava, soybeans and beans.
- Most of the respondents (89%) agreed that the selected crops were adapted to their soil and agro-climatic zone. The remaining low percentage of respondents stands for farmers who

resisted and were still clinging to some of their traditional crops which were not prioritized or grown as mono-crop in the area.

- The valley has been retained as the most preferred area (69%) for land use consolidation and mono-cropping because it is most of the times a free land owned by the district and exploited by farmer cooperatives. As for uphill land, it is made of individual and family fragmented pieces of land in which there are most often perennial plants such as banana and fruit trees. For this reason, it becomes not easy to clear off these plants so as to consolidate land and grow one crop.
- In Nyamagabe district farmers have understood the benefits of growing a single crop on an extended land. Those benefits include facility in protecting their crops in fighting against pests and erosion, eligibility to get Crop intensification Program's package of incentives.
- Since Land Use Consolidation program is a pillar for Crop Intensification Program, farmers who, voluntarily decide to consolidate their lands and grow

prioritized and selected crop must receive incentives such as fertilizers and seeds through voucher system.

To the second objective this study wanted to *analyze the economic situation of Nyamagabe farmers before and after the introduction of LUC*. It provides a kind of baseline data which served as a basis for comparison with data from the result of LUC. It brings together five

questions which are likely to provide quantitative and reliable information on the then economic status of farmers. It aims at quantifying the data on land fragmentation, productivity and productivity factors, food crop sufficiency and surplus. Table 2, 3, 4 and 5 summarize results as follows:

Table 2: Views on the level of the farmers' economic capacity before LUC

	Attributes	Frequency	Percent
Size of land before LUC	Between 0.1 and 0.3 (ha)	10	10.0
	Between 0.3 and 0.5 (ha)	37	27.0
	Between 0.5 and 1 (ha)	30	40.0
	Between 1 and 2 (ha)	23	23.0
	Total	100	100.0
Plots in possession	Between 1 plot and 4 plots	35	35.0
	Between 4 plots and 8 plots	43	43.0
	Between 8 plots and 12 plots	22	22.0
	Total	100	100.0
Factors influencing negatively farm productivity before LUC	Shortage of land	60	60.0
	Lack of tenure security	15	15.0
	Fragmentation of land	95	95.0
	Poor quality of land	90	90.0
Sufficient of production before LUC	Yes	18	18.0
	No	82	82.0
	Total	100	100.0
Availability of food crop surplus before LUC	Yes	17	17.0
	No	83	83.0
	Total	100	100.0

Source: Primary data, 2015

The study revealed:

- That 77% of farmers owned between 0.1 and 0.5 (ha) of land which was far below the required

surface of land (1.0ha) which can be productive (Mosley, 2004).

- That 65% of respondents owned between 4 and 12 plots before implementation of land use

consolidation. According to Shuhao (2005) land fragmentation leads to increased travelling time between fields, hence lower labor of productivity and higher transport costs for inputs and outputs.

- That factors influencing negatively farm productivity before LUC in Nyamagabe district were in the order of land fragmentation (95%), poor quality of land (90%), shortage of land (60%), and lack of tenure security (15%). It has been noted that land fragmentation constitutes a serious obstacle to rational agricultural development because it hinders mechanization, causes inefficient production and involves large costs to alleviate its effects, resulting in a reduction in farmers' net incomes.
- That before the introduction of LUC program, 82% of the

respondents could not get sufficient yields due to eroded and undersized units of land, poor farming practices, and low level in the use of fertilizers. These constantly led to poor and insufficient harvests which subsequently contributed to farmers' poverty. Only 18% of respondents had sufficient production. Here, one can quickly notice that not all of the farmers, who had the said productive land, could get sufficient productions before LUC.

- That, as confirmed by many of respondents, there was insufficient production before the introduction of the program which explains - 83% of respondents agreed that there was no food crop surplus for sale to market.

Table 3: Views on the level of the farmers' economic capacity after LUC

Items	Attributes	Frequency	Percent
Land increase	1acre to 2 acres	85	85.0
	3acres to 4 acres	10	10.0
	5 acres and above	5	5.0
	Total	100	100.0
Yield increase	Twice	11	11.0
	Thrice	44	44.0
	Four times	40	40.0
	Five times	5	5.0
	Total	100	100.0
Sufficiency of production	Yes	72	72.0
	No	28	28.0
	Total	100	100.0
Availability of food crop surplus	Yes	66	66.0
	No	34	34.0
	Total	100	100.0
Improvement of livelihood through income	Off-farm jobs created	15	15.0
	New assets acquired	66	66.0
	Opening saving account	58	58.0
	Health insurance	66	66.0
	Children school fees	42	42.0

Source: Primary data, 2015

The study reveals that their land has been increased 1 to 2 Acres after consolidation. Above 84% of respondents revealed that at the end of season B 2015, they had an increase in yield three times. Sector agronomists' view about the extent to which LUC raised productivity and yields is that the average raise is between 2 to 3 times. And the reason behind was benefits they got from land use consolidation such as fertilizers and improved seed grants, zero soil erosion,

mono-cropping practice, common fight against pests and land leveling.

Again the study revealed that 72% of farmers who produce sufficient food crops for their families show that there is food security which is an important indicator of economic development. This food security leads to the food crop surplus they sold to market. This increase of income of agriculture household was explained by intensive use of agriculture input, erosion control, introduction of new crops with high value, availability of market and the ways agriculture

techniques were applied. With the increase of income from the sale of food crop surplus 58% of respondents said that they were able to open savings accounts ranging from 45,000 to 600,000 Frws in SACCOs and in BPR. Others acquired new assets such as cattle, plots, TV screens, motorbikes, etc...., others

created off-farm jobs like shop-keeping, shoe retailing, taxi-motorcycling, others paid for health insurance while others were able to finance their secondary school children's education.

The factors of that land increase and LUC benefits are presented in table 4 as follows:

Table 4: Factors of land increase

Responses	Frequency		Percent		Total
	Yes	No	Yes	No	
Few and straight access routes	73	27	73.0	27.0	100.0
Removal of border lines	98	2	100.0	0.0	100.0
Land leveling	58	42	58.0	42.0	100.0
Straight erosion ditches	80	20	80.0	20.0	100.0
Land Use Consolidation Benefits					
Common action against erosion	85	15	85.0	15.0	100.0
Common sowing and harvesting time	50	50	50.0	50.0	100.0
Fertilizers and seed grant	100	0	100.0	0.0	100.0
Common action against pests	70	30	70.0	30.0	100.0
Low production cost	15	85	15.0	85.0	
Common sowing and harvesting time	50	50	50.0	50.0	100.0

Source: Primary data, 2015

The study revealed that the removal of border lines followed by the setting of straight erosion ditches are the main factors causing the increase of land after the implementation of the LUC program in Nyamagabe District.

Most of the respondents echoed that the first benefit farmers get from LUC is

fertilizers and seed grant. The second benefit enjoyed by farmers (85%) who participated in LUC is the protection of their land against soil erosion. Among the immediate results of putting various and small pieces of land together is the joined action against erosion by setting straight erosion ditches in the consolidated land. In addition to land fragmentation, Gunther

(1999) said that the relief of the country has exacerbated soil erosion. Rwanda could lose up to 10MT of humus per hectare per year. About 50 percent of all farms are subject to erosion and erosion follows over cultivation as cause of fall in agricultural productivity. The third one is the common action against pests. This is the resulting advantage of having planted the same selected crop at the same time on a big scale. The individual effort against pests would be isolated and hence costly hence a collective action has always been efficient and effective to all farmers involved in LUC. The least mentioned benefit brought by LUC is low

production cost. Putting together fragmented plots of land reduces crop production cost as the time used to reach each piece, the transportation of fertilizers, seed and harvest, the supervision activity which would make farmers incur high costs if their lands were not consolidated. This lowly ranked profit was stressed by sector agronomists because when fragmented plots are reorganized and combined, they make up efficient farm which cuts off production costs. The comparison of production before and after LUC is presented in table 5 as follows:

Table 5: Production estimates by farmers

	Harvest before LUC			Harvest after LUC		
	Lowest / Acre	Highest / Acre	Average	Lowest / Acre	Highest / Acre	Average
Maize	11kg	13kg	12kg	30kg	44kg	37kg
Beans	8kg	12kg	10kg	21kg	23kg	22kg
Irish potato	70kg	100kg	85kg	240kg	340kg	290kg
Wheat	8kg	10kg	9kg	33kg	39kg	36kg

Source: Primary data, 2015

These figures show that the production of beans doubled. It increased from 10 kg to 22 kg thanks land use consolidation benefits and related incentives. The harvest of Irish potatoes has increased by

3.4 times: before land use consolidation, farmers could get 85kg in average per Acre but in 2015 season B, Irish potato growers reached 290 kg per Acre. As for wheat, the above table 5 indicates that its

production quadrupled from 9 kg before to 36 kg per Acre.

As for the third objective this study wanted to *examine the contribution Land Use Consolidation has had to the economic development of Nyamagabe farmers*. This focused on analyzing the correlation between the LUC and economic development of farmers in

Nyamagabe district, using Chi-Square Analysis, which was appropriate in this research. The relationship was also confirmed through the question related to “the extent to which LUC contributes to the economic situation of farmers in Nyamagabe district”. Table 6 presents results as follows:

Table 6: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11.186 ^a	1	.001		
Continuity Correction ^b	2.311	1	.128		
Likelihood Ratio	5.168	1	.023		
Fisher's Exact Test				.083	.083
Linear-by-Linear Association	11.000	1	.001		
N of Valid Cases ^b	100				

a. 3 cells (75.0%) have expected count less than 5. The minimum expected count is .08.

b. Computed only for a 2x2 table

Source: Primary data, 2015

As indicated, Chi-square calculated is 11.186^a while chi-square tabulated is 3.841. Since Chi-square calculated is greater than Chi-square tabulated, the research concluded that there was a relationship between LUC and economic situation of farmers in Nyamagabe

district. The decision can also be made according to the P-value; in this research, P-value is 0.001. Since P-value is less than alpha (0.05), the null hypothesis was rejected and the research accepted alternative hypothesis. This also means that there was a significant relationship

between LUC and economic situation of farmers in Nyamagabe district. Besides the relationship has been confirmed also by the respondents where they showed the extent to which LUC contributed to the economic situation of farmers in Nyamagabe district.

4. Conclusion

The above findings allow concluding that the majority of Nyamagabe farmers are not only aware of land use consolidation program but also have participated in its activities. Their participation brought to them a new approach of dealing with their land. By consolidating it, they have been able to protect and to enlarge it; and then by acquiring new agricultural techniques and methods they have considerably been able to increase the productivity of their plots and lastly, by applying the incentive package, they have been able to double and even to quadruple the harvest of the prioritized crops. These results of land use consolidation program and many more others contributed to the economic growth of Nyamagabe farmers at 43.1%. With that, the researcher can assert that Land Use Consolidation program has been succeeding in Nyamagabe district. Though with these, one can state with confidence that Land Use Consolidation

program has been a very strong catalytic program for the economic development of Nyamagabe District farmers who embraced it totally, still this study suggests that:

- LUC program should enhance education and sensitization towards mono-cropping and prioritized crops.
- District and sector agronomists should make sure farmers are involved in the determination of land to be consolidated. This will ensure ownership of the program as a whole.
- District and sector agronomists should compile report showing productivity increase for each prioritized crop.
- The determination of priority crops for each agro-climatic zone should be done jointly with farmers.

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