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Land Use Consolidation in Rwanda: A Case Study of Nyanza District, Southern Province

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Abstract

The study assessed the adoption of land use consolidation and its determinants in Nyanza District of Southern Province, Rwanda. Land use consolidation is part of the on-going crop intensification program led by the Ministry of Agriculture in Rwanda. The extent to which this policy has been adopted is less spatially known. In addition, there is scarce knowledge about the factors affecting the adoption of this policy at household level. A sample of 132 households was randomly selected for the interviews conducted in August 2010. The analysis focused on farm, household, and institutional factors to investigate how these determine household's decision to adopt land use consolidation. The findings show that gender, family size, trust, distance, cropping/farming practices are important determinants of a farmer's decision to adopt land use consolidation in Nyanza District, Southern Rwanda.

Key words: *Land fragmentation, land use consolidation, Nyanza District, Rwanda*

1. Introduction

Land fragmentation remains an important feature of agricultural sector in many parts of Africa including Rwanda (Kapfer and Kantelhardt, 2008). Population growth, dysfunctional land, credit and commodity markets in rural areas, inheritance laws and land/agrarian reforms which occurred in the 90s are among major causes of this land fragmentation (Niroula and Thapa, 2005; Lerman and Cimpoieş, 2006).

Throughout the world, land use consolidation is increasingly being recognized by policy makers and development officials as strategy to address two important challenges of the Millennium Development Goals (MDGs): First, in the framework of eradicating extreme poverty and hunger; land consolidation is expected to improve farming activities by increasing the scale of efficiency as well as competitiveness of the agricultural sector. Second, land use consolidation facilitates implementation of soil and water conservation (SWC) measures such as terraces and trenches. Consequently, land use consolidation can be considered environmentally conducive of sustainable land use and management (Mihara, 1996; Niroula and Thapa, 2005).

The rural area in many developing countries, in general, accommodates the part of the population with relatively less wealth. Land remains the main asset on which people's livelihoods are based. Land use consolidation is regarded as part of development factor rural development (Lerman and Cimpoieş, 2006). The effect of land use consolidation can be captured from different perspectives such as, at farm level and household levels. At farm level, effective implementation of land consolidation policies can increase labour

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productivity and lower transportation cost for inputs and outputs (Kapfer and Kantelhardt, 2008), reduce cost of irrigation and land conserving investments, soil erosion, as well as potential land disputes and negative externalities (Blarel *et al*, 1992; Mihara, 1996). At household level, land use consolidation drives to large scale crop production when combined with appropriate crop rotation, which in turn, allow farmers to produce both for food subsistence and for the markets (Cimpoieş *et al*., 2009). Furthermore, plot consolidation reduces income inequalities between rural households (Kimhi, 2009).

Rwanda of post 1994 war and genocide against Tutsi is characterized by major and various development and policy reforms aimed at poverty reduction. This institutional process focuses at reducing poverty through agricultural transformation which, in turn, aims at enhanced agricultural productivity. Towards this end, land reform policies form part of the agricultural transformation across the country of which land use consolidation is currently among those taking the lead. The Strategic Plan for Agricultural Transformation (PSTAII) (2008) envisages some incentive measures for farmers to adopt land use consolidation. These include provision of market and financial information, financial assistance, specialized extension services (training opportunities to participating farmers), and other services to reduce transaction costs (such as purchase and sales agreements, leases and by-laws) (GoR, 2004a; USAID, 2007). Therefore, the leading logic for the land use consolidation is mostly the economies of scale in terms of inputs supply (fertilizers and pesticide), extension services, crop specialization, and monitoring. However, some challenges still persist to make this land use consolidation effective (Huggins, 2012, Kathiresan, 2012).Land use consolidation strategy comes as part of solutions to ever increasing population growth coupled with low and declining per capita agricultural land size (currently less than 0.5 ha) and productivity, which causes little technological progress in agriculture (Clay *et al.*, 1995). The country also suffers from problems of soil fertility mainly due to soil erosion, over-cultivation of agricultural and marginal lands, low use of productivity-enhancing inputs, and variable rainfall (Byiringiro and Reardon, 1996; Clay *et al*., 1995). These problems are exacerbated by land tenure insecurity, weak agricultural research base and extension system, imperfect financial and labor markets, and poor infrastructure in rural areas (Musahara, 2006; Hitayezu *et al*., 2010; Bizoza *et al*. 2007).

Early studies in Rwanda have followed similar research efforts in other developing countries and have acknowledged the economic rationale of land use consolidation. Jayne *et al*. (2003) found that more than 50% of farm families have less than 0.70 hectare, which is below the economically viable farms land size (Government of Rwanda – GoR 2004b). Viable farm sizes, particularly in the Eastern Province, are acknowledged to be associated with observed decrease in poverty levels (Jayne *et al*., 2003; Musahara, 2006; Strode *et al*., 2007; GoR, 2004c). Clay and Reardon (1994) found that farm size positively influence land conservation practices (investment in anti-erosion ditches). Furthermore, development researchers such as André and Plateau (1995); Daudelin (2003); Musahara and Huggins (2005) observed that fragmented, scattered and depleting landholdings have led to rapid competition for land and land disputes, creating social tensions in the past Rwanda. This land fragmentation is partly explained by the nature of land property rights. Two major modes of land acquisition have characterized Rwanda over time namely, acquisition according to customary law or conceptions and acquisition according to rules of the written laws (GoR, 2004d). The first mode of acquisition might have greatly contributed to the land fragmentation through mainly land occupation and inheritance.

Theoretically, the economic advantages provided by economies of scales coupled with the presence of incentive measures provided under Strategic Plan for Agricultural Transformation (SPAT) are expected to increase the adoption of land consolidation by agricultural households in rural Rwanda. Experience from Moldova shows that larger farms produce higher family incomes and that productivity increases as the number of parcels decreases (Lerman and Cimpoieş, 2006). Little is known for the case of Rwanda after land consolidation policy is enacted. Notwithstanding important findings from past studies, neither of the above-mentioned studies has empirically determined farm, household and institutional factors

that influence households' adoption of land use consolidation in rural Rwanda.

The aim of the study is to assess at micro and macro levels keyed determinants of land use consolidation in Nyanza District of Southern Province Rwanda. More specifically, the study investigates what farm, household and institutional factors are likely to influence farmer's decision to adopt land use consolidation. Results from the study are important for both the policy makers and the scientists as they bring additional information on the dynamics of land use in Rwanda.

The remainder of the paper is organized as follow. The second section gives the rationale of land use consolidation in Rwanda. Section three describes methods used for data collection and analysis. Section four presents key results from the empirical analysis of the adoption of land use consolidation. Section five ends with some conclusions and recommendations.

2. Rationale for Land Use Consolidation in Rwanda

Agriculture is a well-known and important economic sector in Rwanda. The vision 2020, which is the leading development strategy for Rwanda, acknowledges agriculture as the leading development sector. Likewise the 2009 estimates support that the agriculture sector is the bedrock of the Rwandan economy. The sector contributes about 34 % of the GDP compared to 46% and 14% for the services and industry sectors, respectively (RDB, 2010).Thus, agricultural reform constitutes a particular significant part of the overall economic reform process. The struggle for poverty reduction calls for agricultural transformation which has led to the 2008 strategic plan for agricultural transformation in Rwanda (phase I and II). In this plan, both food security and rural poverty reduction are top priorities for the ongoing agricultural transformation. Furthermore, Rwanda's 2005 Land Reform considers land use consolidation as part of means to gain from economies of scale and to address the ever increasing land fragmentation problem. In addition, other elements of the Crop Intensification Program (CIP) (such as the Voucher System that facilitates easy access to inputs) sustain the ongoing land use consolidation policy.

Given that poverty in Rwanda is more felt in rural populations that also depend heavily on land; policies aiming at how to improve land use and management are regarded key towards poverty reduction. Thus, land use consolidation is viewed as strategic instrument expected to reduce poverty, thereby help ensuring better livelihoods for the majority of rural Rwandans. However, land use consolidation, although a necessary condition is not sufficient to provide wealth and improved livelihoods as well as secure long-term sustainable rural development in Rwanda (Bizimana *et al*, 2004). Furthermore, some empirical facts show that Rwanda is yet to face certain development challenges such as limited land holdings and inequality in income distribution. For example estimates of 2001 shows that more than 60 % of households had less than 1ha. And that the Gini-coefficient that measures the degree of inequality of the distribution of family income in a country was estimated at 0.51 for the period 2001-2006 (GoR, 2006) at national level; suggesting some income inequalities among Rwandans (see Table 1). Also the Rwandan draft land policy (Bledsoe, 2004) recognizes that important share of land is in the hands of the elites who are mainly located in the urban area. But, the government of Rwanda has set mechanisms to allocate land to the landless (GoR, 2004) and promote land sharing and land use consolidation to facilitate land access and to avoid small and land fragmentation, respectively.

Table 1

Gini coefficients for Rwanda (2001 and 2006)

Coverage / Area	Year 2001	Year 2006
Kigali Urban	0.49	0.47
Other towns	0.52	0.52
Rural areas	0.37	0.44
National	0.47	0.51

Article 20 in the Rwandan land Act spells out the need to augment levels of productivity in agriculture through introduction of land use consolidation (GoR, 2004). The tension between those who would regard land markets as 'good' and customary system 'bad' is also imminent in discourses on land fragmentation and land consolidation. It is necessary to mention however that

land fragmentation in Rwanda has been a coping strategy of using different plots for different crops in different seasons. But, with land use consolidation farmers are suggested to crop one crop per consolidated plots and hence go for mono-cropping farming system. In this context it is also important, Blarel and Bruce (2001) asserts, that gains from consolidating land may not be as high as expected. Neither is tendency towards mono-cropping, which is not necessarily the most optimal choice under conditions of land scarcity and agricultural risks such as unfavorable weather and crop diseases.

Cognizant of the fragmentation of agricultural land as a problem, earlier studies have documented the importance of land use consolidation to alleviate poverty and encourage efficient agricultural production (Kathiresan, 2012). The main focus for land use consolidation in Rwanda is to improve the land use management leading to increased agricultural productivity (GoR, 2009). The list of prospects of this policy comprises the following (USAID, 2007): increase agricultural yields, protection of smallholder land rights, improve the status of livelihoods and lives of millions of rural Rwandans, promote efficient and sustainable use of land resources, promote the equitable distribution of land resources that recognizes the importance of agriculture to the subsistence needs of Rwanda's rural population, preserve individual choice in farming operations, increase opportunities for and benefits derived from private investment in the agricultural sector, increase off-farm employment opportunities, protect and promote women's access to and benefits from land and other resources.

The implementation process is government led and farmers are involved at some stages. Government efforts towards this end are structured in tune of the existing legal and policy framework (USAID, 2007). The implementation process is undertaken at national level jointly with other support land related policies. The organic land law determining the use and management of land in Rwanda provides opportunity for the government in regulating the land use consolidation. The same land law defines land consolidation as the combining of land parcels so that they can be used more efficiently and productively. Also, this permits the state to expropriate land for purposes of land management, to terminate leases for purposes of promoting efficient land use, to order by decree the consolidation of land parcels. However each landholder will retain her individual rights to her parcel, and reserves a role for the land commissions in planning and implementing land consolidation (USAID, 2007).

Land scarcity in combination with ever increasing population is the most structural constraints for poverty reduction in Rwanda. As already indicated land area per capita has been decreasing steadily. The current estimate is less than 1 ha while population has continued to increase since the 1950s (Bizoza and Hebinck, 2010, *unpublished*). Under such conditions, little is known of the extent to which land use consolidation in fact can reduce poverty. This constitutes another research interest and is beyond the scope of this article. Furthermore, the land consolidation policy is yet in its early stage whilst impact oriented studies require sufficient time series or panel data that is not currently available. The purpose is rather to understand what factors determine the adoption process of land use consolidation in rural Rwanda.

3. Materials and Methods

This study was carried out in Nyanza District, Southern province Rwanda. The district is subdivided in 10 sectors with 51 cells and 420 villages known as *Imidugudu* as depicted in Figure 1. The geographical coverage of the district is 671.2 km^2 with an estimated population of 225,209 inhabitants (estimates of 2002 general population census) compared to 229, 439 inhabitants as estimated by the district. This population size is predicted to be 233, 669 in 2012 and the population density is about 342 inhabitants per km^2. The altitude is between 1300 and 1,800 m (absl). Nyanza District is located in the tropical region with humid climate and an average annual temperature of 20^0C.

The dominant economic sector in the Nyanza District is agriculture sector providing the major proportion of employment to the population (estimate of about 90 %) similar to most parts of Rwanda. Major food and cash crops cultivated include coffee, maize, rice, beans and cassava. Land is generally fertile but productivity has declined due to excessive exploitation and irregular rainfall observed in the last few years. However,

the District has a good number of swamps which have the potential to improve crop productivity and ensure food security conditional upon proper exploitation.

Data used in this study was obtained from a household survey of 132 households carried out in August 2010 to investigate determinants of land use consolidation adoption in the research area. The total sample population comprises adopters (84%) and non-adopters (15%) of land use consolidation. The intention was not to have both categories for comparison purposes or for impact assessment rather to give chance to both categories in providing information for this study. All these respondents provide information on factors that are likely to affect the choice of farmers to adopt or not to adopt land use consolidation policy by farmers. Household respondents were selected randomly from six cells of three sectors that were purposely selected. Similarly, each household in the sample area had the same chances to be selected for individual survey. The selection of sample sectors was more purposive. The main guiding selection criteria of sectors are based on the extent to which the sector has implemented the land use consolidation policy based on secondary information from the district. The governance structure of land use consolidation gives more weight to local level institutions namely the sector and the cell. The three sectors are Muyira, Busoro and Kibirizi. The two former ones are reported at the District level having more adopters of land use consolidation policy whilst Kibirizi Sector is reported to have less adopters. The next Table (2) describes the sample design. Number of respondents is equally distributed per sector as well with an average of about 17 % per cell. Out of 132 survey respondents; 76 % are male respondents compared to 24 % who are females.

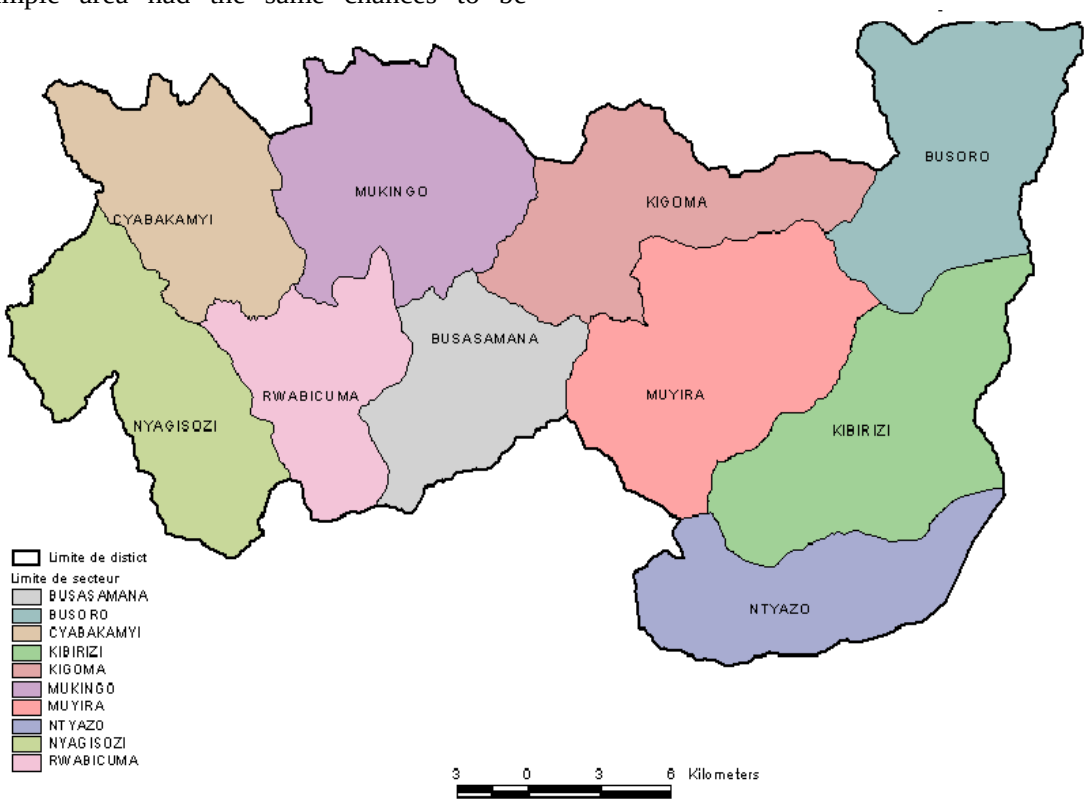


Figure 1: Administrative map of Nyanza District

Table 2

Sample design: respondents per sampled sector

Sector	Cell	Male Respondents	Female Respondents	Total
Busoro	Munyinya	16	6	22
	Masangano	16	6	22
Muyira	Nyamiyaga	17	5	22
	Gati	17	5	22
Kibirizi	Mututu	17	5	22
	Mbuye	17	5	22
Total		100	32	132

Table 3

Descriptive and definition of model variables

Variable	Mean	Std. Dv	Definition of the variable
Female HH	0.24	0.43	Equals 1 if female headed household
Years old	42.92	12.28	Years old of the head of the household
Education	4.97	3.08	Years of formal education of the head of household
Labour availability			Number of adults per household (people more than 18 years old)
Household income	215527	335725	Annual estimate of household farm income (Rwandan Francs)
Informal Credit Access	0.64	1.03	Equals 1 if a farmer received credit from informal organization in the last 12 months relative to land use consolidation
Farm size (ha)	0.95	1.48	Total farm size per household in hectares
Number of plots	1.37	0.62	Number of plots per household
Crop rotation	0.71	0.45	A dummy variable indicating the intensity of land use through crop rotation based on government guidelines
Farming Practice (hedging)	0.72	0.44	A dummy variable used to record land farm practice.
Number of crops	2.56	0.53	Number of crops grown per plot from August 2009 to August 2010.
Distance to nearest financial institution	43.82	11.08	Walking Minutes distance to the nearest financial institution
Distance to nearest market	42.23	11.46	Walking minutes distance to the nearest market
Farmer association membership	0.76	0.69	Number of association memberships of head of household from August 2009 to August 2010.
Trust	3.96	0.04	Average of community's overall trust

Data collected were related household (head) characteristics, farm characteristics, and institutional related variables as described in Table (3). The data were analyzed at household level. It is possible for a given household to have and consolidate more than one plot with variant physical and household –specific variables. A household that has consolidated at least one plot is considered as an adopter in the analysis. The effort is to assess the relationship between household's decision to adopt land use consolidation policy with factors from household, farm, and institutions such as, trust. Trust is part of cognitive social capital that is conducive to collective investment in land use and management (Glaeser *et al*. 2002, Krishna, 2004).

To measure trust, the survey asked whether the respondent trusts his/her neighbour (s). These neighbours are potentially partners in a consolidation process. A scale of trust was also pre-coded from 1 (strongly disagree) to 5 (strongly agree). Given that this question was asked after some respondents had already consolidated their lands; we used an average index of trust computed at cell level to avoid possible endogeneity. These explanatory variables were specified in reference to other previous adoption studies (see Feder *et al.* 1985, Knowler and Bradshaw, 2007, Lambin *et al.* 2001). For analytical purposes, the Probit Maximum Likelihood (ML) estimator was applied with robust standard errors in order to take into account potential heteroskedasticity that is common in most cross-sectional data (Wooldridge, 2002). In view of the above, the following equation (Equ.1) was estimated and results are reported in Section four.

$$Y_i = \alpha + \beta_1 HC_i + \beta_2 FC_i + \beta_3 IC_i + \varepsilon_i \quad (1)$$

Where Y stands for adoption (or not) of land use consolidation while the subscript i indexes a sample household. *HC*, *FC*, and *IC* are vectors of variables expected to influence Y_i while β_i represents the vector parameters representing marginal effect of each component of the above variable vectors. The intercept α represents the expected value of Y when the effect of observed variables is equal to zero.

4. Empirical Results and Discussion

The equation (1) was estimated to assess what factors seem to correlate with the decision to adopt (or not) land use consolidation, with focus on institutional factors such as trust. The interest in the trust factor is partly explained by the uncertainty that goes together with land reforms with potential reluctance to adopt the policy in fear of land eviction or land grabbing, and so on. The estimated coefficients were obtained based on robust standard errors. Results from the analysis are presented in Table (4). The second and the third columns present probit ML estimates of the adoption of land use consolidation, while columns four and five present estimates of the Instrumental Variable Probit.

Among household characteristics hypothesized to influence the adoption of land use consolidation only female head of household is found negative and statistically significant (at 1% level). The implication was that the households headed by females were less likely to adopt the land use consolidation. Part of explanation was that probably women in general are more risk averse and therefore are reluctant to consolidate their lands with households headed by males. Again, given that the registrations of lands were yet to be done in the study area; this could add reason for women's reluctance to consolidate their land uses with their counterparts- male headed households. Land use consolidation processes lead, in most cases, to changes in the farming system(s) and soil and water conservation measures. Because the government plays an important role in the design and the implementation of the policy; farmers were encouraged to adopt land use consolidation as well as new crop rotation system as suggested by the extension officials. Farmers are provided with 50% subsidized improved seeds and fertilizers as part of compliance measures to the land use consolidation policy. These were captured by the crop rotation variable which was also found positive and statistically significant at 1% critique level. However, the crop rotation system needs careful consideration as wrong rotation may lead to reduced crop yield. For instance, farmers contend that if you rotate cereals with other cereals; crop yield is likely to decline. And they suggest that cereals should be rotated with another category of crops such as root crops and legumes.

Table 4

Probit ML, Instrumental Variable Probit Estimates of Adoption of Land Use Consolidation

Variable	Probit ML Estimates		Instrumental Variable Probit	
	Coefficient	*T-ratio*	*Coefficient*	*T-ratio*
Female HH	-1.889	-3.19***		
Age	0.009	0.59		
Education	-0.091	-1.52		
Labour availability	-0.281	-1.65		
Farm-Household Income			4.90E-06	2.20**
Informal Credit Access	0.129	0.39	0.029	0.24
Crop rotation	3.006	4.36***	1.680	3.20***
Soil conservation (hedging)	1.368	2.88***	0.385	0.95
Distance to nearest finance	-0.068	-2.37***	-0.027	-1.13
Distance to nearest market	0.031	1.08	-0.002	-0.09
Association membership	-0.117	-0.50**	0.253	1.15
Trust	12.572	2.31**	11.286	2.56***
Constant	-48.184	-2.23**	-44.578	-2.50**
Wald Chi-Square	28.28		29.89	
Probability > χ^2 /Prob>F	0.0029		0.0002	
Pseudo *R*-square / R-Square	0.5013			
LR	-28.842641			
/arthrho			-0.052	-0.10
/lnsigma			12.49008	103.35***
Sample size (*n*)	132		132	

Notes: * significant at 10 %level, ** Significant at 5% level*** significant at 1% level

In addition, the mono-cropping system is yet debatable. Mixed cropping has some advantages especially for small scale farmers. It allows farmers to avert some risks in their farming and also bridge two agricultural seasons in terms of food availability.

Farm fragmentation or small size land holdings is common in the study region as in many parts of Rwanda. Under such situations, it is a hard job to implement long term infrastructures for soil and water conservation such as trenches and bench terraces. Once farmers adopt land use consolidation they are, therefore, able to protect their soils as a result of increased land space making possible the use of trenches and bench terraces coupled with plant hedges. A dummy variable (soil conservation) indicating if the respondent(s) use(s) trenches in their consolidated land use was specified. Empirical results show that this factor is positive and significantly correlated with the decision to adopt land use consolidation (at 1 % level).

Distance from the homestead to the nearest financial institution may discourage land use consolidation (significant at 1 % level). Land use consolidation requires more investment such as in soil conservation and the purchase of improved seeds and inputs. The more a financial institution is distant from the homestead, greater transactions costs are expected. Most of rural areas in Rwanda

are characterized by scanty financial institutions, explaining partly the obtained negative correlation with land use consolidation. This is a challenge especially in areas where farmers are consolidating their lands. Once lands are consolidated; more option for credits sources are highly needed to make the process sustainable and profitable to farmers.

Among institutional variables specified, farmer association or group membership and trust are included. The effect of association membership is estimated to be negative and not statistically important. Bizoza (2011) also found a similar result in his analysis about institutions and adoption of technologies in Rwanda. This outcome contrasts with empirical findings from earlier studies that membership in associations is positively and significantly associated with land related investment (e.g. Nyangena, 2008). But, there is evidence from the field observation that the land use consolidation process is linked to membership in farmer association or working in a cooperative farming model. The explanation is that consolidated land uses are supposed to be managed through farmer organizations to ensure smooth implementation of planned collective farming activities.

The estimated coefficient of trust is positive and significant (at 1 % level). This implies that trust constitutes key element of the enabling factors for land use consolidation. This finding is consistent with earlier studies on the role of social capital in community land use and management (e.g. Bouma *et al.*, 2008; Nyangena, 2008, Bizoza, 2011). Sample respondents consolidated their lands before the land registration took place. This process requires more time and resources. But, results from analysis support that where social capital is vital; farmers can still consolidate their lands before the formal land registration process.

The Instrumental Variable Probit (IVProbit) estimator was also applied to capture the effect of income on the probability of land use consolidation among the survey respondents. Results were presented in columns 4 and 5 of the same Table 4. Two reasons explain the choice of the IV probit estimator: Firstly, income was suspected to be endogenous. However the Durbin Wu Hausman test rejected the assumption that income is endogenous. Only simple correlation test shows that income is highly correlated with land use consolidation at 1 % level (with *T-ratio* = 4.52). Secondly, there is general understanding from the literature that expected improved income benefit justifies land use consolidation (e.g. Lerman and Cimpoieş, 2006). To test this, household characteristics such as gender, age and education were used as instruments to estimate the indirect effect of farm income on the probability of adopting land use consolidation. This effect was estimated to be positive and significant (at 5 % level). This result tells us that the expected increased farm income is a key determinant of adoption of land use consolidation in the study area. If this is materialized, then more farmers will embark on the process of land use consolidation. The implication for crop rotation and trust coefficient estimates remain the same as per the first regression. The test whether all parameter coefficients are equal to zero has been rejected. The value for Probability > χ^2 /Prob>F (suggest that all parameters coefficients are statistically different from zero (0.003 <1% critique level).

Trust and crop rotation were found to be two important factors in the institutionalization process of land use and management across the two model analyses. One part of the explanation is that the land use consolidation process is undertaken before (and jointly in some places) the on-going land registration process aimed at securing land property rights and land titles. Choices in crop rotation are another keyed factor in land use consolidation as linked to improved agricultural production. Thus, these two factors are important determinants of land use consolidation policy and these should receive much attention by the policy.

5. Conclusions

In this study the aim was to assess the determinants of the adoption (or not) of land use consolidation policy in Nyanza District, Southern Province, Rwanda. Findings from the analysis showed that some household, farm, and institutional factors are of particular importance in adoption of land use consolidation in the study area. Female headed household was found to be an important household factor in explaining the adoption of land use consolidation policy. This result sustains the on-going debate about the role of gender in the

adoption studies. With respect to farm related factors; crop rotation and soil conservation variables seem to affect farmers' decision to adopt land use consolidation in the study region. One of the conclusions that can be made is that adoption of land use consolidation changes the existing farming system among farmers. Crop rotation is not solely the choice of a farmer it is done according to extension guidelines.

Another important result is that trust of neighboring farmers is a determinant factor in the process of land use consolidation. This finding supported an important feature of social capital assets in a country of post conflict like Rwanda. The result showed the extent to which trust is being rebuilt among farmers after the 1994 war and genocide against Tutsi and hence conducive to collective action such as land use consolidation and soil and water conservation (Bizoza and Graaff, 2012). Furthermore, capacity strengthening of local leaders especially those at village and cell levels is needed so that they can be able to sensitize farmers on all aspects regarding land use and management reforms. This is likely to allow farmers to be confident in the process of land use consolidation until land registration process is complete.

Given that this research is among the first studies in Rwanda on land use consolidation, more empirical research is recommended on effects of these processes both at micro and macro level in this country. Only then it can be assessed whether the expected benefits of this process indeed are achievable in the context of Rwanda. Further research at Macro-level is recommended to establish an impact analysis of land use consolidation process vis-à-vis the institutionalization process undertaken in Rwanda.

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