Impact of Land Use Consolidation Program on Socio-economic Development in Rwanda, case of Ruhango District

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Abstract

The Purpose of this paper is to assess the impact of Land Use Consolidation Program to the socio-Economic Development of in Rwanda, case study of Ruhango district. The target population of this study will be 42913 people, from which a sample of 100 households head participating in Ruhango District Rwanda, where they was selected with different techniques.The participants was selected using a purposive sampling technique and random sampling. This study adopted a comparative descriptive design which used questionnaires and interviews as instruments of data collection. The quantitative data was first checked to find out blank entries so that they were filtered out and the remaining data was analyzed using SPSS version 21.0 in order to get the research findings correct and specific. It was also found the there was a high degree of positive correlation between land use towards socio economic development where Karl Pearson coefficient of correlation (r) was 0.803 this implies that land use consolidation contributed to the socio economic development positively and at high level

Keywords: Land use consolidation, Socio economic development, Fame

1. Introduction

In Africa, land use consolidation was introduced in some countries during the colonial period to mitigate for land fragmentation. For example, Malawi experienced land consolidation in 1930s by colonialists. 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, I939). In the case of Ghana, customary lands, farmland sizes are relatively small. Additionally, household farmlands are highly fragmented. Current agricultural interventions, however,

focus on input subsidization that are ad hoc and the benefits of which are short lived. An alternative approach is considered to be the innovative and sustainable application of long term strategies such as land consolidation with which fragmented farmlands could be reorganized in order to improve yields reduce the cost of production and improve the incomes of farmers. However, the successful implementation of land consolidation depends greatly on the suitability of local conditions with respect to land tenure and land use (Abubakri, 2015).

This situation of land fragmentation in Rwanda and the introduction of land use consolidation policy as its solution attracted the researcher in this regard, the researcher want to know the impact of Land Use Consolidation on the socio economic Development in Rwanda, case study of Ruhango district. After the implementation of LUC program in all country and it had the impacted the live hood of people in Rwanda including of Ruhango district and the researcher wanted to find out the impact of land use consolidation program on socio-economic development. The general objective of the study was to investigate impact of land use consolidation program on socio-economic development in Ruhango District, Rwanda. This research will be used to gain knowledge of conducting a research through the firsthand experience of data collection and interpretation. The results of this study will be also used to raise the knowledge on variety of issues related to the entire land consolidation project. The study will widen up range of knowledge to other researchers and hence constitute an addition to literature in the field of land consolidation as a project.

The findings of this study will be of importance to different stakeholders and many aspects. The study will help the government of Rwanda to always consider leadership and management courses when hiring different project related with the socio economic development in Rwanda and Also the government will be aroused to always organize induction courses and in service training programmes as well as seminars for the newly appointed agricultural managers of the projects particularly those who are already serving.

Finally, the study is of significance to the academic community by adding to the existing knowledge in the area of land consolidation policy. Land managers, agriculturalists and consultants will refer to this study as a guide to assist in effective management practices and also as a benchmark to address the needs of the poor

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rural citizens. Generally, the findings of this study will benefit students to improve their performance in areas of academics and discipline of agriculture.

2. Methods and Materials

Ruhango District is one of the eight districts of Southern Province. It has Nine (9) administrative Sectors. It covers an area of 626.8 square kilometers. Its relief, alternate seasons, vegetations give a smooth climate for its population. From Pest Management Plan (PMP) and Arrangement for LWH 2013. It is not only in fruits but also Ruhango district has the highest concentration of crossbred cattle (NISR, 2011)

Poronsky et al (2009) recommended the survey design for research where attitudes, ideas, opinions and comments on the problem or issue under investigation. The descriptive survey design was chosen for this present study, because it is sought to gain insight or perception into a phenomenon as a way of providing basic information in an area of study. Therefore, this type of design will be applied to the present research. The researcher will adopt the descriptive survey design. This research design guide in the process of collecting, analyzing and interpreting our findings. It was the research design that brought the fundamental questions–how would the study subject be brought into scope of the research? And more importantly how they (the study subjects) would be employed within the research setting. (Abdullah andLevine1979).

Denscombe, (2008) asserts that the sample must be carefully selected to be representative of the entire population and to provide information that can scientifically be tested. The study population comprised 42913 household from nine administrative sectors namely Kinazi, Bweramana, Kinihira, Byimana, Mbuye, Mwendo, Kabagali, Ruhango, Ntongwe as indicated in table 3.1.

Table 3.1: Distribution of households in Ruhango District

Sector	Households	Percentage
Bweramana	6095	14.20
Kinazi	4658	10.85
Kabagali	3855	8.98
Kinihira	4960	11.55
Mbuye	4004	9.33

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Mwendo	5925	13.80
Ntongwe	4333	10.09
Ruhango	3662	8.53
Byimana	5421	12.63
Total	**42913**	**100**

Source: Ruhango, DDP2018

The sample size was derived from population 42913 household heads using Sloven's formula at a confidence interval of 90% and margin of error of 10% as described below:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n is the sampled size of household-heads

N is the population from which the sample was drawn estimated at 42913 households

e is the margin of error estimated at 10%.

Substituting in the above formula, the sample size is determined as;

$$\boldsymbol{n = \frac{42913}{1 + 42913(0.1)^2}}$$

$$\boldsymbol{= \frac{42913}{1 + 42913\ (0.01)}}$$

$$\boldsymbol{n = 99.76 \simeq 100}$$

This means that a 100 household-heads out of 42913 was the sample size of the respondents from the whole population of this study.

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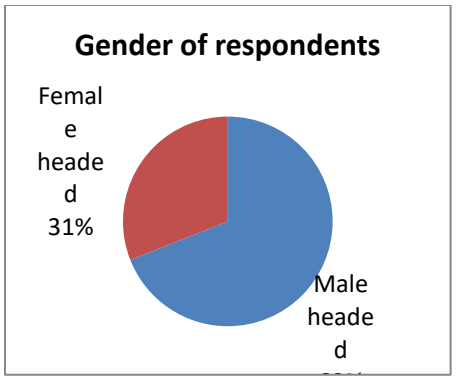
Figure 3. 1Map of Ruhango District

3. Results

This part entirely presents the data collected using both the questionnaire guide and the subsequent analysis leading to the major findings in relation to research questions and objectives. These findings were obtained from both primary and secondary sources. The objective of this study evidence that there is a significant impact between land use consolidation and socio economic development with the evidence of Ruhango district, Rwanda.



(Source: Primary data, 2020)

Figure 4.1 Gender of respondents

Table 4. 1: land possession

Attributes		Frequency	Percent
Possession of land title	Available	92	92.0
	Not available	8	8.0
	Total	**100**	**100.0**

Source: Primary data, 2020

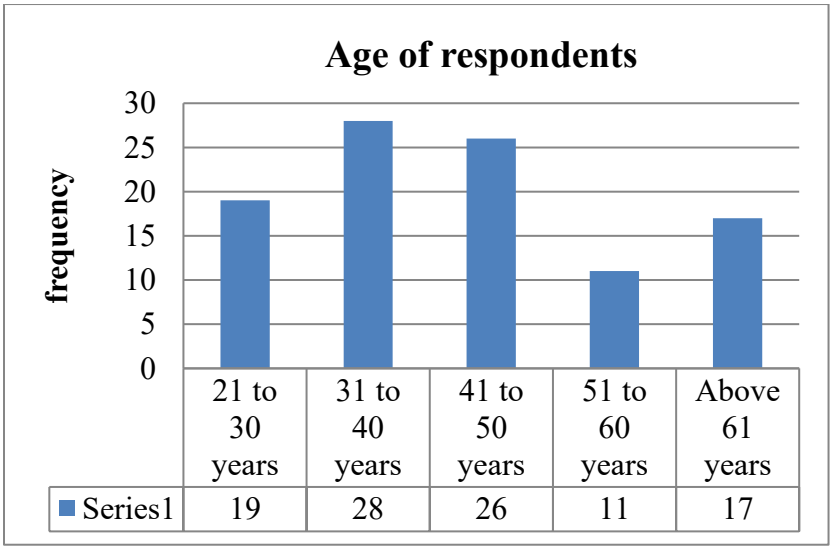


Figure 4.2 Age of respondents

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(Source: Primary data, 2020)

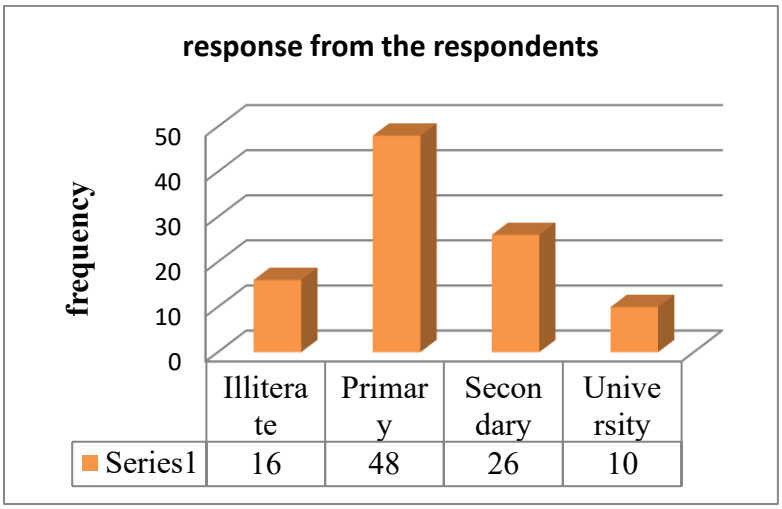

Figure 4.3. Agro- climatic zone

Figure 4.3: Education background of respondents

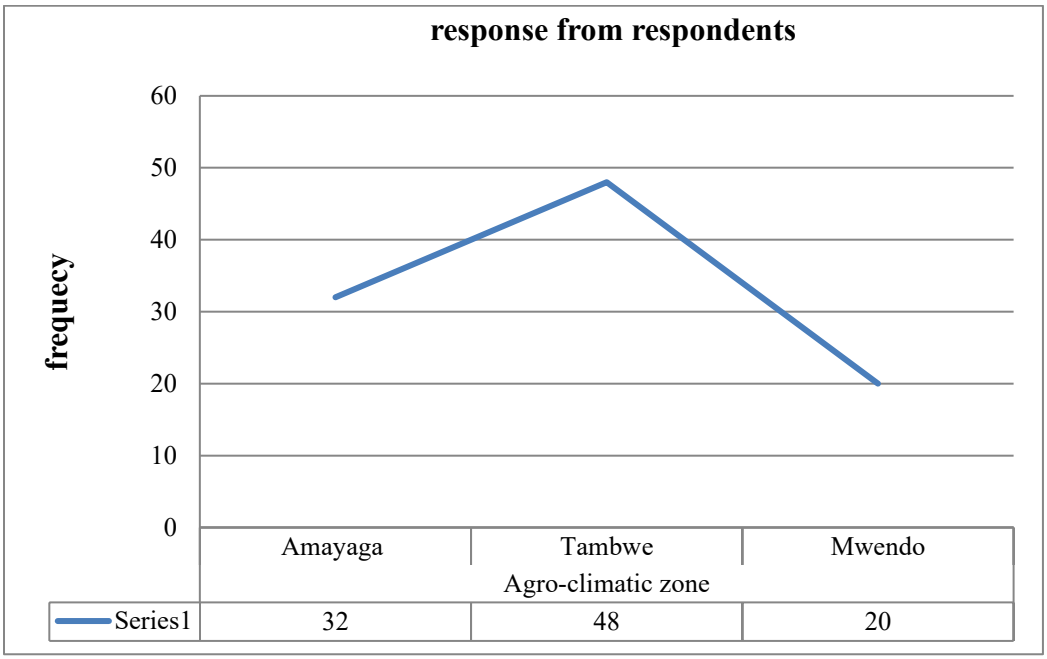

Table 4. 2: understanding of land use consolidation in Ruhango District

Source: Primary data, 2020

	Attributes	Frequency	Percent
Awareness of LUC program	Yes	100	100.0
	No	0	0.0
	Total	100	100.0

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Participation in LUC	Yes	100	100.0
	No	0	0.0
	Total	100	100.0
Type of crops selected	Maize	27	27.0
	cassava	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, 2020

Table 4. 4: Land increase after consolidation

Response	Frequency	Percentage
1 to 2 are	85	85.0
3 to 4 are	10	10.0
7 are and above	5	5.0
Total	100	100.0

Source: Primary data, 2020

Table 4. 6: Comparison of plot productivity before and after LUC

Response	Frequency	Percentage
It has increased	100	100.0
It has not increased	0.0	0.0
Total	100	100.0

Source: Primary data, 2020

Table 4. 3: Views on the level of the farmers' economic capacity

	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

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	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 and 4	35	35.0
	Between 4 and 8	43	43.0
	Between 8 and 12	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, 2020

Table 4. 5: 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

Source: Primary data, 20

Table 4.8: Production estimates by farmers

	Harvest before LUC			**Harvest after LUC**		
	Lowest / Are	**Highest/Are**	**Average**	**Lowest/Are**	**Highest/Are**	**Average**

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Cassava	8kg	10kg	**9kg**	33kg	39kg	**36kg**
Beans	8kg	12kg	**10kg**	21kg	23kg	**22kg**
Maize	11kg	13kg	**12kg**	30kg	44kg	**37kg**
Irish potato	70kg	100kg	**85kg**	240kg	340kg	**290kg**

Source: Primary data, 2020

Table 4. 3: Sufficiency of production after LUC

Response	Frequency	Percentage
Yes	72	72.0
No	28	28.0
Total	100	100.0

Source: Primary data, 2020

Table 4. 9: LUC benefits

Responses	Frequency		Percent		Total
	Yes	No	Yes	No	
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	

Source: Primary data, 2020

Table 4. 13: Improvement of livelihood through income

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Response	Frequency	Percentage
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, 2020

Table 4.14 Relationship between the land use consolidation and socio economic development

Statement		Land use consolidation	Socio economic development
Land use consolidation	Pearson Correlation	1	.803**
	Sig. (2-tailed)		.000
	N	100	100
Socio economic development	Pearson Correlation	.803**	1
	Sig. (2-tailed)	.000	
	N	100	100

Source: Field, 2020.**

4. Discussion

This part entirely presents the data collected using both the questionnaires and the interview guide and the subsequent analysis leading to the major findings in relation to research questions and objectives. These findings were obtained from both primary and secondary sources. The objective of this study with evidence that there is a significant impact between land use consolidation and economic development of farmers.

The researcher distributed 100 questionnaires and gave one week to respond. All respondents gave feedback and this led to the participation rate of 100% which allowed the study to go on. After processes of editing, coding, and recording data in SPSS the researcher generated a table of data to analyze. The research analysis of data was done in the order of demographic characteristics of respondents, and the main objectives were to assess the functioning of

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LUC of Ruhango District, to Identify the socio economic development capacity of beneficiaries of the program before and after their participation in Ruhango district, To relate LUC program towards the socio economic development of Ruhango District.to assess environmental impact due to the land use consolidation programme. The section shows respondents' gender, age and education, possession of land title and agro-climatic zone are presented. The total number of the respondents was comprised 42913 farmers household heads from nine administrative sectors namely Kinazi, Bweramana, Kinihira, Byimana, Mbuye, Mwendo, Kabagali, Ruhango, Ntongwe as indicated in table 3.1

the study intended was to assess the functioning of LUC in Ruhango district and to establish the monitoring and evaluation of the program. They have been mobilized by district and sector agronomists and therefore they know the objectives and purpose of the program. In addition, they have found out the benefits they will enjoy once they embrace the program. Table 4.2 indicates that 100% of the respondents sampled do participate in activities put forward by LUC program since they are all beneficiaries of the program.

As it is indicated in the table 4.2, only 42% of the sampled population indicated that beans is the selected crop, 27% selected maize, 20% selected wheat while 11% indicated that Irish potatoes is the selected crop in their area. These percentages show that during season B 2018 that beans constituted the mostly grown crop in Ruhango consolidated land followed by maize, cassa and Irish potatoes in a descending order. This list of crops are the names of crops fall among the selected and prioritized crops by the Ministry of Agriculture and Animal Husbandry via Rwanda Agricultural Board through Crop Intensification Program. Beans and cassava emerged as the most grown crop because it adapts to both micro- climatic zones of Ruhango district whether in marshlands and up hills.

This research indicated that 89% of the respondents said that the selected crops were adapted to their soil and agro-climatic zone while 11% of the respondent indicated that the selected crop was not compatible. The latter 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.

Table 4.2 of the study established that 69% of the respondents indicated that it has been easy to consolidate land and to practice mono-cropping in the marshlands (valley),

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31% of the respondents indicated that in the uphill it has been easy to consolidate land and to practice mono-cropping. The valley has been retained as the most preferred area for land use consolidation and mono-cropping due to the 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.

Table 4.2 revealed that 95% of the respondents 5% of the respondents respond that they would like return to intercropping strategy. The above percentages 95% against 5% show that Ruhango 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 the study based also on identification of the socio economic development capacity of beneficiaries of the program before and after their participation in Ruhango district. It provides a kind of baseline data which served as a basis for comparison with data from the result of LUC. It aims at quantifying the data on land fragmentation, productivity and productivity factors, food crop sufficiency and surplus. Table 4.3 indicates that 37% respondents owned a piece of land of 0.3-0.5 ha before LUC, 30% owned a land between 0.5-1ha, 23% owned 1-2 ha of land, and 10% owned between 0.1-0.3 ha of land. It has been argued that a plot that is averagely less than one hectare cannot be economically productive (Mosley, 2004). On average, at least 47 percent of households in Ruhango district had plots of less than one hectare (Table 4.3). So, it is clear that more than 47% of farmers owned between 0.1 and 0.5 (ha) of land which was far below the required surface of land which can be productive. Only 23% of households in Ruhango exploit pieces of land which can bring them enough production. Table 4.3 indicates that 43% of respondents owned between 4 and 8 plots before land use consolidation, 35% owned between 1 and 4 plots while 22% owned between 8 and 12 plots before implementation of land use consolidation. The table above gives a clear picture of the extent to which Ruhango plots are fragmented.

It is shown in table 4.3 that 95% of the respondents indicated that land fragmentation is the main factor influencing negatively farm productivity. It has been noted that land fragmentation constitutes a

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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. Land fragmentation is not necessarily a problem in all cases since 90% of the respondents mentioned that poor quality of land influences their farm productivity. Ruhango District soils are generally acidic in nature with a pH ranging from 3.6-5. This generally implies a very poor soil which is saturated with aluminium implying its low agricultural productivity unless organic and mineral fertilizers are added. 60% of the respondents stated that the undersized units of land influence their productivity while 15% echoed that their farm productivity is influenced by lack of tenure security. Table 4.3 shows 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 practice, 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.

As confirmed by many of respondents in table 4.3 there was insufficient production before the introduction of the program which explains why 83% of respondents agreed that there was no food crop surplus for sale to market. After analyzing both variables the researcher had to correlate them in order to find out the role played by LUC program in the economic situations of farmers in Ruhango district and the assessment the environmental impact due to land use consolidation program the eight questions put to respondents focused on arable land. The difference between them will lead to the emergence of the impact of LUC to the environment the study reveals that their land has been increased after consolidation. Thus 85% of respondents indicated that their land increased between 1 and 2 are, 10% stated that their land increased between 3 and 4 are while 5% indicated that their land has been increased above 7 are after land use consolidation.

As it can be observed in table 4.5, above 98% of respondents revealed that the removal of border lines is the main factor behind the increase of their land, 80% saw that the setting of straight erosion ditches caused the increase of their land, 58% stated land leveling as the factor of land increase while 73% revealed that few and straight access

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routes to their plots caused land increase after the implementation of the program.

Table 4.6 shows the comparison of plot productivity before and after LUC. According to the responses above, all farmers- respondents (100%) affirmed that the productivity of their lands increased as a result of LUC. Surely, that increase varied from plot to plot depending on individual land location, farmer's knowledge in farming practice, land characteristics, etc. It can be seen from table 4.8 that the maize production has more than tripled thanks to land use consolidation. The average of production moved from 12 kg before LUC to 37 kg after LUC. Table4.10 shows again 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 Are, Irish potato growers reached 290 kg per Are. As for wheat, the above table indicates that its production quadrupled from 9 kg before to 36 kg per Are and assessment of relationship between LUC and socio economic development of Ruhango district. The relationship is summarized in table 4.13The table 4.5 indicated the perception of respondents on how the air pollution is related to the health risks revealed the perception from respondents on this relationship indicated that there was a correlation between LUC to socio economic development where P-value was 0.000 which was less than the 0.05 as the level of significant. It was also found the there was a high degree of positive correlation between land use towards socio economic development where Karl Pearson coefficient of correlation (r) was 0.803 this implies that LUC contributed to the socio economic development positively and at high level.

5. Conclusion

The title of this work is **"**Impact of LUC program on socio economic Development of Farmers in Ruhango District, Rwanda." It is a quantitative research based on a case study of Ruhango district farmers. The general and specific objectives have been turning around the assessment of the impact of land use consolidation program on the economic development of famers. The three main questions which have guided this study wanted to find out how does Land Use Consolidation Program function in Ruhango District? What is the socio economic development capacity of beneficiaries of the program before and after their participation in Ruhango district? what is the relationship Land Use Consolidation program and the

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socio economic development of Ruhango district? what is the environmental impact due to the land use consolidation programme? The analysis and interpretation of the results for the third objective highlighted the contribution of land use consolidation in developing the economic situation of farmers of Ruhango in reducing soil erosion and land fragmentation, LUC increased the quality and size of arable land, plot productivity and yields.

The raise of productivity and yields led to farmers' food security and food crop surplus to sell to market for money. This brought about the raise of farmers' income. With that financial empowerment, Ruhango farmers have been able do a number of things such as to undertake other off farm activities, to invest in assets and to pay for services for which they could not afford before they participated in Land Use Consolidation program. hese results of land use consolidation program and many more others contributed to the economic growth of Ruhango farmers at 53.7%. With that, the researcher can assert that Land Use Consolidation program has been succeeding in Ruhango district.

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Conflicts of Interest

The authors declare no conflicts of interest.

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