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Nyambane and Gahonzire
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Impact of Land Use Consolidation on Maize Growers' Welfare in Gatsibo District, Rwanda (2012-2015)

[1]David Nyambane and [2]Ferdinand Gahonzire

[1]Faculty of Business and Management, Kampala International University, Western Campus, Uganda.
[2]Faculty of Business Administration (Project Management Option) of Mount Kenya University Kenya.

ABSTRACT

This research delved into the transformative role of land use consolidation (LUC) in enhancing the well-being of maize growers within Gatsibo District, Rwanda, spanning from 2012 to 2015. Employing a descriptive and analytical approach, comprehensive data were gathered from primary sources, drawing from documentation, literature, and library resources. Analysis was conducted utilizing statistical tools like SPSS and Excel, resulting in insightful revelations. The study indicated that a substantial majority of respondents (95%) practiced intercropping maize with other crops using traditional methods. However, post-LUC implementation, there was a marked shift as maize growers transitioned to exclusive maize cultivation on a larger scale, significantly boosting maize production. Notably, 85% of respondents ceased the use of intercropping methods, highlighting the pivotal role of LUC in optimizing maize yield and profitability. Moreover, a significant portion (78%) of respondents reported a considerable increase in maize production ranging from 25% to 75%, elucidating the profound impact of LUC on enhancing economic conditions. This positive shift was reflected in increased monthly earnings and savings, empowering respondents to elevate their socioeconomic status. Consequently, there was a notable surge in various improvements, including enhanced access to healthcare through Mutual Health Insurance, increased expenditures on essentials like clothing, education, household amenities, and the engagement of additional laborers. While LUC brought about substantial improvements, respondents encountered challenges such as inadequate organic manure, adverse weather conditions, low market prices for products, and limited markets for maize. To address these challenges, suggestions were made, including the expansion of communal cowsheds to bolster organic manure production, the establishment of advocacy groups within cooperatives, and the implementation of efficient watering systems to support year-round cultivation, thereby ensuring the sustainability of maize farming. In summation, the implementation of LUC significantly transformed the livelihoods of maize growers in Gatsibo District. Despite encountering challenges, the tangible benefits in terms of increased production, improved economic conditions, and avenues for further enhancements underscore the pivotal role of LUC in fostering agricultural prosperity within the region.
Keywords: Land Use Consolidation, Maize growers and Welfare, Crops, Maize production, watering system.

INTRODUCTION

Land use consolidation is not a new concept, and has been implemented in

different countries for millennia. It is believed land use consolidation was practised in 1060 B.C. in China, 300 B.C. during the Roman Empire. Land Consolidation has been in practice in Europe since the Middle Ages and the current practices date back to the 19th and 20th centuries. Practices of land consolidation are found today in Germany (Flurbereininigung) the Netherlands (ruilverkaveling) France (remembrement), Belgium, Luxembourg, Austria and Switzerland, as well as Finland (uusjako), Norway, and Sweden (fastighetsreglering). There has been considerable land consolidation in Eastern European countries after the reform of the socialist production system that had resulted in fragmented property rights. In the whole of Western Europe by the early 1990s land consolidation involved a quarter of all cultivated land and over 38 million hectares of agricultural land and the farmers benefited from this programme by improving their welfare [1, 2]. The problem of fragmented land began in the 19th century in the world, and in the Iranian year 1341 scattering and small land area, is one of the structural elements of traditional agriculture the distribution of parts, was considered a deterrent. Land reform in Iran caused land fragmentation, increased low-land farmers, and respectively. The fragmentation of agricultural lands has been seen more or less in all countries about problems of land distribution, agricultural planners and politicians recommended integration of land use to solve this problem. The farmers who got involved in its application improved their welfare remarkably [3]. The Land Use Consolidation (LUC) programme was initiated in 2008 as part of a broader Crop Intensification Programme in Rwanda launched earlier in 2007. Not much analysis has been done on its socio-economic impacts on households in Rwanda. Official assessment by the government indicates considerable gains in yield of the select crops. The yield of maize has gone up by more than 5 times in five years, 3 times for beans and cassava, 2 times for wheat and 30 per cent for rice. These are macro-level indicators that have suggested food security in the whole country and by implication reduction in poverty. However not much is known about the impact to household living conditions in general [1]. In the Gatsibo district specifically in the Rwimbogo Sector, the maize growers consolidated land to make their land profitable to improve their livelihood.

By 1994, farm size, on average, was smaller than one hectare, while population density was more than 450 people per square kilometre of arable land. The Rwandan economy is based on the largely rain-fed agricultural production of small, semi-subsistence, and increasingly fragmented farms [4]. The Vision 2020 and the long-term strategy (the EDPRS) have focused on land administration and land use management as key areas for the land reform process that will support sustainable development. These efforts have come up against significant challenges such as population pressure in both urban and rural areas which have led to land degradation. Presently, there are efforts to develop a national land use master plan which will subsequently be translated into local plans to guide zoning for activities including agriculture, urbanization, resettlement, public infrastructures, and biodiversity conservation [5]. The realization of these efforts likely provided appropriate interventions for land degradation which led to enhanced agricultural productivity. Additionally, the appropriate location of activities informed by land suitability assessments ensured that resettlement patterns,

public infrastructure and the overall urbanization process provides the right kind of interventions for urban environment issues in particular and proper national planning targeted at promoting environmental management in support of sustainable development.

In Rwimbogo, there are some people who did not apply the LUC and the poverty and shortage of food is persistent in their families [6]. It is from this background that this study seeks to investigate the land use consolidation impacts on maize growers in Gatsibo District.

METHODOLOGY

Research Design

The study used a descriptive and comparative research design, to determine the impact of LUC on the improvement of livelihood of the maize growers in this study, a comparative research method was used to estimate and investigate the extent to which the parameters of maize growers' livelihood have been improved.

Study Population

A research population is generally a large collection of individuals or objects that is the main focus of a scientific inquiry. It is for the benefit of the population that research is done. The population of this research is composed of 1864 maize growers in the Rwimbogo Sector of Gatsibo District [6].

Sample size

The formula of [7] was used to determine the representative sample from the whole population of 1864 maize growers. 10% was used as the sampling level of precision. This number of 10% is taken for correcting voluntary and/or involuntary errors done by the respondents.

The formula used to determine the sample is written as follows:

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

Where;

n: sample size

N: population = 1864

(e): level of precision =10%

This formula is written by [7] then if the population is 1864 the sample was:

$$n = \frac{1864}{1+18.64(0.1)^2}$$

n = 1864

19.64

n = 94.908

The sampling size is equal to 94.908 approximately equal to 95 respondents. For choosing these 95 people, the random sampling technique was used. For this technique, the questionnaire was given to the maize growers who voted for the yes ballot during their meetings.

Sampling techniques

The sampling used in this research was simple random sampling. In this technique, subjects have an equal chance to be chosen. Thus, sample elements are chosen from the population [8]. That is why Rwimbogo maize growers were chosen to answer the questionnaire and other questions related to the case study.

Data Collection Methods

The reviewed literature informed and influenced the construction of the questionnaire and also assisted in identifying the relevance of land use consolidation in improving the livelihood of maize growers in the Rwimbogo Sector. Structured questionnaires for 95 respondents were used as the main instruments for this research.

Primary Data

According to [9, 10], a questionnaire is a list of carefully structured questions chosen after considerable testing, with a view of eliciting reasonable responses from the respondents [9, 10]. Indeed, the researcher used this method of data collection whereby he carefully framed two types of questions that is "open ended and closed ended" in relation to the objectives of the study to be answered by

carefully selected respondents from Rwimbogo maize growers. Interview is defined as being a scientific process of investigation using a process of verbal communication to collect information in relation to the fixed goal. It is thus about a form of communication which establishes between two people, having for goal to collect certain information relating to a precise object [8]. The case of this work, the researcher adopted the structured interview or maintenance guided which enabled us to collect information in relation with the objectives. The interview was held between the researcher and the Executive Secretary of Rwimbogo Sector.

Secondary Data

This is a collection technique that is based on reading books and other documents relevant to the study. It is sometimes called documentation. According to [11], defined reports and documentation as the analysis of data that already exists in boxes, in some organization's basement or hidden in the core of the computer. Kenneth D. In this research, the researcher used the documentation method as a secondary source of information to collect data from different documents, internet surfs and Rwimbogo maize growers' cooperatives' documents and archives to achieve the study objectives.

Reliability and Validity

The researcher solicited the opinion of various lecturers from Mount Kenya University (MKU), in the Department of Business on the research instrument, to validate the research instrument. Anchored on their expertise and experiences, the scholars gave various objective advices on the contents and judged the suitability and relevance of instruments for this study. Their observations, amendments and recommendations were discussed with the advisor before using the questionnaire for the pilot study. The design and distribution of the questionnaire was composed of two stages. The first stage was the pilot study, which was conducted between September and October 2015. The pilot study was conducted on selected maize growers in the Rwimbogo sector. The objective of the pilot study was to ascertain the reliability of the instruments before the final distribution of the questionnaire to the respondents. The reliability was measured by using Cronbach's coefficient alpha which was based on the mean correlation of each factor. Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. A general rule for measuring reliability is if Alpha is above 0.70 is considerably reliable. Alpha above 0.60 is probably reliable but you should either consider eliminating some elements from the instruments to increase its reliability. Each variable was measured, and if the research obtained a reliability coefficient of 0.772 and above it indicated higher consistency of the multiple items and higher reliability of individual constructs [12].

Data Analysis and Interpretation

During the data collection process, the researcher used careful analysis of the collected data to ensure consistency and accuracy [13]. Data analysis involved both quantitative and qualitative methods. The tables were adopted to summarize the data for analysis and interpretation. The researcher used the software SPSS and Excel to analyse the collected data from the field.

Ethical Considerations

These are related to guidelines delineating the limits of freedom in the research and defining the rights of respondents and the community [14]. In the preparation of the interview, the interviewers' plans were respected. Moreover, Human values have underpinned all activities (confidentiality, respect for people's dignity and avoiding judgment of their opinions, right to anonymity) [15]. The formulation and presentation of questions were simple and avoided embarrassment, guilt and

discomfort. The interpretation of data has followed the general methodological standards without citing the respondent.

RESULTS

Demographic Characteristics of Respondents

The study presented information on demographic characteristics. Detailed results on each of the demographic characteristics are presented below.

Gender of the Respondents

The following table presents the respondents according to their gender. They are male and female.

Table 1: Distribution of respondents according to gender

Gender	Frequencies	Percentages
Female	42	44
Male	53	56
Total	**95**	**100**

Source: Field data.

The data presented in Table 1 revealed that most of the respondents are male. Especially, the data showed that 56% of respondents were male while 44% of the respondents were female. This shows that male is the most representative gender of their families. The apparition of the female respondents is the sign also of equity and equality of the respondents.

Respondents according to their ages

Respondents are grouped in different age intervals. The following table presents the respondents according to their ages.

Table 2: Distribution of respondents according to ages

Age	Frequencies	Percentage
Under 20 years	0	0
21-30 years	32	34
31-40 years	39	41
41-50 years	15	16
50 years and above	9	9
Total	**95**	**100**

Source: Field data.

Table 2 shows that none of the respondents was below 20 years old, 34% of the respondents were 21-30 years old. The respondents who were with the class of 31-40 years old were 41%. The respondents who were within 41-50 years old were 16% while those who were 50 years old and above were 9%. Here the respondents highly represented were in the age bracket of 31-40 years old. These respondents have many responsibilities to satisfy like school fees, paying Mutual Health Insurance and other forms of basic needs.

Education level of the respondents

Respondents have different levels of education. These influence largely their lives as well as the development of their jobs. The following table presents the respondents according to their level of education.

Table 3: Respondents according to their education level

Education level	Frequencies	Percentage
Illiterate	12	13
Primary	78	82
secondary	5	5
University	0	0
Total	**95**	**100**

Source: Field data.

Table 3 shows that the respondents who were illiterate were 13% of the respondents, 82% of the respondents had primary level and 5% of the respondents had secondary level. There were not any respondents who had university level. From this table, the researcher realized that many respondents had primary level. This agriculture domain has low level people.

Marital status of the respondents

Marital status of the respondents talks about how the respondents work in their daily life. The following table presents the marital status of maize growers of Rwimbogo sector.

Table 4: Marital status of the respondents

Statuses	Frequencies	Percentage
Single	7	7
Married	64	67
Widower	21	22
Divorced	3	3
Total	**95**	**100**

Source: Field data.

Table 4 shows that 7% of the respondents were single, and 67% of the respondents were married. Widowed and divorced respondents were 22% and 3% respectively. From this table, many respondents were married which means that these people have many responsibilities to fulfil such as school fees buying clothes, food to feed theirs as well and life insurance. They work hard to get money to use in their daily life.

Presentation of Findings

The following headings are related to the research objectives. The researcher discussed the results from the field objective by objective.

To establish the relation of how maize production has been improved with Land

Use Consolidation

LUC helped in improving how maize was grown in this sector. Before LUC, maize farmers traditionally planted maize. The following subtopics show how LUC improved production.

Ways of planting maize before LUC

Before LUC people used many ways to plant maize. The following table shows the ways adopted by respondents to plant maize before adopting LUC.

Table 5: Ways of planting maize before LUC

Ways of planting	Frequencies	Percentage
Respondents didn't grow maize before	2	2
Mixed with other crops	90	95
Maize itself	3	3
Total	**95**	**100**

Source: Field data.

Data presented in Table 5 show that 2% of the respondents did not grow maize before LUC, 95% of the respondents grew maize mixes with other crops and 3% of the respondents grew maize only. His table showed that many respondents i.e. 95% grew maize traditionally where crops were mixed in the same field.

Use of intra-products

The use of intra products is used by farmers who struggle the increase their farm production. Many respondents who planted maize traditionally did not use intra-products because they practised subsistence farming.

Table 6: Use of intra products

Answers	Frequencies	Percentage
Yes	14	15
No	81	85
Total	**95**	**100**

Source: Field data.

Table 6 shows that respondents who used intra products were 15% while 85% of the respondents did not use intra products. This table shows that most of the respondents did not use intra-products to enhance their farm production.

Table 7: LUC increased maize growers' production

Increment	Frequencies	Percentage
1-25%	5	5
25-50%	30	32
50-75%	44	46
75-100%	16	17
Total	**95**	**100**

Source: Field data.

Table 7 shows that 5% of the respondents increased their production by 1-25%, and 32% of the respondents increased their farm production by 25-50%. The respondents who increased their maize production at 50 to 75% were 46% while respondents who increased their farm production at 75-100% were 17%. This shows the importance of LUC. Many respondents were in the intervals of 25-50% and 50-75%. *Land use consolidation has contributed to the improvement of maize growers' welfare*

The role of LUC is seen in improving the life conditions of its practitioners. The following subtopics show some domains in which LUC improved the livelihood of maize growers.

Daily meal frequency

LUC helps in several domains. The following table shows how maize growers improved the daily meal frequency of maize growers.

Table 8: Frequency of daily meals

Before LUC			After LUC		
Answers	**Frequencies**	**Percentage**	**Answers**	**Frequencies**	**Percentage**
Once a day	35	37	Once a day	6	6
Twice a day	45	47	Twice a day	37	39
Thrice a day	11	12	Thrice a day	39	41
Many times a day	4	4	Many times a day	13	14
Total	**95**	**100**	**Total**	**95**	**100**

Source: Field data.

Table 8 shows that the number of respondents who ate once a day decreased from 37% of the respondents before LUC to 6% of the respondents after applying LUC. The respondents who ate twice a day decreased slightly from 47% of the respondents before LUC to 39% after LUC. The number of respondents who ate thrice a day increased from 12% of the respondents before the application of LUC to 41% after LUC. The respondents tripled from 4% of the respondents before LUC to 14% of the respondents after LUC. The data presented in this table show that the respondents left the classes who ate insufficiently to occupy the classes who ate at increased times a day.

LUC in improving monthly earnings of maize growers

Monthly incomes or earnings help the maize growers economically in their activities. The following table presents the levels of earnings of the respondents.

Table 9: Monthly earnings

Before LUC			After LUC		
Classes	**Frequencies**	**Percentages**	**Classes**	**Frequencies**	**Percentages**
0-10000	35	37	0-10000	6	6
10000-20000	47	49	10000-20000	10	11
20000-30000	9	9	20000-30000	25	26
30000-40000	3	3	30000-40000	36	38
40000-50000	1	1	40000-50000	11	12
More than 50000	0	0	More than 50000	7	7
Total	**95**	**100**	**Total**	**95**	**100**

Source: Field data

The comparative Table 9 shows that the respondents who earned 0-10,000RwF decreased from 37% of the respondents before LUC to 6% after LUC. The respondents who earned 10,000-20,000RwF decreased from 49% of the respondents before LUC to 11% of the respondents after LUC. The respondents who earned 20,000-30,000RwF increased from 9% of the respondents to 26% of the respondents. The respondents who earned 30,000-40,000RwF increased from 3% of the respondents to 38% of the respondents. Those who earned 40,000-50,000RwF increased from 1% to 12% of the respondents. There were not any respondents who earned more than 50,000RwF before LUC and they increased up to 7% of the respondents after LUC. Briefly, the respondents left the lowest class of average monthly earnings (0-10,000RwF and 10,000-20,000RwF) to occupy the higher classes (20,000-30,000RwF, 30,000-40,000RwF and 40,000-50,000) after LUC. LUC helped maize growers to improve their monthly earnings levels.

Estimation of average monthly savings before and after LUC

LUC plays a role in improving not social welfare as well as economic welfare. The following table presents the role of LUC in improving the monthly savings of maize growers.

Table 10: Average monthly savings before and after LUC

Before LUC			After LUC		
Classes	**Frequencies**	**Percentage**	**Classes**	**Frequencies**	**Percentages**
0-5 000	31	33	0-5 000	8	8
5 000-10 000	45	47	5 000-10 000	11	12
10 000-15 000	13	14	10 000-15 000	26	27
15 000-20 000	4	4	15 000-20 000	37	39
More than 20 000	2	2	More than 20 000	13	14
Total	**95**	**100**	**Total**	**95**	**100**

Source: Field data.

Data presented in Table 10 show that respondents who saved 0-5,000RwF decreased from 33% before LUC to 8% of the respondents after LUC. The respondents who saved 5,000-10000RwF decreased from 47% to 12% of the respondents after LUC. Respondents who saved 10 000-15 000RwF increased from 14% from LUC to 27% of the respondents after LUC. Respondents who saved 15,000-20,000RwF increased from 4% to 39% of the respondents after LUC. The respondents who saved more than 20 000RwF increased from 2% of the respondents before the application of LUC to 14% of the respondents after LUC. The respondents advanced remarkably in classes of savings after applying the policy of LUC. Thus, LUC helped the maize growers to improve their average monthly savings tremendously.

Possession of Mutual Health Insurance

Possession of life insurance is one of the indicators of improved welfare. The following table shows the role of LUC in improving maize growers' welfare.

Table 11: Possession of Mutual Health Insurance

	Before LUC			After LUC	
Answers	**Frequencies**	**Percentage**	**Answers**	**Frequencies**	**Percentage**
Yes	39	41	Yes	91	96
No	56	59	No	4	4
Total	**95**	**100**	**Total**	**95**	**100**

Source: Field data.

Table 11 shows that 41% of the respondents had Mutual Health Insurance before the LUC and they have improved after LUC at a rate of 96% of the respondents. The respondents who did not have Mutual Health insurance decreased from 59% of the respondents before LUC to 4% after LUC. Results presented in this table confirm the great role of the application of LUC in improving the livelihood of maize growers by appropriating Mutual Health Insurance.

Other improvements are done with LUC

Other improvements done with the application LUC helped the respondents to satisfy other basic needs.

Table 12: Other improvements done with LUC

Before LUC			After LUC		
Improvements	**Frequencies**	**Percentage**	**Improvements**	**Frequencies**	**Percentage**
To buy clothing sufficiently	19	20	To buy clothing sufficiently	94	99
To pay to the children's school fees	39	41	To pay to the children's school fees	67	71
To equip the household	54	57	To equip the household	86	91
To engage a workman farmer or domestic	31	33	To engage a workman farmer or domestic	82	86
To buy a radio	42	44	To buy a radio	95	100

Source: **Field data.**

Table 12 shows that respondents who bought clothes sufficiently before were 20% of the respondents while after the application of LUC, they increased up to 99%. Of the respondents who paid school fees for their children 41% before LUC and 71% of the respondents after LUC. Respondents who equipped their households increased from 57% to 91% of the respondents after LUC. The respondents who engaged a working farmer or domestic shifted from 33% to 86% of the respondents after LUC. A radio is a source of information countrywide, the respondents who bought radios increased from 44% of the respondents before LUC to 100% after LUC. Thus, the application of LUC changed the lifestyle of maize growers in the Gatsibo District.

Challenges faced by maize growers in land use consolidation and propose the ways forward to overcome them

There are many challenges in the application of LUC by maize growers. The following table presents the challenges faced by maize growers in Gatsibo District.

Table 13: Challenges faced by maize growers in LUC

Challenges	Frequencies	Percentages
lack of enough organic manure	62	65
Using traditional tools	86	91
Bad weather	95	100
Low price of the products	91	96
Lack of markets for the production	89	94

Source: Field data.

Table 13 shows that 65% of the respondents faced the lack of enough

organic manure, and 91% of the respondents faced the use of traditional tools like hoe only. All respondents affirmed that they faced bad weather. This is caused by the shortage of rain motivated that Eastern province is situated in a region with a low quantity of rainfall. Respondents who faced the challenge of low price of the products were 96% while those who lacked markets of maize production were 94%.

Proposed ways forward to overcome challenges

The following are the suggested ways forward to overcome the stated challenges for the betterment of maize production.

Table 14: Ways forward to overcome challenges

Ways forward	Frequencies	Percentages
To increase common cow shades in villages	70	74
To rent a tractor	84	88
To put in place an advocacy organ	90	95
To be grouped in cluster	93	98
To put in place a watering system	95	100

Source: Field data.

Table 14 shows the suggested ways forward of respondents. 74% of the respondents suggested increasing the common cowsheds in villages to increase the quantity of organic manure. 88% of the respondents suggested renting tractors to facilitate the ploughing process. 95% of the respondents suggested putting in place an advocacy organ. 98% of the respondents suggested that maize growers should be grouped in clusters and all respondents suggested that a watering system should be put in place to facilitate planting even in dry seasons to plant in as many seasons as possible.

DISCUSSION

Demographic characteristics of respondents

Data presented in Table 1 showed that respondents were characterized by the preponderance of male respondents at a rate of 56%. According to age, respondents highly represented were in the age bracket of 30-40 years old. These respondents have many responsibilities to satisfy like school fees and other forms of basic needs. These data came to prove that many respondents were situated in active ages. According to Table 3 shows that many respondents had primary level at 82% of the respondents. There were not any respondents who had university level. The researcher realized that many respondents had primary levels. This agriculture domain has low-level people. For the marital status of the respondents, Table 4.4 showed that 7% of the respondents were single, 67% of the respondents were married. Widowed and divorced respondents were 22% and 3% respectively. From this table, there was an increment of widowed people caused by the Genocide of Tutsi of 1994 and the AIDS pandemic. Many respondents were married which means they worked hard to get money to use in their daily life.

Objective one

The objective which was "to establish the relation of how maize production has been improved with land use consolidation" has been verified. Data presented in Table 5 showed that many respondents (95% of the respondents) grew maize mixed with other crops. Respondent used archaic methods of mixing crops. After the LUC, maize growers used to grow maize only. In addition, they planted the maize on a

larger scale than before to increase maize production. According to the data presented in Table 6, many respondents so be 85% of the respondents did not use intra-products. This comes to show the importance of LUC in educating people to maximize their profit in maize production. Table 7 highlights the crucial role of LUC in the increment of maize production. Many respondents were in intervals of respondents who increased maize production by 25-50% and 50-75% of respondents. They were 78% of the respondents.

Objective two

The second objective which was "To investigate how land use consolidation has contributed to the improvement of maize growers' welfare" was approved. Daily meal frequencies were improved. This shows that many respondents left the situation of hunger to have plenty of food. LUC helped people to improve the economic situation of the respondents. They improved their monthly earnings by leaving the lowest classes to be grouped in the higher classes of earnings (Table 4.9). Respondents left the lowest classes of savings to be grouped into the classes that have much savings (Table 10). The monthly earnings and average monthly savings motivated the respondents to adhere to Mutual Health Insurance more than before LUC (Table 11); and they performed another improvement like buying clothes sufficiently, paying school fees, equipping their households and engaging other helping workers (Table 12). In Sum, the application of LUC changed the life conditions of maize growers in Gatsibo District.

Objective three

The third objective which was "To examine challenges faced by maize growers in land use consolidation and propose the ways forward to overcome them" was verified by the data presented in Tables 4.13 and 4.14. Respondents met different challenges like lack of enough organic manure, bad weather, low price of the products and lack of markets for maize production. Respondents suggested that the common cowsheds in villages should be increased to increase the quantity of organic manure, the advocacy organ should be started like a cluster of their cooperatives, and a watering system should be put in place to facilitate planting even in dry seasons to have the durability of growing maize.

CONCLUSION

LUC is the policy which came to cope with the increase in population to liberate the cultivable arable soil to merge plots and to make larger fields to increase agricultural production. This also was motivated by the Crops Intensification Program in which regions of Rwanda have been assigned the crops to be grown. The policy of LUC helped the Rwandans and maize growers in particular to improve their livelihood by increasing maize production, improving monthly earnings as well as average monthly savings of the respondents. The data presented and analysed proved the achievement of the objectives.

Recommendations

The central Government should put in place the irrigation channels to face the shortage of rainfalls. Local leaders should sensitize the population to increasing the common cowsheds in their villages.

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