

Comparative Study Of The Factors Affecting Sustainability Of Agricultural Cooperatives In Rwanda, Case Study Of Two Rice Farmers Cooperatives Of The Southern Zone.

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Abstract: This study is entitled “Comparative study of the factors affecting the sustainability of agricultural cooperatives in Rwanda”. The Government of Rwanda views cooperatives as a potential vehicle through which the cooperatives members could expand access to income-generating activities, develop their business potential, including entrepreneurial and managerial capacities through education and training; increase savings and investment, and improve social well-being with special emphasis on gender equality, housing, education, health care and community development. Agricultural cooperatives in Rwanda lead to a variety of achievements to its members, such as the supply of agricultural inputs, access to financial aid, market access among others. However, not all the formed cooperatives are fruitful to their members. Most of these cooperatives start well, members are willing to work hard for their development, they perform well in the beginning, but after a while, most of them become dormant, or even it becomes worse and they fail completely. The main objective of this research was to analyze factors affecting the sustainability of agricultural cooperatives. The present research was guided by the following specific objectives: to analyze rice production and factors of yield variation before and after joining cooperative, to examine the social factors of sustainability agricultural cooperatives in Rwanda, to identify economic factors of sustainability agricultural cooperatives in Rwanda and to identify institutional and governance factors affecting agricultural cooperatives in Rwanda. It was conducted on two farmers cooperatives located in the Southern province of Rwanda. Among those cooperatives, one is considered as a model cooperative and the other one a cooperative with poor performance. The target population from those two rice farmers’ cooperatives was 350 from Ngiryi and Nsuri cooperatives, from which a sample size of 154 rice farmers was derived from Ngiryi and Nsuri cooperatives. The sampling methods used are cross-sectional survey with 154 respondents selected by systematic sampling and cluster sampling. Another method adopted in this research is participatory approach. The multiple linear regression analysis was also used to assess the level of success of cooperatives from socio-economic and institutional factors. The key findings from the field survey revealed that, the average mean of rice production in Ngiryi cooperative was 2.94 tons before farmers being grouped into cooperatives, after joining cooperative, the yield shifted up to 4.96 tons. This showed that after rice farmers were grouped into cooperatives, the yield was increased by sixty eight percent (68.7%) of the total production before joining cooperatives. The same case of Nsuri cooperative, the average yield before cooperative was 1.55 tons while after intervention of cooperatives the yield was 3.271 tons of rice. For the considered social factors, due to the level of significance of 0.01 with the p-value of 0.0000, (p-value<0.01), the analysis showed that there is significance effect of social factors on the sustainability of Ngiryi cooperative, with p-value of 0.0000 (p-value<0.01), the same was observed for Nsuri cooperative the analysis showed that there is significance effect of social factors on Nsuri cooperative. For the considered economic factors, the results from the chi-square table showed that there is significant effect of economic factors on the sustainability of Ngiryi cooperative with p-value of 0.000 which is less than to level of significance of 0.01. The Pearson chi-square from this correlations was found to be 9.562 respectively. Whereas for Nsuri cooperative the results from the chi-square table showed that there is no significance effect of economic factors on the on Nsuri cooperative. This is explained by p-value of 0.066 which is greater than the level of significance of 0.01 (P-value =0.066>0.01) and their corresponding Pearson chi-square of 3.373 respectively. In terms of the considered institutional and governance factors (the understanding of cooperative principles and concepts by cooperative leaders, decision making by cooperative leaders, understanding of the tasks by leaders and involvement of cooperative members in decision making), the results from the chi-square test of Institutional and governance factors in the case of Ngiryi cooperative showed that there is significant effect of fore mentioned factors to the sustainability of agricultural cooperatives. Whereas on the side of Nsuri cooperative, Chi-Square Tests showed that there is no significant effect of institutional and governance factors on the functioning of Nsuri cooperative. By conclusion drawn from the comparative study of two rice farmers cooperatives, the Ngiryi cooperative has better management and better performance compared to Nsuri cooperative, these were arrived by comparing level of contribution or R-square values where Ngiryi perform at 57% mean while Nsuri cooperative has succeed at 44% respectively.

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1. Introduction

The Rwandan economy is based on Agriculture. This sector accounts for a third of Rwanda's GDP; constitutes the main economic activity for the rural households and remains their main source of income. Price volatility, climate change, scarcity of land and lack of training are just some of the challenges faced by many small farmers across the country.

Vision 2020 is the primary socio-economic policy document on which all national and sector policies and strategies are based. It describes modernization of agriculture and animal husbandry as one of the six pillars for building a diversified, integrated, competitive and dynamic economy. Vision 2020 seeks to transform Rwanda's economy through a rapid increase in growth and a significant reduction in poverty. By 2020 it is expected that the country will reach middle-income status with per capita GDP of US\$ 1240 from US\$ 220 in 2000. Other goals include a reduction by more than one-half in the incidence of poverty and extreme poverty and improvements in a range of standard of living indicators (MINAGRI, 2013).

Agriculture is a priority sector, with an emphasis on moving the sector from subsistence to commercial production through attracting increased investment. The target for agricultural growth until 2020 has been revised upward to 8.5 % per year (MINAGRI, 2013).

A long practice of subsistence farming, low agricultural productivity, low use of fertilizers, non-market oriented farming, shortage of financial resources, low or no access to financial credits, are some of the challenges and problems that characterize the agriculture sector in different rural areas of the country. All this lead to poverty, food insecurity, and problems of rural development.

A national agriculture policy was created in 2001, with the purpose of creating conditions favourable to sustainable development and promotion of agricultural and livestock produce, ensuring national food security, integrating agriculture and livestock in a market-oriented economy and generating increasing incomes to the producers. Cooperatives, are one important aspect of achieving the goals of the national agriculture policy. Co-operatives empower small-scale producers by enabling them to face these challenges together. Co-ops also enable farmers to join their pieces of land and achieve large-scale farming. Cooperatives are democratic, member-run and member-financed enterprises. They have been a model for bringing together people across all spheres of society in common economic and social interests. In Rwanda, cooperatives comprise nearly 2.5 million members grouped into approximately 5,000 active cooperative entities. These cooperatives are regulated by Rwanda law n° 50/2007 of 18/09/2007 determining the

establishment, organization and functioning of cooperative organizations (Nkuranga, T. & Wilcox, K., 2013).

Most commonly found in Rwanda in the agricultural sector, cooperatives are providing significant results in the production of tea, coffee, rice, maize, Irish potatoes, vegetables, fruits, milk, meat and fish but also seeing gains in other sectors such as finance SACCOs (Savings and Credit Cooperatives), mining and transportation (motorcycles and minibuses) as well. However, performance and sustainability of agricultural cooperatives has a great challenge. This thesis will explore the performance of agricultural cooperatives, it will allow to know the factors affecting the sustainability of agricultural cooperatives in Rwanda, and provide propositions to improve their performance and sustainability of those cooperatives.

2. Statement of Problem

The government of Rwanda views cooperatives as potential vehicle through which the cooperative members could create employment and expand access to income-generating activities, develop their business potential, increase savings and investment and improve social well-being. Significant progress has been made in the establishment of agricultural cooperatives, and this activity is encouraged by the government. Agricultural cooperatives lead to a variety of achievements such as the supply of agricultural inputs, access to financial aid, market access among others. And most importantly farmers member of cooperatives are given a chance to become active market players through cooperative membership.

However, not all the formed cooperatives are fruitful. There appear a good number of cooperatives which are considered as dormant, or ghost cooperatives. It is very common that members withdraw from cooperatives. Many cooperative are short lived and others still vulnerable. They also appear defunct cooperatives. Most of cooperatives start well, members are willing to work hard for their development, they perform well in the beginning, but after a while, most of them become dormant, or even it becomes worse and they fail completely. Such kinds of cooperatives are not beneficial to farmers, and they can lead a bad perception of cooperatives to other farmers. This is a major problem, which in the long run can limit the number of active cooperatives and the number of farmers willing to be part of cooperatives. It is in this regard that this work will help in analyzing the factors affecting the sustainability of farmers' cooperatives, through analyzing their performance.

3. Objectives of the Study

The broad objective of this study, is to evaluate the problem of sustainable performance of farmers' cooperatives in Rwanda, through an analysis of the indicators of performance and comparison of 1

successful cooperative and 1 unsuccessful farmers' cooperatives.

3.1 Specific objectives of the Study

- i. To analyze rice production and factors of yield variation before and after joining cooperative
- ii. To examine the social factors of sustainability agricultural cooperatives in Rwanda.
- iii. To identify economic factors of sustainability agricultural cooperatives in Rwanda.
- iv. To identify institutional and governance factors affecting agricultural cooperatives in Rwanda.

3.2 Hypothesis

H₀: There is significant contribution of social, economic and institutional factors on the sustainability of agricultural cooperatives in Rwanda.

H₁: There is no significant contribution of social, economic and institutional factors on the sustainability of agricultural cooperatives.

4 Research methodology

4.1 Research Design

The current study used descriptive research design, which had both qualitative and quantitative analysis. The study used both primary and secondary data. Primary data was obtained directly from respondents (rice farmers) through face-to-face interviews using multi-stage and pre-tested questionnaire. A multi-stage questionnaire was used to collect primary quantitative data from two cooperatives members from Gisagara and Huye Districts. Secondary data were obtained from the Rwanda cooperative agency (RCA), the Rwanda Agriculture Board (RAB), internet, published books and journals, and records of Ministry of Agriculture and Animal Resources, Rwanda.

4.2 Target population

The study population on comparative study of the factors affecting sustainability of agricultural cooperatives in Rwanda is comprised of farmers members of two cooperatives: KOPRORIZ Ngiryi in Gisagara and KOPRORIZ Nsuri in Huye District. The total population to be studied is 350 farmers in general in which Nsuri cooperative has 150 rice farmers while Ngiryi cooperative has 200 rice cooperative.

4.3 Sampling size and technique

Sampling was used to select the respondents from the two farmers' cooperatives. A sample is a smaller sub set of the research/study population and samples that do a good job at conveying accurate information about the whole are referred to as representative samples (Ruane, 2005). Thus, the use of the sample in order to ascertain findings is commonly referred to as sampling (Ruane, 2005). Sample size is the number of representative elements selected from a population on which an investigation was conducted. To get the sample size, the sample size was determined by using the following formula of (Kothari, 2005):

$$n = \frac{Z^2 \times P \times Q \times N}{D^2(N-1) + Z^2 \times P \times Q}$$

Where n= sample size, N= size of population (number of household), Z= coefficient normal distribution, Q= probability of failure, D = margin error and P= probability of success.

For Kothari, the margin error or level of significance varies between 5 % and 10 %. The researcher used a margin error of 5 % (0.05), confidence level (confidence Interval) of 95 %. The probability of success is p=0.5, failure probability of q=0.5, and Z² is 1.65 according to probability tables.

The total population under study was 350 people $n = \frac{1.65^2 \times 0.5 \times 0.5 \times 350}{0.05^2(350-1) + 1.65^2 \times 0.5 \times 0.5} = 154$ respondents which are the rice farmers in cooperatives. From this point, two questionnaires pertained for two cooperatives from agricultural cooperatives in Gisagara and Huye Districts, were developed and 154 questionnaires related to rice farmers from those cooperatives mentioned above were also developed according to specific objectives of this study.

The following formula was used to calculate the total number of respondents in each cooperative:

$$nh = \frac{N_i \times n}{N}$$

Where: ni= the sample size proportion to be determined; Ni= the population proportion in the stratum; n= the sample size and N= the total population of two cooperatives from Gisagara and Huye District.

4.3.1 Sampling techniques

Purposive sampling method was used to select the two farmers' cooperatives, where one cooperative is classified as model sustainable cooperatives and the other one is categorized as low transition to growth, in other words cooperative with poor performance. The two cooperatives as the case of interest were put into two separate "strata." Each stratum was then sampled as an independent sub-population, out of which individual elements were selected, using a systematic type of sampling.

To select the farmers that were part of this sample size, a systematic sampling method (Nichols P et al, 1991) was used selecting respondents from the cooperatives' member lists in specific intervals. Choosing the respondents this way limited a biased selection with the purpose of getting a representative sample of all the members in each cooperative (Nichols P et al, 1991).

5 Data Collection Instruments

Data was collected using different instruments. Hence the use of:-

5.1 Primary Data

Primary data were collected from respondents through questionnaire, interview and focus group discussions.

(i) Questionnaires

Questionnaires were filled out, the results analyzed and discussed in comparing the two cooperatives. Once this has taken place, users from cooperative boards to government departments responsible for cooperative development would have a better understanding of specific problems facing agricultural cooperatives in the Rwandan context and the solutions required to make them a success.

(ii) Interviews

The interview refers to a personal exchange of information between the interviewer and the interviewee (Bowling, 2002). In this case, the researcher used the interview schedule to guide the discussion with the respondents. The main purpose of using interview is to complement the main instrument (questionnaire).

(iii) Focus group discussion

Participants were selected according to age and gender to allow free expression as much as possible. Two focus groups were conducted. A focus discussion group guide was used to guide the discussion. Points that were raised during the discussions would be noted, and the meetings were moderated by the principal investigator on the factors affecting sustainability of farmers' cooperatives in Rwanda, specifically in the area of study.

5.2. Secondary data**(i) Documentation**

During the process of documentary analysis, the researcher reviewed some documents relevant to the

study topic. The researcher read documents such as reports, journals, and other publications to get secondary data related to farmers' cooperatives worldwide as well as for Rwanda where the current case is taking place.

(ii) Internet and library source

Secondary data were also obtained from journals, reports, and internet which are in line with the with the study objectives.

5.3 Data Management and Analysis

After entering and coding collected data in the computer, the edited and coded data were analyzed using computer software SPSS computer programs. Descriptive analysis were also be applied to analyze the data from the field survey. In this study, the researcher served test statistics such as correlations and chi-square tests to evaluate the impact of socio-economic and legal factors contributed to success or failure of the cooperatives.

6. RESULTS AND INTERPRETATION**6.1. Rice production and factors of yield variation before and after joining cooperative**

Rice production is important to the economy of the small scale farmers in Rwanda. The rice production variation within the two cooperatives have been affected by inputs use such as fertilizers and improved seeds. The analysis of rice production from Ngiriyi and Nsuri cooperatives are summarized in the following table where the mean value before and after joining the cooperatives had been mentioned with descriptive statistics.

Table 1: Descriptive statistics of Rice production of rice farmers before and after joining cooperatives

Ngiriyi- cooperative	Variables						
	Mean	Max	Min	Range	Variance	Std. Dev	CV
Before	2.94	5	1	4	2.1	1.45	0.49
After	4.96	7	1	6	2.59	1.61	0.32

Nsuri- Cooperative							
	Mean	Max	Min	Range	Variance	Std. Dev	CV
Before	1.55	2.5	0.5	2	0.515	0.717	0.46
After	3.271	4.5	2	2.5	0.562	0.75	0.23

Source: Field, 2015

The results in table (1) indicate the rice production from Ngiriyi and Nsuri cooperatives before and after joining the rice cooperatives. The average mean of rice production in Ngiriyi cooperative was 2.94 tons before farmers being grouped into cooperatives, after joining cooperative, the yield shifted up to 4.96 tons. There was an increase of 68.7% in rice production. This shows that after rice farmers were grouped into cooperatives, the yield was increased by sixty eight percent (68.7%) of the total production before joining cooperatives. The same case of Nsuri cooperative, the average yield before cooperative was

1.55 tons while after intervention of cooperatives the yield was 3.271 tons of rice. The variation in rice production is also computed by means of percentage increase which is 111% of the total rice production before joining the cooperatives.

6.1.1 Factors that affected rice production variation before and after joining cooperatives**A. Usage of NPK and Urea in rice farming before joining cooperative**

The table below shows the factors that contributed to the rice production before and after joining cooperative. The use of fertilizers like NPK and Urea

in rice farming are recommended to increase the production and productivity, the results from surveyed rice farmers working in cooperatives that utilized NPK

before joining cooperative are discussed on the figure below:

Table 2: Distribution of rice farmers according to NPK and Urea usage before joining cooperatives

NPK usage	Ngiryi-cooperative		Nsuri-cooperative	
	Frequency	Percentage	Frequency	Percentage
Yes	26	29.5	9	13.6
No	11	12.5	13	19.7
Didn't produce rice before joining cooperative	51	58	44	66.7
Total	88	100	66	100

Urea usage	Ngiryi-cooperative		Nsuri-cooperative	
	Frequency	Percentage	Frequency	Percentage
Yes	19	21.6	9	13.6
No	18	20.5	13	19.7
Didn't produce rice before joining cooperative	51	58	44	66.7
Total	88	100	66	100

Source: Field data, 2015

The table (2) shown above summarizes the distribution of respondents according to fertilizers usage. It is clear that in Ngiryi cooperative, the rice farmers who were using NPK before joining the cooperative were 26, which means 29.5 % and those of Nsuri cooperative were 9 (13.6%). The number of farmers who were not using NPK before joining the cooperatives is 11 (12.5 %) and 13 (19.7 %) for Ngiryi and Nsuri cooperatives respectively. The remaining 51 farmers (58%) and 44 (66.7%) from Ngiryi and Nsuri respectively didn't produce rice before joining the cooperatives.

About the usage of Urea before joining the rice cooperatives, 19 farmers (21.6 %) and 9 farmers (13.6 %) from Ngiryi and Nsuri respectively were using Urea before joining the cooperatives. 18 farmers (20.5 %) and 13 farmers (19.7) from Ngiryi and Nsuri cooperatives respectively didn't use urea before joining the cooperatives. The remaining 51 farmers (58%) and 44 (66.7%) from Ngiryi and Nsuri respectively didn't produce rice before joining the cooperatives.

B. Usage of NPK and Urea in rice farming after joining cooperative

Table 3: Distribution of respondents according to NPK and Urea use after joining cooperative

	Use of NPK after			
	Ngiryi-cooperative		Nsuri-cooperative	
	Frequency	Percentage	Frequency	Percentage
Yes	88	100	65	98.5
No	0	0	1	1.5

	Use of Urea after			
	Ngiryi-cooperative		Nsuri-cooperative	
	Frequency	Percentage	Frequency	Percentage
Yes	86	97.8	66	100
No	2	2.2	0	0
Total	88	100	66	100

Source: Field data, 2015

The table (3) shown above indicates the rice growers who were using NPK and Urea after joining the cooperative. It is evident that all members of Ngiryi cooperative use NPK while 65(98.5%) from Nsuri cooperative use NPK. It also shows 86(97.8%) from

Ngiryi cooperative use urea while all members of Nsuri cooperative use it after joining the cooperative.

C. View of quantities of fertilizers (NPK) usage in Ngiryi and Nsuri before joining cooperatives

The respondents from Ngiriyi and Nsuri cooperatives were invited to answer questions related to the quantities of fertilizers used before joining their respective cooperatives. The results from the field

survey showing the view of respondents on the quantities of NPK before joining the cooperatives are summarized on the following table:

Table 4: View of NPK quantities of fertilizers that rice farmers used before joining cooperatives
Quantities of NPK before joining cooperatives

Quantities of NPK usage	Ngiriyi-cooperative		Nsuri-cooperative	
	Frequency	Percentage	Frequency	Percentage
No use of NPK	11	12.5	9	13.6
Insufficient quantity	16	18.2	10	15.2
Moderate quantity	7	8	3	4.5
Sufficient/required quantity	3	2.3	-	-
Didn't produce rice before joining the cooperative	51	59.1	44	66.7
Total	88	100	66	100

Source: Field data, 2015

As observed from the above table, for Ngiriyi cooperative, among 26 farmers who were using NPK in their rice farming before joining the cooperative, 16 farmers used insufficient quantities, 7 farmers used moderate quantities and 3 farmers used insufficient quantities of NPK.

For Nsuri cooperative, among the 13 farmers who were using NPK, 10 farmers used insufficient quantities, 3 farmers used and no farmer among them used sufficient quantities of NPK before joining Nsuri cooperative.

Table 5: Quantities of NPK usage after joining cooperatives (Ngiriyi and Nsuri cooperatives)

	Quantities of NPK after joining cooperative			
	Ngiriyi-cooperative		Nsuri-cooperative	
	Frequency	Percentage	Frequency	Percentage
Moderate quantity	7	7.9	18	27.3
Sufficient/ required	81	92.1	47	71.2
Insufficient	0	0	1	1.5
Total	88	100	66	100

Source: Field data, 2015

The rice farmers from Ngiriyi and Nsuri cooperatives were asked questions related to the quantities of NPK they use as one type of fertilizers used to boost their rice production. The results from the field survey on the use of NPK after cooperative revealed that 81 farmers (92.1%) use sufficient quantities whereas 7 farmers (7.9%) use moderate quantity from as for Ngiriyi cooperative. Nsuri cooperative has less number of farmers using sufficient quantities of NPK compared to Ngiriyi cooperative, their number being 47 farmers (71.2%). 18 farmers of Nsuri reported to be using moderate quantities of NPK and 1 farmer reported to use insufficient quantities of NPK.

From the results above, the quantities of fertilizer used have increased in both Ngiriyi and Nsuri cooperatives.

6.2 Social factors of sustainability of agricultural cooperatives

Many authors have researched the factors affecting success or failure of agricultural cooperatives. Progressive research highlights active members' participation and loyalty to the cooperative. The main cause of the researched cooperative failure was the lack of members' motivation in collective action. The other researchers also note the knowledge of members on the principle of cooperatives and their commitment to these principles as the parameters of success.

The results from the field on social factors affecting sustainability of agricultural cooperatives are summarized in the following tables:

Table 6: Descriptive statistics of social factors affecting sustainability of agricultural cooperative, Case of Ngiryi cooperative

	Ngiryi cooperative			
	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Member participation	55	62.5	33	37.5
Meeting members' expectations	67	76.1	21	23.9
Improving living conditions	66	75.0	22	25.0
Health insurance	81	92.0	7	8.0

Source: Field data, 2015

As the table above indicate, interviewed 55 members (62.5 %) have reported to be participating in cooperative activities, 67 members (76.1%) reported that the cooperative is meeting their expectations, 66 farmers (75 %) reported to have improved their living

conditions and 81 members (92%) reported to be benefiting from health insurance due to cooperative membership.

The analysis of variance test of social factors on sustainability of Ngiryi cooperative is provided below:

Table 1: Anova table of social factors that affected sustainability of agricultural cooperative, case of Ngiryi

ANOVA						
Source of Variation	SS	Df	MS	F	P-value	F crit
Between Groups	18.2358	3.0000	6.0786	30.7738	0.0000	3.8384
Within Groups	68.7386	348.0000	0.1975			
Total	86.9744	351.0000				

Source: Field data, 2015

To analyze the contribution of social factors on the sustainability of agricultural cooperative, the researcher used the ANOVA test, due to level of significance of 0.01 with the p-value of 0.0000, (p-value<0.01), the analysis showed that there is

significance effect of social factors on the sustainability of Ngiryi cooperative. The significant good effect of member participation to the sustainability of agricultural cooperatives was also stressed by several authors.

Table 8: Descriptive statistics of social factors affecting sustainability of agricultural cooperatives, Case of Nsuri cooperative.

Benefits	Nsuri cooperative			
	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Member participation	47	71.2	19	28.8
Meeting members' expectations	27	40.9	39	59.1
Improving living conditions	40	60.6	26	39.4
Health insurance	15	22.7	51	77.3

Source: Field data, 2015

As the table above indicate, interviewed 47 members (71.2 %) have reported to be participating in cooperative activities, 27 members (40.9%) reported that the cooperative is meeting their expectations, 40 farmers (60.6%) reported to have improved their living

conditions and only 15 members (22.7%) reported to be benefiting from health insurance due to cooperative membership. The analysis of variance test of social factors on sustainability of Nsuri cooperative is given below:

Table 9: Anova table of social factors that affected sustainability of agricultural cooperative, case of Nsuri cooperative

ANOVA						
Source of Variation	SS	Df	MS	F	P-value	F crit
Between Groups	6.2841	3.0000	2.0947	9.1673	0.0000	3.8578
Within Groups	59.4091	260.0000	0.2285			
Total	65.6932	263.0000				

Source: Field data, 2015

Due to level of significance of 0.01 with the p-value of 0.0000, (p-value<0.01), the analysis showed that there is significance effect of social factors on the sustainability of agricultural cooperatives.

6.3 Economic factors affecting sustainability of agricultural cooperatives.

Economic status is a measure of an individual's or family's economic position based on education, income, and occupation. This section will present data on measures related to socioeconomic status of rice farmers from Ngiryi and Nsuri cooperatives. These

include measures of income (money saving, procurement of inputs, access to market information and poverty levels), and measures associated with income status. In this study, the economic factors that affected sustainable agricultural cooperatives are the benefits that farmers were gaining economically. The tables below illustrate the factors affecting sustainability of farming cooperative on economically and the utilization of benefits in different ways are shown subsequently.

Table 10: Case of Ngiryi cooperative

Economic benefits	Ngiryi cooperative			
	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Poverty reduction	74	84.1	14	15.9
Marketing activities	83	94.5	5	5.5
Saving	70	79.5	18	20.5
Financial auditing	67	76.1	21	23.9
Trainings	58	66	30	34
Improving production	76	86.4	12	13.6
Increased income from rice production	71	80.7	17	19.3
Access to credits	68	77.3	20	22.7

Source: Field data, 2015

Table 11: Descriptive statistics of economic factors affecting sustainable agricultural cooperative, case of Nsuri cooperative

	Nsuri cooperative			
	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Poverty reduction	19	28.8	47	71.2
Marketing activities	21	31.8	45	68.2
Saving	37	56.1	29	43.9
Financial auditing	16	24.2	50	75.8
Trainings	17	25.8	49	74.2
Improving production	46	69.7	20	30.3
Increased income from rice production	15	22.7	51	77.3
Access to credits	7	10.5	59	89.4

Source: Field data, 2015

74 farmers (84.1 %) of Ngiryi cooperative reported to have benefited of poverty reduction due to

cooperative membership compared to only 19 farmers (28.8%) from Nsuri cooperative, 83 farmers (94.5%)

from Ngiriyi cooperative have reported to be enjoying the marketing activities from their cooperative, compared to only 21 farmers (31.8%) from Nsuri cooperative. 76 farmers (86.4%) members of Ngiriyi cooperative and only 15 farmers (10.5%) of Nsuri cooperative benefited of increased income from rice production due to cooperative membership. Another important economic factor which was considered is the

access to credits where 68 farmers of Ngiriyi cooperative claimed to be benefiting of credit due to cooperative membership and only 7 farmers of Nsuri cooperative reported to have accessed credit. In all the observed economic factors, it is clearly observed that farmers of Ngiriyi cooperative are economically benefiting from their cooperative than their fellow farmers from Nsuri cooperative.

A. Case of Ngiriyi cooperative

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.562 ^a	1	.000		
Continuity Correction ^b	7.769	1	.005		
Likelihood Ratio	9.164	1	.002		
Fisher's Exact Test				.004	.003
Linear-by-Linear Association	9.454	1	.002		
N of Valid Cases ^b	88				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.93.

b. Computed only for a 2x2 table

The results from the chi-square table, showed that there is significant effect of economic factors on the sustainability of Ngiriyi cooperative. This is due also to the calculated probability, p-value of 0.000 which is less than to level of significance of 0.01. The Pearson chi-square from this correlations is found to be 9.562 respectively. These findings are in line with other

researchers and are supported by several studies. (Campbell, D., 2001) observed that the most successful livestock cooperatives cannot survive without current capital accumulation. (Prakash, D., 2000a) believes that agricultural cooperatives, to be effective, need to deliver adequate and timely credit facilities leading to higher productivity.

B. Case of Nsuri cooperative

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.373 ^a	1	.066		
Continuity Correction ^b	2.445	1	.118		
Likelihood Ratio	3.384	1	.066		
Fisher's Exact Test				.101	.059
Linear-by-Linear Association	3.322	1	.068		
N of Valid Cases ^b	66				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.64.

b. Computed only for a 2x2 table

From the results shown in the table above, there is no significance effect of economic factors on the sustainability of Nsuri cooperative. This is explained by p-value of 0.066 which is greater than the level of significance of 0.01 (P-value =0.066>0.01) and their corresponding Pearson chi-square of 3.373 respectively.

6.3.1 Payment of capital accumulation before joining cooperatives

The cooperatives main sources of start-up capital are from some donors and some shares from their own members. Each cooperative member is required to pay at least some amount of money as regulated by the cooperatives rules. The information below shows how rice farmers members of Ngiriyi and Nsuri cooperatives have participated in payment of start-up capital.

Table 12: Respondents view on the payment of start- up capital for their respective cooperatives

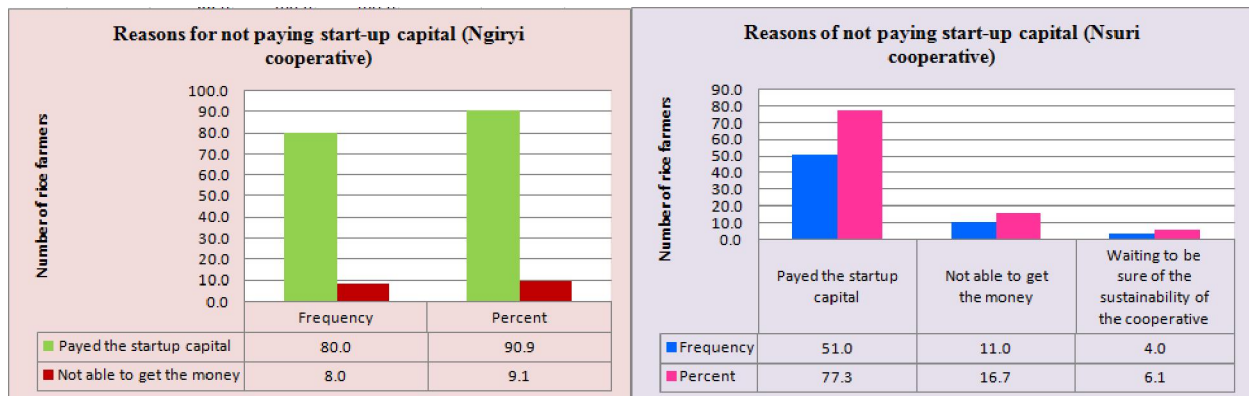
	Payment of start-up capital			
	Ngiryi-cooperative		Nsuri-cooperative	
	Frequency	Percentage	Frequency	Percentage
Yes	80	90.9	52	78.8
No	8	9.1	14	21.2
Total	88	100	66	100

Source: Field data, 2015

Results from the table (4.15) shown above stated that most of rice farmers from Ngiryi and Nsuri cooperatives have participated in payment of start-up capital as report by 80(90.9%) and 52(78.8%) respectively and 8(9.1%) and 14(21.2%) did not participate in capital accumulation.

6.3.2 Reasons of not paying the start-up capital in their respective cooperatives

The researcher also was interested in knowing the reason of not paying start-up capital by some farmers of Ngiryi and Nsuri cooperatives. The results from their views are summarized in the following tables:



Source: Field data, 2015

Figure 1: Reasons of not contributing to the start-up capital of the cooperatives

The most reasons of not contributing in the payment of start-up capital was inability of getting money as accounted by 8(9.1%) and 11(16.7%) from rice farmers of Ngiryi and Nsuri cooperatives, the other reason is that the farmers from Nsuri cooperative were waiting to be sure of the sustainability of the cooperative as indicated by 4(6.1%) of all farmers of Nsuri.

6.3.3 The study of Supply and marketing activities in Ngiryi and Nsuri cooperatives

The respondents were also invited to answer questions related to the quantity of rice sold. The results from the field study are discussed broadly on the following tables:

Table 13: Percentage of rice sold by cooperatives members (Ngiryi and Nsuri cooperatives)

Ngiryi cooperative		Variables						
SNO		Mean	Max	Min	Range	Variance	Std. Dev	CV
		84.75	100	70	30	100.5	10.02	0.118
Nsuri- Cooperative		Variables						
SNO		Mean	Max	Min	Range	Variance	Std. Dev	CV
		67.71	100	30	70	403.6	20.09	0.296

Source: Field data, 2015

The results from Descriptive statistics revealed that the highest and minimum rice sold to company from Ngiryi cooperative were 100% and 70% of paddy rice, mean value of the rice sold was 84.75%. In this study also, the maximum and minimum yield of rice sold was 100% and 30% of paddy rice, while the mean value of the rice sold to the markets was 67.71%.

6.3.4 Targeted markets of the rice production of Ngiryi and Nsuri cooperatives

Members strongly believe that their rice production will continue to increase due to gained skills and inputs use to their rice farming.

Table 14: Target markets of rice production in Ngiryi and Nsuri cooperative

	Targeted markets of rice production in Ngiryi & Nsuri cooperative			
	Ngiryi-cooperative		Nsuri-cooperative	
	Frequency	Percentage	Frequency	Percentage
Local community	1	1.1	40	60.6
Companies	87	98.9	26	39.4
Total	88	100	66	100

Source: Field data, 2015

As observed from the table (14), the main markets where the rice production are sold is the company as said by 87(98.9%) and 40(60.6%) of rice farmers from Ngiryi and Nsuri cooperatives respectively. The other markets like local communities are not significant as indicated by 1(1.1%) of rice farmer from Ngiryi cooperative.

6.4 Institutional and governance factors affecting agricultural cooperatives in Rwanda.

The institutional factors are main important point that should be analyzed to evaluate the performance of any cooperative. The table below indicates the main institutional factors that led to the development of

Ngiryi and Nsuri cooperatives and the results from the field survey are discussed in the next paragraph accordingly.

6.4.1 Respondents view on institutional and governance factors of success of agricultural cooperatives

The rice farmers from Ngiryi and Nsuri cooperatives were asked questions whether their cooperatives have the governance laws and the results from the field visit showed that the two cooperatives namely Ngiryi and Nsuri has the documents and rules as required by Rwanda Cooperative Agency.

Table 15: Perception of respondents on the issue of cooperatives' documents

	Does your cooperative has required documentation?			
	Ngiryi-cooperative		Nsuri-cooperative	
	Frequency	Percentage	Frequency	Percentage
Yes	80	90.9	50	75.6
No	3	3.4	7	10.6
Don't know	5	5.7	9	13.6
Total	88	100	66	100

Source: Field data, 2015

The results from the field visit showed that 80(90.9%) and 50(75.6%) from Ngiryi and Nsuri cooperatives agreed that the cooperatives have the documents like statute and written bylaws.

The assessment of the relationship of institutional and governance factors among them, their contribution on the sustainability of agricultural cooperatives, the researcher tried to use the chi-square test. Due to poor

performance of Nsuri cooperative as shown by descriptive statistics above, the researcher tried to evaluate whether there are no other institutional and governance that may hinder its success and the results from the chi-square test are summarized in the table below:

C. Case of Nsuri cooperative

Table 16: Chi-square test on the relationship between institutional and governance factors on sustainability of agricultural cooperative**Chi-Square Tests**

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.591 ^a	1	.107		
Continuity Correction ^b	1.841	1	.175		
Likelihood Ratio	2.598	1	.107		
Fisher's Exact Test				.133	.087
Linear-by-Linear Association	2.552	1	.110		
N of Valid Cases ^b	66				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.82.

b. Computed only for a 2x2 table

The factors considered in this statistical test are the understanding of cooperative principles and concepts by cooperative leaders, decision making by cooperative leaders, understanding of the tasks by leaders and involvement of cooperative members in decision making. Regarding results from Chi-Square Tests, it is shown that there is no significant effect of institutional and governance factors on Nsuri cooperative since Pearson Chi-Square (Chi-Square

observed) = 2.591^a with the p-value=0.107 which is greater than to level of significance $\alpha=0.01$ at the DF of 1 unit. This shows that for this particular cooperative, there exist problems in leadership, institutional and governance factors. Hence, there is a need of improving cooperative management and good leadership for better success.

B. Case of Ngiriyi cooperative**Chi-Square Tests**

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	19.114 ^a	1	.000		
Continuity Correction ^b	16.990	1	.000		
Likelihood Ratio	21.321	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	18.897	1	.000		
N of Valid Cases ^b	88				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.26.

b. Computed only for a 2x2 table

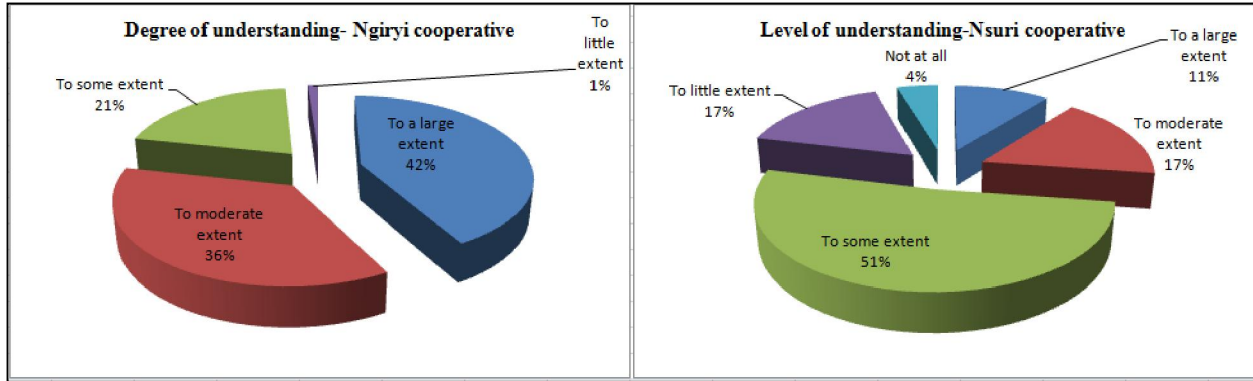
The factors considered in this statistical test are the understanding of cooperative principles and concepts by cooperative leaders, decision making by cooperative leaders, understanding of the tasks by leaders and the involvement of the cooperative members in decision making.

The results from the chi-square test of Institutional and governance factors in the case of Ngiriyi cooperative showed that there is significant effect of fore mentioned factors to the sustainability of agricultural cooperatives. This also is explained by Pearson Chi-square coefficient of 19.114, at 1% of level of significance with the degree of freedom 1 and the p-value of 0.000.

This in line with the findings of John et al (2006) who pointed out that with respect to the factors involved in the success of cooperatives, the knowledge of cooperative principles by cooperative managers and their commitment to these principles are the most effective parameters in a cooperative's success.

6.4.2 The extent level of understanding bylaws of rice farmers in cooperative

The figure below shows the degree of the extent of understanding the bylaws by rice farmers in two cooperatives namely Ngiriyi and Nsuri cooperatives. The findings from the field survey are summarized by the following graph:



Source: Field data, 2015

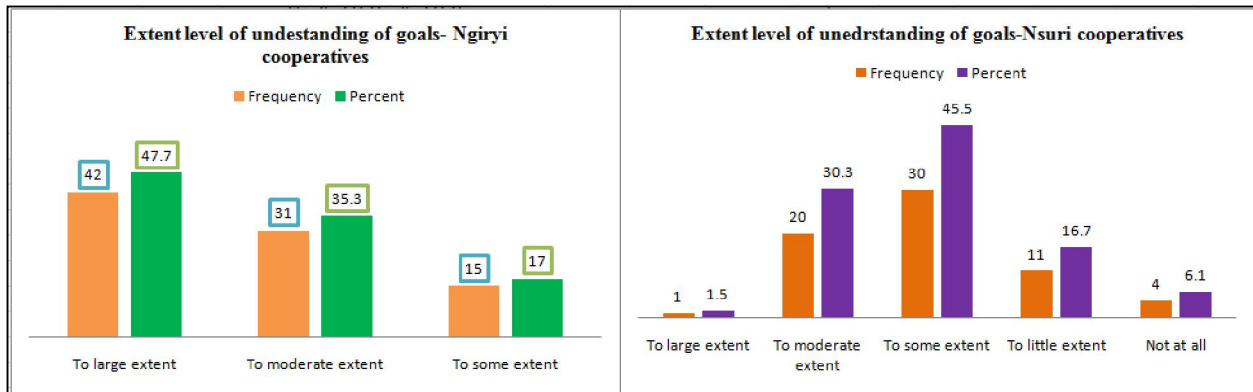
Figure 2: Extent level of understanding the bylaws by Ngiriyi and Nsuri cooperative members

The figure (2) describes the level of understanding of rice farmers from Ngiriyi and Nsuri cooperatives. It is evident that 42% and 11% of rice producers from Ngiriyi and Nsuri cooperatives understand laws that govern the cooperative at large extent, followed by those who understand some extent as reported by 21% and 51% of rice producers from

Ngiriyi and Nsuri cooperatives, then there are 36% and 17% from Ngiriyi and Nsuri who agreed moderately.

6.4.3 Level of understanding the mission and goals of rice farmers cooperatives

The researcher tried to evaluate the level of extent at which the respondents understood the goals of the rice farmers cooperatives and the results from the field survey are summarized on the following chart:



Source: Field data, 2015

Figure 3: Extent level of understanding the mission and goals of Ngiriyi and Nsuri cooperatives

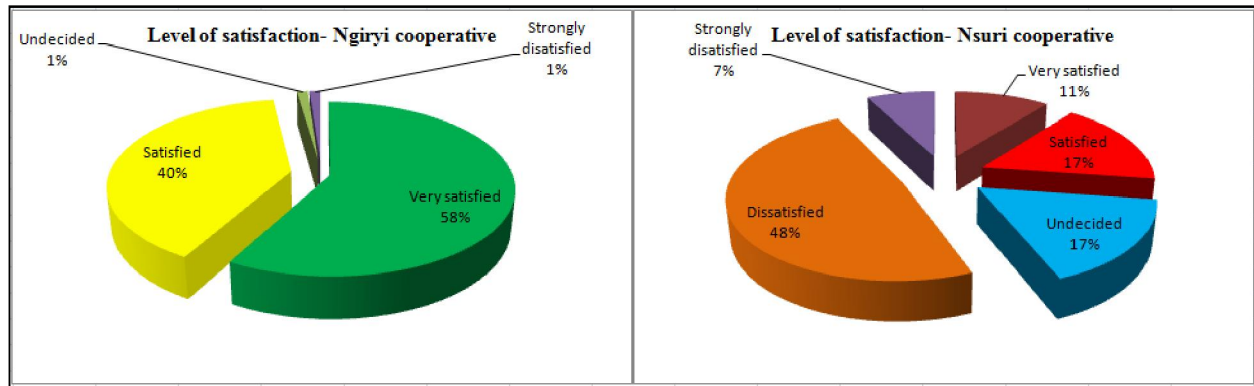
Each cooperative performance should be based on its goals, vision, mission, core values and its motto. The information below indicates at which level the respondents understood the goals of each cooperative under study. It showed that 42(47.7%) and 1(1.5%) of respondents from Ngiriyi and Nsuri cooperatives understand the goals at large extent, while 31(35.3%) and 20(30.3%) understood moderately the goals of each cooperative respectively. There are 15(17%) and 30(45.5%) understood the mission and goals at some extent.

6.3.4 The role of the leadership participation in success or failure of cooperative

There are various definitions of leadership as given by writers and authors on management. But all

these definitions were looked at critically have the same general idea as to what leadership is. Thus, there is no universal accepted definition of leadership. Leadership as the term implies, can be seen from different perspective. The leader in the cooperative is responsible for defining operational or management level objectives, goals and policies, selection of employees and preparation of budgets within the cooperative. They also organize and direct men and material so as to achieve the defined goals. The multiple role and function performed by the leader of any cooperative society is of paramount important to group and development of the society. The table below indicates the views from cooperative members on the

leadership status and the findings are summarized on the following figures:



Source: Field data, 2015

Figure 4: The level of satisfaction with the leadership by rice farmers of Ngiryi and Nsuri cooperatives

The most rice farmers from Ngiryi cooperative are very satisfied as indicated by 58% of all sampled farmers, 40% are satisfied, then 1% strongly dissatisfied and undecided. When looking Nsuri cooperative, 48% of rice farmers are dissatisfied with the leadership of their cooperative organs, 17% are undecided, 17% again are satisfied with the leadership of their cooperative organs, then there are 11% which are very satisfied and 7% which are strongly dissatisfied with the leadership.

6.5 Multiple linear regression analysis of social, economic and institutional factors on the sustainability of agricultural cooperatives

The general purpose of this theme is to review effect of social, economic and institutional factors on the sustainability of agricultural cooperative in Rwanda, especially from Ngiryi and Nsuri cooperative

from Huye and Gisagara District of southern province. In this analysis multiple linear regression analysis of social factors, economic factors and institutional factors at the increasing of rice production within the cooperative. Multiple linear regression analysis is a statistical technique that attempts to explore and model the relationship between two or more variables which are involved in the current study. The results from the field study are summarized in the following tables.

Sustainability

$$= f(\text{social factors} + \text{Economic factors} + \text{Institutional and governance factors} + \text{Other factors})$$

A. Tests statistics of factors contributed to sustainability of agricultural cooperative, case of Ngiryi cooperative

Table 17: Coefficient of determination of the cooperative performance, case of Ngiryi cooperative

SUMMARY OUTPUT			
SNO	Regression Statistics	Percentage	
1	Multiple R	0.5719	57.19%
2	R Square	0.3270	32.7%
3	Adjusted R Square	0.1868	18.68%
4	Standard Error	0.1671	16.71%
5	Observations	88	

Source: Field data, 2015

Table 18: Case of Ngiryi cooperative

ANOVA					
	df	SS	MS	F	Significance F
Regression	15	0.9773	0.0652	2.3325	0.0089
Residual	72	2.0113	0.0279		
Total	87	2.9886			

Source: Field data, 2015

Table 19: Regression analysis of the factors contributed to sustainable agricultural cooperatives, case of Ngiriyi cooperative

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	1.0686	0.1262	8.4652	0.0000
X1 (Age)	0.0215	0.0179	1.2054	0.2320
X2(Education level)	0.0151	0.0427	0.3544	0.7241
X3(Membership years)	0.0262	0.0208	1.2606	0.2115
X4(Improving farming knowledge)	0.0139	0.0131	1.0670	0.2896
X5(Procurement of inputs)	0.1746	0.0611	2.8595	0.0055
X6(Working with other farmers as group)	0.0919	0.0503	1.8264	0.0719
X7(Poverty reduction)	0.0440	0.0545	0.8071	0.4223
X8(Marketing)	0.1085	0.0584	1.8578	0.0673
X9 (Saving)	0.0289	0.0525	0.5514	0.5831
X10(Development)	0.1084	0.0538	2.0144	0.0477
X11 (improving living conditions)	0.0491	0.0552	0.8892	0.3768
X12 (Trainings)	0.1198	0.0472	2.5412	0.0132
X13 (Understanding by laws)	0.0380	0.0471	0.8068	0.4224
X14 (Understanding by goals)	0.0205	0.0314	0.6551	0.5145

Source: field data, 2015

The summary of test statistics showed that the coefficient of determination of the social, economic and institutional governance factors contributed on the sustainability of Ngiriyi cooperative called R² (R square) for the analyzed data is 0.5719 or 57%, this mean that the contribution of social factors, economic and institutional factors and years of membership on the sustainable cooperative has impacted fifty seven percent; the remaining are for other factors which were not studied. The analysis of variance (ANOVA) table showed that the F-test statistic is 2.3325 with p-value

of 0.0089. Due to calculated p-value which is less than to 0.05 of level of significance, the researcher could not the null hypothesis, then the researcher could confirm the alternate hypothesis that there is a contribution of institutional, social and economic factors on the sustainability of agricultural cooperative, case of Ngiriyi cooperative at 95% confidence interval and 5% level of significance.

B. Tests statistics of factors contributed to sustainability of agricultural cooperative, case Nsuri cooperative

Table 20: Coefficient of determination of the cooperative performance, case of Nsuri cooperative, case of Nsuri cooperative

SUMMARY OUTPUT			
<i>SNO</i>	<i>Regression Statistics</i>	<i>Percentage</i>	
1	Multiple R	0.4439	44.39%
2	R Square	0. 1971	19.71%
3	Adjusted R Square	0.0511	5.11%
4	Standard Error	0. 4762	47.62%
5	Observations	66	

Source: Field data, 2015

Table 21: Analysis of variance of factors contributed to the sustainability of farmers' cooperatives, case of Nsuri cooperative

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	14	4.96497	0.354641	1.711889	0.082198
Residual	51	10.56533	0.207163		
Total	65	15.5303			

Source: Field data, 2015

Table 22: Regression analysis of the factors contributed to sustainable agricultural cooperatives, case of Nsuri cooperative

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	1.134132	0.51144	2.217525	0.031069
X1 (Education level)	-0.04279	0.058208	-0.73507	0.465664
X2(Occupation)	-0.08612	0.112874	-0.76298	0.448991
X3(Membership years)	-0.04287	0.071028	-0.60355	0.548817
X4(Improving farming knowledge)	-0.08675	0.068622	-1.26429	0.211871
X5 (Procurement of inputs)	0.09577	0.173359	0.55249	0.583025
X6(Working with other farmers as group)	-0.36418	0.146625	-2.48377	0.016327
X7(Poverty reduction)	-0.38435	0.179338	-2.14318	0.036891
X8 (Marketing)	-0.00588	0.162853	-0.03615	0.971302
X9 (Saving)	-0.10087	0.138638	-0.72763	0.470164
X10 (Development)	0.05210	0.14638	0.355965	0.723335

Source: field data, 2015

The summary of test statistics of Nsuri cooperative as other case of study revealed that the coefficient of determination between factors such as the personal, social and economic factors contributed on the sustainability of Nsuri cooperative called R^2 (R-square) for the analyzed data is 0.4439 or 44.39% this mean that the contribution of personal factors such as education, professional occupation and years of membership within Nsuri cooperative has impacted at least forty four percent. When focusing on the analysis of variance (ANOVA) table, it showed that the F-test statistic is 1.711 with p-value of 0.082 respectively of Ngirya cooperative at 95% confidence interval and 5% level of significance. Due to calculated p-value which is greater than to 0.05 of level of significance, the researcher could accept that there is significant contribution of social factors, economic and institutional and governance factors on the development of Nsuri cooperative, therefore this particular cooperative is not well organized for stronger sustainable. This cooperative failed to be sustainable due to the fact that the considered social (member participation, meeting members' expectations, improving living conditions and health insurance) and economic factors (poverty reduction, benefiting of marketing activities, saving, financial auditing, trainings, increased income from rice production and access to credits) and the institutional factors (such as the understanding of cooperative principles and concepts by cooperative leaders, decision making by cooperative leaders, understanding of the tasks by leaders and the involvement of the cooperative members in decision making) are not working properly in this particular cooperative. Thus according to findings from the multiple linear regression analysis, there is no significance contribution of social, economic and institutional factors on the sustainability of Nsuri cooperative.

In addition, these findings have the dissimilarity with the results of researchers conducted by (Karami and Agahi, safari et al, 2010b) showed that educational agents influenced on success of agricultural production cooperatives which this paper confirmed it. Results of correlation coefficient indicated that there would be a significant and positive relationship between managerial factor and success of agricultural production cooperatives at the level 1% and also they are in consistence with results of (Safari, 2010).

These findings on the contribution of institutional factors to the sustainability of agricultural cooperatives are in line with the results of (Mahazril, 2012) who found that the correlation indicate that there is a weak positive relationship between members' participation and cooperatives performance measured by their profit growth as the Pearson correlation value 0.236, or 23.6%. Study conducted among cooperatives in Malaysia produced two main elements that reflect the members' participation which; one is participation in the policy making process through the attendance at annual general meeting and second is patronage the cooperatives products and services offered by their cooperative (Sushila et al, 2010). This study shows that even though participation from members are importance for the cooperative movement and board members agree that opinion from members during their annual meeting may contribute towards their performance, but still there is lack of participation from their members as some of the cooperatives viewed the cooperatives not as importance as the other business. They only attend the annual meeting but not actively involved in the administration of those cooperatives and resulted to weak relationship between the variables.

In addition also, (Cook, M. , 1995) outlined five general problems that cooperatives usually faced in

their development such as horizon problem, free rider problem, portfolio problem, control problem and influence on cost problems. Although this study has demonstrated that farmer cooperatives in Northwest China could be successfully established and developed, there were also signs that the two studied cooperatives have also faced some common problems.

7. Conclusion And Key Findings

The main objective of the study was to conduct a comparative study of the factors affecting sustainability of agricultural cooperatives in Rwanda, a case study of two farmers cooperatives of the southern zone. The present research report was guided by the following specific objectives: to analyze rice production and factors of yield variation before and after joining cooperative, to examine the social factors of sustainability agricultural cooperatives in Rwanda, to identify economic factors of sustainability agricultural cooperatives in Rwanda and to identify institutional and governance factors affecting agricultural cooperatives in Rwanda.

The key findings from the field survey revealed that, the average mean of rice production in Ngiryi cooperative was 2.94 tons before farmers being grouped into cooperatives, after joining cooperative, the yield shifted up to 4.96 tons. This showed that after rice farmers were grouped into cooperatives, the yield was increased by sixty eight percent (68.7%) of the total production before joining cooperatives. The same case of Nsuri cooperative, the average yield before cooperative was 1.55 tons while after intervention of cooperatives the yield was 3.271 tons of rice. The variation in rice production is also computed by means of percentage increase which is 111% of the total rice production before joining the cooperatives. Results showed that the main reason of this remarkable increase in rice production was due to increase in the numbers of farmers who adopted the use of fertilizers (NPK and Urea) after joining the cooperative and the increase in the used quantities of NPK and Urea after joining the cooperatives. For instance in the case of quantities of NPK used, among 37 farmers of Ngiryi cooperative who produced rice before joining the cooperative, 11 farmers didn't use NPK, 16 farmers used insufficient quantities of NPK, 7 farmers used moderate quantities of NPK and only 3 farmers used sufficient quantities of NPK, whereas after joining Ngiryi cooperative 81 farmers (92.1%) are now using sufficient quantities of NPK and 7 farmers (7.9%). In the same perspective, among 22 farmers who produced rice before joining the cooperative, 9 farmers didn't use NPK, 10 farmers used insufficient, 3 used moderate quantities and none of them used sufficient quantities of NPK. After joining the cooperative, 47 farmers (71.2%) of Nsuri

cooperative use sufficient quantities of NPK, 18 (27.3%) use moderate quantities and only one farmer (1.5%) use insufficient quantities of NPK.

For the considered social factors, due to the level of significance of 0.01 with the p-value of 0.0000, (p-value<0.01), the analysis showed that there is significance effect of social factors on the sustainability of Ngiryi cooperative, with p-value of 0.0000 (p-value<0.01), the same was observed for Nsuri cooperative the analysis showed that there is significance effect of social factors on Nsuri cooperative.

For the considered economic factors, the results from the chi-square table showed that there is significant effect of economic factors on the sustainability of Ngiryi cooperative with p-value of 0.000 which is less than to level of significance of 0.01. The Pearson chi-square from this correlations was found to be 9.562 respectively. Whereas for Nsuri cooperative the results from the chi-square table showed that there is no significance effect of economic factors on the on Nsuri cooperative. This is explained by p-value of 0.066 which is greater than the level of significance of 0.01 (P-value =0.066>0.01) and their corresponding Pearson chi-square of 3.373 respectively. As a concluding remark, Ngiryi cooperative was found to be sustainable due to that its members benefit from economic factors, whereas in general farmers of Nsuri cooperative don't benefit enough of economic factors.

In terms of the considered institutional and governance factors (the understanding of cooperative principles and concepts by cooperative leaders, decision making by cooperative leaders, understanding of the tasks by leaders and involvement of cooperative members in decision making), the results from the chi-square test of Institutional and governance factors in the case of Ngiryi cooperative showed that there is significant effect of fore mentioned factors to the sustainability of agricultural cooperatives. Whereas on the side of Nsuri cooperative, Chi-Square Tests showed that there is no significant effect of institutional and governance factors on the functioning of Nsuri cooperative. This shows that for Nsuri cooperative, there exist problems in leadership, institutional and governance factors compared to Ngiryi cooperative which is a sustainable cooperative.

When looking on side of sustainability of agricultural cooperative, the summary of test statistics showed that the coefficient of determination of the social and economic factors contributed on the sustainability of Ngiryi cooperative called R^2 (R square) for the analyzed data is 57%, this mean that the contribution of institutional factors, social and economic factors and other factors like education,

professional occupation and years of membership on the sustainable cooperative has impacted fifty seven percent. The summary of test statistics of Nsuri cooperative as other case of study revealed that the coefficient of determination between factors such as social, institutional and economic factors contributed on the sustainability of Nsuri cooperative called R^2 (R-square) for the analyzed data is 44.39%, this mean that the contribution of personal factors such as education, professional occupation, social and economic factors, institutional factors and years of membership within Nsuri cooperative on the sustainable cooperative has impacted forty four percent. By conclusion drawn from the comparative study of two rice farmers cooperatives, the Ngiryi cooperative has better management and better performance compared to Nsuri cooperative, these were arrived by comparing level of contribution or R-square values where Ngiryi perform at 57% mean while Nsuri cooperative has succeed at 44% respectively.

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