IMPACT OF MODERN AGRICULTURE TECHNOLOGIES ON SOCIO-ECONOMIC DEVELOPMENT OF FARMERS; A CASE OF KOABIBIKA, RUBENGERA SECTOR, KARONGI DISTRICT (2018-2021)

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Abstract

Modern agriculture technology has been introduced in Rubengera Sector as a way government strategy to improve productivity as well as economic development of farmers. The persistence of problem of poverty in Karongi District would raises concern regarding whether modern agriculture technologies have contributed to economic development of farmers in Karongi District or not. The study entitled "Impact of Modern Agriculture Technologies on Socio-Economic Development of Farmers; a case of KOABIBIKA, Rubengera Sector, Karongi District" was guided by three specific objectives: to analyze the modern agriculture technologies practiced by KOABIBIKA Cooperative members in Rubengera Sector, to assess the level of socio-economic development of farmers/ members of KOABIBIKA in Rubengera Sector and to establish the relationship between modern agriculture technology practices and socio-economic development farmers/ members of KOABIBIKA Cooperative in Rubengera Sector. The study used descriptive and correlational research design. The population of the study comprises of farmers of KOABIBIBKA cooperative in Rubengera Sector. The sample size of the study is 268 beneficiaries of Modern Agriculture technologies adoption obtained using Yaman formula. Questionnaire and documentary review were used to collect data and finally the study used descriptive statistics and inferential statistics as method of data analysis. The findings revealed that the overall view of respondents on agriculture intensification technology was excellent with mean score of 4.43, for agriculture mechanization technology in KOABIBIBKA cooperative was excellent with mean score of 4.45 and for Agriculture diversification technology in KOABIBIBKA cooperative was excellent with mean score of 4.41. The findings revealed that the average the quantity of beans sold by all members of KOABIBIKA over the last 4 years was 6110.75 Kgs with standard deviation of 2,399.02 Kgs. The average the total annually income of beans production by all members of KOABIBIKA was 4,068,200 Rwfs over the last 4 years'

whist the standard deviation of annually income of beans production by all members of KOABIBIKA was 2,238,818. The results revealed that agriculture intensification has significance positive effect on socio-economic development as indicated by β₁= 0.404, p-value=0.000<0.05..The regression results revealed that agriculture mechanization has significance positive effect on farmer's socio-economic development as indicated by β₂= 0.284, p-value=0.000<0.05.The results revealed that agriculture diversification has significance positive effect on women economic development as indicated by β₃= 0.106, p-value=0.043<0.05. The findings revealed that there is positive and significant high correlation between modern agriculture and socio-economic development among farmers of KOABIBIKA cooperative at (r=0.825, p-value=0.00<0.01); this means that an increase of modern agriculture practices influence an increase of socio-economic development of KOABIBIBKA cooperative members in Rubengera sector, Karongi District. The study concluded that modern agriculture technology has improved the socio-economic development of farmers of KOABIBIBKA cooperative at 82.5% where farmers are able to pay school fees for their children and their income and saving has increased after adoption of agriculture intensification. More trainings and capacity building of the farmers should be initiated on all the available modern agricultural technologies this will increase the levels of awareness of the existing modern agricultural technologies

Key terms: *Modern Agriculture technology, social economic development, farmers*

1. Introduction

Modern agriculture technology has seen the doubling of global cereal production between the 1960s and the 1990s, and hence increases in the global per capita food supply (World Bank, 2008). Modern agriculture introduced in the Asian and Latin American countries during the 1960s and 1970s, experienced yield increases and accelerated agricultural output growth due to the adoption of high yielding varieties of wheat, rice, and maize combined with intensive use of inputs such as fertilizer and irrigation (Hailu et al, 2019).

In Malawi, Alliance for a Green Revolution in Africa (AGRA) cooperates with the government of Malawi to provide subsidies for inorganic fertilizer, where half of the cost for the subsidies is financed by a loan from the World Bank to the Tanzanian government. Various staple and cash crops have been targeted crops intensification and more efficient use of inputs. Food crops include Maize, sorghum, wheat, pulses, cassava, potatoes, plantains and millet. Cash crops include coffee, cotton, tobacco, sisal, tea, cloves, horticultural crops, oil seeds, spices and flowers (Kassie et al, 2018).

In Eastern Africa, especially in Tanzania however, government efforts are underway to revamp agricultural productivity. Such efforts include the introduction of the fertilizer subsidy scheme famously known as the fertilizer voucher technology. The national agriculture input voucher

scheme (NAIVS) was introduced in 2008 intended to facilitate fertilizer use in targeted, high-potential areas, boost the return to fertilizer use and ultimately increase food production. The voucher technology enables a farmer to get a maximum of two bags of fertilizers to be used on only one acre (Alia, 2017).

In Rwanda, Government of Rwanda initiated specific policies and programs to address the agricultural Sector challenges such as the National Agricultural Policy, the Strategic Plan of Agricultural Transformation (PSTA). To address the specific challenges related to the crop low productivity and the very limited use of agricultural inputs, an important program was put in place in 2015 (Rwibasira, 2016). The Crop Intensification Program (CIP) which has four major components: distribution of improved inputs land use consolidation proximity extension services, and post-harvest handling and storage with the aims to raise the productivity of priority crops, increase the revenues in smallholder farms and thereby ensure food security through sustainable intensification processes.

Despite many efforts such as mobilization and political coordination, supervision, technical assistance, inputs distribution and markets made by MINAGRI, local authorities of Karongi District, partners implementation of modern agriculture technology in Karongi District in order to mitigating land fragmentation as major obstacle to agricultural development in the Sector and also to address the problem of scarcity resource and poverty; yet crops yield is still very low due to not use improved seeds, 87% of population in Karongi District did not use chemical fertilizer, 37% of all households did not own any type of livestock, 80% of the farms operate under 1 ha in area, 43.7% of land in Karongi is not protection against soil erosion (GoR, 2019).

Modern agriculture technology has been introduced in Rubengera Sector as a way government strategy to improve economic development of farmers. The persistence of problem of poverty in Karongi District would raises concern regarding whether modern agriculture technology has contributed to economic development of farmers in Karongi District or not. Hence, this study seeks to investigate the impact of modern agriculture technology on social economic development of famers/ members of KOABIBIKA in Rubengera Sector, Karongi District.

Research objectives

The study was guided by the following specific objectives:

1. To analyze the modern agriculture technologies practiced by KOABIBIKA members in Rubengera Sector;

2. To assess the level of socio-economic development of farmers/ members of KOABIBIKA in Rubengera Sector

3. To establish the relationship between modern agriculture technology practices and socio-economic development of farmers of KOABIBIKA cooperative in Rubengera Sector.

2. Material and Methods

2.1. Description of KOABIBIKA

KOABIBIKA is agricultural cooperative located in Gitwa Cell, Rubengera Sector, Karongi District in Western Province. This cooperative was created in 2013 and has by 814 members who produce beans and maize, fruit and vegetables. The purpose of this cooperative was to improve the growing of beans and maize fruit and vegetables production in terms of quantity and quality using technology and it has been initiated and supported by SAIP and LWH projects. The purpose of cooperative; farmers were encouraged to form and join that cooperative so that they can increase their bargaining power and earn higher prices for their produce. This is achieved through the establishment of beans and maize cooperative for the purpose of producing high-quality and quantity of beans that is competitive at the national as well as international markets (KOABIBIKA report, 2022).

2.2. Data collection instruments

Questionnaire: The researcher used questionnaire to collect data regarding the impact of modern agriculture on socio-economic development of farmers/ members of KOABIBIKA. The questionnaires were self-administered and each respondent received the same set of questions in exactly the same way. The instrument contains questions that facilitated collection of data relative to objectives of the study. Regarding the study objectives (or variables), the study will

use 5-point like scale to measure on how the perception of farmers on modern agriculture technology and the level of economic development of farmers. This ranged from strongly agree to strongly disagree (Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree). The researcher initially contacted the respondents, ranging from an initial letter of introduction giving notice of the study and handing paper questionnaires to the respondents and also the study used telephone contact.

Documentation review: According to Newing (2011), documents are materials, which contain the information about a phenomenon that researchers wish to study. In this study the 5 annual reports of KOABIBIKA were viewed

2.3. Data analysis

According to Cooper and Schindler (2017), the analysis of data allows the researcher to organize the data collected during the study in order to assess and evaluate the findings so as to arrive at some reasonable, valid and relevant conclusion. This study employed a descriptive statistical method for representing and summarizing of the bio data. Descriptive and inferential statistics such as correlation analysis were used to analyze the data. The data in this study were computed and analyzed using Statistical package for Social sciences (SPSS) which is software for data analysis.

Descriptive statistics: Descriptive statistics such as mean, frequency, standard deviation and percentage were used to describe the perception of farmers on modern agriculture technology in KOABIBIKA cooperative in Rubengera Sector and the level of economic development of KOABIBIKA cooperative members.

Pearson Correlation test: The Pearson correlation coefficient is a very useful way to measure the statistical relationship that exists between modern agriculture technology and socio-economic development of KOABIBIKA cooperative members.

Multiple regression models: Multiple regression analysis was used to establish the role played by each predictor such as (agriculture intensification, agriculture mechanization, agriculture diversification) and socio-economic development of f KOABIBIKA cooperative members.

Model specification

The following econometric model will be used as follow:

The equation $(Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + e)$

Where B_o = constant

$\{\beta_1, \beta_2 \text{ and } \beta_3\}$ = coefficients of independent variables and μ = error term

Y= Socio-economic development of farmers

X1=Agriculture intensification

X2= Agriculture mechanization

X3=Agriculture diversification

3. Research results
3.1. Descriptive results

3.1.1. Agriculture intensification technology in KOABIBIKA cooperative, Rubengera Sector

The study sought to determine the effect of agriculture intensification technology in Rubengera Sector. To achieve this, the respondents were asked to give their opinion on their level of agreement or disagreement with the statements in a Likert scale of 1-5 where; 1 = strongly disagree, 2= disagree, 3 = Not Sure, 4 = Agree, 5 = strongly agree. The findings were presented in Table1.

Table 1: Agriculture intensification technology in KOABIBIKA cooperative, Rubengera Sector

	SD	D	N	A	SA	Mean	St.

	fi	%	Fi	%	fi	%	Fi	%	fi	%		dev
I used improved seeds in my farm	4	1.5	20	7.5	0	.0	56	20.9	188	70.1	4.51	.94
I used chemical fertilizer and pesticides in my farm	0	.0	4	1.5	4	1.5	76	28.4	184	68.7	4.64	.60
I have been trained on how using chemical fertilize as the extension services	4	1.5	4	1.5	16	6.0	64	23.9	180	67.2	4.54	.80
I have involved in preparation the request of land consolidation for a specific area	12	4.5	16	6.0	16	6.0	96	35.8	128	47.8	4.16	1.08
Everyone willing to join the program receives fertilizers, seeds and others extension services.	0	.0	32	11.9	16	6.0	32	11.9	188	70.1	4.40	1.05
I have received fertilizers and seeds based on the size of each parcel.	224	00	20	7.5	12	4.5	12	4.5	0	83.6	4.64	.88
I used improved seeds in my farm	8	3.0	28	10.4	36	13.4	44	16.4	152	56.7	4.13	1.18
Overall mean											**4.43**	**0.93**

Source: Primary data, 2022

In respect to agriculture intensification technology in Rubengera Sector, the overall view of respondents on agriculture intensification technology was excellent with mean score of 4.47 and the standard deviation of 0.92 which implies that there is strong evidence of existing of fact and homogeneity response that agriculture intensification technology used by Rubengera Sector was identified as at very high extent.

Table 2: Agriculture mechanization technology in KOABIBIKA cooperative in Rubengera Sector

	SD		D		N		A		SA		Mean	St. dev
	fi	%	Fi	%	fi	%	Fi	%	fi	%		
I used hand tool technology as simplest agriculture mechanization technology	0	.0	28	10.4	16	6.0	20	7.5	204	76.1	4.49	1.01
I use machines (tractors) in my agriculture	4	61.5	4	1.5	36	13.4	40	14.9	184	8.7	4.48	.89

											Mean	St. dev
I obtained supporting activities, such education and training, extension, credit are also addressed.	12	4.5	8	3.0	48	17.9	44	16.4	156	58.2	4.21	1.12
I use irrigation technology for increasing agricultural output	0	.0	36	13.4	8	3.0	60	22.4	164	61.2	4.31	1.05
The farmers of selected schemes are encouraged to join the program based on the forecast benefits they will gain.	0	.0	24	9.0	4	1.5	24	9.0	216	80.6	4.61	.90
I practiced unification of land parcels with an estimated easier and productive farming than the fragmented parcels	16	6.0	8	3.0	0	.0	12	4.5	232	86.6	4.63	1.07
Overall mean											4.45	1.00

Source: Primary data, 2022

Based on Table 2, about agriculture mechanization technology in Rubengera Sector was excellent with mean score of 4.45 and the standard deviation of 1.00 which implies that there is strong evidence of existing of fact and homogeneity response that Agriculture mechanization technology in Rubengera Sector was identified as new adoption level is very low.

Table 3: Agriculture diversification technology in KOABIBIKA cooperative in Rubengera Sector

	SD		D		N		A		SA		Mean	St. dev
	fi	%	Fi	%	fi	%	Fi	%	fi	%		
Crop diversification play role to farmers in KOABIBIKA in Rubengera Sector	4	1.5	8	3.0	12	4.5	80	29.9	164	61.2	4.46	.84
I started to diversifying my activities after adopting the new technologies	12	4.5	12	4.5	12	4.5	100	37.3	132	49.3	4.22	1.04
Farmers negotiate pre-season contracts with agro- dealers	0	.0	36	13.4	20	7.5	32	11.9	180	67.2	4.33	1.09
Farmers in setting price favorable after harvesting process	0	.0	20	7.5	12	4.5	52	19.4	184	68.7	4.49	.89

Famers to bargain the fair price of fertilizer with suppliers	0	.0	28	10.4	44	16.4	20	7.5	176	65.7	4.28	1.08
I have access to agriculture loans from SACCOs	4	1.5	32	11.9	4	1.5	0	.0	228	85.1	4.55	1.09
I plant different trees in my farms	4	1.5	12	4.5	12	4.5	40	14.9	200	74.6	4.57	.89
Overall mean											4.41	0.98

Source: Primary data, 2022

Based on the results from the table 3, Agriculture diversification technology in KOABIBIKA cooperative in Rubengera Sector was excellent with mean score of 4.41 and the standard deviation of 0.98 which implies that there is strong evidence of existing of fact and homogeneity response that agriculture diversification technology in KOABIBIKA cooperative in Rubengera Sector was identified as at very high extent

Table 4: Health insurance coverage before and after modern agriculture

	Before		After	
	Frequency	Percent	Frequency	Percent
Mutuelle de Santé	160	62.6	200	74.6
other health insurance	60	22.3	38	14.1
No health insurance	48	17.9	30	11.1

Source: Primary data, 2022

3.1.2. Trends of total annually income of beans production among members of KOABIBIKA

The study sought to analyze the trend of total annually income of beans production among members of KOABIBIKA form 2018-2021. The results from analysis were presented in the table 5.

Table 5: Trends of total annually income of beans production among members of KOABIBIKA Cooperative

Years	Quantity of beans sold among members of KOABIBIKA	Price of beans per each Kg	Total annually income

2018	3662	400	1,464,800
2019	8053	400	3,221,200
2020	8187	600	4,902,000
2021	8356	800	6,684,800
Mean	7064.5	550	4,068,200.00
St. dev	2271.72	191.49	2,238,818.03

Source: KOABIBIKA report, 2018-2021

The findings from the table 5, indicated that there is an increase in trends of total annually income of beans production by all members of KOABIBIKA from Frws 1,464,800 in 2018 to 6,684,800 Rwfs in 2021 where in 2018, the total annually income of beans production by all members of KOABIBIKA was 1,464,800 Rwfs. In 2019, the total annually income of beans production by all members of KOABIBIKA was 3,221,200 Rwfs. In 2020, the total annually income of beans production by all members of KOABIBIKA was 4,902,000 Rwfs, the total annually income of beans production by all members of KOABIBIKA was 137,700,000 Rwfs while 2021, the total annually income of beans production by all members of KOABIBIKA was 6,684,800 Rwfs. The average the total annually income of beans production by all members of KOABIBIKA was 4,068,200 Rwfs over the last 4 Years whist the standard deviation of annually income of beans production by all members of KOABIBIKA was 2,238,818 Rwfs

3.2. Multiple linear regression

With this test, it was assumed that the kind of relationship that exists between independent and dependent variables is linear. To ascertain this, and to know the extent to which the predictors affects socio-economic development, regression test was carried out; the predictors in this case include; agriculture intensification, agriculture mechanization and agriculture diversification, while dependent variable is women economic development. The findings are presented in table 6.

Table 6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.747[a]	.558	.549	.23940

a. Predictors: (Constant), agriculture intensification, agriculture mechanization and agriculture diversification)

Source: Primary data, 2022

Findings established an R-squared value of .549. This means that when all the independent variables were taken together, they gave an R-squared value of 0.549(54.9%). Thus, the independent variables (agriculture intensification, agriculture mechanization and agriculture diversification) taken together could account for up to 54.9% of the total variation in farmers' socio-economic development at 95% of confidence interval. The remaining 45.1% in the variation in socio-economic development of farmers could be explained by other factors not in the model. This meant that in an ideal situation without interference from extraneous variables, the independent variables accounted for up to 54.9% of the total variance in social economic development of farmers. The model summary indicates that at 95% confidence level, information sharing in supply chain is a significant explanatory variable for any change in women economic development, the magnitude of which is explained by the coefficient of determination (R^2). From the results, modern agriculture technology explains 54.9% of any change in socio-economic development. The remaining 45.1% is explained by other factors not captured in this bi-variate model.

Table 7: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	9.852	3	3.284	111.32	.000[b]
	Residual	7.794	264	0.0295		
	Total	17.646	267			

a. Dependent Variable: Socio-economic development of farmers

b. Predictors: (Constant), agriculture intensification, agriculture mechanization and agriculture diversification),

In order to examine on whether the data was good fit for regression model, the ANOVA was undertaken and the data being good fit for data was tested at 5% level of significance. Since from the Table 4 indicated an F-value of 111.32 is greater than the critical $F(, v_1=3, v_2=264) = 2.65$ and also because p-value calculated $=0.000$ is less than Critical p-value $=0.05$ level of significant. Therefore, this implies that modern agriculture technology such as: agriculture intensification,

agriculture mechanization and agriculture diversification, as independent variable is good predictors of farmers' socio-economic development

Table 8: Regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.853	.269		3.174	.002
	Agriculture Intensification	.404	.057	.449	7.127	.000
	Agriculture mechanization	.284	.059	.343	4.821	.000
	Agriculture diversification	.106	.052	.141	2.041	.043

a. Dependent Variable: Farmers' socio-economic development

Source: Primary data, 2022

The equation ($Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$) becomes:

Farmer's socio-economic development = 0.853+0.404*Agriculture intensification +0.284 *Agriculture mechanization +0.106* Agriculture diversification

The regression equation above has established that taking all factors into account (agriculture intensification, agriculture mechanization and agriculture diversification) constant at zero, socio-economic development will be 0.853.

The regression results revealed that agriculture intensification has significance positive effect on socio-economic development as indicated by β_1= 0.404, p-value=0.000<0.05, t=7.127.

The regression results revealed that agriculture mechanization has significance positive effect on farmer's socio-economic development as indicated by β_2= 0.284, p-value=0.000<0.05, t=4.821.

The regression results revealed that agriculture diversification has significance positive effect on women economic development as indicated by β_3= 0.106, p-value=0.043<0.05, t=2.041.

4. Discussion

With reference to Table 1, the findings show that farmers have adopted modern agriculture technology especially agriculture intensification where 83.6% of respondents strongly agreed that they have received fertilizers and seeds based on the size of each parcel 70.1% of respondents strongly agreed that they used improved seeds in their farm 68.7% of respondents strongly agreed that they used chemical fertilizer and pesticides in their farm. 67.2% of respondents strongly agreed that they have been trained on how using chemical fertilize as the extension services. The findings are related to what respondents stated that agriculture extension lead farmers to extend their farms. However, they face a big challenge about information they got from agronomists or agriculture policy where farmers do not get fertilizers at time nor regular training to use them. This concurs with Umeghalu (2018) who noted that most small scale farmers are unable to access agricultural technologies because of the high initial capital requirements required by the agricultural research companies disseminating them. Further Small scale farmers, research scientist and extension officers all agreed to the fact that low access to agricultural research activities can also be attributed to inadequate access to information about the research centers, their activities and products, this can be explained by the observations made by the respondents who noted that most research centers are located far away from the small scale farmers' farming points and Wambugu (2017) also found out that farmers were in contact with government extension services because of; budgetary limitations and inadequate allocated resources also weak research-extension linkages, unavailability of mobility and lack of training opportunities for updating extension personnel knowledge have also been identified as possible reasons.

Based on Table 2, about agriculture mechanization, the findings revealed that in respect to agriculture mechanization in KOABIBIKA cooperative, Rubengera Sector, the results indicate that 76.1% of respondents strongly agreed that they used hand tool technology as simplest agriculture mechanization technology. 68.7% of respondents disagreed that they use machines (tractors) in their agriculture. 58.2% of respondents strongly agreed that they obtained supporting activities, such education and training, extension, credit are also addressed. 61.2% of respondents strongly agreed that they use irrigation technology for increasing agricultural output with proper authorization were made. 86.6% of respondents strongly agreed that they practiced unification of land parcels with an estimated easier and productive farming than the fragmented parcels. The overall view of respondents on agriculture intensification technology was excellent with mean

score of 4.47 and the standard deviation of 0.92 which implies that there is strong evidence of existing of fact and heterogeneity response that agriculture intensification technology used by KOABIBIKA cooperative members was identified as at very high extent. However as explained by the farmers, they face many challenges in adopt modern agriculture technology such as land, agricultural inputs, water, modern equipments and machineries and financial resources

The findings revealed that mechanization is needed to improve the production and lead to economic development. This is evidenced by (Cwaile & Oladele, 2018) who stated that agricultural development also brings social and cultural developments, as increased per capita income in rural areas invariably results in increased literacy and level of education which are conducive for social transformation. For major food crops, basic information on production management practices should be gathered, including varieties or hybrids and the amount of fertilizer being used. The respondents explained that mechanization has helped to use irrigation to improve their products especially beans, onions and maize. This shows that modern agriculture technology is very important to farmers to increase yield for their socio-economic development.

The overall view of respondents on agriculture mechanization technology in KOABIBIKA cooperative was excellent with mean score of 4.45 and the standard deviation of 1.00 which implies that there is strong evidence of existing of fact and homogeneity response that Agriculture mechanization technology in KOABIBIKA cooperative, was identified as at very high extent.

Based on agriculture diversification, as shown in Table 3, the findings revealed that 61.2% of respondents strongly agreed that crop diversification play role to farmers KOABIBIKA Cooperative in Rubengera Sector 49.3% of respondents strongly agreed that they started to diversifying the varieties of seeds after adopting the new technologies, 67.2% of respondents strongly agreed that farmers negotiate pre-season contracts with agro- dealers. 65.7% of respondents strongly agreed that famers to bargain the fair price of fertilizer with suppliers 85.1% of respondent disagreed that they have access to agriculture loans from SACCOs. 74.6% of respondents strongly agreed that they plant different trees in their farms.

The overall view of respondents on Agriculture diversification technology in KOABIBIKA Cooperative in Rubengera Sector was excellent with mean score of 4.41 and the standard deviation of 0.98 which implies that there is strong evidence of existing of fact and homogeneity response that agriculture diversification technology KOABIBIKA Cooperative in in Rubengera Sector was identified as at very high extent.

The farmers explained that Access to information is critical for the farmers to adopt any modern agricultural technology available, access to information makes farmers more knowledgeable about the existing technologies, and accessed information will assist farmers in the decision making process either to adopt or not adopt the available technologies (Tobon, 2011). The results obtained from both respondents showed that smallest scale farmers access information on modern agricultural technologies but a more targeted approach should be used during the dissemination of agricultural information to ensure that information reaches as many farmers as possible taking into account the many sources available that the farmers can use to obtain information about new technologies being disseminated.

The findings from the Table 4, revealed that 78.7% of respondents reported that did not have health insurance before modern agriculture technology while after modern agriculture technology the situation has been charged where none of respondents reported that the situation of access of heath care services was difficult. The second findings revealed that the majority 80.9% of respondents reported that after modern agriculture technology have paid health insurance (Mutuelle de santé). This implies that modern agriculture technology contributing to improvement of health care services of their members. Hence, people who join agriculture technology are easily to pay Health Insurance so that they can easily have access to clinic, health center and hospitals. Based on the findings above, it is evident that the first hypotheses of the study stated that there is no significant relationship between agriculture intensification and farmers' socio-economic development.

The results in Table 5, show that before modern agriculture technology, the situation of access to education facilities of the families were worse where 53.9% of respondents reported that were able to pay school fees of children this means that it was not easy to get school fees of the children and their relatives while after modern agriculture technology the situation has been

changed where none of respondents reported that were not able to pay school fees of the children. And also the findings revealed that after modern agriculture technology the majority 51.7% of respondents reported that have high access to education facilities. This implies that after modern agriculture technology, the majority 51.7% respondents were able to pay school fees of the children and relatives in easy way which means that after modern agriculture technology the capacity of able to pay school fees and other education facilities of the children has been improved and the findings show that 70.8% of respondents obtained food of the families in easy way while before it was difficult this is evidenced by the statistics which show that average the quantity of beans produced reserve for meals by each member of KOABIBIKA over the last 4 years was 29.4 Kgs with standard deviation of 5.60 Kg.

5. Conclusion

Based on the results of the study the study concluded that better application modern agriculture system in terms of agriculture intensification, agriculture mechanization, agriculture diversification played positive significant contribution to socio-economic development of farmers of KOABIBIKA cooperative in Rubengera Sector adopted modern agriculture. This shows that modern agriculture plays a significant role in total income and it is also significantly useful on soco-economic development; the study concluded that modern agriculture technology especially agriculture intensification has improved the socio-economic development of farmers of KOABIBIKA cooperative in Rubengera Sector where farmers are able to pay school fees for their children and their income and saving has increased after adoption of agriculture intensification.

The findings revealed that It was very evident that the small scale farmers have limited access to resources required for agricultural production for instance land, agricultural inputs, water, modern equipments and machineries and financial resources low access to resources required for agricultural production has thus negatively influenced the adoption of modern technologies. The findings from respondents explained that farmers have low access to agricultural research activities, products and technologies being disseminated from most agricultural research centers within the Sector, as the study found out low access to agricultural research activities by farmers can be attributed to limited access to financial resources by farmers because most farmers are

low income earners, low access to information about the research centers and their activities because most agricultural research centers are located far away from the farmers' farming points. It can thus be concluded that low access to agricultural research products by small scale farmers has negative influenced on the adoption of modern agricultural technologies by farmers. It's thus imperative that the local government should subsidized inputs for the farmers as well as establish community input stores which will make the inputs more easily accessible and available to the small scale farmers for the adoption of modern agricultural technologies. Modern agricultural equipment and machinery hire services should be established the governments to the enable small farmers have access the modern equipments and machineries easily and at a low cost.

The provision and delivery of extension services to small scale farmers can only be effective if there is constant contact between the extension providers and the small scale farmers being served, the study discovered a low contact between the farmers and extension officers the farmers thus have a low access of extension services the implication of the low access to extension services being inadequate transfer of knowledge between the extension officers and farmers thus influencing the adoption of modern agricultural technologies negatively.

Acknowledgements

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