Transforming Farmers as Agripreneurs: An Evaluation Study on CLIMATE SMART FARM BUSINESS SCHOOL

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ABSTRACT

This study investigated the participants' knowledge and practical learning application after the training course on Climate Smart Farm Business School (CSFBS) conducted by the Agricultural Training Institute Regional Training Center 8 (ATI-RTC 8) on 2016. It also investigated the socio-economic welfare of the training participants in their households. Specifically this study aimed to: (1) describe the socio demographic characteristics of the training participants; (2) to know the socioeconomic effects of the Climate Smart Farm Business School (CSFBS) on the socioeconomic development of the training participants in household level; (3) determine the level of knowledge of the training participants on Climate Smart Farm Business School (CSFBS); (4) determine the problems that hinder application of knowledge and skills on Climate Smart Farm Business School (CSFBS); and (5) provide inputs for policy recommendations. To address the objectives of the study, personal interviews were conducted among 127 randomly selected respondents. Pooled OLS regression analysis was used to capture the effect of the training course on CSFBS on different socio economic factors and the results were subjected to several diagnostic tests.

The data revealed the following findings: (1) 92 of the respondents adopted the technologies/techniques taught in the training; (2) the knowledge of the participants increases by 157.14% and 94.5% of the respondents became moderately skilled while 4.7% became highly skilled as shown in their knowledge tests; (3) the yield of the respondents who adopted increases by an average of 4 sacks; (4) the mean income of those who adopted is Php 11,371 which is much higher compared to the Php mean income of those who did not; (5) and 98% of the respondents observed that the training brought changes or improvements also to their community and other people duplicated their practices learned from the training.

Since, this training course yielded significant results, especially on income and yield of the training participants, it should be continued and properly monitored so that the change will be constant and will probably brought more positive effects not only on the training participants but also on others and on their community. More techniques can also be adopted as time passes by.

INTRODUCTION

The Philippine economy is heavily dependent on the development of the agricultural sector which is the most efficient poverty reduction measure. But climate change threatens agriculture production's stability and productivity. Though farmers are under the greatest threat from climate change, they could also play a major role in addressing it.

Transforming farmers to become entrepreneurs as they are adopting the threats of the changing climate is one of the program thrusts of the Agricultural Training Institute. The Climate Smart Farm Business (CSFBS) is a new extension modality that aims to work with farmers to help them build knowledge and skills to make their farms more profitable and resilient amidst the unpredictable effects of climate change. This training course integrates the concept of farming as a business, good agricultural practices and risk-proofing their livelihood against weather events. This program takes the school to the farmers having FFS, CSFFS and FBS in one forum.

Further, climate smart agriculture covers the adoption and mitigation strategies in farming from soil conservation, water resource management, decision support tools and financial risk management, which farmers could practice.

Meanwhile, farm business school covered the topics on understanding marketing and markets, basic concepts of farm business profitability, the farmer as entrepreneur, choosing enterprise for the farm, components of farm business plan, value addition, assessing the benefits and performance of a farm.

The initiatives of the government to meet the ASEAN economic community are also part of the modules covering the code of good agricultural practices, its importance, advantages, requirements and procedures.

Objective of the Study

This study generally aimed to evaluate the participants' knowledge, practical learning application after the training and socio economic development of the household of the training participants. Specifically, it intended to;

1. Describe the socio demographic characteristics of the training participants;

2. To know the socioeconomic effects of the Climate Smart Farm Business School (CSFBS) on the socioeconomic development of the training participants in household level;

3. Determine the level of knowledge of the training participants on Climate Smart Farm Business School (CSFBS);

4. Determine the problems that hinder application of knowledge and skills on Climate Smart Farm Business School (CSFBS);

5. Provide recommendations based on the findings of the study.

THEORETICAL/CONCEPTUAL FRAMEWORK

The framework indicated that inputs such as manpower, money, machinery, methods and time are necessary and sufficient to implement outlined activities to deliver the expected outputs of the project in which the project management is accountable. Logically, interventions conducted particularly the consultation and launching resulted to the confirmation, show of commitment to the project, and MOA signing by the Local Chief Executives, extension workers and the identified participants. Provision of technical advisories and conduct of benchmarking also resulted to the improvement of their farming system or way of planting while the conduct of exhibit during graduation provided the beneficiaries with the experience of selling and marketing their products. Monitoring was also conducted by the extension worker and ATI staff to ensure that technologies were adopted by the beneficiaries and problems identified and resolved.

The delivery of these outputs led to increased knowledge, skills and attitudes of the clients that enabled them to establish and improve their farms and adopted most of the technologies introduced to them. This resulted to increased productivity in terms of yield and income. These outcomes also influenced their neighbors to duplicate the techniques/technologies taught to the training participants. Through the training the participants learned and become a farmer entrepreneur or agripreneur.

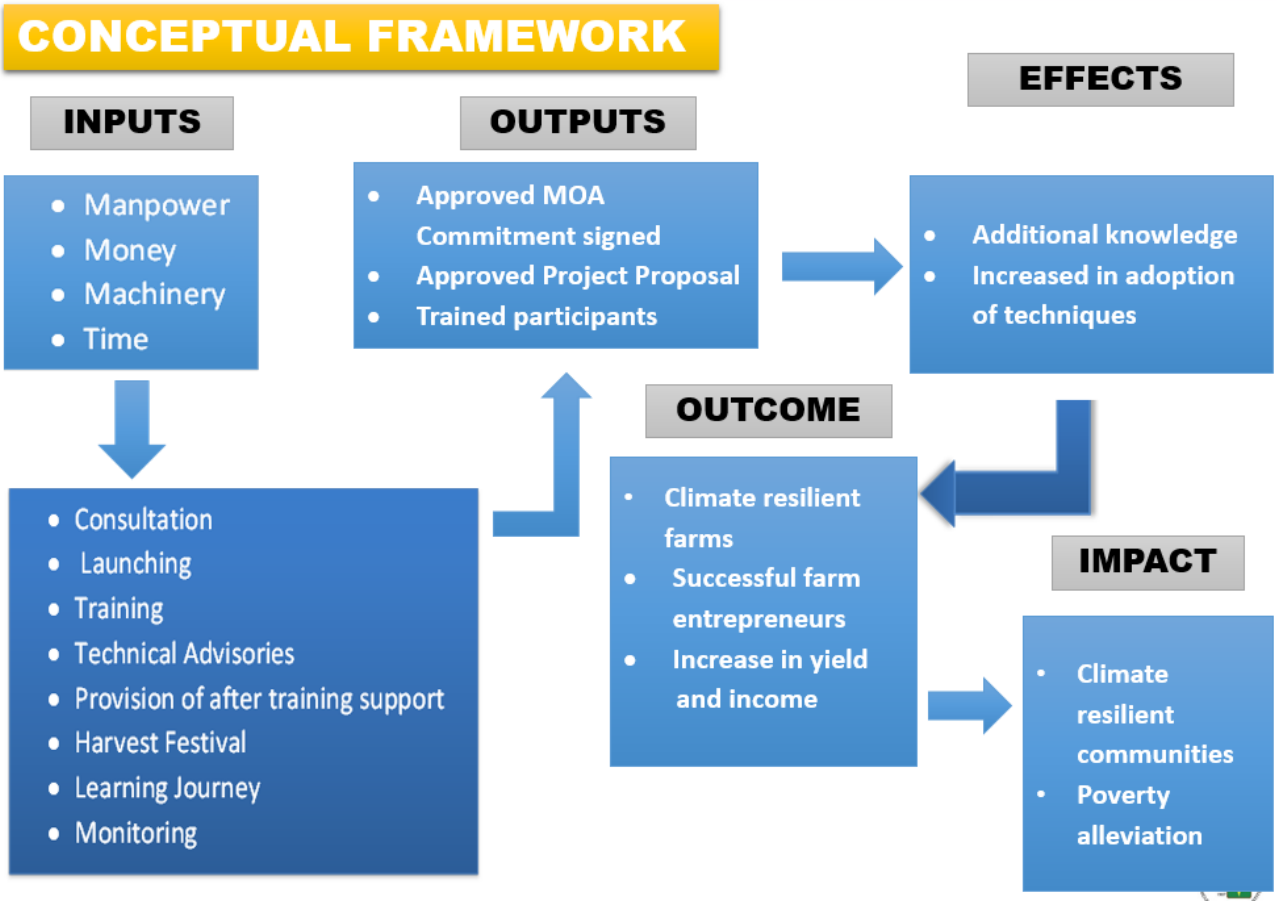


Figure 1. Schematic diagram showing the outcome of training course on CSFBS to the household beneficiaries

METHODOLOGY

Locale of the Study

This study was conducted in selected households from six (6) municipalities (Taft, Catubig, Macrohon, Tanauan, Capoocan, and Villaba) where CSFBS was conducted.

Sampling Procedure

A sample of the participants from each of the six (6) municipalities served as the population. All of one hundred eighty seven (187) training participants served as the population and was randomly selected using the Slovene's formula. The margin of error is set to 0.05. As determined using the Slovene's formula, the sample size of the respondents is one hundred twenty seven (127). A total of ninety two (92) training participants adopted the techniques or technologies taught to them in the training while thirty five (35) trainees were not able to practice what they learnt.

Table 1. Sample distribution of the training participants who adopt and did not adopt on the technologies and techniques taught in the training in each municipalities (2016).

Municipality	Adopt	Did Not Adopt
Capoocan	11	5
Catubig	13	11
Macrohon	12	4
Taft	19	5
Tanauan	21	3
Villaba	16	7
Total	**92**	**35**

Data Collection

Primary and secondary data were both used in this study. The list of the training participants of Climate Smart Farm Business School (CSFBS) is the secondary data that was from the office of the Agricultural Training Institute – Regional Training Center 8 (ATI-RTC 8). This list was used for gathering the primary data, which was collected through an interview using a structured questionnaire.

Data Analysis

Descriptive statistics were used to characterize the effects of the Climate Smart Farm Business School (CSFBS) on the socioeconomic development of the training participants in household level. The study used means, totals, frequencies, and percentages to analyze qualitative and quantitative data. Diagnostic test was also conducted to test the validity of the results. The study also used regression using the semi-logarithmic model where ln(income) and ln(yield) were used as dependent variables and were regressed in each of the explanatory variables. Pooled OLS regression was used to know if the CSFBS has an effect on the income and yield of the household of the respondents.

Empirical Model

This study focused only on the effects of the CSFBS on income and yield of the training participants in household level.

To quantify the effects of the Climate Smart Farm Business School (CSFBS) on the socioeconomic development of the household of the training participants, three (3) different models were used:

$$ln(YIELD) = \beta_0 + \beta_1\, ADAPT + \beta_2 SOI1 + \beta_3 SOI2 + \beta_4 SOI3 + \beta_5 SOI4 + \beta_6 AGE + \beta_7 SEX + \beta_8 HS + \beta_9 HO + \beta_{10} LO + \beta_{11} EL + \beta_{12} SA + \mu \quad (1)$$

$$ln(INC) = \beta_0 + \beta_1\, ADAPT + \beta_2 AGE + \beta_3 SEX + \beta_4 HS + \beta_5 HO + \beta_6 LO + \beta_7 EL + \beta_8 SA + \mu \quad (2)$$

Where:

ln(YIELD)

Measures the increase in yield per sack of the household in log form (dependent variable for model 1).

ln(INC)

Measures the average monthly income of the household in log form (dependent variable for model 2).

ADOPT

Adopt is the adoption of knowledge/skills of the respondents. It is a dummy variable, 0 for did not adopt and 1 for adopt.

*SOI*1

Source of income 1 of a household is categorized as agricultural income. It is a dummy variable, 0 for not and 1 for yes. It includes income from farming, copra, abaca weaving, tuba gathering, charcoal making, corn farming, vegetable gardening, swine raising, and fishing.

*SOI*2

Incomes of laborers and service workers fall under the source of income 2 or the wage income. It is a dummy variable, 0 for not and 1 for yes.

*SOI*3

Source of income 3 is the non-farm income or income from being self-employed. It includes those from business, remittance, official's honorarium, income from being a government official/employee and income from being a professional worker. It is a dummy variable, 0 for not and 1 for yes.

*SOI*4

Sources of income 4 is a dummy variable, 0 for not and 1 for yes. It is the other sources of income that includes pension and money from being a 4P's beneficiary.

AGE

Age is measured in number of years of the respondent.

GEN

Gender is a dummy variable, 0 for male and 1 for female.

HS

Household size or the number of family members in each household is measured by count.

HO

House ownership is a dummy variable that is answerable by yes or no (1 = yes, owns the house; 0 = no, otherwise).

LO

Lot ownership is a dummy variable that is answerable by yes or no (1 = yes, owns the residential lot; 0 = no, otherwise).

EL

Educational level is measured in the number of years spent in school.

SA

Social awareness includes awareness on the importance of attending the training course on the CSFBS and awareness on the effects of practicing or adopting on the technologies and techniques taught during the training. It is a dummy variable that is answerable by yes or no (1 = yes, socially aware; 0 = no, otherwise).

μ = error term

RESULTS AND DISCUSSION

Socioeconomic Profile of the Respondents

One of the concerns of the study is to obtain information describing the socio-economic profile of the training participants. The socio-economic factors that are used in the analysis were source of income, total monthly income of the household, age, sex, household size, house ownership, lot ownership, educational level, and social awareness.

Age

A total of one hundred twenty seven (127) training participants participated in the study. Mean age of respondents is 48 years old. Almost one half (40.9%) belonged to the middle age bracket (Fig. 1). At this range, most people are more eager to learn additional knowledge through trainings that could help them in their everyday living.

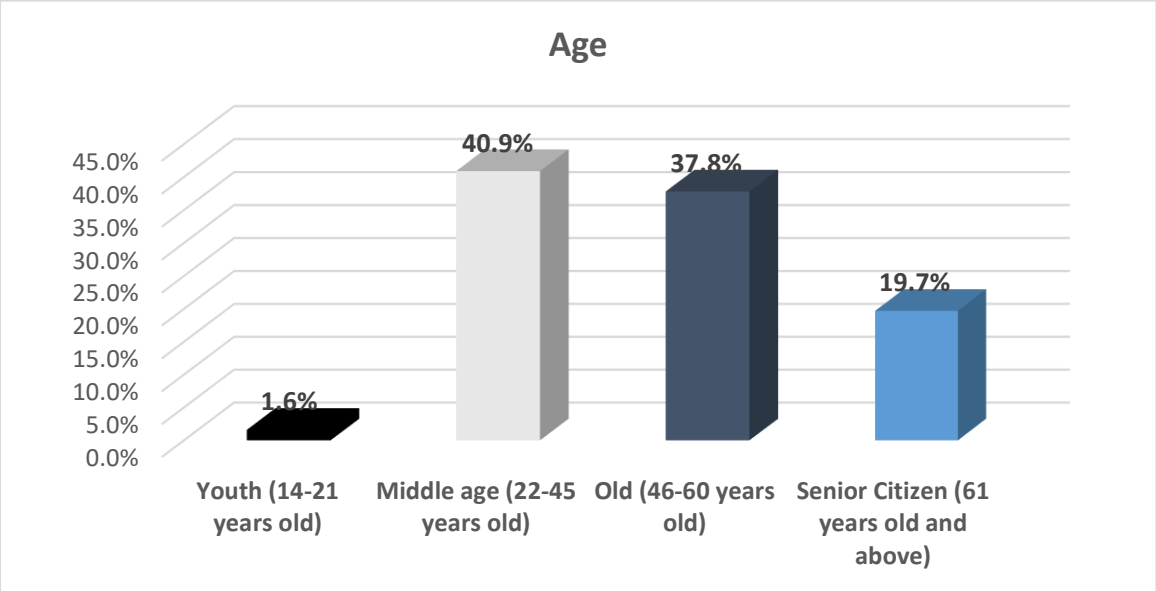


Figure 2. Age of the respondents

Sex

More than one half of the respondents were females and the remaining 42% were males (Figure 2). This means that females are more responsive to invitations for trainings than males.

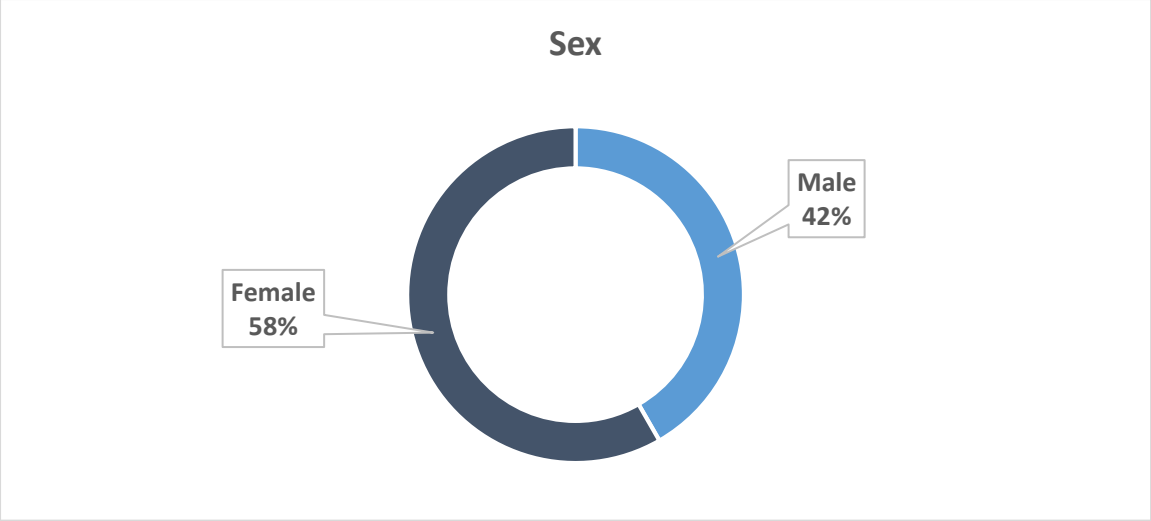


Figure 3. Sex of the respondents

Civil Status

Ninety-seven of the respondents or 76.4% were married with an average of four (4) children (Fig. 3). This suggests that married people are more willing to engage in any activities that could give them additional source of livelihood and possibly increase their income.

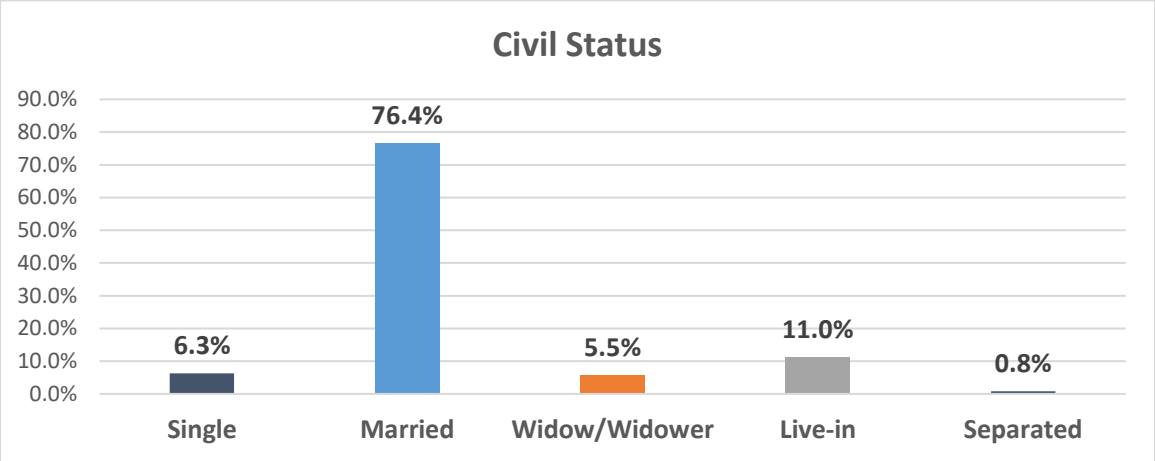


Figure 4. Civil status of the respondents

Educational Attainment

As shown in Figure 4 below, most of the respondents were not able to go to college. Only twenty nine or 22.8% were high school graduates, 21.6% were in the intermediate level, 19.7% graduated in elementary, and 11.8% were in the secondary level. Not being sent to school in a continuous manner by the parents/guardians might be the reason for it. Instead of going to

school, some of them might have chosen to give up/sacrifice their studies to earn a living for them to help their parents for the family needs.

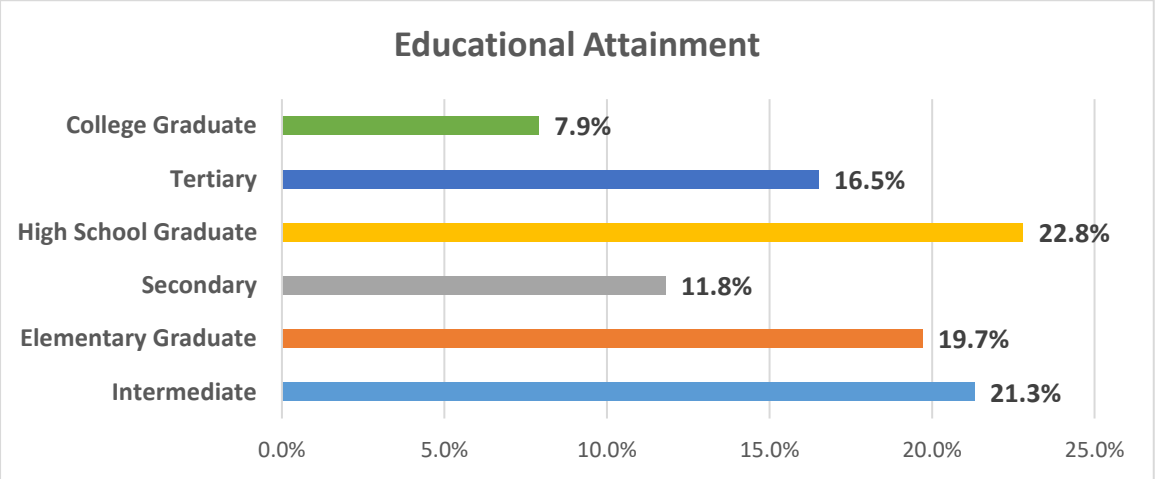


Figure 5. Educational attainment of the respondents

Household Size

The distribution of household size is shown in the Figure 5 below.

Almost one-half (48.8%) of the households are composed of four (4) to six (6) members which is represented by sixty two (62) households. This household size is usually represented by a married couple having two (2) to four (4) children. Thirty two (32) or 25.2% of the total number of households have one (1) up to three (3) members. Meanwhile, 20.5% have members ranging from seven (7) to nine (9). Seven (7) households, which is equivalent to 5.5%, is composed of ten (10) members and above. This is due to the presence of extended families in the study site.

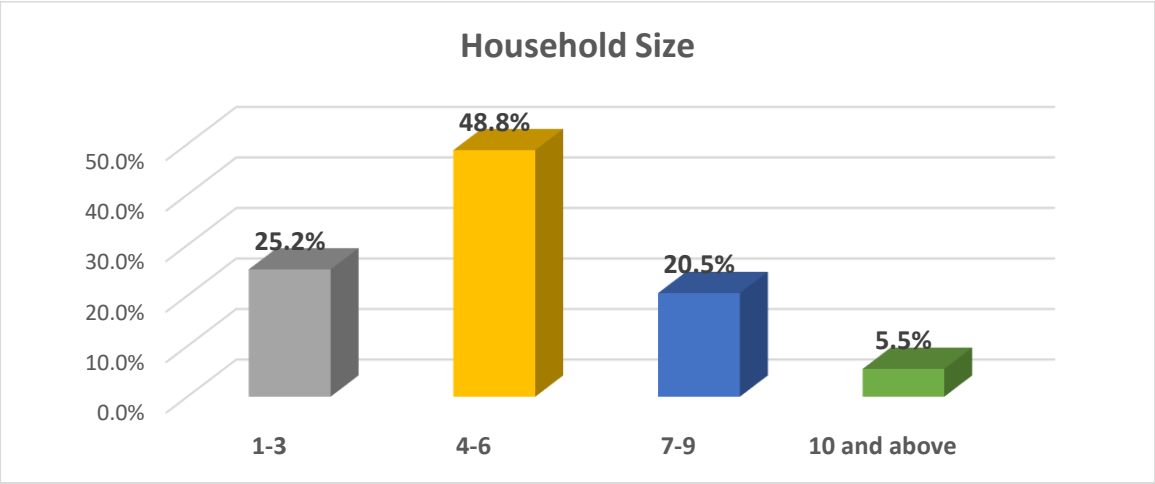


Figure 6. Household size of the respondents

House Ownership

As shown in Figure 6, only 5 or 3.9% of the respondents did not own their houses while 96.1% lived at their own houses. Presumably house ownership reflects households' economic status.

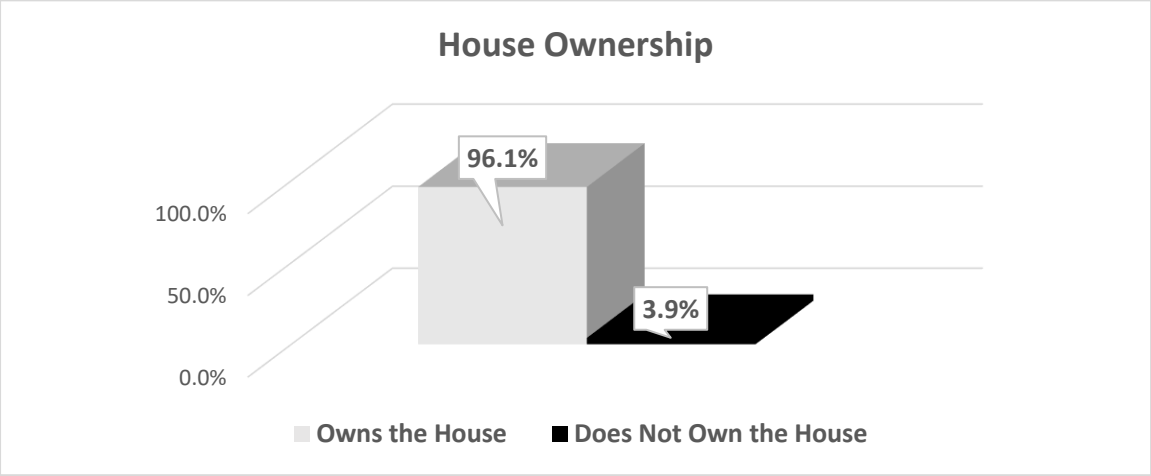


Figure 7. House ownership of the respondents

Residential Lot Ownership

More than one-half (66.9%) of the households own their residential lots as shown in Figure 7 below, while 33.1% of the respondents were a settler with no legal title to the land occupied (tenant, rented, installment, borrowed, and rent free).

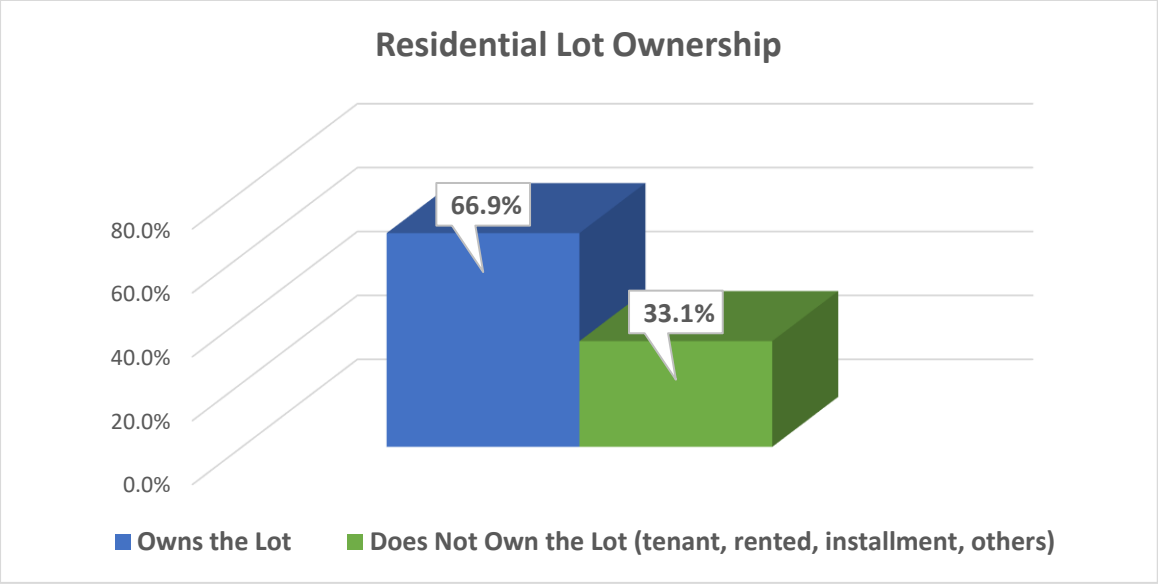


Figure 8. Residential lot ownership of the respondents

Social Awareness

Two or 1.6% of the respondents from those who did not adopt were not aware on the importance of attending the training course on the CSFBS and on the effects of practicing or adopting on the technologies and techniques taught during the training while 98.4% were socially aware.

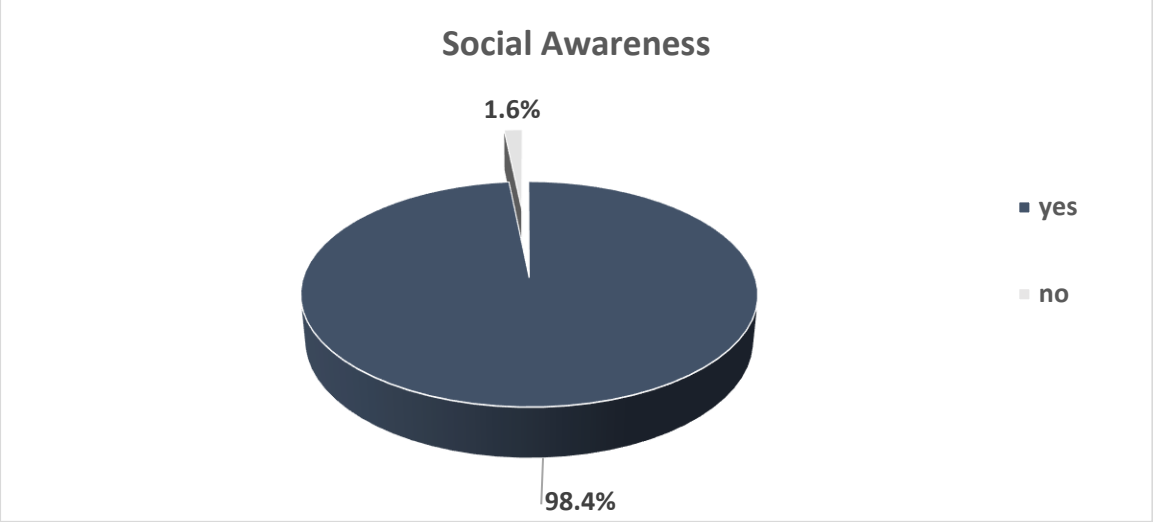


Figure 9. Social awareness of the respondents

Estimation of Effects

Sources of Income

Sources of income are used as a determinant in knowing how much money a household earns. Having multiple sources of income does not always mean that a household or an individual earns more than those who only have single source of income. The table below shows the sources of income of the respondents.

Table 2. Sources of income of the sample household.

Sources of Income		Adoption of Knowledge or Skills					
		Adopt		Did Not Adopt		Total	
		Count	Column N %	Count	Column N %	Count	Column N %
Agricultural Income	yes	78	84.8%	27	77.1%	105	82.7%
	no	14	15.2%	8	22.9%	22	17.3%
	Total	92	100.0%	35	100.0%	127	100.0%
Wage Income	yes	42	45.7%	19	54.3%	61	48.0%
	no	50	54.3%	16	45.7%	66	52.0%
	Total	92	100.0%	35	100.0%	127	100.0%
Non-farm Income or Self Employed	yes	56	60.9%	20	57.1%	76	59.8%
	no	36	39.1%	15	42.9%	51	40.2%
	Total	92	100.0%	35	100.0%	127	100.0%
Other Sources of Income	yes	47	51.1%	17	48.6%	64	50.4%
	no	45	48.9%	18	51.4%	63	49.6%
	Total	92	100.0%	35	100.0%	127	100.0%

Agricultural income is the primary income source of the respondents. Of the households surveyed, 82.7% of them rely on farming, vegetable gardening, corn farming, copra, abaca weaving, tuba gathering, charcoal making, swine raising and fishing. More than one-half or 59.8% derived their income from being a self-employed or from non-farm income (remittance, official's honorarium, income from being a government official/employee and income from being a professional worker). Sixty four or 50.4% of the respondents are also relying on other sources of income, like from their pensions and as a 4P's beneficiary. And 48% of them receives earned wages from working as laborers and service workers.

Increase in Yield

As shown in Table 3 below, at higher ranges, seven of the total number of households with participants who adopted which is 7.6% of the population has an increase in yield ranges from 8 and above sacks while none of those who did not adopt. Half of those who adopted has an increase in yield ranges from 0-3 sacks and 42.4% has an increase of 4-7 sacks. All of those who did not adopt have only 0-3 sacks increase in yield. The mean increase in yield of those who adopt is 4 sacks and 1 for those who did not adopt.

Table 3. Increase in yield

Increase in Yield	**Adoption of Knowledge or Skills**					
	Adopt		Did Not Adopt		Total	
	Count	Column N %	Count	Column N %	Count	Column N %
0-3	46	50.0%	35	100.0%	81	63.8%
4-7	39	42.4%	0	0.0%	39	30.7%
8 and above	7	7.6%	0	0.0%	7	5.5%
Mean	4		1		3	
Total	92	100.0%	35	100.0%	127	100.0%

Total Monthly Income of the Household

The total monthly income of the household (in Php) is shown in Table 4 below. As a result in increase in yield shown on Table 3, income of the household also increases. Data shows that households with training participants who are adopting the technologies or techniques taught to them during the training are earning more than the households with participants who are not adopting. Almost one-half or 43.5% of those who are adopting are earning income ranges from Php 9,001 and above while majority or 40% of those who are not adopting has income that ranges only from Php 3,001-6,000. The mean income of those who are adopting is Php 11,371 which is much higher compared to the Php 6,000 mean income of those who are not adopting.

Table 4. Total monthly income of the household (in Php).

Total Monthly Income of the Household	Adoption of Knowledge or Skills					
	Adopt		Did Not Adopt		Total	
	Count	Column N %	Count	Column N %	Count	Column N %
1,000 and below	6	6.5%	5	14.3%	11	8.7%
1,001-3,000	15	16.3%	6	17.1%	21	16.5%
3,001-6,000	16	17.4%	14	40.0%	30	23.6%
6,001-9,000	15	16.3%	4	11.4%	19	15.0%
9,001 and above	40	43.5%	6	17.1%	46	36.2%
Mean	11,371		6,000		9,891	
Total	92	100.0%	35	100.0%	127	100.0%

Estimation of Effects using Pooled OLS Regression Analysis

Table 5 shows if there is significant change in yield and income as a result of adopting on technologies/techniques taught during the training course on Climate Smart Farm Business School (CSFBS). The analysis was done using pooled OLS regression using yield and income as dependent variables while the independent variables regressed are: (1) After CSFBS which is a dummy for time with a value of 1 for after attending the training and value of 0 for before attending the training; (2) Adopt is a dummy for those who adopt or those who did not with 1 representing for those who are adopting or practicing and 0 for not; and (3) impact factor which is the interaction for the time and adopt. The third dummy is the most important variable in the regression because this is the one being considered as the real estimator of impact which eliminates the effect of counter factual. This is being called as the difference-in-difference estimator of impact. This method takes into account any differences between the treatment and comparison groups that are constant over time. (Gertler, et.al, 2009)

Based on the results, through the help of the training course on CSFBS, significant effects or outcomes can be seen in the yield and income of the respondents.

By adopting to the threats of the changing climate, learning to become agripreneur, and understanding the decision support tools and financial risk management, their farm became more profitable and resilient amidst the unpredictable effects of climate change resulting to an increase in yield with an average of 4 sacks per production.

One avenue for income to increase will be for the households to engage in business. As yield of the respondents per production increases, the more they are willing to market their surplus sacks, resulting also to an increase in income. Thus, creating a multiplier effect.

Table 5. Estimation of impact using pooled OLS regression analysis.

VARIABLES	(1) impactYield2 logYield	(2) impactIncome2 logIncome
After CSFBS	-0.1	0.0485
	(0.189)	(0.265)
Adopt	-0.173	0.453**
	(0.157)	(0.220)
After CSFBS * Adopt	0.690***	0.0195
	(0.222)	(0.311)
Constant	1.615***	8.267***
	(0.134)	(0.187)
Observations	254	254
R-squared	0.130	0.035

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Adoption on CSFBS and the Other Factors Affecting Yield and Income

Table 6 below shows the relationship between the two dependent variables and the predictor variables included in the model.

The regression model used in this study is a semi-logarithmic model where log (yield) and log (yield) were used as dependent variables and each variables were regressed on the explanatory variables. Multiplying the coefficient of the explanatory variable yields the percentage change in yield or income of the household per absolute change in the explanatory variable.

Robust standard errors were used in the model and different diagnostic tests were also used to check the validity of its results. The two models are all significant at 1% since Prob > F = 0.0000. The R – squared in each model are small because this study used a cross – sectional data and it is expected to have low R – square in a cross - section.

Model 1 used the yield of the respondents as its dependent variable and based on the result, 11.1% of the variation of the dependent variable is explained by the variables included in the model. The variable other sources of income, social awareness, house ownership, and female were positively related with the dependent variable to yield. Other sources of income and social

awareness are significant at 1% while female and house ownership are significant at 5%. A 1 unit increase in other sources of income would lead to a 29.5% increase in yield. If the amount of money that the respondent receives from pension or from being a 4Ps beneficiary increases, they will have more money to acquire additional and improved farm inputs that will lead to an increase in yield. The same as the more socially aware an individual is, yield will increase by 44.5% and if the household owns the house that they are residing, yield will increase by 43.3%. If a household is headed by a female, the yield of the household will increase by 25.1% compared to male headed households. Maybe, in this sense, females are more productive in farming more than males. Most of the males in the study sites are into service-oriented works and are working as laborers, so females in their households are into farming since they are staying in their house whole day. Also, most of the participants of the training conducted are females.

In model (2), 19.0% of the variation of the dependent variable which is income is explained by the variables included in the model. Among the variables included in the model, the results indicate that the variables adopt, house ownership, lot ownership, social awareness, and female were positively associated with the dependent variable. House ownership, adopt, lot ownership, female, and educational attainment are significant at 1%. If the training participant will adopt to the technologies/techniques taught in the training, their income will increase by 37.5%. Since the participants are adopting to the threats of the changing climate, their production increases which also leads to an increase in their income through marketing their crops. If the household owns the house that they are residing, income will increase by 95.2% as well as if they own the residential lot, their income will increase by 51.5%. Also, if a female headed the household, income will intend to increase by 27.9% and as number of years spent in school increases, income also increases by 6.32%.

Table 6. CSFBS and socio-demographic variables affecting yield and income.

VARIABLES	(1) Yield (log form)	(2) Income (log form)
Adopt	0.123	0.375***
	(0.123)	(0.144)
Agricultural Income	-0.0337	
	(0.157)	
Wage Income	-0.0932	
	(0.112)	
Non-Farm Income	0.106	
	(0.113)	
Other Sources of Income	0.295***	
	(0.109)	
Age	-0.00454	0.00634
	(0.00434)	(0.00593)
Female	0.251**	0.279**
	(0.113)	(0.129)
Household Size	-0.00982	-0.0312
	(0.0232)	(0.0266)
House Ownership	0.433**	0.952***
	(0.182)	(0.195)
Lot Ownership	-0.102	0.515***
	(0.117)	(0.151)
Educational Attainment	-0.0227	0.0632***
	(0.0176)	(0.0201)
Social Awareness	0.445***	0.233
	(0.169)	(0.160)
Constant	1.898***	6.304***
	(0.409)	(0.531)
Observations	254	254
R-squared	0.111	0.190

Note: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Diagnostic Test Results

To test the validity of the results and to check for potential problems with analysis, several diagnostic tests were used. Detailed explanation of the results were found at the appendices section.

Table 7. Summary of diagnostic test.

	Heteroscedasticity	Omitted variable	Specification error	Multicollinearity	Normality test
Model 1	no	no	no	no	Close to normality
Model 2	yes	no	no	no	Close to normality

Level of Knowledge and Skills

Mean Scores in the Knowledge Tests

Respondents' knowledge on meat processing was measured through knowledge tests. The comparison of the respondents' mean score in pre-test and post-test showed an increase of 11 points (157.14%). This means that the training was able to increase the participants' knowledge on farm business.

Table 8. Mean scores of the respondents in the knowledge tests

Item	Mean
Pre-Test	7
Post-Test	18
Score increase	11
% Increase in Score	157.14

Number of Respondents who Passed or Failed in the Knowledge Tests

A respondent's score will be considered a passing score if that individual obtained 70% of the total item.

Almost all (97.6%) of the respondents failed in the pre-test. However, in the post-test, 70.1% of the respondents passed in the post-test which shows 27.5% change in their scores.

Table 9. Number of respondents who failed or passed in the knowledge tests.

Item		Count	Column N %
Pre-Test	Failed	124	97.6%
	Passed	3	2.4%
	Total	127	100.0%
Post-Test	Passed	89	70.1%
	Failed	38	29.9%
	Total	127	100.0%

Level of Knowledge

The level of knowledge of the training participants on the main topics discussed during the training are assess using the rating scale: 1 for obliviousness (no knowledge about the subject); 2 for cognizant (heard the subject but has no knowledge about it); 3 for understanding (has knowledge about the subject); 4 for engaged (practiced or involved); and 5 for expertise

(has been practicing or has authority in it). The respondents rated seven topics discussed during the training.

Figure 9 below shows the average responses of the respondents in each topics discussed during the training.

Results showed that there is an increase between the knowledge level of the training participants before and after. It can be seen from the first two topics that the respondents are now practicing to market their products and are now adopting to the threats of the changing climate which can be seen in topic 6. Training participants are not still practicing their knowledge on other topics such as on (1) making market survey report, (2) contract farming and appraisal, (3) assessing and managing business risks, and (4) risk reduction in farm business. One possible reason for it could be that the training course was still new to them. Maybe some of them are now adopting the topics but not most of them. And since the average responses or the respondents which has a greater number was used, it cannot be seen in figure 9 below.

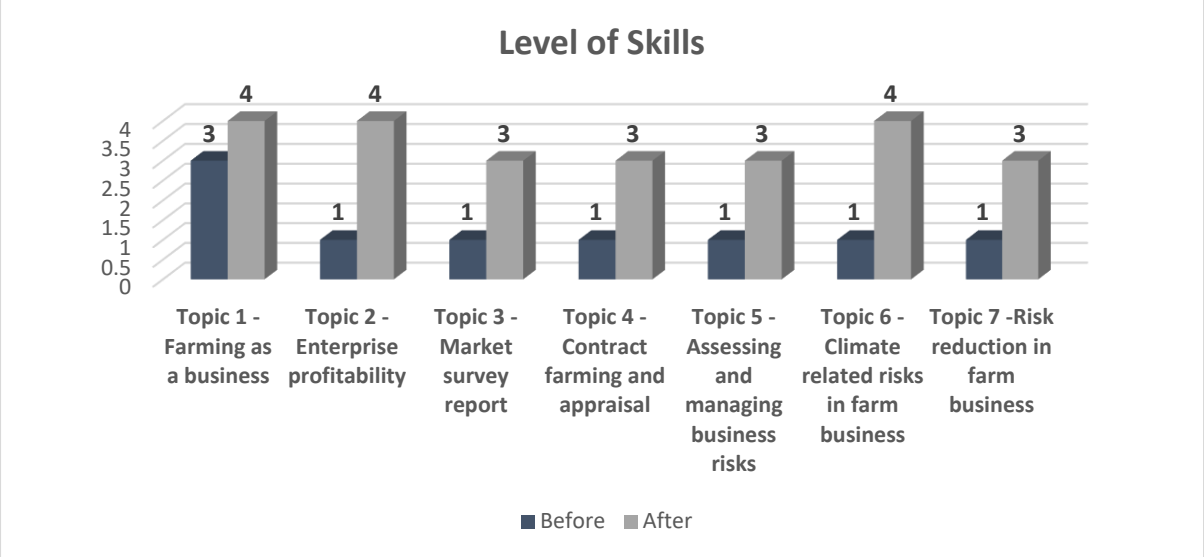


Figure 10. Level of knowledge of the respondents to the topics taught in the training

Level of Skills

Figure 10 below shows the level of skills of the respondents on the technologies/techniques taught in the training

Six (4.7%) of the respondents claimed that they are now highly skilled in the techniques/technologies taught during the training course on CSFBS. Most of them or 94.5%

claimed that they are moderately skilled and 0.8% or one training participant is still not skilled after the training.

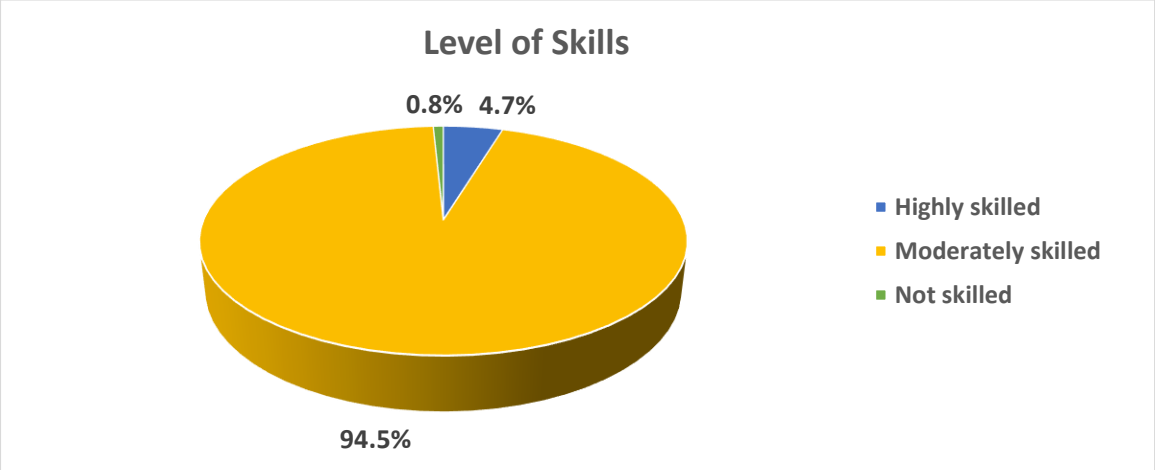


Figure 11. Level of skills of the respondents on the technologies/techniques taught in the training

Application of Knowledge and Skills

Number of Trainees who Adopted the Techniques

Figure 11 below shows the number of training participants who adopted the technologies/techniques taught during the training course on CSFBS. Ninety two or 72.4% of the respondents adopted and 35 or 27.6% trainees did not.

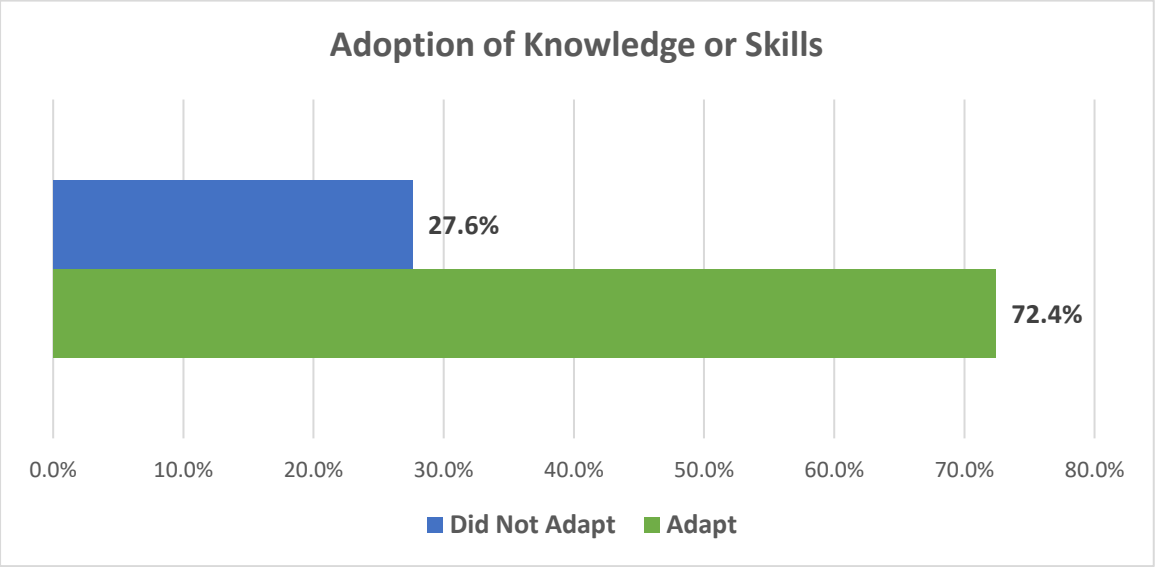


Figure 12. Number of trainees who adopted and did not adopt the techniques.

Adopted Techniques

As shown in table 10, the most adopted technique by the training participants is marketing and the least one is getting and managing loans.

Table 10. Adopted Techniques

Techniques	Count	Rank
Marketing	92	1
Preparing a business plan	57	9
Keeping farm business records	60	7
Conduct benchmarking	72	5
Calculating land holdings	62	6
Calculating yield per hectare	73	4
Calculating sales	76	2
Calculating profit	74	3
Cash and credit management	58	8
Getting and managing loans	37	10

Improvement in the Community

The respondents noted that the training brought changes not even to their selves but also to their community. Figure 11 below shows that 98% of the respondents noticed it and only 2% did not. They observed that the livelihood in their community improved. Also, the goods and food supply in their community has increased. By sharing also what they learn from the training, others were encouraged to plant, to do farming, duplicated the techniques that the training participants learned from the training, and together they were able to learn extra income from it. Camaraderie was also promoted especially on the members of the association.

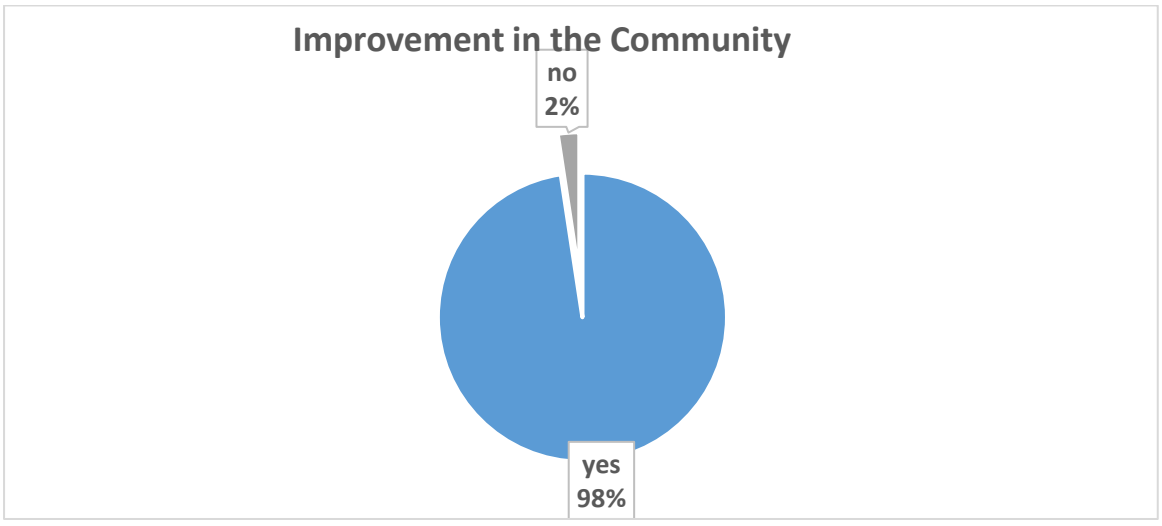


Figure 12. Improvement in the community brought by the training

Problems Met

Respondents met different problems in adopting to the technologies/techniques taught in the training. The problems mentioned by the respondents were (1) attack of pests/insects/diseases; (2) lack of fertilizer supply; (3) financial problem; (4) heavy rains, drought, flood, soil erosion; (5) lack of laborers; (6) insufficient water supply; (7) problem in marketing the products; (8) no irrigation; (9) lack of farming tools and equipment; (10) undeveloped farming system; and (11) preparing bio organic fertilizers takes time and is hassle.

CONCLUSION

The training course on Climate Smart Farm Business School (CSFBS) brought changes into the life of the training participants. According to the respondents, through attending the training, their knowledge in the right, more improved and modern farming and planting techniques increases. Same as on their knowledge on marketing, on calculating sales and profit, and fertilizer application. Through the training, they learned farm business, financial management, business management, risk management, how to make business plans, identifying the right plants for the different seasons, market survey reports, preparation of bio-organic inputs or organic fertilizers, keeping farm business records, how to conduct benchmarking, pest and diseases management, marketing, packaging, and labelling. In short, they become a farmer entrepreneur.

Ninety two of the respondents adopt the techniques taught during the training while the other thirty five respondents did not. Significant effects can be seen on the income and yield of the respondents.

Since, this training course yielded significant results, especially on income and yield of the training participants, it should be continued and properly monitored so that the change will be constant and will probably brought more positive effects not only on the training participants but also on others and on their community. More techniques can also be adopted as time passes by.

RECOMMENDATION

Due to the positive effects of the training course on CSFBS, other batches shall be conducted to other municipalities. Monthly monitoring shall also be done to properly assess the adoption of the participants and to address unforeseen problems immediately.

Assistance in planting inputs shall also be continued such as fertilizers and other bio-organic inputs. Assistance on acquiring farm implements, machineries, and on availing irrigation shall also be provided. If possible, ATI should act as a middlemen for the crops produced and be the one to market it or sell it. Additional training on pest management or pest control should also be conducted and topics on climate change shall also be integrated in every agri-related trainings.

REFERENCES

Climate Smart Farm Business School (CSFBS-Training of Trainers) Modules

Gertler, Paul J. et.al. 2009. “Impact Evaluation in Practice”. Washington D. C.

Training Design on Climate Smart Farm Business School (CSFBS-Farmer Level) 2016

APPENDICES

Appendix 1. Pooled OLS regression analysis results.

Yield Pooled OLS Regression Model from Stata

```
. reg logYield Time Treatment TimexTreatment
```

Source	SS	df	MS		
Model	23.3850946	3	7.79503153	Number of obs	= 254
Residual	156.150084	250	.624600335	F(3, 250)	= 12.48
				Prob > F	= 0.0000
Total	179.535178	253	.709625211	R-squared	= 0.1303
				Adj R-squared	= 0.1198
				Root MSE	= .79032

logYield	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Time	-8.42e-15	.1889218	-0.00	1.000	-.3720812	.3720812
Treatment	-.1726692	.156955	-1.10	0.272	-.4817917	.1364534
TimexTreat~t	.689703	.2219678	3.11	0.002	.2525377	1.126868
_cons	1.614753	.1335879	12.09	0.000	1.351652	1.877854

Income Pooled OLS Regression Model from Stata

```
. reg logIncome Time Treatment TimexTreatment
```

Source	SS	df	MS		
Model	11.1288829	3	3.70962764	Number of obs	= 254
Residual	307.273928	250	1.22909571	F(3, 250)	= 3.02
				Prob > F	= 0.0305
Total	318.40281	253	1.25850913	R-squared	= 0.0350
				Adj R-squared	= 0.0234
				Root MSE	= 1.1086

logIncome	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Time	.0484873	.2650171	0.18	0.855	-.4734633	.570438
Treatment	.453331	.2201744	2.06	0.041	.0196979	.886964
TimexTreat~t	.0195319	.3113736	0.06	0.950	-.5937179	.6327817
_cons	8.266773	.1873954	44.11	0.000	7.897698	8.635847

Appendix 2. Multiple linear regression analysis results.

Yield Multiple Linear Regression Model from Stata

```
. reg logYield Adapt AgInc WageInc NonFarmInc OtherInc Age Sex HSize HOwnership LO Educ Aware
> Benefit
```

Source	SS	df	MS		
Model	20.0130618	12	1.66775515	Number of obs	= 254
Residual	159.522116	241	.661917496	F(12, 241)	= 2.52
				Prob > F	= 0.0039
Total	179.535178	253	.709625211	R-squared	= 0.1115
				Adj R-squared	= 0.0672
				Root MSE	= .81358

logYield	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Adapt	.1225857	.1215465	1.01	0.314	-.1168434	.3620148
AgInc	-.0336607	.1479877	-0.23	0.820	-.3251752	.2578537
WageInc	-.0932369	.1108655	-0.84	0.401	-.3116261	.1251523
NonFarmInc	.1063256	.1105724	0.96	0.337	-.1114862	.3241374
OtherInc	.2950956	.1100616	2.68	0.008	.0782901	.511901
Age	-.004535	.0045596	-0.99	0.321	-.0135169	.0044468
Sex	.2505436	.1123219	2.23	0.027	.0292856	.4718015
HSize	-.0098229	.0223519	-0.44	0.661	-.0538529	.0342071
HOwnership	-.4331269	.2735713	-1.58	0.115	-.9720231	.1057692
LO	-.101662	.1221138	-0.83	0.406	-.3422086	.1388846
Educ	-.0227001	.0172448	-1.32	0.189	-.0566699	.0112698
AwareBenefit	.4445352	.4306275	1.03	0.303	-.403739	1.292809
_cons	1.898159	.6042225	3.14	0.002	.7079275	3.08839

Income Multiple Linear Regression Model from Stata

```
. reg logIncome Adapt Age Sex HSize HOwnership LO Educ AwareBenefit
```

Source	SS	df	MS		
Model	60.4156512	8	7.5519564	Number of obs	= 254
Residual	257.987159	245	1.05300881	F(8, 245)	= 7.17
				Prob > F	= 0.0000
Total	318.40281	253	1.25850913	R-squared	= 0.1897
				Adj R-squared	= 0.1633
				Root MSE	= 1.0262

logIncome	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Adapt	.3753218	.1520316	2.47	0.014	.075866	.6747776
Age	.0063389	.0053076	1.19	0.234	-.0041154	.0167932
Sex	-.2794577	.1353146	-2.07	0.040	-.545986	-.0129294
HSize	-.0311553	.0277181	-1.12	0.262	-.0857516	.0234409
HOwnership	.9519499	.340136	2.80	0.006	.2819861	1.621914
LO	.5152405	.1528151	3.37	0.001	.2142415	.8162395
Educ	.0631664	.0209218	3.02	0.003	.0219569	.1043759
AwareBenefit	.2328313	.5366047	0.43	0.665	-.8241157	1.289778
_cons	6.303996	.7304751	8.63	0.000	4.865184	7.742808

Appendix 3. Diagnostic tests results.

Model 1 (Yield)

Heteroscedasticity Test (Model 1)

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of logYield

         chi2(1)      =     1.42
         Prob > chi2  =   0.2338
```

Since the result shows that it is insignificant because Prob>chi2=0.2338, so we accept the null hypothesis, which means that it is homoscedastic.

Omitted Variable Test (Model 1)

```
. ovtest

Ramsey RESET test using powers of the fitted values of logYield
       Ho:  model has no omitted variables
                 F(3, 238) =      1.59
                  Prob > F =      0.1922
```

Result shows that Prob>F=0.1685, which means insignificant, so accept the null hypothesis, thus the model has no omitted variables.

Test for the Presence of Specification Error (Link Test – Model 1)

```
. linktest
```

Source	SS	df	MS		
Model	20.6745851	2	10.3372926	Number of obs =	254
Residual	158.860593	251	.63291073	F(2, 251) =	16.33
				Prob > F =	0.0000
Total	179.535178	253	.709625211	R-squared =	0.1152
				Adj R-squared =	0.1081
				Root MSE =	.79556

logYield	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_hat	2.761647	1.732281	1.59	0.112	-.6500114	6.173306
_hatsq	-.5150894	.5038269	-1.02	0.308	-1.507356	.4771777
_cons	-1.465213	1.467029	-1.00	0.319	-4.354468	1.424043

The variable _hatsq is insignificant (with pvalue = 0.308). Specification error is not present.

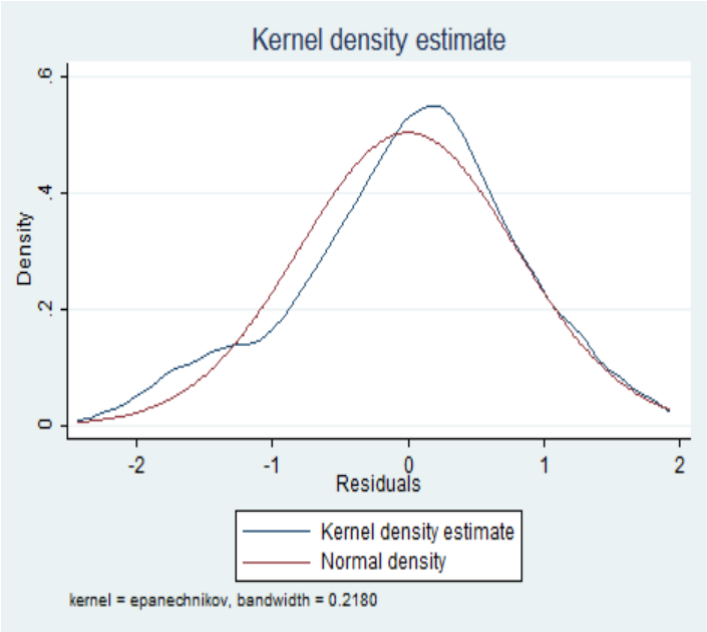
Test for Multicollinearity (vif – Model 1)

```
. vif
```

Variable	VIF	1/VIF
Age	1.37	0.729079
Educ	1.34	0.746495
LO	1.28	0.780370
AgInc	1.20	0.830834
WageInc	1.18	0.849397
Sex	1.18	0.849457
OtherInc	1.16	0.860569
Adapt	1.13	0.883562
NonFarmInc	1.13	0.884157
AwareBenefit	1.10	0.906638
HOwnership	1.09	0.920676
HSize	1.05	0.948421
Mean VIF	1.18	

The mean vif (1.18) is less than 10, so there is no multicollinearity.

Kernel Density Test for Normality of Residuals (Model 1)



Results show that the kernel density estimate is almost the same as the normal density.

Model 2 (Income)

Heteroscedasticity Test (Model 2)

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of logIncome

         chi2(1)      =     7.70
         Prob > chi2  =   0.0055
```

Since the result shows that it is significant because Prob>chi2=0.0055, so we reject the null hypothesis, which means that there is heteroscedasticity, implying that one of the independent variable explained the error term, with this we need to correct heteroscedasticity by adjusting standard error.

Corrected Model due to Heteroscedasticity

```
. reg logIncome Adapt Age Sex HSize HOwnership LO Educ AwareBenefit,ro

Linear regression                               Number of obs =     254
                                                F(  8,   245) =   13.88
                                                Prob > F      =  0.0000
                                                R-squared     =  0.1897
                                                Root MSE      =  1.0262
```

logIncome	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
Adapt	.3753218	.1443437	2.60	0.010	.0910089	.6596347
Age	.0063389	.0059324	1.07	0.286	-.005346	.0180238
Sex	-.2794577	.1288254	-2.17	0.031	-.5332043	-.0257111
HSize	-.0311553	.0265976	-1.17	0.243	-.0835444	.0212338
HOwnership	.9519499	.1951352	4.88	0.000	.5675934	1.336307
LO	.5152405	.1506541	3.42	0.001	.218498	.811983
Educ	.0631664	.0200957	3.14	0.002	.023584	.1027488
AwareBenefit	.2328313	.1601702	1.45	0.147	-.082655	.5483175
_cons	6.303996	.5310914	11.87	0.000	5.257908	7.350084

Omitted Variable Test (Model 2)

```
. ovtest

Ramsey RESET test using powers of the fitted values of logIncome
       Ho:  model has no omitted variables
                 F(3, 242) =      1.40
                  Prob > F =      0.2427
```

The model has no omitted variables since that Prob>F=0.1171, which means it is insignificant.

Test for the Presence of Specification Error (Link Test – Model 2)

```
. linktest
```

Source	SS	df	MS		
Model	60.5484064	2	30.2742032	Prob > F	= 0.0000
Residual	257.854404	251	1.02730838	R-squared	= 0.1902
Total	318.40281	253	1.25850913	Adj R-squared	= 0.1837
				Root MSE	= 1.0136

logIncome	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_hat	2.316104	3.66353	0.63	0.528	-4.899072	9.53128
_hatsq	-.0766563	.2132465	-0.36	0.720	-.4966369	.3433243
_cons	-5.630647	15.7041	-0.36	0.720	-36.55925	25.29795

Specification error is not present because the variable _hatsq is insignificant (with pvalue = 0.720).

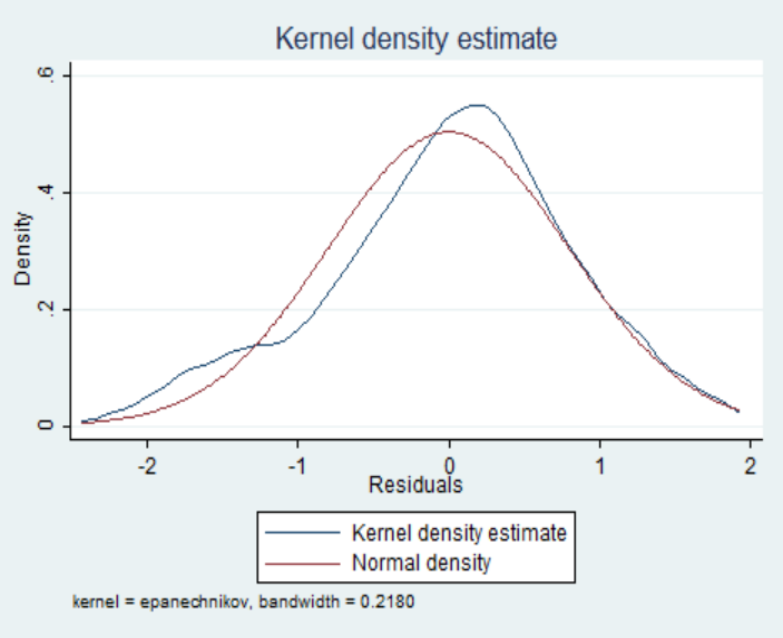
Test for Multicollinearity (vif – Model 2)

```
. vif
```

Variable	VIF	1/VIF
LO	1.26	0.792730
Educ	1.24	0.806819
Age	1.17	0.855999
Adapt	1.11	0.898425
AwareBenefit	1.08	0.928874
Sex	1.07	0.931127
HOwnership	1.06	0.947481
HSize	1.02	0.981138
Mean VIF	1.13	

The mean vif is less than 10, so there is no multicollinearity.

Kernel Density Test for Normality of Residuals (Model 2)



Results show that the kernel density estimate is close to the normal density estimate.

DOCUMENTATION