Utilization of the Department of Agrarian Reform Common Service Facilities in Isabela Philippines: Effects to Agrarian Reform Beneficiaries Organization Members Productivity Yield and Income

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Crisel C. Domingo
College of Agriculture, Isabela State University; Nueva Vizcaya State University

ABSTRACT

This study discusses the effects of utilizing the Common Service Facilities provided by the Philippine Government through the Department of Agrarian Reform Program to Agrarian Reform Beneficiaries Organization (ARBO) members in terms of labor productivity, yield/output, and income. Findings were based on responses from two sample groups purposively selected at random: the ARBO cooperatives and 51 sample-ARBO members. Findings show increases in all variables measured such as labor productivity, yield/output, and income. The test for significance using multiple linear regression further showed that the use of CSFs has significant effects on yield/output and income in both dry and wet seasons. The *t* test further shows the significant difference in the effects between utilization and non-utilization of CSF. The findings suggest that appropriate facilities can be provided to ARBOs to increase their yield, policies on extending the CSF has to be reviewed by DAR, and cooperative ARBO management has to maintain or increase the incomes of member beneficiaries.

Keywords: CSF utilization, Significant Effects, Income, Yield.

1. INTRODUCTION

1.1 Background of the Study

The Philippines is primarily an agricultural country despite the plan to make it an industrialized economy. The country's agriculture sector is made up of four sub-sectors: farming, fisheries, livestock, and forestry. Crops that are primarily and widely grown include rice, corn, coconut, sugarcane, bananas, pineapple, coffee, mangoes, tobacco, and abaca (a banana-like plant). Secondary crops include peanut, cassava, camote (a type of rootcrop), garlic, onion, cabbage, eggplant, "calamansi", rubber, and cotton. In later years, however there is a big problem faced by the industry due to adverse weather conditions. Declines on revenues has been reported every year where most of the sectors in agriculture believe to have low productivity. Incidentally, the level of poverty incidence in the country since 2015 is 21.6% with which the population lives below the national poverty line. It is suggested that the agricultural industry is one of the main concerns to address this problem and this has been discussed on the Asian South East Asian Integration held for the last few months. (Business Statistics 2015, cited Asian Development Bank [ADB, 2015]). Amongo (2011), described the government programs to support farmers and found that provision of agricultural machineries, postharvest facilities (e.g. dryers and multi-purpose drying pavements), as well as processing facilities (rice mills, warehouses, etc.) to farmer associations are matching grants limited justification for government support towards providing larger facilities (i.e. postharvest and processing) to address coordination problems. (World Bank, 2007).

The 2014 Philippine Socio-Economic Report showed productivity of all other crops are not being met and are unlikely to be met, during the first three quarters of 2014. Note that the following literature did not mention the use of specific facilities other the green technology package to impact output. It was stated that despite the poor production performance, labor productivity in the sector grew to meet the planned target although the value is smaller compared in 2013. Production and yield levels in the agriculture and forestry sector remain low. The yield of other major crops in the Philippines, such as white and yellow corn, coconut, cassava, coffee, cacao and rubber has yet to significantly improve. There were also significant reductions in banana and pineapple production due to slow recovery from the typhoons that frequently visited Mindanao. Likewise, sugarcane yield level fell short of the 62.8 MT/ha target for the year. It reached 54.9 MT/ha for the first half of 2014. Another factor that contributes to low production levels is the incomplete (DAR, 2017).

To slowly overcome the vicious cycle of poverty, there are line agencies of the Government that offered different programs and support that provide services to serve the needs of the farmers. DAR – (that is responsible for the implementation of the Comprehensive Agrarian Reform Program (CARP), land tenure improvement and development of program beneficiaries) maneuvered its strategies by extending common service facilities (CSFs) coupled with training for farmer-beneficiaries to facilitate the efficient and effective execution of the program (DAR, 2013).

Over the years, the following projects were extended by DAR in line with the government thrusts which is inclusive growth and development. The Department of Agrarian Reform (DAR, 2013) in Ilocos Norte recently conducted series of assessment and evaluation on the projects and farm implements given to 21 agrarian reform beneficiaries organizations (ARBOs) under the Agrarian Reform Community Connectivity and Economic Support Services (ARCCESS) of the department. Chief Agrarian Reform Officer Teresita Acang said the general objective of the assessment and evaluation is to review the status of the business operations of the common service facilities (CSFs) such as farm tractors, threshers, reapers, etc., given to the ARBOs as business assets (DAR, 2013). The farm implements were given as "equipment grant" which are operated by farm cooperatives as a business asset where user fees are collected and utilized for the operation and maintenance of the farm equipment. Acang who was Chief Agrarian Reform Officer in 2015 suggests "The need to assess the income of the CSFs and account its contribution to the over-all ARBOs business operations". Further ARCCESS is a joint project between DAR and local government units, which seeks to strengthen ARB communities by building support service in the community (DAR, 2013). "It runs on five major components which include provision of CSFs for production and processing, agri-technology and agri-extension services, business development services, how to run agricultural enterprise, credit facilitation and land tenure improvement".

ARCCESS Project is one of the priority banner programs of DAR to "increase farm productivity, improve household incomes of Agrarian Reform Beneficiaries (ARBs) and provide sustainable livelihood through the organization of competitive agricultural enterprises initially designed to be implemented in three (3) years". The program provides the following through the ARBs organization (cooperatives or associations): access inputs, credit and marketing support for individual member farmers. Organizations such as cooperatives facilitate the exertion of group bargaining power, thereby empowering smallholder farmers in the competition for public and institutional resources. While DAR recognizes support to individual and unorganized ARBs is just as important, the DAR's scarce human and financial resources can be more strategically and effectively utilized if the services are coursed through organized farmers. ARCCESS supports smallholder farmers by organizing them into productive partners for rural development. Increase income of the ARBOs is targeted through the provision of CSFs and the development of business skills necessary for the management of their own enterprises. The CSFs are augmented with professional business services to train and coach the ARBOs to undertake "agri-enterprises". It is understood that ARBOs are provided with both the infrastructure and the necessary competencies to manage this infrastructure as they develop their respective enterprises.

Given these criteria, DAR Isabela extended several services to its farmer beneficiaries since 1996. One of these is the CSFs provision to help their farmer-members in their farm production. Data however showed that the program has been fully implemented in the year 2015. CSFs was availed by ARBO cooperatives in the form of combine harvester, flat-bed dryer, 4 WD tractor (35 hp), and mechanical rice transplanter. There are ARBO who have received CSFs in Isabela, considering that it is one of the provinces that have vast agricultural land areas. The ARBO cooperatives are: Bannawing Farmers' Multi-purpose Cooperative of Jones, North Siffu Farmers' Multi-Purpose Cooperative of Roxas, Villacabanes Credit Cooperative of San Manuel and Division 4 Series Council of Irrigator's Association (CIA) of Cauayan City, Isabela. (DAR Cauayan City, Isabela, 2017).

The province of Isabela has a total area of agricultural land with 240,600 hectares. As a sad note, 22.6% of these was converted into industrialized/commercialized land wherein private businessmen and companies built buildings such as malls, residential subdivisions and other private sectors acquired marginalized land. The municipality having the widest agricultural land area which is co shared with industrial land coverage are the following; Ilagan City which is the capital town of Isabela has a total land area of 32,604.26 hectares was utilized primarily for agricultural production and there is about 8,487.26 converted into industrial land. In addition, Cauayan City has 19,959.7065 hectares and about 4,013.2820 converted into commercialized land while Santiago City has 21,631 hectares devoted to agriculture and 3,721 hectares were converted into industrial/commercialized land. Nowadays, a lot of establishments were built due to the plan of leaders to invest and have an income to be used in other projects of each municipality to cater the needs of the citizens residing in the community. (Agriculture Sector in Cagayan Valley, 2016).

1.2 Significance of the Study

It is believed that the government and non-government intervention programs could help in the equitable distribution of income and utilization of common service facilities by the ARBO. The result of this study will be significantly useful to the following stakeholders: to the DAR for them to have an outlook of the significance of the DAR-ARCCESS program; To the four (4) identified ARBOs in the province of Isabela under different municipalities like Jones, San Manuel, Roxas and Cauayan City, Isabela. Results will provide support mechanism or incentives for farmers and the need for a collective effort in the utilization of facilities in order to obtain equitable returns from rice and corn production. The study may be useful to the planners in following policies and programs aimed at improving economic welfare of the farm household/small scaled farmers.

1.3 Objective of the Study

To date, the CSFs have been on the hands of the said ARBOs for three years. Thus, this study posts a query on the effect of the use of CSF on farm area, labor productivity, yield/output and income of the ARBOs, of the province of Isabela Philippines in terms farm area; labor productivity; yield and Income.

2. METHODOLOGY

The descriptive study adopted in part, the standard impact pathway approach (Department of Agriculture and Department of Budget and Management, 2010) which involves input, output, outcomes and impact (Figure 1). The inputs are the resources allocated for agricultural development interventions; the outputs are the goods and services produced using the resource like the interventions provided, regulations and policies developed and implemented, plans monitored and implemented.

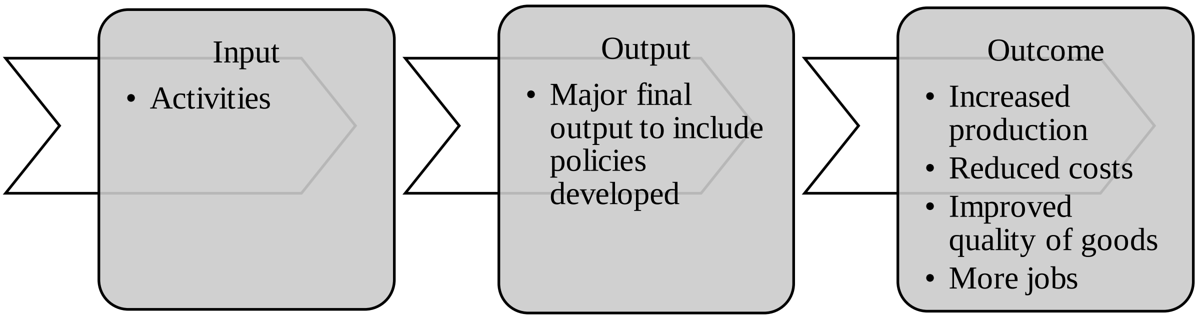

Figure 1. Impact Pathway Framework for Public Expenditure on Agriculture (DA and DBM, 2010, cited in Briones, 2010)

Impact evaluations of project implementation with the application of linear regression models had been used in several impact or assessment studies like that of Lacaden (2015; p 14-30) and World Bank (WB, 2008). It is suggested that effects and impacts should recognize that policy interventions primarily gear to inducing sustainable changes at institutional levels which can also have indirect effect at the beneficiary level (World Bank, 2008). Hence, the policy in extending the CSFs to beneficiaries is a component of this study. Briones (2010) and Lacaden (2015) mentioned that outcomes are intermediate effects resulting from produced goods or services delivered, which is likewise the limitation of this concept; considering that the project is only on its fourth year of implementation and finally the impact refers to changes in terms of ultimate societal goals which can be poverty reduction. Inputs in effect roughly correspond to the government support which involves the DAR ARCESS program to poverty reduction. Output corresponds to the major final outputs of the DAR; in terms of the common service facilities extended to cooperatives, their regulations developed and implemented, the policies of the ARBO cooperatives implemented and the reduced cost, improved productivity and quality of life which is more likely to have impact on productivity, yield and income. The outcome of the CSFs in this study is described in the form of the volume yield/output, labor productivity and the income generated by the ARBO members. In addition, the evaluation method as a descriptive study is ideal method for evaluating effects which compares the result of a project with and without intervention scenario (Lacaden 2015). Such a with-and-without comparison pins down causality of an independent variable to the dependent variable (Figure 2) through multiple linear regression (Render, Stair and Hanna, 2010; Garson, 2014; cited in Lacaden 2015). The same paradigm was used by Lacaden (2015) where results can provide reasonable conjectures of the intervention scenario.

Fortunately, in this paper, the evaluation concept is likewise applicable because of the government intervention; hence, the hypothetical without intervention scenario is called a counter-factual (Briones, 2010; Lacaden, 2019). The interventional factor in this concept is the same as the CSFs of DAR ARCESS which intends to help the farmer-members and the cooperative, altering the present system they are in. Figure 2 presents the schematic presentation of this concept.

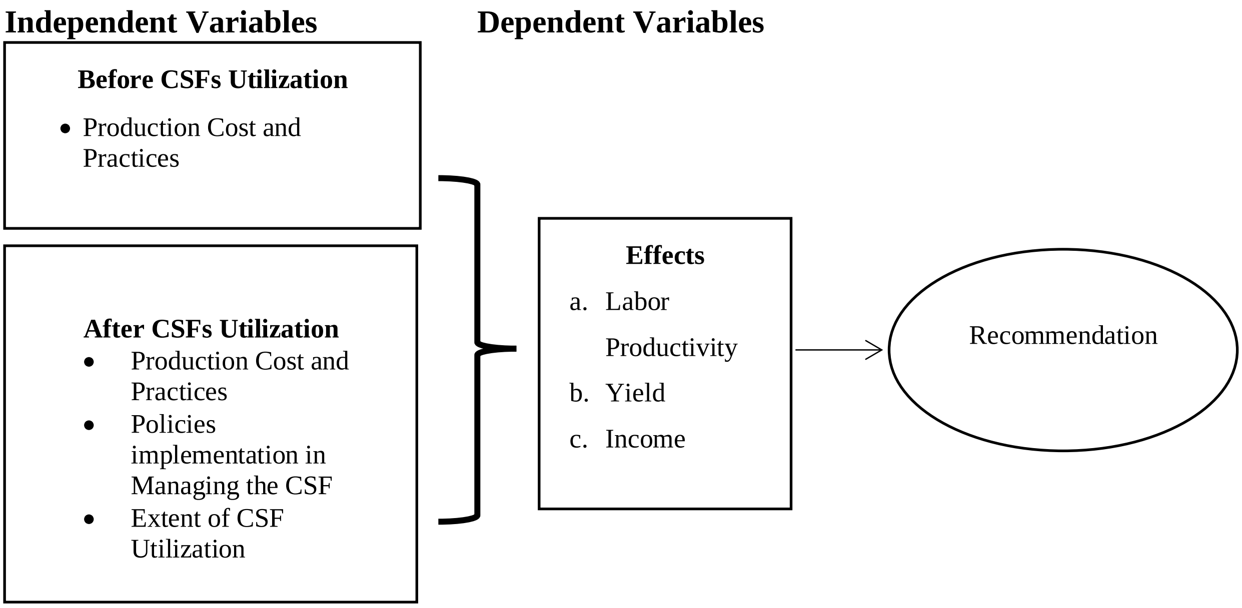

Figure 2. Research Paradigm

3. RESULTS AND DISCUSSIONS

The effects of CSF utilization in terms of labor productivity, yield/output and income are provided as follows with which multiple linear regression further measured the significant effect.

3.1 Effects of CSFs utilization, labor productivity. The effects of CSFs utilization in terms of labor productivity can be observed in Table 1. It indicates before and during the labor productivity in terms of cavan/head. ARBO cooperatives of North Siffu Farmers Multi-Purpose Cooperative had an average of 3.70 during the utilization of CSFs, 2.64 from Villacabanes Credit Cooperative, 2.10 produced cavan/head of D4 Series CIA members and 1.60 from Bannawing Farmers Multi-Purpose Cooperative. Overall, the average increase in cavan/head produced by the labor in each cooperative was 2.51. This yielded a positive effect which led to an increase on the labor productivity by 0.49 cavans after the utilization of CSFs. (Table 1).

3.2 Effects of CSFs utilization in terms of yield/output (kg) during dry and wet season.

Linear regression analysis through the Statistical Package for the Social Sciences (SPSS) software was employed to determine the effects of CSFs utilization in terms of yield/output during dry and wet season of the ARBO members in Isabela. The variables used to explain and predict the effect of CSFs utilization were area planted, labor cost, fertilizer costs (dry), chemical costs dry (kg), seed costs (dry) and total costs (dry). These variables were fitted into the regression model with yield as the dependent variable. The cost in using the CSFs (10%) is combined with the total labor cost. As such the following are the results:

3.2.1 Fit of the model, Dry Season

Table 2 shows the regression model summary. The fit of the regression model can be determined by looking at the value of R^2 and $R^2 = 0.972$. The explanatory variables accounted for about 97.2% of the variation in the yield among ARBO members. Only 2.8% in the variation was attributed to variables or effects that were not captured in the model. The Analysis of Variance (ANOVA). The value of F is 252.841 which represents the over-all significance of the model, i.e. all independent variables that are significant in the study (Table 3).

Table 1. Labor Productivity in terms of cavan/head: Before and During the CSFs Utilization of ARBO members.

Particular	**ARBO members**			
	Frequency (n=51)	**Average Cavan/head: Before CSF's Utilization**	**Average Cavan/head: During CSF's Utilization**	**Change Increase/ Decrease**
ARBO's				
North Siffu Farmers Multi-Purpose Cooperative	10	2.31	3.70	1.39
Bannawing Farmers Multi-Purpose Cooperative	4	1.60	1.60	0
Villacabanes Credit Cooperative	2	2.14	2.64	0.5
D4 Series CIA	35	2.05	2.10	0.05
Mean		**2.02**	**2.51**	**0.49**

Table 2. Regression Model Summary of yield/output (kg) during dry season.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.986[a]	0.972	0.968	4542.707	2.114

a. Predictors: (Constant), Total Cost (Dry), Labor Cost, Chemical Cost (dry), Seed Cost (Dry), Fertilizer Costs (dry), Area Planted

b. Dependent Variable: Yield (kg)

Table 3. Analysis of Variance of yield/output (kg) during dry season.

Model	Sum of Squares	Df	Mean Square	F	Sig. (p)
Regression	3.131E10	6	5.218E9	252.841	0.00
Residual	9.080E8	44	2.064E7		
Total	3.221E10	50			

a. Predictors: (Constant), Total Cost (Dry), Labor Cost, Chemical Cost (dry), Seed Cost (Dry), Fertilizer Costs (dry), Area Planted

b. Dependent Variable: Yield (kg)

***-highly significant*

3.2.2 The Regression Model Coefficients, Dry Season

Looking at the p-value of each explanatory variable will help identify the significant variables in the regression model. A p-value less than 0.05 ($p < 0.05$) means that the variable is a significant predictor of the yield (kg) of ARBO members in Isabela. Table 4 shows the result of the regression analysis. The coefficients of the regression model and their corresponding significance can be derived from the said table. From the table, the regression equation can be written as:

Yield (kg) = 10607.980 + (1392.199) Area Planted + (5331.399) Labor Cost + (0.152) Fertilizer Costs (dry) + (0.830) Chemical Costs (dry) + (0.549) Seed Costs (dry) + (0.160) Total Costs (dry)

Table 4 further shows that the significant predictors of the yield of ARBO members in Isabela were labor cost, chemical costs and seed cost. The coefficient of labor productivity is 5331.399 with a t-value of 7.844 that is found to be statistically significant at 1% level of significance. This means that for every 1kg productivity of labor it can yield 5331.40kgs. Moreover, the coefficient of chemical costs (dry) is 0.830 with a t-value of 3.704 that is found to be statistically significant at 1% level of significance. This means that for every 1 peso increase in chemical costs, the yield will increase 0.830kg. Lastly, the coefficient of seed costs (dry) is 0.549 with a t-value of 3.432 that is found to be statistically significant at 1% level of significance. This means that for every 1 peso decrease in seed costs, the yield will decrease by 0.549kg. The rest of the predictors (area planted, fertilizer costs, and total costs were found to be non-significant at 5% level of significance. The constant of the model is 10607.980, which represents the yield (kg) of the respondents if all independent variables were ignored or have a value of zero. The constant term is found to be statistically significant at 1% level of significance.

Table 4. Regression analysis by coefficients of yield/output (kg), dry season.

Particular	B	T	Sig. (p)
(Constant)	10607.980	6.315**	0.000
Area Planted	1392.199	0.745^{ns}	0.460
Labor Cost	5331.399	7.844**	0.000
Fertilizer Costs (dry)	0.152	1.086^{ns}	0.283
Chemical Cost (dry)	0.830	3.704**	0.001
Seed Cost (Dry)	0.549	3.432**	0.001
Total Cost (Dry)	0.160	1.723^{ns}	0.092

a. Dependent Variable: Yield (dry) ns- not significant **highly significant * significant at 5% level

*ns- not significant; * - significant at 5% level; **- Highly significant*

3.2.3 Fit of the model, Wet Season

Table 5 shows the regression model summary for wet season. The fit of the regression model can be determined by looking at the value of R^2 and $R^2 = 0.946$. The explanatory variables accounted for about 94.6% of the variation in the yield of the ARBO members. Only 5.4% in the variation was attributed to variables or effects that were not captured in the model. Note that during wet season, the use of CSFs is combined with the labor cost contributing 10% of its value. Analysis of Variance (ANOVA, Table 6) value of F is 128.156 which represents the over-all significance of the model, i.e. all independent variables that are significant in the study.

Table 5. Regression Model Summary of yield/output (kg) during wet season.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.973[a]	0.946	0.938	6295.002	2.408

a. Predictors: (Constant), Total Cost (wet), Labor Cost, Chemical Cost (wet), Seed Cost (wet), Fertilizer Costs (wet), Area Planted
b. Dependent Variable: Yield (kg)

Table 6. Analysis of Variance of yield/output (kg) during wet season.

Model	Sum of Squares	Df	Mean Square	F	Sig. (p)
Regression	3.047E10	6	5.078E9	128.155**	0.00[a]
Residual	1.744E9	44	3.963E7		
Total	3.221E10	50			

a. Predictors: (Constant), Total Cost (wet), Labor Cost, Chemical Cost (wet), Seed Cost (wet), Fertilizer Costs (wet), Area Planted

b. Dependent Variable: Yield (kg)

***-highly significant*

3.2.4 The Regression Model Coefficients, Wet Season

Looking at the p-value of each explanatory variable, this helps identify the significant variables in the regression model. A p-value less than 0.05 ($p < 0.05$) means that the variable is a significant predictor of the yield (kg) of ARBO members in Isabela. Table 7 shows the result of the regression analysis. The coefficients of the regression model and their corresponding significance can be derived from the said table. From the table, the regression equation can be written as:

Yield (kg) = 12966.778 + (1883.618) Area Planted + (5453.498) Labor Cost + (0.667) Fertilizer Costs (wet) + (-0.487) Chemical Costs (wet) + (0.006) Seed Costs (wet) + (0.437) Total Costs (wet)

On Table 7, the significant predictors of the yield of ARBO members in Isabela were labor cost, fertilizer costs (wet) and total cost (wet). The coefficient of labor cost is 5453.498 with a t-value of 5.660 is found to be statistically significant at 1% level of significance. This means that for every 1kg productivity can generate 5453.498kgs. Moreover, the coefficient of fertilizer costs (wet) is 0.667 with a t-value of 4.332 that is found to be statistically significant at 1% level of significance. This means that for every 1 peso decrease in fertilizer costs, the yield will decrease 0.667kg. Lastly, the coefficient of total costs (wet) is 0.437 with a t-value of 3.785 that is found to be statistically significant at 1% level of significance. This means that for every 1 Peso increase in total costs, the yield will increase by 0.437kg. The rest of the predictors (area planted, chemical costs, and seed costs) were found to be non-significant at 5% level of significance. The constant of the model is 12,966.778, which represents the yield (kg) of the respondents if all independent variables were ignored or have a value of zero. The constant term is found to be statistically significant at 1% level of significance.

Table 7. Regression analysis by coefficients of yield/output (kg), wet season.

Particular	B	T	Sig. (p)
(Constant)	12966.778	5.713**	0.000
Area Planted	1883.618	0.677[ns]	0.502
Labor Productivity	5453.498	5.660**	0.000
Fertilizer Costs (dry)	0.667	4.332**	0.000
Chemical Cost (dry)	0.487	1.071[ns]	0.290
Seed Cost (Dry)	0.006	0.036[ns]	0.972
Total Cost (Dry)	0.437	3.785**	0.000

a. Dependent Variable: Yield (wet) ns- not significant **highly significant * significant at 5% level

*ns- not significant; * - significant at 5% level; **- Highly significant*

3.3 Effects of CSFs utilization in terms of Income

Linear regression analysis through the Statistical Package for the Social Sciences (SPSS) software was employed to further quantify the effects of CSFs utilization in terms of income during dry and wet season for ARBO members. The variables used to explain and predict the effect of CSFs utilization were: area planted, labor cost, yield, fertilizer costs, chemical costs, seed costs and total costs. These variables were fitted into regression model with net income as the dependent variable. When CSFs is not combined to the labor cost, CSFs variables effect alone was not found fit to the model. Thus, in this section, the values of CSFs variables were combined to labor productivity.

3.3.1 Fit of the model, Dry Season

Table 8 shows the regression model summary. The fit of the regression model can be determined by looking at the value of R^2. The R^2 =0.995 would mean that the explanatory variables accounted for about 99.5% of the variation in the net income of the ARBO members during dry season. Only 0.5% in the variation was attributed to variables or effects that were not captured in the model. These are labor cost, chemical cost, seed cost and fertilizer cost. The use of CSFs which is 10% is combined with the labor cost. Table 9 shows the Analysis of Variance (ANOVA) which strengthened the results of this study. The value of F is 1353.761 which represented the over-all significance of the model, i.e. all independent variables that were significant in the study.

Table 8. Regression Model Summary of income during dry season.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.998[a]	0.995	0.995	24491.21	1.547

a. Predictors: (Constant), Total Cost (Dry), Labor Cost, Chemical Cost (dry), Seed Cost (Dry), Fertilizer Costs (dry), Yield (kg), Area Planted

b. Dependent Variable: Net Income (dry)

Table 9. Analysis of Variance of income during dry season.

Model	Sum of Squares	Df	Mean Square	F	Sig. (p)
Regression	5.684E12	7	8.120E11	1353.761**	0.00[a]
Residual	2.579E10	43	5.998E8		
Total	5.710E12	50			

a. Predictors: (Constant), Total Cost (Dry), Labor Cost, Chemical Cost (dry), Seed Cost (Dry), Fertilizer Costs (dry), Yield (kg), Area Planted

b. Dependent Variable: Net Income (dry)

***-highly significant*

3.3.2 The Regression Model Coefficients, Dry Season

The p-value of each explanatory variable helped identify the significant variables in the regression model. A p-value less than 0.05 ($p< 0.05$) means that the variable is a significant predictor of the net income of the ARBO members in Isabela. Table 10 shows the result of the regression analysis. The coefficients of the regression model and their corresponding significance can be derived from the said table. From the table, the regression equation can be written as:

Net Income = 5357.924 + (12747.625) Area Planted + (7963.466) Labor Cost + (18.342) Yield (kg) + (3.177) Fertilizer Costs (dry) + (4.945) Chemical Costs (dry) + (0.568) Seed Costs (dry) + (0.593) Total Costs (dry)

Table 10 further shows the significant predictors of ARBO members net income in Isabela which are yield (kg), fertilizer costs (dry) and chemical costs (dry). The coefficient of yield (kg) is 18.342 with a t-value of 22.568 that is found to be statistically significant at 1% level of significance. This means that for every 18.342kg yield, the ARBO member could obtain Php1 of income. Moreover, the coefficient of fertilizer costs (dry) which is 3.177 with a t-value of 4.159 that is found to be statistically significant at 1% level of significance. This means that for every PhP1 decreased in fertilizer costs, the net income would decreased by PhP3.177. Lastly, the coefficient of chemical costs (dry) is 4.945 with a t-value of 3.572 that is found to be statistically significant at 1% level of significance. This means that for every 1 peso decreased in chemicals costs, the net income would decreased by PhP4.945. The rest of the predictors (area planted, labor cost, seed costs and total costs were found to be non-significant at 5% level of significance. The constant of the model is 5357.924, which represented the net income of the respondents if all independent variables were ignored or have a value of zero. The constant term is found to be non-significant at 5% level of significance.

Table 10. Regression analysis by coefficients of income, dry season.

Particular	B	T	Sig. (p)
(Constan)	5357.924	0.429[ns]	0.670
Area Planted	12747.625	1.257[ns]	0.215
Labor Cost	7963.466	1.403[ns]	0.168
Yield (kg)	18.342	22.568**	0.000
Fertilizer Costs (dry)	3.177	4.159**	0.000
Chemical Cost (dry)	4.945	3.572**	0.001
Seed Cost (dry)	0.568	0.585[ns]	0.561
Total Cost (dry)	0.593	1.144[ns]	0.259

a. Dependent Variable: Net Income (dry) ns- not significant **highly significant
* significant at 5% level
*ns- not significant; * - significant at 5% level; **- Highly significant*

3.3.3 Fit of the model, Wet Season

Table 11 shows the regression model summary. The fit of the regression model can be determined by looking at the value of R^2.The $R^2 = 0.994$ means that the explanatory variables accounted for about 99.4% of the variation in the net income of the ARBO members. Only 0.6% in the variation was attributed to variables or effects that were not captured in the model. Table 12 shows the Analysis of Variance (ANOVA). The value of F is 978.944 which represent the over-all significance of the model, i.e. all independent variables that were significant in the study.

Table 11. Regression Model Summary of income during wet season.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.997[a]	0.994	0.993	29253.9769	1.424

a. Predictors: (Constant), Total Cost (wet), Labor Cost, Chemical Cost (wet), Seed Cost (wet), Fertilizer Costs (dry), Yield (kg), Area Planted
b. Dependent Variable: Net Income (wet)

Table 12. Analysis of Variance of income during wet season.

Model	Sum of Squares	Df	Mean Square	F	Sig. (p)
Regression	5.864E12	7	8.378E11	978.944**	0.00[a]
Residual	3.680E10	43	8.558E8		
Total	5.901E12	50			

a. Predictors: (Constant), Total Cost (wet), Labor Cost, Chemical Cost (wet), Seed Cost (wet), Fertilizer Costs (wet), Yield (kg), Area Planted

b. Dependent Variable: Net Income (wet)

***-highly significant*

3.3.4 The Regression Model Coefficients, Wet Season

The p-value of each explanatory variable helped identify the significant variables in the regression model. A p-value less than 0.05 ($p < 0.05$) means that the variable is a significant predictor of the net income of the ARBO members in Isabela. Table 13 shows the result of the regression analysis. The coefficients of the regression model and their corresponding significance can be derived from the said table. From the table, the regression equation can be written as:

Net Income = 16069.737 + (11872.021) Area Planted + (2315.926) Labor cost+ (16.609) Yield (kg) + (1.756) Fertilizer Costs (wet) + (1.437) Chemical Costs (wet) + (3.384) Seed Costs (wet) + (0.802) Total Costs (wet)

Table 13 further shows that the significant predictors of the net income of ARBO members in Isabela were yield (kg), fertilizer costs (wet) and seed costs (wet). The coefficient of yield (kg) is 16.609 with a t-value of 23.707 that is found to be statistically significant at 1% level of significance. This means that for every 16.609kg the ARBO member could obtain PhP1 peso of income. Moreover, the coefficient of fertilizer costs (wet) is 1.756 with a t-value of 2.053 is found to be statistically significant at 5% level of significance. This means that for every PhP1 decreased in fertilizer costs, the net income would decreased by PhP1.756. Lastly, the coefficient of seed costs (wet) that is 3.384 with a t-value of 4.022 that is found to be statistically significant at 1% level of significance. This means that for every PhP1 decreased in seed costs, the net income would decreased by PhP3.384. The rest of the predictors (area planted, labor productivity, chemical costs and total costs were found to be non-significant at 5% level. The constant of the model is 16069.737, which represented the net income of the respondents if all independent variables were ignored or have a value of zero. The constant term is found to be non-significant at 5% level.

Table 13. Regression analysis by coefficients of net income.

Particular	B	T	Sig. (p)
(Constant)	16069.737	1.154^{ns}	0.255
Area Planted	11872.021	0.914^{ns}	0.366
Labor Cost	2315.926	0.393^{ns}	0.696
Yield (kg)	16.609	23.707**	0.000
Fertilizer Costs (dry)	1.756	2.053*	0.046
Chemical Cost (dry)	1.437	0.671^{ns}	0.506
Seed Cost (Dry)	3.384	4.022**	0.000
Total Cost (Dry)	0.802	1.299^{ns}	0.201

a. Dependent Variable: Net Income (wet) ns- not significant **highly significant
* significant at 5% level

*ns- not significant; * - significant at 5% level; **- Highly significant*

3.3.5 The significant difference between the utilization and non-utilization of the ARBO members on the CSFs in terms of farm area, labor productivity, yield/ output, and income.

This section presents the test of significant difference between the effects of utilization and non-utilization of CSFs in terms of labor productivity, yield/output and income.

As presented in Table 14, there is significant difference in the farm area incurred before and after the utilization of CSFs with a t-value of 2.48 and probability value of 0.017. This is found to be statistically significant at 5% level of significance which increased farm area to 0.37 hectares. In terms of labor productivity, there was significant difference incurred before and after CSFs utilization with a t-value of 2.92 and probability value of 0.005 that is found to be highly significant at 1% level of significance which increased to 0.33. Yield/output in terms of cavans/head were found to be statistically significant at 5% level of significance with a t-value of 2.45 and probability value of 0.018 which increased to 69.67 cavans while income during dry and wet season were also be found significant at 5% level with a t-value of 2.55 and probability value of 0.014 which increased to PhP61,228.23. This means that farm area; labor productivity, yield/output and income of the respondents were change and have increased.

Table 14. T-test of utilization and non-utilization of the ARBO members on the CSFs in terms of farm area, labor productivity, yield/output and income. Paired Sample Test.

	ARBOs	Mean	T	df	Sig. (p) (2-tailed)
Pair 1	LaborB – LaborD	0.33	2.92**	50	0.005
Pair 2	YieldBC – YieldDC	69.67	2.45*	50	0.018
Pair 3	IncmBdry – IncmDdry	61228.23	2.55*	50	0.014
Pair 4	IncmBwet – IncmDwet	61228.23	2.55*	50	0.014

*Note: *-Significant, **-Highly significant*

It is to be noted that any statistical p value (significance) less than ≤ or equal to the statistical level of significance for the variables tested would reject the null hypothesis. On one hand, statistical p values above the level of significance shall accept the hypothesis. A concrete example of these scenarios is this study. In terms of Labor productivity pair 1 (Table 31) $p = 0.005$ when compared to 5% level of significance, post a rejection of the hypothesis. Because $p = 0.005 < 5\%$. The same is true with the rest of the variables where the statistical p values were less than ≤ or equal to the level of significance. yield pair 2 $p = 0.018 < 5\%$, income (dry and wet season) pair 3 and 5 $p = 0.014 < 5\%$. From these results, it can be concluded that there is a significant difference between the utilization and non-utilization of the ARBO members on the CSFs in terms labor productivity, yield/output and income.

4. CONCLUSION

The aim of DAR-ARCESS is to increase the income of ARBO cooperatives and its members thus, the results showed that this goal can be partially achieved based on the findings of the study. For both cropping seasons, CSFs has significant effect on yield/output and income. In terms of labor productivity, there is significant difference incurred before and after CSFs utilization (with a t-value of 2.92 and probability value of 0.005 that is found to be highly significant at 1% level of significance which increased to 0.33). Therefore, there is significant difference between the effects of utilization and non-utilization of the ARBO members on the CSFs in terms, labor productivity, yield/output and income. Conclusive to these are problems such as include the appropriate facility to serve the farming needs of ARBO members, limited number of facilities that are always used and limited knowledge on the use and management of facilities.

5. RECOMMENDATIONS

Based on the foregoing results, this section forwards the following recommendations. This may be considered by the concerned stakeholders:

DAR agency is encouraged to monitor closely the facilities that were distributed in each cooperative in selected municipalities of Isabela if it is still operational or there is a need for repair and maintenance. If the facilities are not being utilized, DAR may consider the transfer of CSFs to other ARBOs; DAR personnel and officials are also encouraged to pull-out the facilities that were not utilized well by the member beneficiaries and look into other cooperatives that met the needed requirements to be recipients of CSFs.

ARBO Cooperatives beneficiaries are encouraged to consider the following measures:

1. May consider continuous attend training/seminars to be updated in the production and management of their crops planted to increase their farm area, labor productivity, yield/output and income.
2. The strict implementation of policies for the repair and maintenance be observed. This will help ARBO members realize the value of the facilities borrowed. Policies on the collection of rental fees on the utilization of CSFs are highly advised to be strictly implemented. Managers/operators are advised to practice a limitation in terms of the number of membership to avoid busy/conflict scheduling in the utilization of CSFs by its members.
3. The orderly utilization of capital share is to be divided and distributed to the members. Charged fees of facilities may always be recorded in order to observe and monitor the payment of members. The fees are suggested to be properly utilized for the repair and maintenance as reflected in the depreciation value of each CSFs. ARBO Cooperative is advised to prioritize their members in the utilization of CSFs.

ARBO Members/Farmers are suggested to be more responsible in paying the rental fee of CSFs that they used in their farm; Proper cooperation and attention in attending seminars/training to increase their income on rice production is highly sought for.

Future Researchers may conduct A study on the Impact Assessment of Modern Technology on Rice Production to the Rice Farmers Socio Economic status in Isabela is encouraged to be pursued by future researchers; may conduct impact studies regarding Farm Mechanization in Region 02 and that a research on Production Efficiency of ARBO members using Modern Technologies in Farming in the Region be conducted by zealous researchers.

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