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ASSESSING THE FARMERS' SATISFACTION WITH THE PARTICIPATORY COCONUT PLANTING PROJECT (PCPP) USING REGRESSION ANALYSIS

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Abstract

Farmers' subjective satisfaction can be a basis for the improvement of any development programs in agriculture. This paper intended to evaluate the farmers' satisfaction with Participatory Coconut Planting Project (PCPP) and predict its governing factors using a statistical model. This study utilized secondary and cross-sectional data from a current study in the literature to quantify the farmers' perception and its factors to PCPP that is organized by Philippine Coconut Authority (PCA). Hence, the study involved 145 coconut farmers who participated in the PCPP to increase their productivity and income level. The data were summarized through descriptive calculations and determine the association of variables with the aid of regression analysis. Results of the study have depicted that coconut farmers, on average, are satisfied with the different functions of PCPP in regard to their farming activities. This implies that farmers are being assisted with their needs and concerns involving the production process. The regression model has revealed that younger farmers are more likely satisfied with the project. In addition, farmers with higher incomes tend to appreciate the PCPP functions. Moreover, farmers who experienced some training and a member of some agricultural associations are more satisfied with PCPP. Conclusively, young and active farmers who involved themselves in government programs in agriculture are more productive, efficient, and appreciative of farming projects. Hence, it is suggested that PCPP must be strengthened to reach out to more coconut farmers to improve their production, income, and their lives.

Key words**:** *coconut products, Participatory Coconut Planting Project, perception of coconut farmers, statistical model, Philippine Coconut Authority*

INTRODUCTION

Coconut (*Cocos Nucifera* L.) farming in the Philippines is considered as an important source of livelihood for many Filipinos in rural areas in the country. Apparently, coconut products have a significant role in improving the national economy since it has a major contribution to the Gross Domestic Product (GDP) [10]. In [13], it is depicted that coconut is reasoned to be the lifeblood of agriculture in the Philippines since it provides an assortment of different products made from coconut.However, it is stated in [16], that the coconut industry in the country is characterized by a high frequency of poorness among rural and small-scale coconut farmers. On the face of it, several studies are dealing with the issues of coconut farming to improve the lives of coconut farmers and increase its production in the country [12], [16], [8].

In addition, there are government programs implemented to maintain sustainable development concerning the coconut industry in the country. In particular, the Philippine Coconut Authority (PCA) has initiated the program Participatory Coconut Planting Project (PCPP) to boost the engagement of coconut farmers in planting and replanting coconuts [12]. The project has recommended a proper protocol for planting which is guided by Good Agricultural Practices (GAP). The purpose of these PCA programs is to achieve increased productivity as well as improve the profitability and living status of coconut farmers [5].

Moreover, it aims to widen the plantation rehabilitation in the country to improve coconut production and forest conservation [14], [7]. A farmer with at least 0.5 hectares of land devoted to a coconut plantation is eligible to participate in PCPP which involves two phases of development in planting

namely [5]: Phase 1: The nursery operation; and Phase 2: The field planting of seedlings.

To exhibit the effectiveness of PCPP, farmers' point of view on the project is a good source of information. According to Aguda et al. [1], it is imperative to assess the farmers' satisfaction with the program (i.e., PCPP) to assure its effectiveness and positive impact. Hence, the research article is conducted. In fact, the study on PCPP is very limited in the literature.

In general, the article aimed to elucidate the level of farmers' satisfaction with PCPP and predict its influencing factors by the statistical model. Specifically, the article's objectives are: (1) to summarize the coconut farmers' socio-demographic profile; (2) to quantify the level of satisfaction of farmers with PCPP; and (3) to predict the factors affecting the farmers' satisfaction level with PCPP. The significance of this study is to provide new information that might be a basis for the improvement of the PCPP implementation. Additionally, the results of the study may help farmers improve their participation in the project as well as their knowledge. Furthermore, this article might be baseline information for agricultural researchers focusing on coconut production and merchandise.

MATERIALS AND METHODS

This article employed a descriptive-correlational design that portrayed the summary and relationship among variables used in this study. Secondary data were utilized from the current study by Dargantes Jr. et al. [5], titled "Modeling farmers' involvement in the participatory coconut planting project of the Philippine coconut authority." The said study only focuses on the factors affecting the farmer's involvement in PCPP and does not explain the determinants of their satisfaction with the PCPP features. So, the study dealt with the farmers' perception (satisfaction) of the PCPP and its influencing determinants (demographic and socioeconomic profile). The coconut farmers involved in this study came from three municipalities in Leyte, Philippines namely: Mahaplag, Inopacan, and Hilongos.

The dependent variable of this study is the level of satisfaction of farmers with PCPP. The satisfaction involves a 5-point rating scale to the following 7 features of PCPP as follows [5]: (1) farmers' general assessment of the PCPP project; (2) sourcing procedure of own seed nuts; (3) usefulness of PCPP to the farmers' income; (4) dissemination of the ideas of PCPP program; (5) relevance of PCPP to the farmers' need; (6) application process to the access of PCPP project; (7) effect of the PCPP to the lives of farmers. The perception score for each feature has been summed to get the total perception score. A lower score means that farmers have lower satisfaction and a higher score implies higher satisfaction with the PCPP project. Table 1 presents the interval of satisfaction scores and their corresponding verbal interpretation.

Table 1. Satisfaction scores of PCPP

Satisfaction scores	Verbal interpretation
7.00 - 12.60	Very unsatisfied
12.61 - 18.20	unsatisfied
18.21 - 23.80	Undecided
23.81 - 29.40	Satisfied
29.41 - 35.00	Very Satisfied

Source: [5].

On the other hand, the independent variable is the various profile of coconut farmers such as age, sex, civil status, educational attainment, household size, annual income, tenurial status, farm size, number of years in farming, attended training in agriculture (yes or no), membership of farmers association (yes or no). The study utilized the following descriptive measures to summarize the said variables: mean, standard deviation, and percentages. It also used a bar graph to visualize the differences in values.

To depict the significant determinants of farmers' satisfaction levels, a multiple linear regression in the way of the ordinary least square (OLS) method was employed. In that case, we consider a data collection $\{S_i, X_{i1}, \dots, X_{im}\}_{i=1}^{n}$ of n coconut farmers, the regression assumes that the relationship between the dependent variable S_i and the m independent variable X_{it} ($\forall t \in \{1, \dots, m\}$) is linear. In light of it, the

regression model portrayed the best fit line that minimizes the random errors of each independent variable incorporated in the model as it correlates with the dependent variable. Hence, the regression (OLS) model is given by

$$S_i = \partial_0 + \partial_1 age_i + \partial_2 male_i + \partial_3 married_i + \partial_4 education_i + \partial_5 hhsize_i + \partial_6 \log(income)_i + \partial_7 owner_i + \partial_8 farmsize_i + \partial_9 yearsfarming_i + \partial_{10} training_i + \partial_{11} membership_i + \epsilon_i$$

where: S_i refers to the level of farmers' satisfaction to PCPP, age_i refers to theage of coconut farmers (number of years), $male_i$ refers to a dummy variable that represents a male farmer (1-male, 0-female),$married_i$refers to a dummy variable that represents a married farmer (1-married, 0-otherwise), $education_i$ refers to the educational attainment of coconut farmers (1-elementary level, 2-elementary graduate, 3-high school level, 4-high school graduate, 5-college level, 6-college graduate), $hhsize_i$ refers to the household size or family member of farmers, $\log(income)_i$ refers to logarithm of annual income (₱), $owner_i$ refers to a dummy variable that represents a farmer who own the coconut farm, $farmsize_i$ refers to the coconut farm size (in hectares), $yearsfarming_i$ refers to the number of years in coconut farming, $training_i$ refers to a dummy variable that represents a farmer who undergone some training in agricultural farm, $membership_i$ refers to a dummy variable that represents a farmer who are member of some farmers association and ϵ_i refers to the remaining random error in the model. Post-estimation techniques for regression analysis were also employed and tested at a 5% level of significance to secure valid results. Furthermore, all statistical calculations and analyses were assisted by a statistical software called STATA to assure accurate results.

RESULTS AND DISCUSSIONS

Profile of Coconut Farmers

The summarized profile of coconut farmers is presented in Table 2. On average, coconut farmers are aging (M=54.89, SD=15.19) workers. In the study of Dargantes Jr. et al. [5], it is portrayed that age is not a hindrance in farming activities. In fact, farming is a good exercise to become an active and healthy individual. On the other hand, it is mentioned in the study of Casinillo [3], that most of the rural farmers are relatively old since the younger individual are pursuing better educational attainment. More than half (66%) of these farmers are male and about 34% are female. Approximately, 78% of these farmers are married and have more responsibilities as opposed to those not married (22%). In addition, the average educational attainment of these farmers is high school level (M=2.86, SD=1.52).

Table 2. Coconut farmers' profile

Variables	Mean	Std. dev.
Age	54.89	15.19
Male (dummy variable)	0.66	0.47
Married (dummy variable)	0.78	0.42
Educational attainment	2.86	1.52
Household size	4.17	1.99
Annual income (₱)	79,206.21	108,823.2
Farm owner (Dummy variable)	0.74	0.44
Farm size (in hectares)	1.52	1.36
Years in Farming	28.37	15.80
Training (Dummy variable)	0.30	0.46
Membership (Dummy variable)	0.53	0.50

Source: Authors' own calculation (2022).

It is worth noting that knowledge and information learned from school are helpful in their farm activities [4]. On average, the household size of these farmers is close to 4 family members. More or less, the annual income of farmers in coconut farming is close to 79,206.21 (₱). The large dispersion (SD=108,823.2 (₱)) of income is due to the differences in taking care of the coconut farm and farm size. About 74% of these farmers own the coconut farm and about 26% of them are a tenant. The average coconut farm managed by these farmers is close to 1.52 (SD=1.36) hectares and the average number of years in farming is approximately 28.37 (SD=15.80) years. Only 30% of these farmers

have undergone some training related to agricultural farming and 70% of them are farming through their own experience. Note that seminars and training make them competitive over other farmers [15]. Furthermore, about 53% of these farmers are a member of some agricultural associations that might help them acquire information and obtain financial assistance [17].

Farmers' Satisfaction with PCPP

There are no farmers who are very unsatisfied with the features of PCPP and only 1.38% of them are unsatisfied. These are farmers who did not appreciate and do not get any benefit from the function of PCPP in their farming activities. About 15.86% of these farmers are neutral or undecided if they are satisfied with the project. However, there are 38.62% of these farmers are satisfied with a general assessment of the project. These are farmers who experience a positive impact from PCPP on their lives as coconut farmers.

Fortunately, the dominant (44.14%) of the coconut farmers are very satisfied with the features of PCPP in their coconut farming production experiences. The PCPP program has provided them with the basic needs of the farming system and experience the usefulness of the project to their lives as a farmer. On average, the farmers' satisfaction is close to 28.8 (SD=5.16) and is classified as "satisfied" (Based on Table 1). This implies that farmers are being assisted in their production activity and benefiting from the function of PCPP [5].

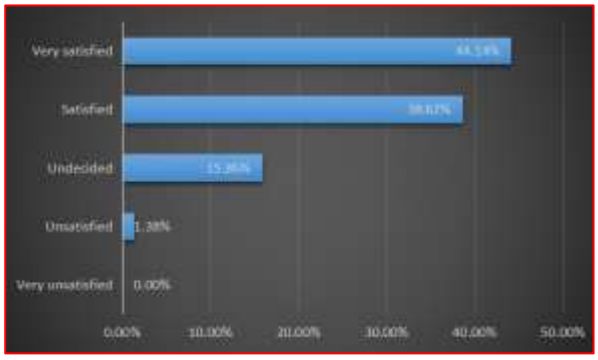

Fig. 1. Farmers' level of satisfaction with PCPP.
Source: Authors' construction (2022).

Regression Model

Post-estimation techniques were done to secure a valid finding in the regression equation model. The model was found to be homoscedastic (X^2=1.14; *p*-value=0.286) by the Breusch-Pagan test. This implies a constant variance in the model [10]. In addition, the model does not possess an omitted variable bias (F=2.63; *p*-value=0.053) with the assistance of the Ramsey RESET test [9]. Moreover, the model is free from the multicollinearity problem since the variance inflation factor (VIF) value is lesser than 10 (i.e., VIF=1.47). Hence, no significant correlation between the independent variables in the model exists [2].

Although the Shapiro-Wilk test has revealed that the residuals in the model are not normal (Z=2.087; *p*-value=0.018), the figure (Fig. 2) above shows that the kernel density estimate graph for residuals is close to the normal density graph. In other words, the residuals are almost normal. Hence, the model has valid results and provided a piece of reliable information and predictions.

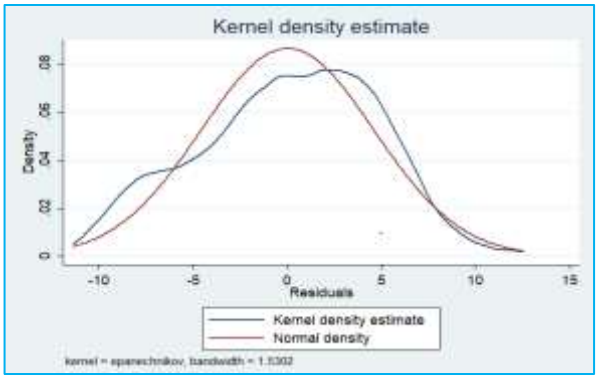

Fig. 2. Kernel density estimate and normal density graphs for the regression residuals.
Source: Authors' construction (2022).

Table 3 shows that the regression model (F_c=3.10; *p*-value=0.001) is highly significant at a 1% level. It is also shown that the goodness-of-fit is equal to 0.204 which indicates that there are independent variables that influence the farmers' satisfaction with PCPP. Firstly, the age (∂_1 =-0.082; p-value=0.037) of a farmer is considered a significant predictor of farmers' satisfaction at a 5% level. The negative coefficient indicates that younger farmers are more likely to appreciate the PCPP features. This means that younger farmers are more active in participating in the different activities of the said project.

Apparently, participation in agricultural projects may increase knowledge and gain innovative techniques in farming [11]. Secondly, the model reveals that farmers with higher income (∂_6=2.253; *p*-value=0.075) are more satisfied with the PCPP functions at a 10% level. This implies that farmers who gain more knowledge in the project and improve their income level tend to appreciate the usefulness of the project to their livelihood. In fact, the main purpose of the project is to improve the coconut plantation in the country and improve the lives of rural farmers [5], [6].

Table 3. Regression model for coconut farmers' satisfaction with PCPP and its causal determinants.

Independent Variables	Coefficient[a]	Std. error[b]
Constant	18.495*** (0.003)	6.189 (2.99)
Age	-0.082** (0.037)	0.038 (-2.11)
Male (dummy variable)	1.271[ns] (0.175)	0.932 (1.36)
Married (dummy variable)	-0.837[ns] (0.426)	1.048 (-0.80)
Educational attainment	0.151[ns] (0.665)	0.348 (0.43)
Household size	0.258[ns] (0.217)	0.207 (1.24)
log (Annual income (₱))	2.253* (0.075)	1.257 (1.79)
Farm owner (Dummy variable)	0.308[ns] (0.775)	1.074 (0.29)
Farm size (in hectares)	0.156[ns] (0.626)	0.319 (0.49)
Years in Farming	0.023[ns] (0.560)	0.039 (0.58)
Training (Dummy variable)	1.740* (0.069)	0.949 (1.83)
Membership (Dummy variable)	1.644* (0.058)	0.859 (1.92)
Observation	145	
F_c	3.10***	
p-value (Two-tailed)	0.001	
Coefficient of determination (R^2)	0.204	

Note: a - p-values are enclosed with parenthesis; b - t-values are enclosed with parenthesis; ns - not significant; *p<0.1; **p<0.05; ***p<0.01.
Source: Authors' calculation (2022).

Thirdly, the participation of farmers in the different agricultural seminars and training (∂_{10}=1.740; *p*-value=0.069) will provide them with more information that is useful for their coconut production and it is a significant predictor of the farmers' satisfaction with PCPP. In that case, they become better at doing their work and tend to appreciate the agricultural programs as they help them with their needs [14]. Lastly, being a member (∂_{11} =1.644; *p*-value=0.058)of a farmers' association is more likely to appreciate the government programs due to the information and benefits they have gained. In [17], an association of farmers is an organization that is responsible for disseminating innovative information suitable for agricultural production and allocating agricultural inputs.

CONCLUSIONS

The main aim of this article is to measure the level of satisfaction of farmers with PCPP and elucidate its influencing determinants. Results showed that farmers are satisfied with the different functions of PCPP in coconut farming. Farmers are being assisted with their needs and received the necessary information to improve production and their livelihood. The regression model revealed that younger and more active farmers are more involved in the project and tend to appreciate it more. It is also shown that the farmers who benefited from the project and had higher incomes from coconut farming are more satisfied with the said project. Moreover, training and membership are positively correlated to the farmers' satisfaction with the features of PCPP. Conclusively, the involvement of young farmers in agricultural projects makes them more knowledgeable and productive in farming. Hence, it is highly suggested that the PCPP must be strengthened to reach out and help more coconut farmers in rural areas and continually improve coconut farming in the country. In addition, the local government and PCA must also provide equipped extension agents to disseminate innovative technologies in coconut farming. Finally, it is recommended that for future research, one may consider the farmers' perception of the effectiveness of PCPP to supplement the findings of this current article.

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