Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development
Vol. 23, Issue 3, 2023
PRINT ISSN 2284-7995, E-ISSN 2285-3952

MODELING THE EFFECTIVENESS OF THE COCONUT DEVELOPMENT OFFICER (CDO) IN THE PARTICIPATORY COCONUT PLANTING PROJECT(PCPP)

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Abstract

The effectiveness of a coconut development officer (CDO) is an important factor in a coconut farmer's productivity and profitability. This article aimed to pave an explanation of the effectiveness of CDO in coconut farmers' view and determine its influencing factors. Secondary data were utilized from the existing paper in the literature and analyzed using standard descriptive statistics and ordered logistic regression analysis. Results depicted that CDOs of PCPP are "effective" in their assigned task based on the farmers' point of view. This implies that CDOs are doing their responsibilities and farmers have experienced an improvement in coconut growing activities. Moreover, the ordered regression model revealed that being a young farmer, with low education attainment, and good economic income, a farmer who owned a coconut field, training and seminars, and membership in any agricultural organization are predictors of the effectiveness of CDO based on farmers' perspective. Conclusively, to further enhance the CDO's effectiveness in their responsibilities, they must undergo some rigorous training about the new technologies and techniques in coconut farming.

Key words**:** *coconut development officer, coconut farmers, regression model, Philippines*

INTRODUCTION

The goal of the Philippine Coconut Authority (PCA) is to develop the coconut production and industry in the country to become globally competitive and to attain sustainability [6], [12], [16]. In fact, coconut farming is one of the sources of income for many rural farmers in the Philippines [16]. Hence, PCA is making a move to facilitate and guide the farmers to enhance their coconut growing activity as income generation. In that case, the PCA has formed a program called the Participatory Coconut Planting Project (PCPP)that will help the coconut farmers in the country how to plant and replant coconut trees with the newly discovered technologies [6], [7]. The program also will address the problems and issues that farmers are facing in coconut production and facilitate how to improve their profitability. Moreover, the PCA has formed a staff called the coconut development officer (CDO) who is responsible to facilitate, educate and guide the farmers in improving farm management and controlling pests and diseases of coconut trees [6].

In addition, CDO staff are also tasked to introduce the newly discovered innovative technology and research-based information to farmers through training and seminars. All the protocols of PCA in coconut farming are based on Good Agricultural Practices (GAP)[6], [12]. In [14], it is depicted that the country Philippines has a lot of poor and small-scale coconut farmers that need assistance to improve their productivity. It is worth noting that the effectiveness of CDO will results in the success of PCPP in improving the lives of coconut farmers and impact the economy of the country [6]. Hence, it is necessary to do research in evaluating the effectiveness of CDO in view to the farmers to collect useful information and remedy on how to improve the PCPP programs and its constituents.

In literature, research studies involving PCA projects and their functions to the Philippine company are scarce. Moreover, assessing the effectiveness of the performance of CDO in

PCPP has never been done in rural areas in Leyte, Philippines. Whence, the general goal of this study is to explain the effectiveness of CDO in coconut farmers' view and predict its influencing determinants. The purpose of this article is to expose the importance of CDO to coconut farmers' production and to gather information on how to improve their performance. The findings may also help the coconut farmers to know their role and their responsibilities in the PCPP program as well as their contribution to the economy. Moreover, the findings may be used as baseline information for some agricultural economists dealing with coconut growing and may contribute to the agricultural literature.

MATERIALS AND METHODS

The design of this article is descriptive-correlational research in which it describes the data of the study and determines the relationship between dependent and independent variables. Secondary and cross-sectional data were used in this study from the current article in the literature that dealt with the PCPP program of PCA [6]. The study summarizes the participation of coconut farmers in the PCPP and captures the influencing determinants. However, it does not focus on the effectiveness of the CDO as an extension agent to the farmers. Hence, this study is concentrating on the farmers' perception of how effective is the CDO's role in coconut growing and captures the significant causal factors affecting the farmers' view. The respondents of this study were coconut farmers in selected municipalities of the province of Leyte, Philippines that are under the PCPP program. In selecting the data, it has undergone clearing and excluding the outliers. Plus, the old farmers who are no anymore active in coconut planting were excluded. In that case, very old farmers aged 75 and above are eliminated. Hence, the study dealt with 132 coconut farmers as participants. The study employed the chosen variables which include the socio-demographic profile, farming profile, and farmers' perception of the effectiveness of CDO. For the socio-demographic profile of farmers, it includes their actual age in years, sex (male or female), civil status (married or not), educational status (Scoring guidelines: elementary level - 1, elementary graduate - 2, high school level - 3, high school graduate - 4, college level - 5, college graduate - 6), household size (members of the family), and annual income (in Philippine peso (PHP)).

As for the farming profile, it considered the following variables: tenurial status (owner or not), farm size (in hectares), number of years in farming, attending training in agriculture programs, and membership of any agricultural association. Thirdly, farmers' perception of the effectiveness of CDO in the following aspect: (1) technical capability of CDO staff ; (2) effective Sense of responsibility, seriousness, and dedication to services; (3) effective giving clear instructions to participants; (4) effective implementation of a monitoring system; and (5) effective settling/handling problems effectively. The five roles of CDO were evaluated by farmers on a scale of 1 to 5. Table 1 shows the scoring guidelines and their equivalent verbal description.

Table 1. Guidelines for the effectiveness of CDO

Total Perception Score	Ordered logistic code	Verbal description
1.00 – 1.80	0	Highly ineffective
1.81 – 2.60	1	Ineffective
2.61 – 3.40	2	Uncertain
3.41 – 4.20	3	Effective
4.21 – 5.00	4	Highly effective

Source: [2].

The questionnaire for the effectiveness of CDO has undergone validity by experts in agriculture and found that it is effective to capture the overall perception of coconut farmers towards the responsibility of CDO staff. In addition, the 5-item questions have a reliability coefficient of 0.92 and can be interpreted as reliable [5]. In the data management and analysis, the data were formatted in excel to fit in a statistical program called STATA version 14.0. After that, standard statistical measures (mean - M, standard deviation - SD, minimum (min) and maximum (max) value, frequency counts - n, percentages - %) were used to describe and give meaningful interpretation to the variables

used in this study. In determining the predictors of the effectiveness of CDO staff from farmers' perspectives, an ordered logistic regression model was constructed. The dependent variable is treated ordinal as shown in Table 1 and the independent variables are the socio-demographic and farming profile of coconut farmers. Furthermore, standard diagnostic or post-estimation tests were conducted to ensure that the results provide a reliable interpretation and prediction.

RESULTS AND DISCUSSIONS

Profile of Coconut Farmers

The profile of the coconut farmers is presented in Table 2 using the standard descriptive measures. First, the farmers who are actively participating in the coconut planting project PCPP are aged from 18 to 74 years old and have a mean age is close to 52.42 years old (SD=13.59 years old). There are more male (67%) farmers who participated in the said project as opposed to female (33%) farmers. This result is expected since this type of work is masculine in nature. About 82% of these farmers are married and there are only 18% of them are not they are either single or widowers/widows. On average, these farmers are elementary graduate or high school level (M=2.88, SD=1.51) and some of them has also finished a college degree (max=6). The household size of these farmers is close to 4 members ranging from 1 to 11 members. On average, their annual income in coconut farming is close to 81,370.00 PHP (SD=112,973.50 PHP) and the minimum is 12,000.00 PHP and the maximum is 720,000.00 PHP. There are 72% of these farmers owned their coconut farms and about 28% of them are just tenants or workers. The average number of hectares of their coconut farm is close to 1.53 ha and ranges from 0.25 to 6 ha. Approximately, these farmers are being coconut farmers for 27.17 years (SD=14.70 years). The youngest is about 1 year of experience and the oldest is about 63 years of experience in coconut farming. Only 32% of these farmer has undergone training on the different new technologies in agriculture, particularly in coconut planting. And 68% of them have no proper training in the knowledge of coconut planting activities. In other words, their knowledge is just based on their experience and information from other farmers. In addition to that, about 54% of these farmers are members of the agricultural association or farmers' cooperatives, and 46% of these farmers do not have membership in any organization.

Table 2. Farmers'socio-demographic profile.

Variables	Mean	SD	min	max
Age[a]	52.42	13.59	18	74
Male[b]	0.67	0.47	0	1
Married[b]	0.82	0.39	0	1
Educational attainment	2.88	1.51	1	6
Household size	4.19	1.89	1	11
Annual income[c]	81370.45	112973.5	12000	720000
Farm owner[b]	0.72	0.45	0	1
Farm size[d]	1.53	1.36	0.25	6
Farming experience[a]	27.17	14.70	1	63
Training[b]	0.32	0.47	0	1
Membership[b]	0.54	0.50	0	1

Note: a - in years; b - dummy variable; c - in Philippine peso (PHP); d - in hectares (ha).
Source: Author's calculation (2023).

Effectiveness of CDO in Farmers' View

Table 3 shows that no farmers said that CDOs are highly ineffective in their assigned job. And only 5.3% of the farmers have experienced that CDOs are ineffective in imparting their knowledge on how to enhance planting coconut and how to implement the new practice management in their farm. In addition, about 17.42% of these farmers have perceived that they are uncertain if their job is effectively improving their lives as a farmer. This means that their productivity and economic income have not increased since they join the PCPP project and were guided by CDO. However, the dominant (41.67%) of these farmers have experienced the effectiveness of CDO officers. These farmers have improved their productivity and efficiency in coconut planting activities and improved their economic income as well [10]. They have also improved their practices in land and pest management [10]. In fact, there are farmers (35.61%) who said that CDO of PCPP is highly effective. This CDO staff serves as extension agents that help farmers in regard to their concerns and problems in coconut farming. In addition to that, CDOs

are responsible for training coconut farmers on new innovative technologies and they also identify the problems and needs of farmers to give solutions [8]. On average, CDOs in PCPP are considered effective (M=4.03, SD=0.74) in their job as a helper and guide for coconut farmers in improving their coconut activities. Hence, the existence of CDO in PCPP is very relevant and serves as an educator and mediator to the coconut farmers as well as a problem solver. It is worth noting that smallholder coconut farmers are facing challenges nowadays, hence, they need guidance from experts to apply relevant technologies in solving their problems [13].

Table 3. Effectiveness of CDO in farmers' perspective

Effectivity category	Frequency (n)	Percentage (%)
Highly ineffective	0	0.00
Ineffective	7	5.30
Uncertain	23	17.42
Effective	55	41.67
Highly effective	47	35.61
Mean average (SD)	**4.03 (0.74) - Effective[a]**	

Note: a - See Table 1 for details.
Source: Author's calculation (2023).

Ordered Logistic Regression Model

Table 4 presents the constructed ordered logistic regression model which captures the influencing determinants of the effectiveness of CDO. Prior to that, the post-estimation or diagnostic tests for the model in the form of ordinary least square (OLS) has shown that the variance is constant and no omitted variable bias exists using the Breusch-Pagan/Cook-Weisberg test for heteroscedasticity and Ramsey RESET test, respectively [11]. In addition to that, the model has no problem with multicollinearity with the aid of variance inflation factor (VIF) which results in VIF<10 [2]. Moreover, the residuals of the model are not normally distributed (W=0.97, p-value=0.006) based on the result of the Shapiro-Wilk W test for normal data. However, it is shown in the kernel density estimate graph that the residuals are almost normally distributed based on the normal density as presented in Fig. 1. In that case, the model is valid in giving the desired results which avoids bias and misleading interpretation. The ordered logistic regression model is significant (X^2=45.62, p-value<0.001) at a 1% level which indicates that statistically significant factors of the effectiveness of CDO exist. Plus, the coefficient of determination (R^2=0.145) has shown a model fit that implies that the effectiveness of CDO is governed by some determinants of coconut farmers.

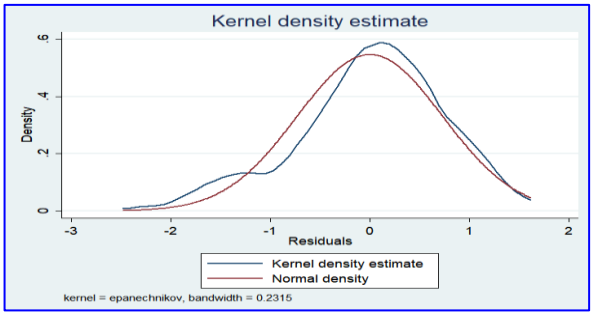

Fig. 1. Graph of k-density and normal density of residuals.
Source: Authors' construction (2023).

Hence, the following independent variables are significant factors of the effectiveness of CDO that include age (significant at 5% level), educational attainment (significant at 10% level), annual income (significant at 1% level), being an owner of coconut farm (significant at 1% level), training attended (significant at 5% level), and membership of any agricultural organization (significant at 1% level).

Table 4. Regression model (ordered logistic) for the effectiveness of CDO staff and its influencing factors

Causal Factors of Effectiveness of CDO	Ordered Logit Models	
	Coefficient	*Std Error*
Socio-demographic profile		
Age[a]	-0.047**	0.019
Male[b]	-0.026[ns]	0.400
Married[b]	0.108[ns]	0.472
Educational attainment	-0.295*	0.151
Household size	-0.034[ns]	0.092
log (Annual income[c])	2.601***	0.914
Farming profile		
Farm owner[b]	1.273***	0.468
Farm size[d]	0.051[ns]	0.145
Farming experience[a]	-0.018[ns]	0.018
Training[b]	1.051**	0.418
Membership[b]	1.167***	0.389
Observation	132	
χ^2-computed	45.62	
p-value (two-sided)	<0.001	
Pseudo R^2	0.145	

Note: a - in years; b - dummy variable; c - in Philippine peso (PHP); d - in hectares (ha); *p<0.10; **p<0.05***p<0.01.
Source: Author's calculation (2023).

The model reveals that younger farmers are positively influencing the effectiveness of CDO in their responsibilities. This means that

if the farmers are more active and able to do the different activities in coconut planting and management, the CDO effectiveness is more likely to take place. Note that if the farmer is young, they can do more masculine work compared to older farmers [3]. Plus, as the age of a farmer increases, work productivity is decreasing [17], [18]. Secondly, the model depicted that farmers with low educational attainment say that CDOs are effective in their tasks. This means that farmers with less knowledge of higher education perceived that they are being helped by CDO to improve their productivity in coconut farming. This further indicates that being a coconut farmer does not have to attain a good education for their task as a worker on the farm. As long as they are guided by extension agents (i.e., CDO in PCPP), they can be more productive in their coconut activities [21]. In fact, most educated individuals are looking for a decent job to improve their economic income and live on to farm instead [4]. A farmer with a higher annual income said that CDOs are effective in their responsibilities. This implies that CDOs are doing their job well and have increased the productivity and economic profit of coconut farmers. In [6], it is stated that CDOs are taking a sense of responsibility as problem solvers and as a helper of the farmers' technical activities in coconut planting management. Moreover, the model reveals that a farmer who owned a coconut farm said that CDO staffs are effective in their work. It is worth noting that if a farmer owned the land, they take all the responsibilities and the economic profit which is more advantageous to other farmers who are just tenants. This indicates that they can directly observe the changes and benefits of having the guidance of CDO as they participated in the PCPP. In fact, farmers who owned their farms will not anymore pay labor and they don't have to share a portion of their profit [4], [15], [20]. Plus, training and workshops in agriculture are helping the coconut farmers to see the effectiveness of CDO as their educator. This indicates that farmers are being oriented rigorously with the different innovative technologies that might help in progressing the coconut growing [9]. According to [15], training and educational program in agriculture improve the farmers' knowledge, practices, and attitudes as well as their economic profitability. Furthermore, the model discloses that membership in any agricultural association is a significant factor in the coconut farmers' perspective that CDOs are effective agents. This means that the benefits of being a member of an association help the farmers experience the results of CDO's role in coconut growing activities. In [1] and [19], it is depicted that an agricultural association is vital to the farmers' concerns and needs which include information and capital.

CONCLUSIONS

This article aimed to explain how effective is the CDO of PCPP in a farmers' perspective and determine its statistically significant factors. The findings of this study revealed that CDOs are effective in their job as helpers of farmers to improve their coconut growing activities. Thus, they have done their duties as an educator and problem solvers in regard to assessing the coconut farmers in the PCPP program. Conclusively, being a young farmer, having low education attainment, and having a good economic income have influenced the farmers' view of the effectiveness of CDO. In addition, a farmer who owned their coconut field, training and seminars, and membership in a farmers association are predictors of the effectiveness of CDO. Hence, the CDO must be strengthened through rigorous training to educate young farmers and help them improve their practices and income. Furthermore, it is suggested that one may incorporate the farmers' happiness level and access to credit in coconut farming to elucidate their economic well-being for future studies.

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