

ORDINAL LOGISTIC MODEL FOR THE ENGAGEMENT OF SMALL-SCALE ABACA FARMERS WITH PHILIPPINE FIBER INDUSTRY DEVELOPMENT AUTHORITY (PhilFIDA)

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Abstract

This paper aimed to investigate the small-scale abaca farmers' engagement level towards the Philippine Fiber Industry Development Authority (PhilFIDA) in Eastern Visayas, Philippines, and capture its significant predictors. Primary data was gathered from a cross-sectional survey of 263 abaca farmers using random sampling. The survey is in the form of face-to-face interviews to gather useful information with the aid of a developed semi-structured questionnaire. The data were analyzed using descriptive statistics and ordinal regression analysis. Results depicted that, on average, abaca farmers have no engagement ($M=1.44$; $SD=0.85$; $M_d=1$) with PhilFIDA. This implies that small-scale farmers are not collaborating with PhilFIDA in terms of their extension delivery system and project implementations for the development of the abaca fiber industry. The ordinal regression model revealed that being an owner ($p\text{-value}=0.072$) and the number of years in farming ($p\text{-value}=0.088$) are both significant predictors of farmers' level of engagement towards PhilFIDA. This means that a farmer who owns the land and has more experience is more likely to collaborate with PhilFIDA's agricultural projects and development programs. Moreover, the regression model showed that PhilFIDA's visit ($p\text{-value}<0.001$) and interaction with the Local Government Unit (LGU) ($p\text{-value}<0.001$) can increase the farmers' engagement towards PhilFIDA. This implies that communication and campaign to the PhilFIDA's development program can increase the abaca farmers' participation. Hence, the PhilFIDA and LGU must work together to reach out to small-scale farmers, especially in remote areas.

Key words: Abaca farmers, Philippine Fiber Industry Development Authority, engagement level, ordered regression

INTRODUCTION

One of the important agricultural resources in the Philippines is abaca (*Musa textilis Née*), considering its usefulness and economic measure which helps the gross domestic product (GDP) and national income in the country [8], [13]. In addition, abaca fiber can be transformed into a useful product in different forms which become a major contributor to the Philippine economy and a key player in the abaca trade globally through export activities [9], [10]. In Eastern Visayas, Philippines, abaca fiber is one of the leading sources of income, especially for the small-scale farmers in the region, and is considered the largest supplier [13] [14]. In that case, the Philippine government has focused on improving and widening the abaca fiber production in the different areas of the country through programs and organizations

that support farmers in regard to agricultural information and inputs. Implementing agricultural programs is a way to enhance farmers' income and productivity, address food security in the country, promote sustainable economic growth, and alleviate poverty, among others [18], [19].

One of the organizations that is promoted by the Philippine government is the *Philippine Fiber Industry Development Authority* (PhilFIDA) which aims to advance the development and growth of the abaca fiber industry in the country by doing research and development [8]. Additionally, PhilFIDA also aims to support abaca production by introducing some innovative agricultural technologies, providing training and seminars to farmers, and implementing standards in trade regulation. With that, it is stated in [19] that PhilFIDA staff and extension agents must be trained and be educated to function well in

their required tasks and obtain the development in the abaca production in the country. However, several issues impede the effective delivery of extension services of PhilFIDA in the country. In [17], it is depicted that not all of the abaca farmers are being supported by PhilFIDA due to some constraints which resulted in the existence of challenges in the production process in the Philippines. In fact, in [4], it is mentioned that there are a lot of problems in the abaca industry and there is only a small interaction between small-scale farmers and PhilFIDA. Among other problems, it includes inadequate human resources development programs, limited funding support for inputs, poor initiatives of agencies and institutions on agricultural development, and even a lack of social media as a means of providing extension services. Hence, to enhance government programs and agencies like PhilFIDA, it is necessary to investigate the perception of abaca farmers which gathers information to formulate useful arguments for improving the existing policies.

Apparently, the study about the abaca farmers' perception of the government agencies involving the fiber industry is scarce. In fact, there is no paper in the literature that deals with regression analysis in modeling the perception of abaca farmers towards the PhilFIDA functions. Henceforth, this research paper is realized. The general objective of this study is to describe the level of perception of abaca farmers towards the PhilFIDA functions and support and develop a statistical model that determines its predictors. Specifically, this paper sought the following research objectives: (1) to characterize the abaca farmers' profile (socio-demographic and economic); (2) to measure the level of abaca farmers' perception towards their interaction with PhilFIDA; (3) to develop a statistical model that determines the significant predictors of abaca farmers' perception towards PhilFIDA. The significance of this paper is to provide insights and suggestions that are useful in improving PhilFIDA's implementation of programs and projects. Additionally, the results of this research paper may stipulate how to improve the engagement

of abaca farmers and PhilFIDA that leads to productivity and sustainability. Moreover, the findings of this study may be used as baseline information for many agricultural economists focusing on the abaca industry and contribute new knowledge in fiber stakeholders' literature.

MATERIALS AND METHODS

The Research Design

This research paper applied a quantitative survey in collecting data which is cross-sectional. In analyzing the information, the study employed some descriptive metrics and inferential statistics in analyzing multivariate correlation. Hence, this paper utilized a complex correlational research design to achieve the objectives, particularly in exploring causal relationships between dependent variables and independent variables using regression analysis.

The Participants and Sampling Method

Region VIII also known as Eastern Visayas is a place in the Philippines that has a wide area devoted to abaca production and is considered as largest supplier in the country [8]. Due to some problems in the production process, farmers' income, and agricultural support, the researchers decided to investigate the farmers' relationship to PhilFIDA as an organization that is responsible for enhancing their farm activities. Thus, the population of interest is the abaca farmers in the whole region of Eastern Visayas. In that case, the list of registered abaca farmers was asked in the Municipal Agriculture Office (MAO) in each town of Eastern Visayas. After securing the list of all abaca farmers with their farm area in hectares, a farmer with more than 2 hectares was excluded since the study only considered small-scale farmers. Due to constraints of time and researchers' resources, a simple random sampling technique was employed to ensure no bias in choosing a respondent, that is, every farmer has an equal chance of being selected as a participant in the survey. A Slovin's formula with a researcher's reasonable margin of error was used to determine the sample size needed. Hence, the

study employed 263 small-scale abaca farmers as participants in the research survey.

The Research Instrument, Data Collection, and Ethics

In this study, the researchers have developed a structured questionnaire which was founded on the agricultural studies in the literature [6], [19]. The questionnaire has two sections such as (i) the profile of abaca farmers and (ii) the level of farmers' perception towards their engagement with PhilFIDA. In the first section, the abaca farmers were asked on the following profile: (1) age (number of years), (2) sex (male or female), (3) marital status (married or not married), (4) educational attainment (number of years), (5) other income aside from abaca farming (yes or no), (6) size of abaca farm (number of hectares), (7) tenurial status (owner or not owner), (8) farming experience (number of years), (9) visited by PhilFIDA? (yes or no), (10) abaca yield (kilogram per hectare), (11) distance from home to abaca farm (number of kilometers), and farmers' level of interaction (4-point rating scale: 1-No interaction, 2-Weak interaction, 3-Moderate interaction, 4-Strong interaction) to abaca stakeholders such as (12) State Universities and Colleges (SUCs) and (13) Local Government Unit (LGU).

As for the second section, the farmers were asked to rate their level of engagement with the abaca stakeholder PhilFIDA using a 4-point rating scale such as 1-No engagement, 2-Weak engagement, 3-Moderate engagement, 4-Strong engagement. In that case, Table 1 presents the possible perception scores and their verbal interpretation.

Table 1. Level of engagement perception scores.

Possible perception scores	Verbal description
1.00-1.75	No engagement
1.76-2.50	Weak engagement
2.51-3.25	Moderate engagement
3.26-4.00	Strong engagement

Source: [8].

To ensure that this research study is aligned with an ethical procedure, the researchers have secured consent letters from the higher authorities especially the officials of MAO in each town of Eastern Visayas.

The content of the letter is to inform them of the purpose, procedures, and benefits of the research study.

Another letter was secured for the participants (abaca farmers) of the survey which informed them that their participation is safe and voluntary.

Additionally, anonymity and confidentiality were also guaranteed to the abaca farmers and no potential harm or sensitive words existed in the gathering of information.

Empirical Model and Data Analysis

To ensure statistically sound results, the data collected from abaca farmers has been subjected to clearing which involves the removal of missing data and outlier responses. After which, coding, which is converting from qualitative to quantitative was applied before encoding to Microsoft Excel. Additionally, necessary formatting was done for the data in Microsoft Excel so that it would be aligned for statistical calculations in STATA version 14.0 software.

In summarizing and giving a description of the data, descriptive measures were calculated and presented in a statistical table such as mean (M) average, median (M_d) average, standard deviation (SD), minimum and maximum values, and percentages (%). In addition, a bar graph was constructed to give a clear picture of comparing categorical responses.

To capture the statistical predictors of abaca farmers' perception of their engagement towards PhilFIDA, regression analysis was employed.

Now, since the farmers' perception as dependent variable is ordinal data, in particular, the ordered regression model was considered as an appropriate statistical method.

Hence, the empirical statistical model is presented as follows:

$$PPhilFIDA_j = b_0 + b_1Age_j + b_2Male_j + b_3Married_j + b_4Educ_j + b_5OSincome_j + b_6FarmS_j + b_7Owner_j + b_8YFarming_j + b_9Yield_j + b_{10}Visit_j + b_{11}HomeDist_j + b_{12}SUCs_j + b_{13}LGU_j + \varepsilon_j \dots\dots\dots (1)$$

where $PPhilFIDA_j$ is the ordinal dependent variable (0-No engagement, 1-Weak engagement, 2-Moderate engagement, 3-Strong engagement.), j is the j^{th} respondents where $j \in \{1, 2, \dots, 349\}$, b_i represents to the parameters in the regression model (1) where $i \in \{0, 1, 2, \dots, 13\}$, $FAge_j$ is the age of a farmer (in years), $Male_j$ refers to a indicator variable that captures a male farmer (dummy: 0-female, 1-male), $Married_j$ refers to a indicator variable that captures a farmer who is officially married (dummy: 0-non married, 1-married), $Educ_j$ is the farmers' number of years in schooling, $OSincome_j$ refers to a indicator variable that captures a farmer who has other income (0-None, 1-With other income aside from abaca farming), $FarmS_j$ is the farmer's abaca farm area (in hectares), $Owner_j$ refers to a indicator variable that captures a farmer who owned their abaca farm (dummy: 0-non owner, 1-owner), $YFarming$ is the number of years in abaca farming, $Yield_j$ refers to the abaca yield (kilogram per hectare), $Visit_j$ refers to a indicator variable that captures a farmer that is visited by PhilFIDA personel (dummy: 0-not visited, 1-visited), $HomeDist_j$ is the number of kilometers from farmer's home to their abaca farm, $SUCs_j$ is the farmer's perception to their interaction to the SUCs (1-4 scoring), LGU_j is the farmer's perception to their interaction to the LGU (1-4 scoring), and ε_j is the remaining error term in the model (1). A variance inflation factor (VIF) was calculated to capture multicollinearity problems in the model and necessary corrections must be made if it exists [2]. All statistical inference results were subjected to hypothesis testing at standard alpha level or significance level (1% or 5%).

RESULTS AND DISCUSSIONS

Profile of Small-Scale Abaca Farmers

Table 2 presents the descriptive statistics computation for the socio-demographic and farm profile of small-scale abaca farmers. The youngest farmer is 24 years old and the oldest is 90 years old with an average age of 52.01 (SD=12.16). This mean age result is parallel

to the findings in [8] and [18] that most of the farmers in the Philippines are around 50 years old. Most (72%) of the abaca farmers are male and there are only 28% of them are female. It is mentioned in [16] that farming is a masculine job in which male farmers are more productive and appropriate in their activities. About 79% of the abaca farmers are married and only 21% of them are non-married (single, widow, or widower, among others).

It is worth noting that most of the farmers are close to late middle age ($M=52.01$), hence, it is more likely that they are married and this is consistent with the findings of an existing study in [7]. The farmers' number of years spent in education is close to 7.6 (SD=3.36), which indicates that most of them are high school level and not able to finish a college degree. In [7], it is stated that what they have learned from their schooling is enough in their daily activities in farming which means that they don't need higher thinking skills to achieve in abaca production activities. Most (89%) of the farmers have other income aside from abaca farming and only 11% of them have no other income. Other income is necessary for their daily expenses particularly since abaca farming is not on a monthly basis for financial gain and this finding is consistent in [8]. The average abaca farm size of the small-scale farmers is close to 1 ha (SD=0.59 ha), and the smallest is 0.02 ha while the largest is 2 ha. About 86% of the farmers owned their abaca farm and only 14% of them did not own (e.g. tenant).

Approximately, the abaca farmers' average number of years in farming is close to 20.32 (SD=14.76) where the minimum is 1 year and the maximum is 70 years. In addition, the average yield of abaca farming is close to 307.68 kg/ha (SD=924.23 kg/ha) where the minimum is 5 kg/ha and the maximum is 2,000 kg/ha. About 48% of the small-scale farmers are visited by PhilFIDA to aid them in their farm activities and 52% of them have not visited so far. On average, the farmers' distance from home to their abaca farm is close to 6.85 km (SD=17.65 km) where the nearest is 0.05 km and the farthest is 250 km. Based on the perception score of abaca farmers, their interaction with SUCs ($M=1.02$;

SD=0.14) and LGU (M=1.17; SD=0.56) is weak. This implies that abaca farmers are not collaborating with other stakeholders in their farm activities and these results are consistent with the findings in [4], [19].

Table 2. Descriptive statistics for the profile of abaca farmers (n=263).

Independent variables	Descriptive statistics			
	Mean	SD	Minimum	Maximum
Age (in years)	52.01	12.16	24	90
Male (dummy variable)	0.72	0.47	0	1
Married (dummy variable)	0.79	0.40	0	1
Education (in years)	7.60	3.36	0	16
Other income (dummy variable)	0.89	0.32	0	1
Size of abaca farm (hectare)	1.00	0.59	0.02	2
Owner (dummy variable)	0.86	.39	0	1
Years in abaca farming	20.32	14.76	1	70
Yield per hectare (kilogram)	307.68	924.23	5	2,000
Visited by PhilFIDA personnel (dummy variable)	0.48	0.50	0	1
Distance of farm from home (kilometers)	6.85	17.65	0.05	250
SUCs rating (1-4 scaling)	1.02	0.14	1	2
LGU rating (1-4 scaling)	1.17	0.56	1	4

Source: Authors' own computation (2025).

Abaca Farmers' Level of Engagement towards PhilFIDA

Figure 1 shows the level of engagement of abaca farmers toward the PhilFIDA. It is revealed that most (73.88%) of the farmers have no engagement in PhilFIDA projects and agricultural activities. In [15], it is found that farmers with no involvement with agricultural extension services have lower productivity and profitability as opposed to farmers with engagement. About 13.06% of the farmers have a weak engagement towards PhilFIDA, 7.84% with moderate engagement and only 5.22% have a strong engagement. It is worth noting that a farmer that is influenced by extension services has a positive effect on their farming activities since they will adopt innovative technologies and can increase their

agricultural knowledge and techniques [1], [3], [11].

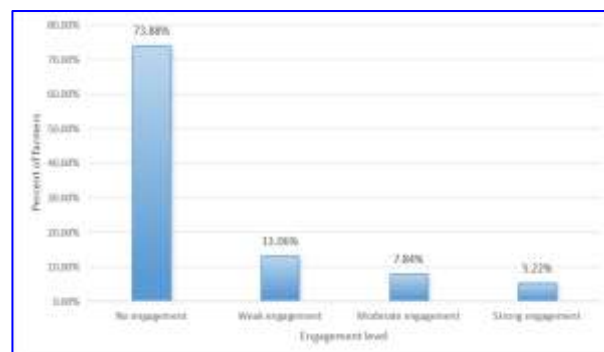


Fig. 1. Farmers' engagement level with PhilFIDA.
Source: Authors' construction (2025).

Table 3 depicted that the abaca farmers' engagement perception score is close to 1.44 (SD=0.85) and the median is 1 which can be interpreted that they have no engagement towards PhilFIDA on average. This implies that the PhilFIDA project management program must be advertised and needs additional personnel to reach small-scale farmers in remote areas. In [4], it is mentioned that PhilFIDA must increase its resources to support abaca farmers and conduct training and seminars to educate farmers on how to adopt new technologies and improve decision-making in farm production activities. In [5], it is depicted that PhilFIDA's responsibility is to promote the development and growth of the fiber industry in the country, hence, the government must support widening its implementation and reach out to more small-scale farmers, especially the remote areas in the Philippines.

Table 3. Perception score for farmers' engagement with PhilFIDA.

	Mean	SD	Median	Interpretation*
Farmers' engagement with PhilFIDA	1.44	0.85	1.00	No engagement

Note: * - See Table 1 for details.

Source: Authors' own computation (2025).

Ordinal Regression Analysis

Table 4 presents the derived ordinal regression model with farmers' level of engagement as the dependent variable. The regression model ($X^2=107.23$) is highly significant at a 1% level with the number of observations of 263 (small-scale abaca

farmers). The coefficient of determination is approximately 0.245 (Pseudo R^2) and the log-likelihood of the ordinal regression is -165.567 which indicates that the model has a better fit and it implies that there are some significant factors that affect the abaca farmers' level of engagement towards PhilFIDA. It is revealed that age (p -value=0.577), sex (p -value=0.287), marital status (p -value=0.559), educational attainment (p -value=0.146), other income (p -value=0.862), size of abaca farm (p -value=0.489), yield (kilogram) per hectare (p -value=0.287), distance from home to abaca farm (p -value=0.736), and farmers' rating towards their interaction to SUCs (p -value=0.124) are not significant predictors to the farmers' level of engagement towards PhilFIDA. This implies that the said variables do not influence their interaction with the PhilFIDA program activities and project implementations.

One of the significant predictors of farmers' level of engagement towards PhilFIDA is the tenurial status, in particular, a farmer is an owner (p -value=0.072) of an abaca farm is more likely to engage with the PhilFIDA development activities and production support and this is statistically evident at 10% level. This goes to infer that a farmer being an owner of an abaca farm is more confident to seek help from PhilFIDA and coordinate with them about the production process and activities. Moreover, on the side of PhilFIDA, they can easily reach out to the farmers who own the farm since the owner is more capable of deciding about the projects and technologies offered to them. In [17], it is mentioned that they reach the small-scale abaca farmers to improve their productivity and farming techniques through extension delivery systems. The years in farming (p -value=0.088) is a significant factor that influences the abaca farmers' level of engagement towards PhilFIDA. This means that a farmer with higher experience tends to be interacting with PhilFIDA in regard to their project implementations and extension services which implies that farmers are willing to be helped in their production process.

Table 4. Ordinal regression model for farmers' engagement with PhilFIDA.

Independent variables	Ordered logistic model (Dependent variable: Farmers' engagement)		
	Coefficient	Standard Error	p-value
Age (in years)	-0.0088 ^{ns}	0.0157	0.577
Male (dummy variable)	0.3878 ^{ns}	0.3644	0.287
Married (dummy variable)	-0.2476 ^{ns}	0.4238	0.559
Education (dummy variable)	0.0729 ^{ns}	0.0502	0.146
Other income (dummy variable)	-0.0864 ^{ns}	0.4971	0.862
Size of abaca farm (hectare)	0.2303 ^{ns}	0.3331	0.489
Owner (dummy variable)	0.8142*	0.4519	0.072
Years in abaca farming	0.0221*	0.0129	0.088
Yield per hectare (kilogram)	-0.0002 ^{ns}	0.0008	0.794
Visited by PhilFIDA personnel (dummy variable)	1.7098**	0.3771	<0.001
Distance of farm from home (kilometers)	-0.0070 ^{ns}	0.0208	0.736
SUCs rating (1-4 scaling)	1.2829 ^{ns}	0.8330	0.124
LGU rating (1-4 scaling)	1.8938**	0.3326	<0.001
Number of observation	263		
Chi-square computed (X^2)	107.23		
p-value (two-tailed test)	<0.001		
Pseudo R^2	0.245		
Log-likelihood	-165.567		

Note: ** p <0.01; * p <0.1; ns - not significant.

Source: Authors' own computation (2025).

In [3], it is mentioned that farmers are more likely to apply agricultural technologies if they have more experience and knowledge in the farming system. In addition, farmers with enough years of experience have the ability to understand the advantages of interacting with the project implementation and innovative technologies brought by PhilFIDA. In addition, Table 4 revealed that the number of visits (p -value<0.001) by PhilFIDA personnel is a highly significant factor at a 1% level that affects the farmers' engagement level to the project implementations and extension support. This implies that a farmer being visited is more likely to engage the extension services, production support, and education and training provided by PhilFIDA as opposed to not being reached out. In [3] and [12], it is portrayed that if a farmer is educated and trained, they are more likely to adopt new techniques and innovative technologies as

opposed to non-trained farmers. In fact, it is stated in [4] that PhilFIDA must strengthen its ability to communicate and collaborate with abaca farmers as main producers to improve its production process and attain sustainability. Furthermore, the ordinal regression model depicted that the abaca farmers' level of interaction with LGU (p -value<0.001) has influenced the level of engagement with PhilFIDA at a 1% level of significance. This implies that interacting with LGU programs and activities helps to connect to the growth and development brought by PhilFIDA. In [4], [8], and [19], it is depicted that LGU and PhilFIDA are working together to provide provisions in abaca farming to farmers for the development of the fiber industry in the country. Moreover, in [19], it is mentioned that LGU is the frontline of the extension delivery system and PhilFIDA is responsible for helping the abaca farmers improve their farming activities.

CONCLUSIONS

This research study aims to develop a statistical model that captures the significant factors affecting the small-scale abaca farmers' level of engagement towards PhilFIDA. Results revealed that the small-scale abaca farmers are considered as no engagement (on average) in the PhilFIDA project and program implementations in improving the fiber industry. In conclusion, PhilFIDA has not rigorously reached out to the small-scale farmers in the remote areas in Eastern Visayas, Philippines. Based on the regression model, an owner and more experienced abaca farmer is the one who collaborates with PhilFIDA in improving their production process in which they apply new agricultural techniques and technologies. Moreover, farmers who are visited by PhilFIDA and interact with LGU are the ones who engage PhilFIDA's projects and programs for the growth and development of the fiber industry. In that case, pro-active communication and a campaign for the abaca rehabilitation program should be initiated by PhilFIDA in the quest to increase the production of small-scale farmers and

improve the harvest of quality fibers in Eastern Visayas. This activity should be a continuous process and it should also be dynamic enough to face changing conditions in the communities. Moreover, LGU personnel can provide extension support through the establishment of abaca demofarms and train their agricultural technicians on abaca production with the aid of PhilFIDA. The need for a more collaborative undertaking especially on studies related to varietal improvement, development of protocols for effective disease management, and mass production of quality planting materials, among others can be pursued. This can be done by developing a program proposal participated by SUCs and other stakeholders anchored on the innovation systems approach. SUCs as the powerhouse of innovation and technologies can assist the PhilFIDA in framing this innovative strategy. In future research, one may include the economics of happiness of abaca farmers in the statistical model to strengthen the current findings.

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