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Cacao growers profiling in one municipality of Region 2 Philippines: Basis for sustainable development program

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Abstract

The Cagayan Valley Regional Development Agenda recognized cacao as a possible product commodity in Region 02, Philippines to meet global demand. The Agricultural Training Institute (ATI) in Cagayan Valley has indicated that cacao production has industry potential. Reviving the cacao sector in Region 02 would help farmers increase their income. ATI-RTC 02 provides constant support to farmers to improve their growing techniques and understanding of cacao. Providing a detailed picture of the difficulties and restrictions faced by cacao producers in the municipality will pave the way for improved policy orientations that would increase productivity and sustainability of cacao produced in the region. This was a descriptive survey. Using a pre-tested interview form, primary data was obtained. The study will focus on 35 cacao producers. The names of these cacao growers were obtained from the Lasam Municipal Agriculturist. The data will be examined using frequency, mean, percentage, and standard deviation. Because most cacao producers have less than one hectare plantation, there is a need to encourage them to extend their lands so that sufficient supply of cacao beans would be secured. Cacao producers should form an organization, processing equipment for growers should be explored, and more production and processing training should be provided. Because climate affects cacao trees, wind breaks should be used and organic insecticides should be used to combat pests and illnesses.

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Introduction

Philippines can be a potential producer of cacao (Abad & Cruz, 2010). The climatic conditions and soil characteristics of the country are conducive to growing cacao. The country's cacao production is mostly comprised of smallholders under 2 hectares. As a cash crop, it plays a very important economic role for smallholder farmers because the tree crop is highly suitable or compatible under different production systems. The climate of the Philippines makes it a conducive environment for Theobroma Cacao trees to thrive and grow. The first known importation of these trees were dated back on the Spanish era by a mariner in 1670 and planted in San Jose, Batangas. The Philippines was the first country in Asia to use cacao as a drink used in special occasions.

The Philippines contributes only 0.16% of the world's total production and the trend seems to have changed negatively with production declining rapidly. The crucial thinning out of the cacao industry in the country started in 1992 when the Comprehensive Agrarian Reform Program (CARP) was implemented. It resulted to the breakdown and redistribution of commercial farms into smaller farm units. In addition, the outbreak of the cocoa pod borer pest was unchecked which caused some plantations to be wiped out and abandoned (Cocoa Phil., 2006).

The Philippine Rural Development Project (PRDP) reported that the cocoa bean is one of the priority products of all the regions in Mindanao. Cacao is an important cash crop for producing countries and a key import for processing and consuming countries. Cocoa producing countries are unable to fulfill the growing demand for cocoa products worldwide, especially chocolate (Cocoa Barometer 2010). The Philippines itself is a net importer of cocoa products with annual consumption equivalent to 50,000 MT of dried cocoa beans. By 2020, the Philippines chocolate industry's projected demand is expected to reach an estimated 100,000 metric tons of dried cocoa beans which would translate to 50-70 million trees and 120-150 thousand hectares of land. In the world market, demand for cocoa beans is projected to reach 4.7M to 5M in 2020 with average annual deficit of 100,000 MT. These trend shares of particular interest to Mindanao, which is responsible for approximately 90% of the country's cacao production. The Philippine cacao industry with Mindanao in the lead particularly Davao Region is targeting to produce 100,000 MT of cocoa beans per year starting in 2020.

Abad and Cruz (2010) noted of the total cacao output in 2008, 66% or 3,470 tons came from Davao Region, of which 24% or 832 tons came from Davao City alone. That the current productivity of cacao is only 6% of the country's production target for the next seven years, which is 100,000 metric tons. To reach the country's desired productivity, cacao farmers has to plant 50 million trees and revive those 400,000 neglected cacao trees in order to be productive again. Since increased productivity is directly related to production efficiency, it is imperative to raise productivity of the farmers by helping them reduce technical inefficiencies.

In response to the demand of cacao products in the world market, the Cagayan Valley Regional Development Agenda identified cacao being one of the potential product commodities in Region 02. No less than the National Economic Development Authority (NEDA) is encouraging farmers to venture on Cacao farming because of its economic viability. The Demand for cocoa can be traced to a specific origin and in certified production systems that follow certain social and environmental guidelines is expected to reach 50% of total world demand by 2020 (Cocoa Barometer, 2012).

Furthermore, the Department of Agriculture through the Agricultural Training Institute (ATI) in the Cagayan Valley reported that cacao farming has the potential as an industry. However, the country lacks raw material to process into chocolates. Reviving the cacao industry in Region 02 is a response to the need of raw materials and will help farmers to boost their income. ATI-RTC 02 is continuously providing interventions to help farmers improve their farming practices aimed to enhance the knowledge, skills and traditional practices (GAO) on cacao, (ati.da.giv.ph).

The municipality of Lasam is one of the towns in the province of Cagayan having an aggregate land area of approximately 23,400 or 234 square kilometers. This is evenly distributed among its 30 barangays. With its large geographic location, there are cacao farms located among its 30 barangays which provide additional income for the cacao owners.

Due to the identified potential of the municipality to venture on cacao industry, last August 2015, in partnership with the Local Government Unit of Lasam, Cagayan State University, through the ATI-RTC 02, training was conducted among the Lasam Farmers that helped them become productive and competitive cacao growers.

Identification of yield performance in cacao farms are necessary for future development. According to experts from around the world who conducted extensive examinations, deficiency in the yield performance of cacao farms was discovered, paving the way for legislative action to be taken to assist cacao farmers in increasing the productivity of their cacao farms and thereby increasing their profits (López *et al.*, 2021; Ofori & Padi, 2020; Sumitha *et al.*, 2018; Wibaux *et al.*, 2018). This type of investigation, however, has not yet been done out, particularly in the Lasam. Since no study has been conducted in the municipality regarding the yield performance of cacao farms in Lasam, providing a clear picture of the problems and constraints encountered by cacao growers in the municipality would pave way of better policy directions that will promote productivity and sustainability of cacao produced in the locality.

In order to do this, the researchers set out to determine the yield performance of cocoa plantations in the municipality of Lasam. Cocoa farmers will be able to concentrate their efforts on the most critical yield response elements as well as the impediments and constraints that the study exposes in their fields as a result of this. While the Cagayan State University at Lasam had set cacao as its banner commodity for production and processing could recommend policy directions to boost the cacao industry. This would also enable cacao growers to focus on the important yield response determinants and to address the problems/constraints that will be identified in the study. Hence, this research has been conceptualized and proposed.

Statement of the Problem

This study will be conducted to identify the yield performance of cacao farms in the municipality of Lasam. Specifically, it aims to answer the following questions:

1. What is the profile of the cacao growers in terms of the following variables?

a. Age
b. Sex
c. Civil Status
d. Monthly family income
e. Length of experience as cacao grower
f. Other sources of income
g. Family size

2. What are the farm-specific characteristics of the cacao growers for the past 5 years in terms of the following?

h. Area of farm grown with cacao
i. Number of cacao trees per hectare
j. Planting distance between trees
k. Number of workers per hectare

3. What are the best practices of the cacao growers with respect to the following aspects?

l. Fertilizing
m. Maintaining
n. Harvesting
o. Drying
p. Processing
q. Marketing

4. What are the common problems that the cacao growers experience with respect to the following aspects?

r. Sources
s. Climatic
t. Costing
u. Pest
v. Processing
w. Marketing

4. What is the yield per hectare of the cacao farms?

Conceptual Framework

In the study of Abad and Cruz, (2011) on the productivity and technical efficiency of smallholder cacao farmers, it was found out that farmers were experiencing increasing returns in the use of farm and that production which represents underutilization of production. This means that the farm has not met its full potential. The results of frontier model indicated that cacao production could be increased by increasing cacao area, labor and fertilizer use. The efficiency level ranged between 0.65 and 0.963 with a mean of 0.894. The major contributing factors to efficiency were farmers' age, and years of formal education.

The study observed that there was an opportunity for an increase in farmers' efficiency and concluded that policies that would directly affect these identified variables should be pursued vigorously.

The Department of Agriculture through the Agricultural Training Institute (ATI) in the Cagayan Valley reported that cacao farming has the potential as an industry. However, the country lacks raw materials to process into chocolates. Reviving the cacao industry in Region 02 is a response to the need of raw materials and will help farmers to boost their income. Thus, one of the present objectives of the present study. ATI-RTC 02 is continuously providing interventions to help farmers improve their farming practices aimed to enhance the knowledge, skills and traditional practices on cacao.

Further, the Department of Agriculture, Regional Field Unit conducted a SWOT analysis of Cacao. It was reported that among of its weaknesses are: Poor cultural management followed by growers, prevalence of pests and diseases among smallholders, Lack of information on pre and post-harvest technologies, Poor bean quality, Lack of marketing promotions in other countries, Lack of quality standards, Lack of marketing strategies. The following threats were also identified: Virus diseases and insect pest, Land use/conversion, Occasional risks due to adverse climatic disturbances, Weakening economic conditions in the country, Decline in production and area, Substitution of low quality cocoa butter with vegetable oils in some applications.

The municipality of Lasam is one of the towns in the province of Cagayan having an aggregate land area of approximately 23,400 or 234 square kilometers. This is evenly distributed among its 30 barangays. With its large geographic location, there are cacao farms located among its 30 barangays which provide additional income for the cacao owners. Since no study has been conducted in the municipality regarding the yield performance of cacao farms in Lasam, providing a clear picture of the problems and constraints encountered by cacao growers in the municipality would pave way of better policy directions that will promote productivity and sustainability of cacao produced in the locality.

While the Cagayan State University at Lasam had set cacao as its banner commodity for production and processing, which could recommend policy directions to boost the cacao industry. This would also enable cacao growers to focus on the important yield response determinants and to address the problems/constraints that will be identified in the study.

Presentation, Analysis and Interpretation of Data

Profile of the cacao growers

This section provides the background information of the cacao growers which may supply material evidence in understanding the context from which the study is conducted. It includes their sex, civil status, age, source of income, monthly family income, other source of income, length of experience as cacao growers other source of income and the family size.

Age.

Of the total thirty five (35) cacao growers, most of them, 16 or 46 percent belong to the age bracket of 51-60 ; 12 or 34 percent belong to the age bracket of 41-50; 5 or 14 percent belong to the age bracket of 61-70; and 1 or 3 percent belong to the age bracket of 21-30 and 31-40. The mean 52.07 and the standard deviation 8.73. Desirably, in the spirit or vertical articulation, the age of cacao growers are indispensable.

Table 1. Personal profile of the cacao growers in terms of their age.

Age (in years)	Frequency (n=35)	Percentage
61 to 70	5	14
51 to 60	16	46
41 to 50	12	34
31 to 40	1	3
21 to 30	1	3
Mean = 52.07	S.D. = 8.73	

Sex

The table 2 shows the profile of cacao growers according to sex .Twenty four (24) or 69 percent are male and eleven (11) or 31 percent are female. This implies that majority of the respondents are male.

Table 2. Personal profile of the cacao growers in terms of their sex.

Sex	Frequency (n=35)	Percentage
Female	11	31
Male	24	69

Civil status

Table 3 provides the details regarding the civil status of the cacao grower respondents. The table shows that 31 or 89 percent of the respondents are married; 2 or 6 percent are widow/widower, 1 or 3 percent is single and another 1or 3 percent is separated.

Table 3. Personal profile of the cacao growers in terms of their civil status.

Civil status	Frequency (n=35)	Percentage
Single	1	3
Married	31	89
Separated	1	3
Widow/widower	2	6

Monthly family income

Table 4 shows the profile of the cacao growers' monthly income. Table 4 reveals that most of their monthly income are 1,000 – 10,000 with frequency count of fourteen (14) or 40 percent; 11,000 – 20,000.

With frequency count of fourteen or 40 percent; 21,000 – 30,000 with frequency count of four (4) or 11 percent and 31,000-40,000 with frequency count of three (3) or 9 percent.

Table 4. Personal profile of the cacao growers in terms of their monthly family income.

Monthly family income (in pesos)	Frequency (n=35)	Percentage
31,000 to 40,000	3	9
21,000 to 30,000	4	11
11,000 to 20,000	14	40
1,000 to 10,000	14	40
Mean = Php14,200.00	S.D. = Php7,899.37	

Number of years of experience as cacao grower

Table 5 shows the farm-specific characteristics of the cacao growers in terms of their experience as cacao growers. The table reveals that 26 or 74 percent have an experience of 5 to 6 years; 4 or 12 percent have an experience of 3 to 4 years; 4 or 11 percent have an experience of 7 or above and 1 or 3 percent have an experience of 1 to 2 years.

Table 5. Farm-specific characteristics of the cacao growers in terms of their experience as cacao growers.

Experience as cacao grower (in years)	Frequency (n=35)	Percentage
7 or above	4	11
5 to 6	26	74
3 to 4	4	12
1 to 2	1	3
Mean = 5.04 years	S.D. = 0.92	

Sources of income

Table 6 shows the personal profile of the cacao growers in terms of their sources of income. Table shows that majority 33 or 94% are involved in farming as the primary source of income ; one respondent is receiving a salary aside from farming and another one (1) or 3 percent is receiving a pension. For secondary sources of income, 33 or 94 percent are engaged in business and one (1) or 3 percent is involved in farming and another 1 or 3 percent established a cacao nursery as another source of income.

Table 6. Personal profile of the cacao growers in terms of their sources of income.

Sources of income	Primary		Secondary	
	Frequency (n=35)	Percentage	Frequency (n=35)	Percentage
Farming	33	94	1	3
Salary	1	3	-	
Pension	1	3	-	
Business	-		33	94
Nursery	-		1	3

Family size

Table 7 shows the profile of the cacao growers along family size. It shows that majority of the respondents have 4-5 family size with frequency of twenty six (26) or 74 percent; 1-3 family size with a frequency of eight (8) or 23 percent and one 7-9 family size with a frequency of one (1) or 3 percent with a mean of 5 and standard deviation 2.

Table 7. Personal profile of the cacao growers in terms of their family size.

Family size (household size)	Frequency (n=35)	Percentage
1 to 3	8	23
4 to 6	26	74
7 to 9	1	3
Mean = 5	S.D. = 2	

Farm-Specific Characteristics of the Cacao Growers

Area of the farm grown with cacao

Table 8 shows the farm - specific characteristics of cacao growers in terms of land area of their farm grown with cacao with frequency of seventeen (17) or 48 percent for less than one (1) hectare; 9 or 26 percent for 3 to 4 hectares; 6 or 17 percent for 1 to 2 hectares and 1or 3 percent for 7 to 8 hectares. The mean is 1.92 hectares which is majority, with a standard of 1.84. This means that the farm has not met its full potential.

As discovered by Aneani & Ofori-Frimpong (2013), the size of the cocoa farm and the overall amount of cocoa produced have a considerable influence on cocoa yield. As a result, the findings of the current study show that expanding cacao area might result in an increase in cacao output levels.

Table 8. Farm-specific characteristics of the cacao growers in terms of area of their farm grown with cacao.

Farm area with cacao (in hectares)	Frequency (n=35)	Percentage
7 to 8	1	3
5 to 6	2	6
3 to 4	9	26
1 to 2	6	17
less than 1	17	48
Mean = 1.92 hectares	S.D. = 1.84	

Cacao tree density per hectare

Table 9 shows the area of their farm grown with cacao. As revealed 14 or 40 percent for 400 to 699 trees per hectare; 11 or 31 percent for 201 to 399 trees per hectare; 7 or 20 percent for 200 trees or less; 2 or 6 percent for 900 or more trees per hectare and 1 or 3 percent for 700 to 899 trees per hectare. The mean is 414 and the standard deviation is 238.12.

Table 9. Farm-specific characteristics of the cacao growers in terms of area of their farm grown with cacao.

Density (trees per hectare)	Frequency (n=35)	Percentage
900 or more	2	6
700 to 899	1	3
400 to 699	14	40
201 to 399	11	31
200 or less	7	20
Mean = 414 trees per hectare	S.D. = 238.12	

Planting distance between trees

Table 10 shows the farm specific characteristics of the cacao growers in terms of distances between the cacao trees. The table reveals that 30 or 86 percent used 4 by 4 meters; 4 or 11 percent used 3 by 3.5 meters and 1 or 3 percent used 4 by 4.5 meters. This indicates that majority of the cacao farmers practice 4 by 4 meters as planting distance between cacao trees.

Table 10. Farm-specific characteristics of the cacao growers in terms of distances between their cacao trees.

Plant distances (in meters)	Frequency (n=35)	Percentage
4 by 4.5	1	3
4 by 4	30	86
3 by 3.5	4	11

Number of workers per hectare

Table 11 shows the farm – specific characteristics of the cacao growers in terms of number of workers per hectare. Thirty or 97 percent for 1 to 2 workers per hectare and there's only one (1) or 3 percent with 3 to 4 workers per hectare.

Best Practices of the Cacao Growers

As to the best practices of the cacao growers. In terms of fertilizer application, twenty eight (28) of them believed that organic fertilizer is better.

According to Sasmita *et al.*'s (2017) research, organic fertilizer containing biochar aided in the development of cocoa seedlings. As to *Maintaining/irrigating* their cacao plantations, rain water as a source of water prevails with a frequency count of 28. When it comes to meeting a portion of the nation's growing water demands, Dave says that rainwater collection and storage is becoming increasingly popular (Abdulla *et al.*, 2021). In harvesting, the use of sickle is the most common with a frequency count of 21. Singh *et al.*'s (2014) study discovered that harvesting using a sickle increases harvesting efficiency.

Table 11. Farm-specific characteristics of the cacao growers in terms of number of workers per hectare.

Number of workers (trees per hectare)	Frequency (n=35)	Percentage
3 to 4	1	3
1 to 2	34	97
Mean = 2 workers	S.D. = 0.34	

In drying cacao seeds, the table shows that majority own solar dryer. According to a research completed by Madarang *et al.* (2019), the usage of the created cacao drier provides cacao producers with technical and economic benefits. In processing cacao seeds, manual grinder was the most commonly used with a frequency count of 23. In marketing cacao products, local market prevails with a frequency count of 33.

Table 12. Best practices of the cacao growers.

Best Practices	Frequency*	Rank
Fertilizing		
Organic	28	1
Combination	7	2
Maintaining/irrigating		
Rain water	28	1
Creek/river/spring	7	2
Harvesting		
Sickle	21	1
Bolo	20	2
Knife	15	3
Pruning scissor	1	4
Drying		
Solar dryer	35	-
Processing		
Manual grinder	23	1
Mechanical grinder	9	2
Mechanical roaster	3	3
None	1	4
Marketing		
Local	33	1
Provincial	1	2
Regional/national	1	3

*Multiple Responses

Common Problems Encountered by the Cacao Growers

Table 13 shows the common problems encountered by the cacao growers. Adverse climatic conditions such as heavy rainfall and flooding ranked first with a weighted mean of 4.66. The item lack of processing tools and equipment ranked second with a mean of 4.60 with a descriptive value as always. The item lack of capital and credit sources ranked third with a weighted mean of 4.43 with a descriptive value as always. The item high cost of farm inputs obtained the fourth highest with a weighted mean of 17 with a descriptive value as often. The item low market price of farm produce ranked fifth with a weighted mean 4.11 with a descriptive value as often and the item presence of pest and diseases ranked sixth with a weighted mean 3.71 with a descriptive value as often. This finding is consistent with the findings of Hainmueller *et al.* (2011) that the cocoa sector has been plagued by persistent problems, including declining productivity, crop damage from pests and disease, persistent poverty among farming communities, health and environmental issues, and instances of child and forced labor on farms.

Table 13. Common problems encountered by the cacao growers.

Aspects	Weighted Means	Descriptive Value
Lack of capital and credit sources	4.43	Always
Adverse climatic conditions such as heavy rainfall and flooding	4.66	Always
High cost of farm inputs	4.17	Often
Low market price of farm produce	4.11	Often
Lack of processing tools and equipment	4.60	Always
Presence of pests and diseases	3.71	Often
Overall Weighted Mean	4.28	Always

Legend:

4.20 – 5.00	>> Always
3.40 – 4.19	>> Often
2.60 – 3.39	>> Sometimes
1.80 – 2.59	>> Seldom
1.00 – 1.79	>> Never

Yield per Hectare of the Cacao Growers

Table 14 shows the yield per hectare of the cacao farms in Lasam, Cagayan. Table shows that yield per hectare ranges from 500 to 999 kilograms of cacao has the highest frequency of 16 or 46 percent; yield per hectare ranges from 1000 to 1499 kilograms of cacao with the second highest frequency of 12 or 34 percent; and the least yield per hectare ranges from

1500 to 1999 kilograms of cacao with a frequency of 7or 20 percent. The mean is 1,120.93 with standard deviation of 390.00. This is supported by the reports coming from The Philippine Rural Development Project (PRDP) which stated that the cocoa bean is one of the priority products of all the regions in Mindanao. Moreover, cacao is an important cash crop for producing countries and a key import for processing and consuming countries. However, cocoa producing countries are unable to fulfill the growing demand for cocoa products worldwide, especially chocolate (Cocoa Barometer 2010).

Table 13. Yield per hectare of the cacao farms in Lasam, Cagayan.

Cacao Yield (in kilograms)	Frequency (n=35)	Percentage
1500 to 1999	7	20
1000 to 1499	12	34
500 to 999	16	46
Mean = 1,120.93kg	S.D. = 390.00	

Conclusions

Based on the foregoing results of the study, the following conclusions have been drawn. Each of the cacao growers earns more or less 75,000.00 annually with their raw products. However, if processed it will double or even triple the earnings of the cacao growers ;and Since majority of the cacao growers have less than one hectare plantation, there is really a need to motivate them to expand their areas so that sufficient supply of cacao beans will be assured.

Recommendations

The following recommendations are made based on the findings: (1) The cacao growers should be organized into an association so that financial assistance can be generated from the different funding agencies; (2) Processing equipment for the growers should also be considered so that their raw products (cacao beans) can be converted into processed products; (3) More training on production and processing purposes should also be considered; (4) Since climatic condition has an adverse effect on cacao trees, the use of wind breakers should be introduced, (5) Pest and diseases can be controlled using organic pesticides.

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