Farmer's Perception on Pro Cocoa National (GERNAS) Program in Boalemo Regency, Gorontalo Province of Indonesia

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Abstract: ***The aim of this study is to describe the implementation of Pro Cocoa National Gerakan Nasional(GERNAS) program in Boalemo Regency and analysing the farmer perception toward GERNAS program regarding to cocoa production and quality in Boalemo Regency, Gorontalo Province of Indonesia. The study was conducted from September 2015 to November 2015 by using survey approach. The samples consist of 52 respondents who met the study criteria. The sample was selected using proportional sampling method. The data were analysed using descriptive analysis and frequency distribution. The results indicated that implementation of the GERNAS program in Saritani village is in line with GERNAS programs' technical guideline based on determination of target famer groups, empowerment of farmer group and cocoa cultivation (pruning, intensity of harvesting, sanitation, pest treatment and fertilization). Besides, farmers indicated that cocoa production and quality was increased in Boalemo Regency.***

I. INTRODUCTION

Approximately 39.96 million farmers are working in agricultural and allied activities in Indonesia [1]. According to Indonesian's Ministry of Agriculture, crop estate (oil palm, coffee and cocoa) had contributed to the Indonesia Gross Domestic Product (GDP) about 5.79 % in year 2014 [2]. The agriculture in Indonesia accounted for 13.5% of GDP in 2016 and maintained this performance in the first quarter of 2017 [3]. The total land area is around 190 million hectares (ha) and 55 million ha are agricultural out of which 24 million ha are arable and 20 million ha under permanent crop [4]. Agriculture is still playing role in reducing poverty in the rural areas.

Indonesian is now the 3rd largest country in cocoa beans produced in the global with approximately of 450, 000 tons in year 2011-2012, andgrowing 777,500 tonnes in 2013 [5, 6]. Indonesia had made up 12.2% of world total cocoa bean production in 2010 [7]. In 2011, there are 614 million US$ or 6.7 % of world's total export in Indonesia [5]. Hence, it's important to prevent the decrement in cocoa production growth, which reduced cocoa export volume and value, thus negative effect on the country's foreign exchange.

In 2010, the Indonesian Agriculture Ministry had announced Pro Cocoa National Program (GERNAS) with the purpose to increase cocoa production. The cocoa development had been continued with co-administration activities and government had undertaken cocoa development activities through Indonesia Government State Budget in 2015. Boalemo regency is one of the locations of cocoa development where cocoa is potential crop that boosts Gross Regional Domestic Product (PDRB) revenue. The development of cocoa commodity in Boalemo regency in 5 years is targeted for 5, 000 ha (One million cocoa tree program) so that area expansion and production target is increased 10% every year,

The farmers also play important roles in the GERNAS program. The GERNAS program has successfully improved the cocoa quality and increased the cocoa production. In addition, each farmer may have different perceptions toward GERNAS program. Therefore, it's necessary to understand farmer's perception toward GERNAS program in Boalemo regency so that the program target had been achieved. Therefore, this study aims to describe the implementation of the Pro Cocoa National (GERNAS) program in Boalemo Regency and analysing the farmer perception toward GERNAS program regarding to cocoa production and quality in Boalemo Regency, Gorontalo Province

II. MATERIAL AND METHODS

Study location and time

The study was conducted in Boalemo, Gorontlo Province as shown in Figure 1. The study site was determined based on the criteria that have a close relationship with the problems raised in this study. The basic consideration included i) cocoa is a good commodity in Boalemo Regency; ii) cocoa development had been implemented in Boalemo Regency from 2011 until now. Womosari Regency is selected for this study due GERNAS program had been implemented since year 2011. The study was conducted from September until November 2015.

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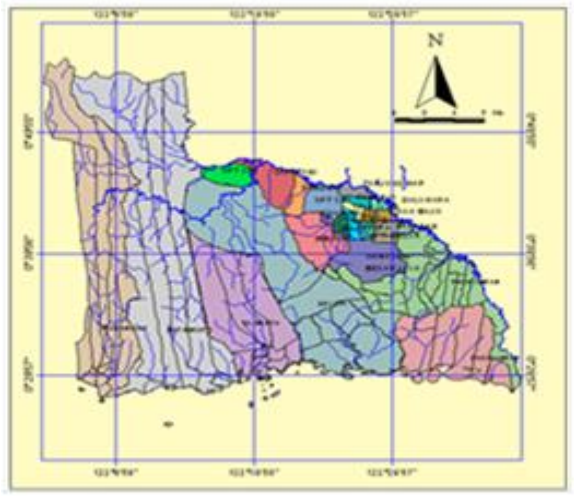

Fig. 1 Map of Wonosari Regency

Study design

The study design used is survey approach. The questionnaire survey was conducted through the samples which selected from the study population.

Study Population and Techniques

The study population was cocoa farmers in Boalemo Regency. The selected cocoa farmers who had been implemented cocoa intensification program which shown in Table 1. The study population is amounted to 578 families with cocoa farm areas, 459.40 hectares.

Table. 1 Data of cocoa farmers groups in intensification activities

Regency	Village	Frequency	Total
Paguyaman	Balate Jaya	45	125
	Bualo	38	
	Bukit Karya	34	
	Rejonegoro	8	
Dulupi	Tangga Barito	91	104
	Kota Raja	13	
Wonosari	**Tri Rukun**	**41**	**258**
	Sari Tani	**112**	
	Pangea SP-1	**48**	
	Bongo III	**47**	
	Pangea	**10**	
Tilamuta	Modelomo	3	3
Botumoito	Mebongo	6	27
	Potanga	21	
Managgu	Keramat	14	61
	Kaaruyan	16	
	Tabulo Selatan	15	
	Bedungan	16	
Total		**578**	**578**

Sampling Technique

The sample in this study is determined based on area had the largest of farmer numbers and largest cocoa farm areas. Wonosari Regency was selected with a proportional rate of 20% of total farmers per village. The sample sizes were 52 respondents as shown in Table 2. The samples determination is done by simple random with consideration of the pattern of farmer community of cocoa homogenous in Boalemo Regency.

Table. 2 Data of samples on the intensification activities

Regency	Village	Total	Percentage (%)
Wonosari	Tri Rukun	41	8
	Sari Tani	112	22
	Pangea SP-1	48	10
	Bongo III	47	10
	Pangea	10	2
Total		258	52

Data Collection

The primary data were obtained through discussion and interviews with farmers who had implemented GERNAS program in 2011. The secondary data were obtained from the Provincial Plantation office in form of GERNAS program data, production and productivity data from the central Bureau of Statistics and, regional development plan from Regency Plantation office. The data collection technique is done through interview, observation and documentary. The interview was conducted based on questionnaires. The observation is done by visiting cocoa farm to observe the real condition. Meanwhile, documentary technique is collecting data/documents related in cocoa research in Boalemo Regency.

Data Analysis

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The data were analysed through descriptive analysis and frequency distribution analysis.

Study Site

Total area of Boalemo Regency is 2,362.58 m^2 or 20.55% of total area of Gorontalo province.Boalemo Regency lies has latitude ⟦00⟧^° 24’04”- ⟦01⟧^° 02’30” and longitude ⟦120⟧^° 33’33”. Boalemo Regency is hills that cover most areas. The rainfall amount varies by 103mm/month with average rainy days of 13 days of rain per month with C-type climate. According to Schmidt and Ferguson, dry season from June to September and rainy season from December to March. The average air temperature in the day time ranged from 32.1 ℃ to 33.5 ℃ and night time ranged from 22.50℃ to 24.4 ℃. Relative humidity ranges from 73% in September to 85% in April and December. The sample area of this study is Wonosari district, which consist of 16 villages, but only 5 villages had implemented cocoa intensification program included Trirukun, Sari Tani, Pangea-SP1, Bongo III and Pangea.

Figure 2 shows Boalemo Regency is surrounded with hinterland in form of plain that falls within a steep slope class ranging from 15% to 40% and slopes above 405 (very steep) as well as parts of the region with slopes between 2% and 15% sloping. High slope is limitation for local development, especially toward South area. The area with slopes above 15% is used for plantations and forests.

Figure 3 shows in Bolemo, largest land usage is forests such as the dry forest of 66,879 hectares and swamp area of 2 hectares. Land usage for agriculture included 31,424 hectares ofdryland farming, mixed dryland farming about 30,203 hectares, paddy field about 7,188 hectares and 31,424 hectares of plantations.

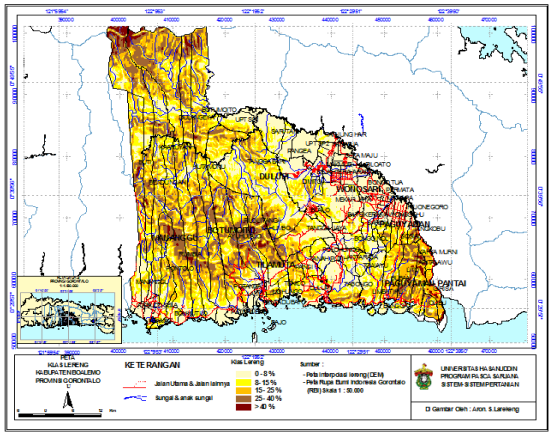

Fig. 2 Boalemo Regency slope areas

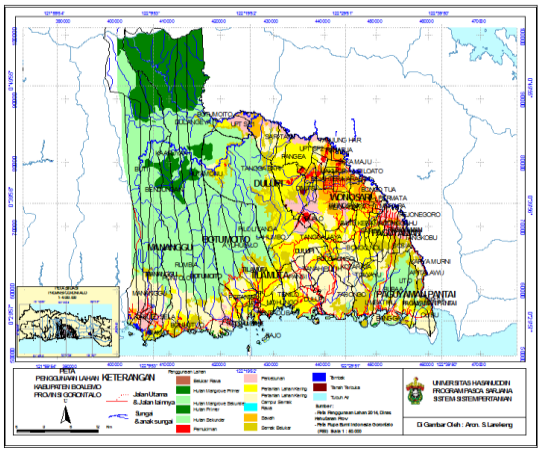

Fig. 3 Land usage in Boalemo Regency

III. RESULTS

Overview of GERNAS program implementation in Boalemo Regency

Table 3 shows Trirukun village, 6 respondents (11.54%) in the socialization group attended GERNAS program, while 8 respondents (15.38%) had joined GERNAS program but in prospective land and farmers selection group. Meanwhile, 10 respondents attended the GERNAS program in the prospective land and farmers selection group and 7 respondents (13.46%) had attended GERNAS program but in socialization. These results indicated that farmers in SP-1 village more active than farmers from Trirukun village among respondents in prospective land and farmers selection groups.

Based on Table 3, high number of farmers in SaniTani village had attended empowerment training, while Pangea had less farmers attended empowerment training. In SaniTani village, 21 respondents (40.38%) had attended training and one respondent (1.92%) did not attend any training on GERNAS program. Meanwhile, only a respondent (1.92%) had attended empowerment training and a respondent (1.92%) did not attend empowerment training for GERNAS program.

Table. 3 Determination of targeting farmer group toward GERNAS program

Village	Category	Determination of target farmer groups					
		Socialization		Prospective land and farmers selection		Training of farmers group empowerment	
		Total (n)	%	Total (n)	%	Total (n)	%
Bongo III	**Attendance**	9	17.31	7	13.46	7	13.46
	No attendance	1	1.92	3	5.77	3	5.77
Trirukun	**Attendance**	6	11.54	8	15.38	5	9.62
	No attendance	2	3.85	0	0.00	3	5.77

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Pangea	**Attendance**	2	3.85	2	3.85	2	3.85
	No attendance	0	0.00	0	0.00	0	0.00
Sari Tani	**Attendance**	22	42.31	22	42.31	21	40.38
	No attendance	0	0.00	0	0.00	1	1.92
SP-1	**Attendance**	7	13.46	10	19.23	6	11.54
	No attendance	3	5.77	0	0.00	4	7.69

Pruning

Meanwhile, pruning implementation on cocoa cultivation in the study site showed four villages are still low in term of technical guidelines for cocoa cultivation that is Bongo III village. Based on Table 4, about 7 respondents (13.49%) had implemented cocoa pruning, while 3 respondents (5.77%) did not implemented cocoa pruning; 6 respondents (1.54%) had implemented cocoa pruning and 2 respondents (3.85%) did not implemented cocoa pruning inTrirukun; a respondent (1.92%) had implemented cocoa pruning and a respondent (1.92%) did not implemented cocoa pruning in Pangea; In SP-1 village, 6 respondents (11.54%) had implemented cocoa pruning and 4 respondents (7.69%) did not implemented cocoa pruning.

Harvest Frequency

According to Table 4, in Trirukun village, 7 respondents (13.46%) had harvest frequently and one respondent (1.92%) had less cocoa harvest frequently; 18 respondents (34.62%) had cocoa harvest frequently and 4 respondents (7.69%) had less cocoa harvest frequently in Saritani; 10 respondents (19.23%) had cocoa harvest frequent in SP-1 village. Four villages had deeply understood in cocoa harvest frequent together with cocoa cultivation technical guidelines.

However, different with Bongo III and Pangea villages which farmers are still lacks of harvest understanding.

Sanitation

Table 4 shows four villages had understood technical guidelines for gardening sanitation. In Trirukun village, 8 respondents (15.385) had proper gardening sanitation; 2 respondents (3.85%) had proper gardening sanitation in Pangea; 22 respondents (42.31%) had proper gardening sanitation in Saritani; 10 respondents (19.23%) had proper gardening sanitation in SP-1 village.

Fertilization

Based on Table 4, three villages had implemented cultivation technique especially fertilization with technical standard. In Trirukun village, 8 respondents (15.38%) had completed cocoa fertilization process; a respondents (1.92%) had completed cocoa fertilization process and a respondent (1.92%) did not completed cocoa fertilization process in Pangea village; In Sari Tani village, 22 respondents (42.31 %) ; 9 respondents (17.31%) had completed cocoa fertilization process and a respondent (1.92%) did not complete cocoa fertilization process.

Table. 4 Cocoa pruning, harvest frequency, sanitation and fertilization at the study site

Village	Category	Cocoa cultivation							
		Pruning		Harvest Frequent		Sanitation		Fertilization	
		(n)	%	(n)	%	(n)	%	(n)	%
Bongo III	**Yes**	7	13.49	3	5.77	6	11.54	6	11.54
	No	3	5.77	7	13.46	4	7.69	4	7.69
Trirukun	**Yes**	6	11.54	7	13.46	8	15.38	8	15.38
	No	2	3.85	1	1.92	0	0	0	0
Pangea	**Yes**	1	1.92	1	1.92	2	3.85	1	1.92
	No	1	1.92	1	1.92	0	0	1	1.92
Sari Tani	**Yes**	22	42.31	18	34.62	22	42.31	22	42.31
	No	0	0	4	7.69	0	0	0	0
SP-1	**Yes**	6	11.54	10	19.23	10	19.23	7	13.46
	No	4	7.69	0	0	0	0	3	5.77

Control of plant-disturbing organism

Table 5 shows in Trirukun village, 8 respondents (15.38%) had performed pest control. Meanwhile, 2 respondents (3.85%) had performed pest control in Pangea, while 22 respondents (42.81%) had performed pest control. In SP-1 village, one respondent did not performed pest control and 9 respondents (17.31%) had performed pest control.

Quality Cocoa seed usage

Table 5 shows in Bongo III village, only 2 respondents (3.85%) were used good quality cocoa seed and 8 respondents (15.38%) did not use lack of quality cocoa seed.

Meanwhile, 3 respondents (5.77%) had used good quality cocoa seed and 5 respondents (9.62%) had used lack of quality cocoa seed in Trirukun village. In Pangea village, 2 respondents (3.85%) did not used good quality of cocoa seed during cocoa cultivation. In additions, 10 respondents (19.23%) did not use any good quality of cocoa seed in the cocoa cultivation.

Fermentation

Table 5 shows there were three villages had farmers did not performed fermentation process in their cocoa plantation areas. In Trirukun village, 8 respondents (15.38%) did not performed fermentation process in their cocoa plantation area. In additions, 2 respondents (3.85%) also did not performed fermentation process in Sari Tani village. In SP-1 village, 10 respondents (19.23%) did not performed fermentation process in their cocoa plantation areas.

Table. 5 Cocoa control of plant-disturbing organism, cocoa seed usage and fermentation in the study site

Village	Category	Cocoa cultivation					
		Control of plant-disturbing organism		Quality Cocoa seed usage		Fermentation	
		(n)	%	(n)	%	(n)	%
Bongo III	**Yes**	8	15.38	2	3.85	2	3.85
	No	2	3.85	8	15.38	8	15.38
Trirukun	**Yes**	8	15.38	3	5.77	0	0
	No	0	0	5	9.62	8	15.38
Pangea	**Yes**	2	3.85	0	0	0	0
	No	0	0	2	3.85	2	3.85
Sari Tani	**Yes**	22	42.31	7	13.46	8	15.38
	No	0	0	15	28.85	14	26.92
SP-1	**Yes**	9	17.31	0	0	0	0
	No	1	1.92	10	19.23	10	19.23

Farmer's perception in the cocoa production after GERNAS program involvement

Based on farmer's perceptions in the cocoa production after GERNAS program involvement in Table 6, only Bongo III and Trirukun villages that farmers agreed their cocoa production greatly improved. Both villages had a respondent for each of village agreed their cocoa production is greatly improved. In Saritani village, 21 respondents (40.38%) were agreed that their cocoa production is improved after GERNAS program involvement. In Bongo III, 5 respondents (9.62%) claimed their cocoa production had no improvement after GERNAS program.

Farmer's perception toward cocoa quality

Table 6 shows no differ in farmer's perception toward cocoa quality after GERNAS program. In Bongo III village, 6 respondents (9.62%) claimed that no changes in their cocoa quality and only a respondent (1.92%) were claimed their cocoa quality is greatly improved. Meanwhile, only 2 respondents (3.85%) claimed their cocoa quality is improved after GERNAS program. In Saritani village, 21 respondents (40.38%) also claimed their cocoa quality is improved after GERNAS program.

Table. 6 Farmer perceptions in the cocoa production and quality after GERNAS program involvement

Village	Category	Cocoa cultivation			
		Farmer perceptions in the cocoa production after GERNAS program involvement		Farmer perceptions in the cocoa quality after GERNAS program involvement	
		(n)	%	(n)	%
Bongo III	**Great improved**	1	1.92	1	1.92
	Improved	3	5.77	3	5.77
	No change	5	9.62	6	9.62
	Decrease	1	1.92	0	0
Trirukun	**Great improved**	1	1.92	1	1.92
	Improved	7	13.46	7	13.46
	No change	0	0	0	0
	Decrease	0	0	0	0
Pangea	**Great improved**	0	0	0	0
	Improved	2	3.85	2	3.85
	No change	0	0	0	0
	Decrease	0	0	0	0
Sari Tani	**Great improved**	0	0	0	0
	Improved	21	40.38	21	40.38
	No change	1	1.92	1	1.92
	Decrease	0	0	0	0
SP-1	**Great improved**	0	0	0	0

Improved	9	17.31	9	17.31
No change	1	1.92	1	1.92
Decrease	0	0	0	0

Farmer perception on sustainability of GERNAS program

Table 7 shows most respondents were agreed with the sustained GERNAS program. There were four villages that all farmers agreed that sustained GERNAS program. In Trirukun village, 8 respondents (15.38%) agreed need to sustain the GERNAS program; 2 respondents (3.85%) agreed need to sustain GERNAS program in Pangea; In Saritani village, 22 respondents (42.31 %) were agreed need to sustain GERNAS program; 10 respondents (19.23%) were agreed to sustain GERNAS program.

Table. 7 Farmer's perception toward GERNAS program sustainability

Village	Category	Farmers perception if GERNAS program is continues	
		(n)	%
Bongo III	**Yes**	7	13.46
	No	3	5.77
Trirukun	**Yes**	8	15.38
	No	0	0
Pangea	**Yes**	2	3.85
	No	0	0
Sari Tani	**Yes**	22	42.31
	No	0	0
SP-1	**Yes**	10	19.23
	No	0	0

IV. DISCUSSION AND ANALYSIS

GerakanNasional (GERNAS) cocoa program is a government program with their main objective to increase cocoa productivity, production and quality which contributed to farmer welfare improvement and the national economy. This program aims are rejuvenation, rehabilitation and intensification of the farmers cocoa plantation area. In additions, the cocoa farmers had equipped with several activities and empower farmers with related agencies. The initial stage of implementation of GERNAS program had been introduced to targeted groups consists of socialization and prospective land and farmer's selection groups. The program participants required to participate with socialization at the first stage and prospective land and farmer's selection groups next.The purpose of socialization group to provide ideas about program implementation and fulfil requirement, while fulfil requirement for prospective land and farmers selection group are owner of cocoa plantation areas, living in selected area for GERNAS coco program, aged 21 years and above or married, joined cocoa farmers group which are targeted group and number of target group members is approximately 20 peoples to 30 peoples.

There were many definitions toward empowerment. Narayan (2012) had defined empowerment is growth of independent in action and choice for shaping or forming someone's life [8].

The empowerment was freedom in action toward authorized responsibilities [9]. Meanwhile, empowerment also defined as giving power to the employees [10]. GERNAS program provides the training to increase the competencies among the farmers. The farmer group empowerment training was conducted after participating of farmer confirmation in order to provide an understanding in group collaboration in the implementation of GERNAS program such as procedures or technical guideline and cocoa cultivation lesson. Pangea and Sari Tani villages are among villages that had high farmer participation in the training conducted by Plantation Agencies. Meanwhile, three villages are not enthusiastic in the empowerment training included Bongo Tiga village, Trirukun village and SP-1 village. These three villages did not meet the program target which encourages farmers participation the empowerment training so that farmers are understand related technical cocoa cultivation and collaboration. After empowerment training, the farmers need to learn cocoa farming techniques included pruning, harvesting frequency, sanitation, fertilization, pest prevention, cocoa seed usage and fermentation.

The pruning is impacted on the tree health and structure through eliminating diseased, broken or dead branches on the mature and young trees and protects the trees to avoid decay-producing fungi from penetrating and infecting other areas of the tree and increased light penetration and air movement throughout the crown of tree [11]. There were three villages is not fully understood technical guidelines in cocoa cultivation where the pruning process had been done to reduce the vascular-streak dieback (VSD) and cocoa pod borer (CPB). According to field observations, farmers did not perform pruning on their cocoa trees are more prone toward diseases and pests than farmers did pruning on their cocoa trees. Besides, the pruning increased cocoa seed sizes and cocoa plant had good frame or shape. Farmers in Sari Tani village had understood the need cocoa pruning which 22 respondents did pruning on the cocoa trees. The pruning is very important to increase cocoa production. The farmers in Pangea and Sari Tani villages considered necessary for cocoa pruning.

Harvest is often done on every 7 days to 10 days depended on the amount of ripen cocoa pods. The results found three villages in the study site had frequent in cocoa harvesting, which referred to the general guidelines issued by the Plantation Directorate in order to prevent CPB and VSD. Meanwhile, farmers are understood necessary frequent of harvesting. There are 7 farmers in Trirukun village did frequent harvesting, 18 farmers in Sari Tani village had frequent harvest and 10 farmers in SP-1 village had frequent harvest. These results showed farmers in three villages had deeply understood the need for harvest frequency which followed cocoa cultivation technical guidelines. However, farmers in four villages did not frequent harvested.

The farmers had considered delayed in cocoa harvesting might reduce their workload since some farmers had other jobs due time consumption and ideal in harvesting only during the harvesting period.

The sanitation is necessary in the cocoa cultivation, which reduced attacking of CPB and VSD. The results found four villages had understood the technical guidelines recommendation in terms of plant sanitation. The cocoa farmers in the study site had been enthusiastic in sanitation implementation because the leaves and cocoa pods had been used as organic fertilizer. There were 4 cocoa farmers in Bongo III. These farmers in this village did not understand the need for land sanitation which control pest population.

The fertilization became integral part of cocoa cultivation and inappropriate fertilization lead to decline cocoa quality. In general, there are two kinds of fertilization is embedded in the soil and spread on the soil surface. The fertilization on intensification is applied once per year at the beginning of rainy season and recommended dose is 200 gram N-P-K fertilization. The result indicated farmers in four villages had implemented cultivation technique especially fertilization. Meanwhile, some farmers in Bongo III and Pangae villages did not performed fertilization process. The farmers had complained that the fertilizer distribution only concentrated to farmer group leader instead directly distributed the fertilizer to the farmers.

The CPB and VSD are the main enemies for cocoa farmers, which reduced cocoa production. The pest control and restriction had been done in two ways such as chemical pesticide or natural enemies or pod wrapping method. According to Indonesian Cocoa Association (INCA) mentioned that CPB increased the difficulty in quality improvement and waste of cocoa bean from endemic areas [12]. The CPB larvae caused the cocoa beans are sticky and undeveloped lead the beans to be small, stick to each other and fruit wall because larvae had destroyed pulp placenta and food tissue of the cocoa beans [13]. Hence, nutrient supply to the bean was disturbed and the cocoa bean did not develop normally. In this study, the farmers had followed the technical guideline and claimed that pest control method such as pest trap or pest wrapping had increased their cocoa production. Meanwhile, 2 respondents in Bongo III village did not perform pest control because these farmers felt less motivated in effort for CPB prevention and did not understand technical cocoa cultivation.

The result showed the farmers used high quality cocoa seed was relatively low in the study site, except farmers in Sari Tani village. The farmers in this village had understood the recommendation from Plantation Office in good quality cocoa usage to increase their cocoa production. The fermentation is done using box-shaped tool, where cocoa beans are kept in the box for 4-6 days. The fermentation process had produced fragrant aroma and high cocoa seed quality that suits with industry need. The results showed that farmers in five villages were not aware of importance in fermentation such as Bongo III village, Trirukun village, Pangea village, Saritani village and SP-1 village. The farmers preferred drying method since fermentation method needs high cost. In addition, drying process is faster than fermentation products and no significant difference in the price between cocoa seed from drying process and fermentation process.

The quality of cocoa beans is determined by the seed weight, moisture contents, number of moldy beans, fermented seed, deformed beans and germination and broken beans. The study found average farmers claimed GERNAS program had increased the cocoa bean quality. The farmers in Sari Tani village had followed intensification activities on plants less than 7.5 years with sufficient fertilization increased number of cocoa beans.

Farmers in four selected villages had supported that the GERNAS program to be continued. The need of sustainability of GERNAS program due to several reasons included: farmers are still need help from GERNAS program, GERNAS program had increased the production and income, useful for farmers and farmers had desire having cocoa plantation. Besides, some of the farmers in Bongo III village claimed GERNAS program is not necessary to be continued due to cocoa pods are not profitable for farmers, GERNAS program did not increase cocoa production and farmers are no longer getting help from the government.

V. CONCLUSION

The implementation of the GERNAS program in Sari Tani village is in line with GERNAS programs' technical guidelines based on determination of target farmer groups, empowerment of farmer group and cocoa cultivation (pruning, intensity of harvesting, sanitation, pest control and fertilizations). Besides, farmers indicated that cocoa production and quality was increased in Boalemo Regency. This study recommends that the plantation offices, both Regency and Province, carry outside-grafting activities on cocoa that use seed origin, so that increased production can achieve maximum production. The government encourages collaborate with fertilizer company in order to provide compound fertilizer (GERNAS fertilizer) which has been considered effective in increasing cocoa production and can be accessed by farmers.

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