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The comparison of productivity before and after cocoa national movement program (gernas) implemented in Mamasa Regency West Sulawesi

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ABSTRACT

In early 1990, Indonesia entered as the third-largest exporter in the world after Ivory Coast and Ghana. The number of cocoa farmers is estimated to be 1.4 million households, generally on a small scale, with an area of about two hectares of cocoa. The very high increase in cocoa prices during the economic crisis in the late 1990s contributed significantly to the poverty alleviation of cocoa farming communities, especially those in rural areas. Almost 20 percent of the national cocoa production comes from West Sulawesi Province. The Cocoa National Movement Program (Gernas) in West Sulawesi is a locomotive for community-based development as a holistic, integrated program involving stakeholders to increase productivity and quality and encourage the growth of the cocoa trade and industry. The Central Government subsequently carried it out formed the National Movement for the Improvement of Cocoa Production and Quality. The research showed that there had been a significant increase in cocoa productivity in Mamasa Regency, West Sulawesi, between before the National Movement Program and after its implementation through rejuvenetion, rehabilitation, and intensification programs. Rehabilitation activities are higher than those of rejuvenation and intensification. Rejuvenation increased cocoa production from 342.68 kg.ha^{-1}.year^{-1} in 2008 to 605.05 kg.ha^{-1}.year^{-1}. Rehabilitation increased cocoa productivity from 332.47 kg.ha^{-1}.year^{-1} in 2008 to 720.98 kg.ha^{-1}.year^{-1} and intensification increased cocoa productictivity from 328.27 kg.ha^{-1}.year^{-1} in 2008 to 531.45 kg.ha^{-1}.year^{-1} during the program implemented.

Keywords:
Cocoa, Productivity, Rejuvenation, Rehabilitation, Intensification

1. Introduction

Cocoa grew rapidly in the 1990s and made Indonesia the third-largest exporter in the world [1] after Ivory Coast and Ghana [2]. The number of cocoa farmers in Indonesia is now estimated at 1.4 million households. The very high increase in cocoa prices during the economic crisis in the late 1990s has brought blessings for smallholders cocoa farmers [3], including in Eastern Indonesia. It contributed significantly to poverty alleviation, especially in rural areas [4]. The plantation sub-sector is the main supporting subsectors that play a role important for the national economy [5], between others as providers of employment [6] and source of income for farmers, source industrial raw materials, and sources of necessity principle as well as foreign exchange contributors to the state [7].

In the cocoa agribusiness system, presumably, it is necessary to look at the intersectoral role in the systems, especially in cocoa plantation business, trading, related industry, and financial institutions with the cocoa plantation business, to get an overview of the role of plantation agribusiness at a regional and national business

scale. Therefore, the agribusiness approach from a sectoral reorientation handling becomes intersectoral from production to business orientation [8].

Generally, production systems and industry have also started to emerge, such as pest and disease attacks, decreased productivity levels, low-quality cocoa beans produced due to poor farming management practices, and market signals from a lack of trade chain. Respect for quality seeds, old plants, and improper management of soil resources. In addition, to the very malignant Cocoa Stem Borer (CSB), several diseases and pests of cocoa that destroy stem vessels or known as Vascular Streaks Dieback (VSD) caused by the fungus oncobasidium theobromae is commonly found in Indonesia [4]. About 20 percent of the national cocoa production comes from the West Sulawesi Province. The stagnation and downward trend in cocoa production that has occurred in Indonesia, together with a significant increase in planted area, has implications for decreasing national cocoa productivity, has become a particular concern for cocoa sector stakeholders.

The Cocoa National Movement Program in West Sulawesi s a locomotive for community-based development was launched on July 31, 2007, by the Government of South Sulawesi. It is an integrated, holistic program involving stakeholders in efforts to increase cocoa productivity and quality. Moreover, the profitability of cocoa farmers related to poverty alleviation, encouraging the growth of the cocoa trade and industry and making cocoa the locomotive of West Sulawesi development, which in turn, the Central Government formed the Cocoa National Movement Program (Gernas) for increasing cocoa production and quality [4].

Furthermore, through the Directorate General of Plantation in 2009, the government began developing cocoa to the national cocoa center, including in West Sulawesi Province such as Mamasa, Mamuju, Majene, and Polewali Mandar Regency [9]. It was known as the Cocoa National Movement Program to increase cocoa productivity. The scope of activities to increase the production and quality of national cocoa in Mamasa Regency includes; (1) rejuvenation of 400 hectares of plants with 400,000 Somatic Embryogenesis (SE) seeds whose activities include providing seeds, dismantling old or damaged plants, planting protective trees, making planting holes, planting, fertilizing, maintaining and controlling pests and diseases, (2) plant rehabilitation covering an area of 2,000 hectares whose activities include side grafting, pruning of staple crops, planting shade trees, maintaining joint products, fertilizing and controlling pests, (3) intensification an area of 2,000 hectares whose activities include weeding, pruning protective trees, pruning staple crops of cocoa, garden sanitation, fertilization, control of pests and diseases and frequent harvests, (4) empowerment of 110 farmers who are representatives of each group participating in the movement to increase national production and quality, whose activities include farmer training and farmer assistance by the assistants, (5) implementation of quality standards whose activities include the provision of quality standard socialization facilities, quality standard socialization and post-harvest facilities provision [10].

One barometer of the success of the cocoa national movement program can be measured from how cocoa productivity is. This study examines the comparison of cocoa productivity before and after Cocoa National Movement Program (Gernas) Implemented in Mamasa Regency West Sulawesi.

2. Materials and Methods

2.1. Sampling

The data was conducted in Tabulahan District, Mamasa Regency, West Sulawesi Province. The population in this study were participants of the program, which are scattered in this place. The sampling technique uses the formula from Taro Yamane quoted by Sugiyono [11] as:

$$n = \frac{N}{N \times d^2 + 1} \quad (1)$$

Where: n = Number of samples
N = Total population of 1,098 farmers
d^2 = Precision set at 10% (difference between expected and occurring samples)

2.1. Data Collection Technique

The types of data collected in this study consisted of primary and secondary data. Primary data is obtained directly from respondents at the research location, while secondary data is obtained from government agencies and other parties considered to know the implementation of the program. Data collection instruments are tools selected and used by researchers in their activities to collect data so that these activities become systematic and made easier by them. Data collection techniques can be done by interviewing using a questionnaire, observation, and a combination of two.

2.2. Observed Variables

To determine the increased productivity of cocoa farming actors, we have observed the average cocoa productivity of cocoa farming during the program implemented.

2.3. Data Analysis

The data collected from the two sources were edited, tabulated, and analyzed by quantitative methods. The formula to calculate the percentage increase in cocoa production is as follows:

$$n = \frac{b - a}{a} \times 100\% \quad (2)$$

Where: b = The average production of farmers after joining the program
a = Farmers' average production before joining the program

3. Results and Discussion

Indonesian plantation commodity which is quite potential in cocoa [12]. Cocoa is a commodity mainstay of plantations whose role is sufficiently important to the national economy. Indonesia has the potential to become the world's largest cocoa producer if the main problems in cocoa plantations can be overcome, developed and managed through the concept of cocoa agribusiness [4]. Cocoa is one commodity traded on the floor of commodity exchange in Indonesia because the purpose of the stock exchange to encourage the formation of a domestic reference price [5].

In West Sulawesi, specially in Mamasa Regency at Tabulahan Subdistrict, which consists of Lakahang Village, has 13 villages and one sub-district, 87 kilometres from the capital district to the capital regency. Tabulahan District is the largest sub-district in the Mamasa Regency, with an area of 534. 14 km^2, or 18.44 percent of the entire Mamasa Regency area of 3,005.88 km^2 [2]. The community generally uses the availability of land to carry out various activities to meet their daily needs, including clothing, food, and shelter needs. Before implementing the Cocoa National Movement Program, cocoa production in Tabulahan was 617.74 kg, and the productivity was 337.70 $kg.ha^{-1}.year^{-1}$. The harvested area and cocoa production for five years during the program in Tabulahan District can be seen in Table 1.

The harvested area for cocoa in Tabulahan District has decreased from 2008 to 2009 because 1,452.38 ha of cocoa farming areas are participating in the Gernas Program. In the 2009 cocoa program, there was 130.63 ha of cocoa gardens or 104,500 ha of rejuvenated cocoa trees, 686.75 hectares of cocoa farming, 549,000 rehabilitated trees, and 635.00 ha of cocoa farming or 508,100 cocoa trees included in intensification activities [9].

Table 1. Harvested area, production, and productivity of cocoa

No.	Year	Harvested Area (ha)	Production (kg)	Productivity ($kg.ha^{-1}.year^{-1}$)
1	2008	1,929.23	617.74	337.70
2	2009	376.85	124.18	329.52
3	2010	588.84	250.26	425.01
4	2011	3,085.65	2,013.23	652.41
5	2012	3,140.19	2,378.23	757.35
Average			1,076.71	500.40

Source: Agriculture office of mamasa regency, 2012

In 2011, cocoa production and productivity as well in Tabulahan District continued to increase with the expansion of the harvested area of 3,085.65 hectares. Rejuvenated plants have produced fruit, and rehabilitated cocoa plants have started to learn to bear fruit. Cocoa production this year amounted to 2,013.12 tons with a productivity level of 652.41 $kg.ha^{-1}.year^{-1}$ [9]. Increased productivity of Cocoa in Tabulahan District, Mamasa Regency, West Sulawesi can be seen in tabel 2.

3.1. Rejuvenation Activities

Table 2. Cocoa productitivity before and after rejuvenation activities

No.	Description	Production ($kg.ha^{-1}.year^{-1}$)		Increased Production (%)
		Before Rejuvenation	After Rejuvenation	
1	Average	342.68	605.05	76.57
2	Minimum	295.00	522.00	42.31
3	Maximum	382.50	664.30	97.46

Source: Primary data after processing, 2021

Cocoa productivity before rejuvenation was an average of 342.68 $kg.ha^{-1}.year^{-1}$ or <500 $kg.ha^{-1}.year^{-1}$ and after replanting an average of 605.05 $kg.ha^{-1}.year^{-1}$. On average, the percentage increase in cocoa productivity after replanting is about 76.57

percent, with a part of the population of cocoa plants in the cocoa farmers decreasing at the time of demolition and some plants from Immature Somatic Embryogenesis seeds. The data above explains that the propagation of cocoa plants using somatic embryogenesis has increased cocoa productictivity before and after the rejuvenation program, an average of 262.37 kg.ha^{-1}.year^{-1}. The farm renewal practices in rejuvenated old trees in the sampled plots were irrespective of the spatial distance from associated non-cocoa trees. The rejuvenation activity is directed to the status of heavily damaged farm marked by old crop. In fact, Gernas Program in Indonesia is considered quite effective to increase cacao production [13]

3.2. Rehabilitation Activities

Rehabilitation of deficient cropping of cocoa plants [13] using side grafting techniques requires budding from superior clones. With the side grafting system, it is expected to improve plant conditions both for growth and productivity.

Table 3. Cocoa productivity before and after rehabilitation activities

No.	Description	Production (kg.ha^{-1}.year^{-1})		Increased Production (%)
		Before Rehabilitation	After Rehabilitation	
1	Average	332.47	720.98	116.86
2	Minimum	264.00	504.00	72.31
3	Maximum	405.45	895.00	158.86

Source: Primary data after processing, 2021

The percentage increase in cocoa productivity after rehabilitation reached an average of 116.86 percent, with some of the connections on the cocoa plants in the cocoa farmers not alive. Data on table 3 explains that rehabilitation of cocoa farming with a side grafting system increased cocoa productictivity before and after the program an average of 388.51 kg.ha^{-1}.year^{-1}. The cocoa rehabilitation has had a lasting impact on the performance of the cocoa sector in recent years; resulting in increments in foreign exchange revenue, production, and exports; the project, to a larger extent, has failed to adequately cater to all of the needs of the most important stakeholder of the cash crop the cocoa farmer.

3.3. Intensification activities

The percentage increase in productivity after the implementation of intensification reached an average of 61.89 percent, which indicates that intensification activities to increase the productivity of cocoa plants through the application of technical standards for cultivation on the cocoa plants had increased before and after the program an average of 203.18 kg.ha^{-1}.year^{-1}.

The implementation of intensification activities is good for cocoa farmers because farmers can increase their cocoa production maximally. Therefore, the courage of cocoa farmers is very important in applying the technology of diversification intensification farming systems. In the location program, intensification activities are not too difficult because the activities are only pruning, fertilizing, and sanitizing, but the farmers did not do these. Cocoa farmers did not routinely carry out maintenance and fertilization properly so that the production was not high. Intensification of cocoa is an essensial objective to increase productivity and farm income. The replacement

of ageing tree stocks with improved planting material is one of the key element in the intensification process [14].

Table 4. Cocoa productictivity before and after intensification activities

No.	Description	Production (kg.ha^{-1}.year^{-1})		Increased Production (%)
		Before Intensification	After Intensification	
1	Average	328.27	531.45	61.89
2	Minimum	264.00	412.75	15.87
3	Maximum	390.00	712.50	105.88

Source: Primary data after processing, 2021

4. Conclusion

Based on the research results, it can be concluded that the implementation of the Cocoa National Movement Program (Gernas) in Tabulahan District, Mamasa Regency has increased cocoa productictivity. Rehabilitation activities are higher than those of rejuvenation and intensification. Rejuvenation increased cocoa production from 342.68 kg.ha^{-1}.year^{-1} in 2008 to 605.05 kg.ha^{-1}.year^{-1}. Rehabilitation increased cocoa productivity from 332.47 kg.ha^{-1}.year^{-1} in 2008 to 720.98 kg.ha^{-1}.year^{-1} and intensification increased cocoa productictivity from 328.27 kg.ha^{-1}.year^{-1} in 2008 to 531.45 kg.ha^{-1}.year^{-1} during the program implemented.

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