

Study of Socio-Economic Aspects Cocoa Fermented Processing Smallholders at Lima Puluh Kota Regency West Sumatera, Indonesia

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Abstract— Cocoa fermentation technology is a technology that aims to establish a distinctive chocolate flavor and reduce bitterness in cocoa beans. But in its application, the technology is difficult to develop because of the same price among farmers who use the technology to a non-fermented cocoa fermentation. Classical problem above all in sharp contrast with the positive attitude of farmers who tend to (accept) this technology, so farmers vacillate with uncertainty measures taken by relevant parties.. Despite the economic constraints which include capital, labor, sales results, and selling price has not been resolved and the social constraints such as lack of initiative groups to collect the results collectively to make this technology still has not been adopted by farmers. Based on this research can be concluded: the attitude of respondents with cocoa fermentation technology is said to be positive or accepting of this technology with an average score of 69-83. Constraints faced by the technical challenges that include harvesting, sorting fruit, peeling the fruit, fermentation, drying and storage, economic constraints (capital, labor, sales results, and selling prices) and social constraints that are emphasized to the factors of cooperation and sharing of information between farmers / group. And income level - average annual cocoa farmers amounted to Rp 12.472.067,3 respondent or Rp.1.039.338, 95 per month, assuming an average price of dry cocoa bean sales were Rp 21 700 / kg.

Keywords— Cocoa fermentation, farmers, incomes, smallholders, technology.

I. INTRODUCTION

Currently the society has been commonly known chocolate candies, chocolate ice cream, chocolate powder distinction. Chocolate products are produced through stages and a relatively long process. Cocoa plants (crops, fruits, seeds) will produce cocoa fruit in which is cocoa beans. From the cocoa beans, with post-harvest treatment, including processing and drying will produce dry cocoa beans that are ready for shipment to the processing plant (processor). By processing, cocoa beans are processed into semi-finished products and finished products [1].

Cocoa consumers, both locally and internationally, are the fat industry and chocolate food. They apply the same stringent quality chocolate product to be produced safely consumed and preferred by consumers. Industry assess the quality of cocoa beans from three aspects: (1) fat yield, (2) purity and contamination, and (3) aroma and flavor. The first aspect is determined by the material in addition to planting, the garden also by environmental conditions (soil fertility and agroclimate), whereas the second and third aspect is more influenced by processing factors. Therefore, cocoa processing steps that ensure the quality must be clearly defined [6].

Fermentation aims to create distinctive chocolate flavor and reduce bitterness in cocoa beans. Fermentation can be carried in a basket made of rattan or bamboo and wooden boxes. Some important aspects for the perfection of the fermentation process is the weight of seeds that will be fermented, mixing / inversion, fermentation time and fermentation box design [7], [9]. [13].

Fermentation technology has several advantages such as taste and aroma of cocoa beans a better, longer stored without undergoing germination and decay. Indonesian National Standard (SNI) also has required the cocoa beans that meet quality standards must be fermented first. [2],[4].

Lima Puluh Kota regency has an area of 1816 hectares of land currently with Generating Plant (GP) is 579 hectares with a production of 584 tons / ha / year. Some cocoa production is non fermented cocoa beans that are marketed to traders in district and district levels. Non fermented cocoa beans produced by farmers related to post-harvest activities are confined to the groove-peel-harvest drying. This is due to hereditary habits of farmers and the lack of accurate information to farmers about the benefits of doing fermentation. There over, also due to the impatience of farmers in selling the cocoa bean processing is done so imperfectly. In fact, many cocoa farmers sell wet or dry cocoa beans that have not been perfectly dried so water level

is still high. Another thing that causes the cocoa farmers are reluctant to perform the fermentation process because of price and non-fermented cocoa bean fermentation is still priced the same by middlemen. Whereas at the factory or the exporter are price differences, where the price of cocoa bean fermentation is more expensive than non-fermented. The difference ranged Rp.1.500 - Rp.2.500/Kg [3].

To anticipate the farmers can cooperate with farmers' groups in conducting a coordinated and continuous fermentation. Manufacturing side or big exporters will be willing to buy more expensive cocoa bean fermentation than non-fermented. With the main requirements of the certainty of quality, quantity and time. But it is very difficult to do now by the farmers because they need the funds quickly, although the amount is not in line with expectations. So that farmers choose to sell cocoa results quickly and cheaply to middleman.

The attitude of farmers in accordance with the opinion of Rogers (1983) and Gonzales (1993) that "when an innovation introduced to the farmers, in general they will not immediately adopt that innovations." A number of farmers will form the first attitude, although they are already familiar with these innovations, then Azwar (1988) adds that attitudes formed in a person will determine their actions, even if the action or behavior that appears not be able to be used as the real indicator.

Cocoa fermented demand especially for the domestic market is still very high. These opportunities should be utilized by the farmers in filling the needs of a large cocoa. If cocoa fermentation in domestic demand has been met, it is also possible market opportunities more lucrative overseas can be reached by farmers. Of the exports of non fermented cocoa beans, cocoa beans from Indonesia are often only used as a mixing fermented cocoa beans from Pantai Gading and Ghana to reduce production prices, make West Sumatera as a central of the western part of Indonesian cocoa production, at the same time establish cocoa marketing production West Sumatra origin must be in the form of fermented. Based on the above description, it seems important to do some research on the socio-economic assessment of processing cocoa fermented smallholders in Lima Puluh Kota regency West Sumatera.

Purpose of this study is (1) measure the attitudes of farmers on cocoa fermentation technology, (2) see the constraints faced by farmers in the cocoa fermentation technology adoption , (3) knowing the income of farmers who do a simple fermentation process or non fermented.

II. METHODS

The study was conducted at cocoa development centers and main producer of cocoa in the Lima Puluh Kota regency is Guguak , Akabiluru and Payakumbuh district. This study focused on cocoa farmers' attitudes towards technology "cocoa fermentation". Cocoa farmers sampled are incorporated in the container farmer group's. Main population or analysis of this study is six groups of farmers who are in three districts. The research method used in the third goals are survey and indepth study.

Sampling farmer group members conducted a simple random balanced (proportionate random sampling), where sampling is balanced against members of six farmer groups

is aimed at equitable distribution of sampling in each farmer group.

The data in this study are classified into two kinds of data sources as follows: The primary data or data obtained in the field and the secondary data or data derived from relevant agencies such as the Plantation Office, Office of Trade, Industry and Cooperatives. In this study, variables were measured are:

1) *Variabel to measure farmers' attitudes towards technology "cocoa fermentation" namely:* method of harvesting cocoa, fruit sorting, cocoa fruit storage method, fruit stripping method, the method of fermentation, cocoa beans drying, storage.

2) *Variables to view the constraints faced by farmers in the adoption of technology "cocoa fermentation":* the technical aspects: methods of harvesting, sorting fruit, fruit stripping means, the method of fermentation, drying cocoa beans, seed sorting post-drying, storage, in the economic aspect: venture capital, labor, equipment / facilities fermentation process, product selling prices, sales execution of product, in the social aspect: planning factor groups/farmers, the factors of cooperation among farmers / groups, the factor of information received, utilization facilities of groups, farmers' initiative and the agreement of the group.

3) *Variabel to know the incomes of farmers who do simple fermentation or non-fermentation process:* the cost incurred by cocoa farmers in the maintenance process - harvesting cocoa, cocoa farmers' revenues earned from sales of cocoa beans.

To measure the attitude of farmers towards each cocoa fermentation technology materials, conducted quantitatively using a score, to see the obstacles faced by cocoa farmers can analyze qualitative description, is intended to examine in-depth and continued with the interpretation efforts in the broad sense and focused on the purpose of research which is the interpretation of data collected, and seeing the amount of revenue for farmers who do simple fermentation or non-fermentation process is done by a qualitative analysis is to calculate:

1) The total cost is calculated from all costs incurred in the maintenance of cocoa up to the sale of their harvest by farmers who make a simple fermentation process or non-fermented (Costs were calculated from the maintenance phase (cocoa aged > 2 years) is from Cocoa has been fruiting stage).

2) Total revenue is the overall sales of cocoa beans by farmers who make a simple fermentation process or non-fermentation.

III. RESULTS AND DISCUSSION

Fermentation aims to create distinctive chocolate flavor and reduce bitterness in cocoa beans. Fermentation can be carried in a basket made of rattan or bamboo and wooden boxes Some important aspects for the perfection of the fermentation process is the weight of seeds that will be fermented, mixing / inversion, fermentation time and fermentation box design[8].

From the guide questions (questionnaire) that has been submitted to the 150 respondents showed that overall respondents - average have a positive attitude (acceptance)

of cocoa fermentation technology with a total score of respondents average 69 -83.

Constraints faced by farmers Cocoa in Adopting Technology of Cocoa Fermentation is in harvesting material, farmers' attitudes to the negative category (75.33%) declared pest squirrel is the main enemy in the fermentation methods of harvesting activities. This is because activity at the time of fruit harvest ripe cacao fruit into the meal caused a squirrel. As a result, cocoa fruit was damaged, reduced seed number and seed quality due to lack of good seeds have been scattered on the ground after being eaten by tupai and reduce crop failure, farmers generally do activities during fruit harvesting cocoa crop has not suffered overall color change (not the fruit cooked right). attitude of farmers with a negative category (15,33%) in fruit sorting technology the skin accumulation is not activities that they usually did, and farmers accustomed to the place immediately dispose of waste disposal. Other factors still lack of farmer's understanding about other benefits from the remnants of cocoa skin.

At farmers' attitudes fruit stripping technology with the negative category (49.33%) said the use of logs is not something they usually do, because they had been accustomed to using a knife to peel the fruit (more practical and faster in doing stripping fruit) and then seed healthy cocoa inserted into the sacks more or less for two days to reduce its water content after stripping activity. Attitude of farmers who refused (7.33%) of this fermentation is reasonable of fermentation activity requiring cost, time and energy more the extra than non-fermented. Farmers must make or buy a box of fermentation, making the drying table (or Waring's loft) and must perform the activities of stirring / reversal. In addition, not become a habit, casket price is also one reason for refusing this technology because of the increasing cost of production. To replace the use of a box or casket, farmers generally use the sacks to store grain. Because an important aspect to perfection of fermentation process is seed weight will be fermented, stirring / reversal, fermentation time and fermentation box design.

In drying technology attitudes of farmers with a negative category (32%) in this drying technology was declared the use of drying tables require an additional fee, most farmers only make drying on the cement floor (in the yard of the house) without being made oblique and without drainage on the outskirts of the floor. In addition require an additional fee, the respondent argued the addition of the slope and floor drains is not a major effect on seed drying activities. Reversal activity 1-2 hours drying time also requires energy, extra time and make the implementation of other activities to be disrupted by a great attention to the activities of this drying.

In addition technical constraints above factors, the respondents experiencing of economic constraints in the form of capital, labor, sales results, and selling price. Implementation of Cocoa fermentation technology requires serious attention from all parties. It can be seen the attitude of farmers who receive this technology has a positive categories (accept) this innovation, but in practice very opposite of the attitude measurement. [10].

From the survey results and activities indepth study, that the cocoa fermentation technology requires a larger capital

than non-fermented, such as fermentation in the manufacture of boxes, tables Dryer (para-para/waring) or addition cement floor is made sloping, drains equipped and support poles for the cloth cover / tarp. Constraints faced by cocoa farmers in adopting the technology in terms of economical cocoa fermentation include:

1) In terms of labor, the constraints faced in the form of additional work time because of the additional drying activities (mixing / reversal) 1-2 hours once and fermentation process a long with a total time of 10 days.

2) The main factor at least the farmers who adopt this cocoa fermentation technology, namely product selling prices. With the same price between non-fermented with fermentation resulted in farmers' reluctance to pursue the activities of fermentation although farmers generally have been done in a simple fermentation (cocoa beans are stored in sacks and hung to remove the pulp).

3) In terms of sales execution results, farmers still do individually with the direct selling to middleman in the market of Payakumbuh city gatherers dried beans that have been periods during the five days of drying. Unlike cocoa fermentation technology that takes a long time (9-10 days), non-fermented cocoa / simple fermentation make farmers more quickly to make money.

Constraints faced by cocoa farmers in the technical and economic fields also affect the ability of groups in providing commodity information and optimal service to their members (social constraints). This is seen with yet-established economic cooperation and information between administrators and group members primarily in the sales results and information on commodity price of cocoa. So that the sale of dried cocoa seeds are done individually [15].

From the results of a survey conducted with different objectives between management and members can be concluded that the farmers group is still functioning as a place or container to hold the activities of related agencies, but not yet functioning whole in economic activities or welfare of members. This is seen by the absence of management initiatives and group members to accommodate the results of dry cocoa beans are collectively or jointly [14].

Sales of cocoa results in a fraud-susceptible individuals due to ignorance of farmers in using measuring instrument moisture content of dry cocoa beans so that farmers receive only all the information or the benchmark price offered by middleman. Ahuja (2011) revealed the availability of information via the internet helps the process of agricultural extension more quickly and effectively.

Research results showed that the average total maintenance cost / year incurred by cocoa farmers is Rp.1.748.000/year or Rp.145.722 / month with details of costs for salaries / wages of labor in performing maintenance activities such pruning, fertilizing and HPT control is Rp.955.000 / year or Rp. 79.580 / month or about 54,6% of of the total overall costs. While the purchase cost of materials such as fertilizers, pesticides and pruning tools is Rp.686.666 / year or Rp.57.222, 2 / month or about 39% of overall costs. And for harvesting activities, the average cost incurred by farmers is Rp.133.333 / year or Rp.11.111,08 / month or about 6% of the total overall costs, with the highest average price obtained by the cocoa farmers who participated in this study is Rp. 25.466,67 and the lowest

price is Rp 17.933,33, so found the average price was Rp 21.700, assuming 1 trunk cocoa harvest producing 1 kg of dry seed / year from 655 cacao tree trunks have been produced (TM) so that the average revenue earned by the cocoa farmers after the cocoa beans are sold to middlemen is Rp 14.220.733,33 / year or Rp. 1.185.061,11 / month.

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TABLE I

DETAILS THE AVERAGE COSTS INCURRED COCOA FARMERS RESPONDENT / YEAR OF MAINTENANCE AND HARVEST

No	Type of Expenditure	Amount (Rupiah)/ Year	Amount (Rupiah)/ Month	Percentage
1	Salary / wages of labor	955.000	79.580	54,6 %
2	Purchase of materials (fertilizer/ pruning tools, pesticides)	686.666	57.222,2	39 %
3	Harvest	133.333	11.111,08	6,4 %
	Total	1.748.000	147.913,28	100 %

Description: The average land area 655 of the cocoa trunk with an average production of 1 kg/trunk/year and the average price of Rp 21.700 at the time of the study.

From the average revenue minus average cost incurred by farmers so found the average income of cocoa farmers who participated in this study is Rp 14.218.985 / year or about Rp 1.184.915,4 / month. This figure is in accordance with the results of questionnaires which were distributed to respondents in which respondents answered on average incomes of cocoa farming does generate revenue of Rp 1 million - Rp 1.5 million / month.

IV. CONCLUSIONS

Based on research result showed that (1) Farmers' attitudes toward cocoa fermentation technology as a whole positive categorized. This means that the respondents accept this cocoa fermentation technology with - average total score of 69-83 (2) Constraints faced by cocoa farmers in cocoa fermentation technology adopting economically form in terms of labor (additional work time), in terms of the implementation of the sales result, the farmers were still doing individual and direct selling and social aspects is the ability of the group to provide commodity information and optimal services to the members which is not optimal. (3) The average income level of respondents cocoa farmers / year for Rp 12.472.067,3 or Rp.1.039.338, 95 / month, assuming an average price of dry cocoa bean sales were Rp 21 700 / kg when the study was conducted. This is in accordance with the majority of the respondents' answers about their income level is Rp.1 million - Rp 1.5 million / month. The suggest the research is farmer groups need to collect the results of the cocoa beans members collectively to reduce occurrence of such fraud in the pricing and calculation of water content and needs a clear policy of the parties involved in accommodating the results of farmer's dry cocoa beans so the cocoa fermentation technology can be applied by farmers.