

Influencing Factors the Interdependence of Cocoa Farmers in Central Sulawesi Province, Indonesia

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Abstract – Cocoa is the leading commodity of the plantation in Central Sulawesi Province, Indonesia. Cocoa diseases infestation and low access of farmers to capital and limited partnership between entrepreneurs or industries with farmers make farming less developed. The development of cocoa commodities seems to involve improving the competence, capacity, and interdependence of farmers. This study aims to analyze the factors that influence the interdependence of cocoa farmers in Central Sulawesi Province. The study used survey design, location were Donggala Regency of North Region, Sigi Regency of West Region, Poso Regency of Central Region and North Morowali Regency of Southeast Region. The sample was taken through proportionally cluster random sampling of 380 respondent. Sampel data were analyzed using Structural Equation Modeling (SEM). Research results show that farmers' competence in weak, due to the weak role of extension workers, lack of innovation availability and low formal education of farmers. The capacity of farmers is weak in organizing and in adapting to the environment due to the low competence of farmers. Low farmer interdependence due to the low capacity of farmers and low interdependence of farmers leads to low production and income.

Keywords - Competence; Capacity; Interdependence; The Productivity of Cocoa Farmer.

I. INTRODUCTION

Cocoa is the leading commodity of a plantation in Central Sulawesi, Indonesia. Attacks of disturbing organisms and low access of farmers to capital and limited partnership between entrepreneurs or industries make farming less developed. Farmers are limited to wishing to think about how to find more relevant in the productivity of farming. The development of cocoa commodities in Central Sulawesi Province involves increasing the competence, capacity, and interdependence of farmers.

Central Sulawesi became the center of cocoa commodities in Indonesia, but from year to year has not been developed. This condition is seen from the low productivity of cocoa caused by the attack of vascular streak dieback (VSD) and cocoa pod borer (CPB), low seed quality produced without fermentation. In addition, low access to capital and limited partnerships between entrepreneurs and industries with smallholders, as well as dry cocoa beans trading system are dominated by middlemen [1-5].

The result of Sahardi et al. [6] the main problem in cocoa farming are: (1) production, where the quantity and productivity of cocoa pod borer (CPB), (2) diversification, where cocoa farmers pay less attention other types of commodities to reduce the risk of failure, (3) post-harvest, where the quality of cocoa is low resulting in low prices, (4) inefficiency of cocoa downstream development, (5) unoptimal use of cocoa waste for fertilizer and animal feed, (6) facilities and infrastructure are less optimal, (7) institutional, where farmer group not yet optimal function, and (8) existence of capital provider institution still limited. The result of Arfan et al. [7] the global order is changing so rapidly and consequently, the challenges faced by agriculture are also growing so that agricultural extension can play an important role for agricultural development. Agricultural development is determined by the provision of quality extension services [8-10]. As stated by Sumardjo [11] the paradigm of economic growth (growth) to, (2) the equity development paradigm and the next two decades generate awareness of the importance developed the

III. RESULT AND DISCUSSION

1. Characteristics of Cocoa Farmers

Characteristics of cocoa farmers in Central Sulawesi Province from the age composition of 92,1 percent of cocoa farmers belong to the productive age. Education is relatively low, ie seven years or equivalent primary school. The intensity of nonformal education through extension is classified as low as once a year. The level of cosmopolitan is low and cocoa farmers own land with an average area of 1,4 hectares per farmer. Farmers participation rate in the development of farming in the medium category tend to be low and the motivation of farmers in meeting the needs of the family and the motivation of farmers in the development of farming in the medium category. The experience of cocoa farmers is in the medium category with an average 17-year and the attachment of tradition shows that there is in the medium category tend to be low.

2. Competence, Capacity and Interdependence of Cocoa Farmers

Competence of farmers tend to be low in both cultivation, harvesting, post harvest, processing and marketing. The results of Schuler et al. [12] indicates that individuals with low competence tend to lack motivation, frustration or apathy that ultimately impedes in the face of the objectives of the work undertaken.

Competence of cocoa farmers is part of the characteristics of individual farmers who can not be separated from the work effectively in the struggle. Based on Sumardjo [13] competence has two meanings, namely: (1) refers to the work or role that can be done by someone with the competence (job specification) and (2) is used to refer to the behavioral dimension that lies behind the competent performance (person specification).

Farmers' capacity tends to be low from farming management, farmer organization and environmental adaptation. In general, cocoa farmers sell dry cocoa beans to the extent of obtaining the proceeds from the sale, the money earned by farmers is used to fulfill daily needs rather than being used as fermentation equipment procurement, provision of fertilizer, procurement of cocoa processing machinery and the addition of cocoa area. As stated by Fatchiya [14] building the capacity of society does not occur at once, both from performance, ability, capability and qualitative potential of an object or person. Capacity also relates to the provision in performing functions and tasks. Factors from within himself and from his environment can affect capacity. Furthermore Anantanyu [15] states the

capacity or ability of farmers is one of the prerequisites for farmers to participate in agricultural development.

The interdependence of farmers in this study is a manifestation of the ability of farmers in making decisions, produce quality cocoa beans and build partnerships. The interdependence of farmers includes the ability to select appropriate and useful information (filter system), the ability to improve the quality of dry beans so as to have good quantity and quality (competitiveness) and the ability of farmers in partnering with employers or business players (partnership).

Low competitiveness caused by the cultivation of cocoa beans produced by farmers in Central Sulawesi Province has not been through fermentation process only through curing so that the taste or aroma is not good and the resulting dry beans are less appropriate export standards. The partnership is weak because the marketing process is controlled by the owners of capital or industry so that the bargaining position of farmers is weak and the processing process depends on the industry. Increasing the interdependence of farmers creates space for farmers to develop filter system, competitiveness, and partnership. The ability of farmers to utilize advantageous information, implement planning-based farming, produce cocoa beans according to Indonesian National Standard (SNI) and ability to build partnerships with private sector, banks and industries including weak.

3. Factors Affecting Competence Level, Capacity and Interdependence of Cocoa Farmers

An analysis of the factors determining the level competence, capacity and interdependence of cocoa farmers in Central Sulawesi Province using Structural Equation Modeling (SEM) with the assistance of Lisrel 9.2 program. The result of model conformity test based on research framework show that the resulting model has been fit seen on the goodness of model RMSEA = 0,074 ($\leq 0,08$); GFI value = 0.92 (≥ 0.90); AGFI = 0.90 (≥ 0.90); CFI = 0.94 (≥ 0.90); IFI = 0.94 (≥ 0.90); NFI value = 0.91 (≥ 0.90) and may be continued for analysis. The structural equation model of factors affecting the level of cocoa farmer interdependence is presented in Figure 2.

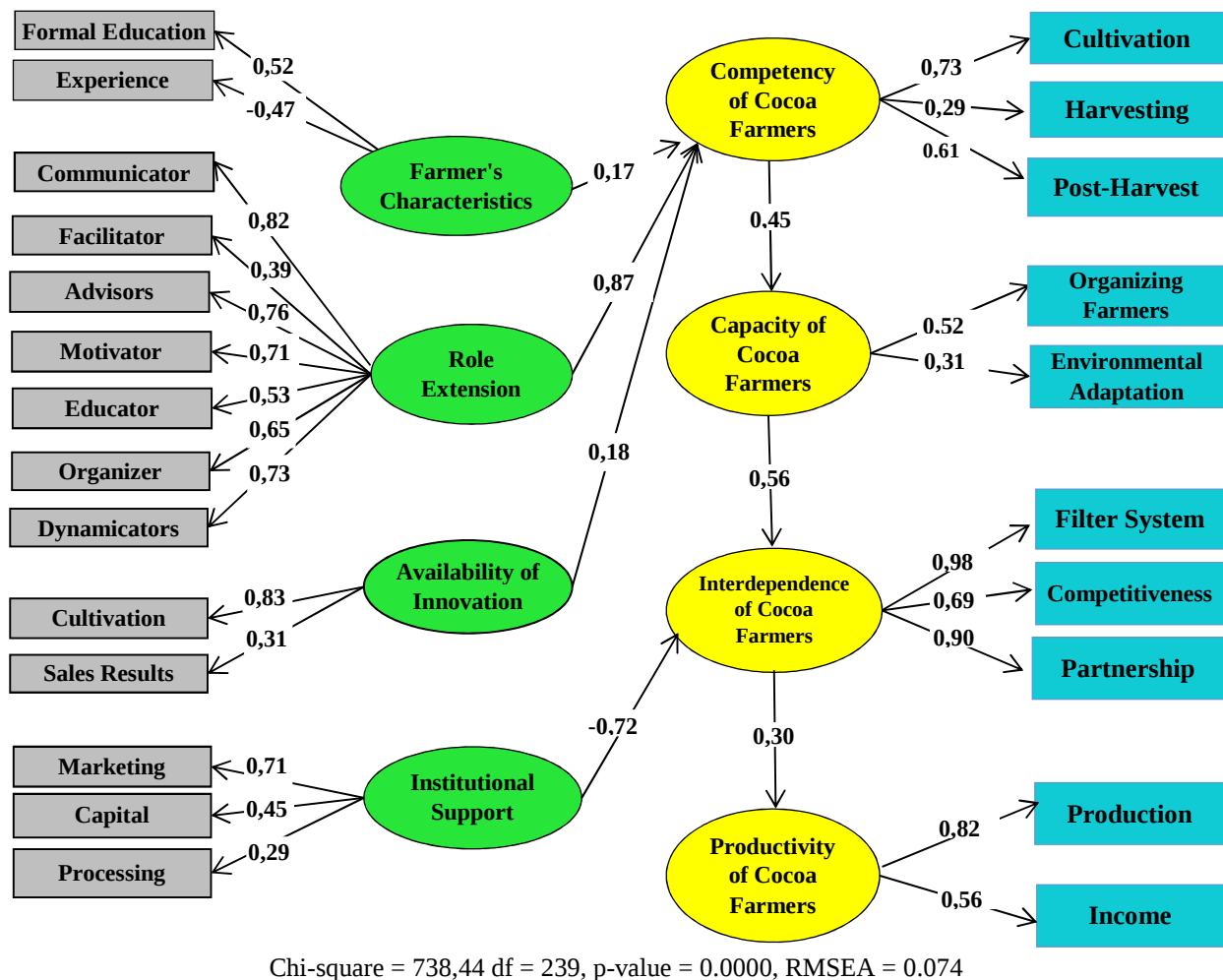


Figure 2. Structural model of dominant factors affecting the interdependence of farmers in improving the productivity of cocoa farming in Central Sulawesi Province, Indonesia

3.1 Factors Affecting the Competence Level of Cocoa Farmers

The results showed that the competence of farmers is influenced by the characteristics of farmers, the role of extension workers and the availability of innovation (Figure 2). The variables that determine the characteristics of farmers are formal education and farmers' experience. Highly educated farmers can work more effectively because it is closely related to the level of knowledge in farming. Rogers [16] states that education has an effect on farmers' responses to innovation. The knowledge and skills of cocoa farming are gained through years of experience in cocoa cultivation. As stated by Aneani [17] farmers who have more experience in cacao cultivation will be easier to adopt cocoa technology.

Increasing the role of extension workers, the availability of innovation, and formal education will increase the competence of farmers. According to Landini et al. [18] extensionists have the role of systematizing innovative training or learning and conducting training based on research results obtained by extension workers. The best extension practice depends on the environmental, institutional, political and cultural contexts. Training of extension workers can improve interpersonal skills. Horizontal communication between farmers and extension workers, making the process of selecting the best technology is expected to increase the competence of farmers.

The role of extension workers has a direct impact on increasing the competence of farmers (Figure 2) because of

its dominant role as communicator, advisor, dynamicators, motivator, organizer, facilitator, and educator. The extension of cocoa plants did not work well because the extension workers who were focused on accompanying cocoa farmers were rarely met and the tasks were focused on food crops so that farmers solved their own problems without direction and assistance from extension workers. Farmers working on cocoa crops still prioritize family-generated experience and interaction with other farmers in their community. The experience that resulted in the commodities cultivated did not experience much development. The problem is expected to be solved through the role of extension as the communicator, facilitator, advisor, motivator, educator, organizer, and dynamicators. As stated by Takemura et al. [19] extension activities related to agricultural techniques must not be viewed as unimportant.

Knowledge of attitudes and skills in cultivation, harvesting and marketing of cocoa farmers still needs to be improved. The improvement can be done through good learning in the process of counseling (non-formal education) based on problems and case studies. The results of this research indicate the role of extension workers as communicators, facilitators, advisors, motivators, educators, organizer, and dynamicators are low, meaning that the role of extension is not in accordance with the Undang-Undang No. 16 of 2006 on Agricultural Extension System, Fisheries and Forestry. The extension process has not been conducted in a participatory manner, still top down where the extension officer is present and communicates directly with the farmers when they meet the farmers' invitation, accompanying the private and the district or provincial agricultural offices in providing education.

Good cocoa cultivation training and assistance of extension workers in overcoming pests of plant diseases, especially about efforts to overcome the attacks *cocoa pod borer* (CPB) and processing of cocoa products ready for consumption is still low. This shows that the extension process in the Central Sulawesi Province is not yet participatory, but there is an extension approach that is all in the service process transfer of technology. As stated by Sumardjo [20] research shows that counseling with a dialogical, humanist, and convergent communications approach is significantly more effective for improving farmer self-reliance than top-down extension models and linear communication models. Extension workers are required to increase rice, corn and soybean production resulting in the role of extension workers in improving the competence of low cocoa farmers.

The availability of innovation is the second factor affecting the level of competence of cocoa farmers that is reflected by the cultivation and processing. The cultivation indicator is the most dominant indicator of innovation availability variable, followed by the processing indicator (Figure 2). According to Robiyo and Siswanto [21] states generally, farmers are less applying cultivation technology innovation according to standards that have been recommended for various things. Cultivation technology used by farmers is generally simple, planting materials are usually not superior varieties or clones, the use of fewer production facilities and the level of knowledge in the cultivation and management of plants or limited gardens.

Based on the results of research, the availability of innovations for cocoa farmers in Central Sulawesi Province is still relatively low, characterized by less application because fertilizers are not available for increased crop production, clones superior to cocoa that produce disease resistant plants, environmentally gracious pesticides and harvesting tools maintaining good cocoa quality and processing of cocoa beans into ready-to-eat products. The results of Tan et al. [22] land tenure can affect farmers to the level of technical efficiency in developing farming. Rogers [16] suggests innovation attributes as a new idea that has a relative advantage, compatibility with the farmer's local environment, complexity, the probability of trying, and observability.

3.2 Factors Affecting the Capacity Level of Cocoa Farmers

Increased capacity of cocoa farmers is determined by the competence of farmers in the aspects of cultivation, harvesting, and post-harvest. As stated by Fatchiya [14], the existing capacity level in a person is influenced by factors from within himself and from the environment outside himself. Factors of the environment one of them is the support of the performance of extension workers consisting of four elements that identify problems and work plan, teaching and learning process, group development, and networking. According Kamruzzaman and Takeya [23] building the capacity of farmers does not occur once. The result of structural equation model analysis of factors affecting the cocoa farmers capacity level is the level of farmers' competence, the low capacity of farmers in organizing and environmental adaptation due to the low competence of farmers (Figure 2).

The farmers' organizing indicator is the most dominant indicator of farmer capacity and followed by environmental adaptation. According to Morton [24];

Harvey et al. [25] the capacity of farmers in developing countries has limited capacity to adapt to environmental change, given the low level of education, low income, limited land, and poor access to technical, market and credit assistance, and reliance on external support.

Organizing cocoa farmers is an important factor in the capacity building process. This is because cocoa farmers in Central Sulawesi in cultivating cocoa are done in groups. Farmers are grouped with the aim of discussing how to solve cocoa plant problems, finding solutions how to overcome cocoa fruit borer attacks and cacao fruit rot disease, sharing information on prices, and jointly planning technical improvement of cocoa beans quality. Capacity building of farmers is done to encourage how farmers interdependence by utilizing the competence of the farmers.

3.3 Factors Affecting the Interdependence Level of Cocoa Farmers

Increased interdependence is determined by the increased capacity of farmers and institutional support. The low interdependence of farmers is due to the low capacity of farmers. The results showed that the capacity of farmers had an effect on the level of interdependence of farmers. The result of Farid's research [26] shows that the dominant factor affecting the interdependence of farmers in making farming decisions is the farmer's self-capacity. Institutional support in marketing is the most dominant indicator of institutional support variables followed by capital and processing.

The influence of institutional support is marked negative (Figure 2). It can be explained that the higher the institutional support the lower the interdependence of farmers. This is due to the marketing process being controlled by local marketing agencies (capital owners) at the sub-district, district and provincial levels as well as the cocoa industry. The process of selling dried cocoa beans is still dependent on the institution, the farmers do not have bargaining position in marketing because the price is controlled by the owners of capital and industry. Farmers do not have the confidence to decide which marketing institutions can provide the best benefits for their farms. Institutional influence makes cocoa farmers not interdependence. Research Pandey et al. [27] stated that the problems faced by farmers are difficult to access to credit, inadequate information, weak institutional services and weak bargaining power of farmers.

The process of cooperation with the owners of capital also takes place in cooperation that is not mutually beneficial. Farmers rely more on middlemen (collector

traders), farmers apply for borrowing loans to collecting traders on condition that the yield of dry beans is handed over to the owners of capital every month with a predetermined time period. Prices are also controlled by collecting merchants. Capital is also often obtained by farmers by borrowing to the owners of capital in the village where they live with a belief system, the process of return according to the agreement between the owners of capital and farmers. Based on the results of the discussion obtained farmers do not have the courage to cooperate with the bank due to difficult administration and mistrust themselves to make a payback.

Dry seed processing as a whole done by the industry. The farmers have not prioritized the crops to be processed into qualified cocoa and in accordance with established standards. Farmers prefer the quantity of yields rather than produce ready-to-eat products. This proves the low level of mutually beneficial cooperation between industry parties, banks, or owners of capital with farmers as the owner of dry cocoa beans. Cooperation takes place based on the benefits of capital owners, causing farmers to become less independent. Institutional support in marketing, capital and processing can be implemented through mutual cooperation, mutual trust, mutual need and mutual dependability.

3.3 Influence of Farmer's Interdependence in Increasing Productivity of Cocoa Farmers

The increase in production and income is due to the increasing interdependence of cocoa farmers. The low level of cocoa farmers affects the low production and income of farmers. The average cocoa production per month in the research area of 2015 is 84 kilograms and in 2016 is 66 kilograms. Based on the average farmer's income per month in 2015 amounting to Rp. 2,131,000,00 and the year 2016 of Rp. 1,325,000,00. According Yanuardy [28] that farmers' income also depends on extreme weather changes, the price of cocoa beans governed by traders and speculators and on chemical fertilizers and pesticides provided by farmers. Based on data from Central Statistics Agency of Central Sulawesi Province [29], cocoa production in Central Sulawesi Province decreased from year to the year 2012 by 181,523 (tons) to 168,733 (tons) in 2016.

Production and income from year to year decreased due to the low interdependence of farmers in cocoa farming that still rely on conventional habits in cultivation, innovation of pest and disease control beneficial always neglected by farmers, regardless of the quality of cocoa beans, the results obtained cannot meet market needs, farm management decisions are not based on the consideration of progress and

needs, there is no mutual cooperation between farmers and industry and banks.

There is an influence on the degree of interdependence to increase the productivity of farmers. The productivity of farmers is directly caused by the level of interdependence of farmers. (Figure 2). The decisive factor affecting the productivity of farmers is the degree of interdependence of farmers. The interdependence of farmers is good in terms of the ability to select appropriate information and useful for cocoa farming (filter system), the ability to improve the quality of dry cocoa beans according to Indonesian National Standard (SNI) so as to have good quantity and quality (competitiveness) and farmers' ability in partnering with private sector, bank and industry or business actor (partnership).

IV. CONCLUSIONS

Farmer competence is weak due to the weak role of extension workers, lack of innovation received by farmers and low formal education. The capacity of farmers is weak in organizing and in adapting to the environment due to the low competence of farmers. The interdependence of cocoa farmers in the low category, this is due to low capacity and institutional support, thus affecting the interdependence of farmers in filter system, competitiveness and partnership.

Increasing the interdependence of farmers is a determinant factor in increasing the productivity of cocoa farming in Central Sulawesi Province, Indonesia. The decline in production and quality of dry beans can be overcome by increasing cocoa farmer interdependence. Low farmer interdependence affects low production and income.

To increase the production and income of farmers is needed to increase the interdependence of farmers. Efforts to increase interdependence should be pursued through increased organizational capacity and capacity to adapt to the environment. The role of extension workers is needed in improving the competence of farmers therefore stakeholders should strengthen the role of extension workers.

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