

The Prominent Role of Agricultural Extension System on Cocoa Agribusiness Development in Aceh, Indonesia

Peran Utama Sistem Penyuluhan Pertanian dalam Pengembangan Agribisnis Kakao di Aceh, Indonesia

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Diterima: 26 Januari 2020 Direvisi: 26 Februari 2020 Disetujui: 7 Mei 2020 Publikasi Online: 1 September 2020

ABSTRACT

This paper aims to analyze the cocoa extension system and factors influencing agribusiness performance on cocoa production. Research was conducted in Pidie Jaya and Southeast Aceh District in July – October 2019. Data and information were gathered from 10 extension workers and 352 cocoa farmers by survey methods. The research result showed that cocoa extension system in Aceh consists of innovation policy subsystem, innovation generating subsystem, innovation delivery subsystem, and innovation receiving subsystem. The public extension services have facilitated 84.66% farmers and private extension services 75.85% farmers, and only 11.93% farmers have been facilitated by farmer's leaders. There was a significant correlation between supporting extension services and the cocoa agribusiness performance. The role of local community has a strong influence in disseminating and implementing technology on cocoa agribusiness. There are different issues that are needed to solve cocoa agribusiness managed by small-scale farmers, namely price incentive policies, supporting fermentation and marketing units of cocoa beans, stimulating the establishment of cocoa processing industry and increasing the quality of extension services.

Keywords: Agribusiness Performance, Cocoa, Extension System.

ABSTRAK

Penelitian ini bertujuan menganalisis sistem penyuluhan kakao dan faktor-faktor yang berkorelasi dengan kinerja agribisnis pada usahatani kakao. Penelitian dilakukan di Kabupaten Pidie Jaya dan Aceh Tenggara pada Bulan Juli – Oktober 2019. Perolehan data dan informasi dilakukan melalui metode survey pada 10 penyuluh dan 352 petani kakao. Hasil penelitian menunjukkan bahwa sistem penyuluhan pada komoditi kakao terdiri dari sub sistem pengambil kebijakan, sub sistem penghasil inovasi, sub sistem penyampaian inovasi dan sub sistem penerima inovasi. Layanan penyuluhan oleh penyuluh pemerintah mencapai 84,66% petani, layanan penyuluhan swasta telah memfasilitasi 75,85% petani, dan 11,93% petani difasilitasi oleh penyuluh swadaya. Terdapat korelasi yang nyata antara dukungan kegiatan penyuluhan dengan kinerja agribisnis usahatani kakao. Pemimpin masyarakat memiliki peran yang tinggi dalam penyebarluasan dan penerapan teknologi dalam kegiatan agribisnis. Beberapa agenda yang perlu diperhatikan untuk mengatasi masalah petani kakao adalah kebijakan insentif harga, pengembangan fermentasi produk dan pemasaran biji kakao, merangsang pembentukan industri pengolahan kakao dan meningkatkan kualitas layanan penyuluhan.

Kata Kunci: Agribisnis, Kakao, Sistem Penyuluhan.



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Published under Department of Communication and Community Development Science, IPB University and in association with Perhimpunan Ahli Penyuluhan Pembangunan Indonesia.

E-ISSN : 2442-4110 | P-ISSN : 1858-2664

INTRODUCTION

The Agriculture sector is widely accepted as the main source of income which highly contributed to increase the economy community and decrease unemployment rate in Aceh Province. The plantation contributes 24.17% to the Gross Domestic Regional Product in the agriculture sector. Cocoa is one of the prime estate besides oil palm, rubber and coffee which gives 8% of total estate production. By covered the area of 101.203 Ha and production of 27.129 Tons (Central Bureau of Statistics, 2018), the cocoa plantation in Aceh currently has the second largest cocoa land and a third-place production in Sumatra, while at national level it places the seventh position of the production. The low level of productivity is the main problem of smallholder cocoa plantations. Even Aceh places the second largest area of cocoa production in Sumatra, but it places the third position by amount of production. However, its productivity of 737 kg/ha is slightly higher than the national average cocoa productivity of 731 kg/ha (Central Bureau of Statistics, 2018). Besides the problem of productivity, farmers also face the problem with the product quality. Farmers still get low prices due to the lack of ability in conducting fermentation process. This has an impact on the difficulty of farmers to improve their welfare. It shows that cocoa has a good prospect to become one of prominent commodity in Aceh, but the problem of productivity and quality need to be concerned to develop cocoa agribusiness.

Dominated by smallholder plantations, major cocoa farmings have been managed by conventional practiced with low technology implementation. Cocoa farms managed on a small scale generally have a low level of technology adoption (Herman *et al.*, 2006; Rubiyo & Siswanto, 2012), their production usually have low competitiveness because they do not meet the quality standards expected by buyers (Tresliyana *et al.*, 2015). Declining productivity due to pest and disease attack as well as climate change continue to occur and make small scale farmer difficult to get good harvests. Hence the government gives more attention to empower farmers through extension services to make better farming system by the adoption of good cocoa farming practices.

Based on Law number 16/2006 on Agricultural Extension System, Fishery and Forestry, the implementation of agricultural extension services aims to enable farmers to organize and help themselves to access market, technology, capital and other resources to increase farming efficiency and farmer prosperity. To reach the goal, Law number 03/2018 emphasizes the need for an agricultural extension system that organizes participatory, integrated and sustainable agricultural education through the development of public and private partnership and all supporting stakeholders. On the other hand, Law number 23/2014 concerning regional government has an impact on changes in the work system and nomenclature of extension agencies in each region, depending on local government policy. At this point, the support of implementing the good extension services depends on the regularity of local government and it can be different among regions. Therefore, as Aceh is developing cocoa as strategic commodity and expecting to become major cocoa-producing region at the national level, a study of the extension system in Aceh is now urgently needed, especially after the policy changes have transformed the structure of the agricultural extension system. The extension system as a bridge between farmers and innovation encourages farmers to change their behavior and solve their problem to create a sustainable cocoa production.

Extension services seek to raise awareness and change people's behavior (Sadono *et al.*, 2014) to get better farming, better business and better living (Sumardjo, 1999). To reach its goals, the system needs to be developed based on the specific conditions of the human resources, development policies and strategies, extension organizations and institutional support, education and training for extension workers, efficient and sustainable technology development and innovation, and reward systems (Amanah, 2008). Thus, agricultural agency needs to collaborate with technical institutions, researcher and private sectors to create precise service to farmers as its client system (Sumardjo, 1999; Syahyuti, 2014). Indraningsih (2017) stated that there were three important components that are interrelated with each other in agricultural information systems, namely generating subsystems, delivery subsystems and receiving subsystems. Generating subsystem provides and develop technological innovation which comes from the research center. In the delivery system, the delivery of technological information from generating subsystem to users is done by optimizing stakeholders and utilizing dissemination media. Receiving system is the target group or technology users which includes the main actors and business actors in agriculture. It consists of farmers, both individually and farmer groups. In addition, the system absolutely needs the support from the innovation policy subsystem to improve the agricultural innovation system performance. Policies related to the extension

implementation by policy makers are relating to budgeting, human resources, information, infrastructure, and decentralization.

The roles of extension to serve better extension services consist of numerous and multi-dimensional aspects. The aspects contain of problem solving, assessment needs, resource mobilization, project planning, implementation, monitoring, and evaluation (Gombe *et al.*, 2016). These roles have been played by government and private sectors through cocoa extension services. Interaction and communication network among parties in building agricultural information exchange system in extension services are known as agricultural extension system (Savran *et al.*, 2011). The development of cocoa extension services on cocoa production in Aceh recently involves partnership between the government and private sectors. Several programs have been implemented in Aceh consist of PEKA (Aceh Cocoa Economic Development), GERNAS (National Movement on Cocoa) and SCPP (Sustainability Cocoa Production Program). Extension service on cocoa is trying to improve farmer ability to manage their uptown to downtown agribusiness.

The change of market, the competitive intensity and the market power are the basic forces that drive the changes in agricultural business orientation (Arabiun, 2014). Agribusiness includes all farming activities i.e. agricultural inputs, production system, distribution and processing of agricultural products and supporting services both facilities and extensions for farmers (Harli *et al.*, 2018). Farmers should be well motivated and competent to manage their farming as a business unit to meet market demands. This can be done through implementation of extension system that collaborates and synergizes with all elements of agribusiness institutions and its supporting institutions to develop cocoa agribusiness. This study aims to analyze the cocoa extension system implemented in the development of cocoa agribusiness. The agribusiness performance on cocoa production were examined as the implementation of best practiced which learned by farmer through cocoa extension services. This study also analyzed the correlation between agribusiness performance with the role of supporting extension services in cocoa production in Aceh.

METHODS

This research is explanatory research with a quantitative approach. Data collection was conducted in Pidie Jaya and Southeast Aceh by survey method in July – October 2019. The research population were 2.958 cocoa farmers who had joined farmer groups. The number of 352 samples were generated based on the Slovin Formula with a five percent error rate. Sample taken by multiple stage sampling: *First*, we determined the selected sub-districts purposively based on the highest number of active farmer groups; *Second*, we selected farmer groups by purposive sampling based on the number and the activeness of group member. *Last*, samples were taken by simple random sampling in each group. The number of samples were determined proportionally based on the number of farmers. The detail of the samples by region can be seen in Table 1. In addition, 10 extension workers have been interviewed as key informants about the extension system on cocoa production in Aceh. The extension workers involved in this research were defined purposively based on their working area and their knowledge about the development of extension system in their region, so they were well representative to explain the qualitative data in this study.

Table 1 The number of samples based on sub-district area in Pidie Jaya and Souteast Aceh

No.	District	Sub-district	Number of farmer group	Number of Farmers	Number of Samples
1.	Pidie Jaya	1. Bandar Baru	5	139	65
		2. Trienggadeng	2	65	33
		3. Ulim	6	159	73
2.	Aceh Tenggara	1. Bukit Tusam	3	57	42
		2. Babel	2	50	35
		3. Tanoh Alas	4	102	72
		4. Semadam	2	44	32
Total			24	616	352

The data collected consist of the cocoa agribusiness performance i.e input implementation (superior clones and fertilizer), on farm performance (tree pruning, shade plants management, pest and disease

control), off farm performance (sortation, fermentation, drying process), marketing performance (access to market, marketing through farmer groups) and the role of supporting extension services (extension worker, community leader, local forum). Data were analyzed descriptively through the frequency distribution table to display the distribution of data and provides an overview of respondents in the study area. The correlation between agribusiness performance and extension role were tested using Spearman Rank Correlation by SPSS ver 23.

RESULTS AND DISCUSSION

Cocoa Extension System in Aceh Province

Extension services on cocoa production were initially carried out as an accompaniment projects in the 1980s and 1990s, consist of the Plantation Development Project in Special Areas (P2WK), and the Rejuvenation, Rehabilitation and Export Plant Expansion Project (PRPTE). Government efforts to improve cocoa productivity continue to be done through farmer extension programs. In 2009, the government organized the National Movement on Cocoa Production and Quality Improvement (Gernas Cocoa) which focused on cocoa rehabilitation, intensification and rejuvenation activities.

The massive development of cocoa extension program has been implemented after Swisscontact held the Aceh Cocoa Economic Improvement Program (PEKA) in 2012. The program was then continued through the framework of government and private partnership by project Sustainable Cocoa Production Program (SCPP) until 2018. The SCPP program aims to improve competitiveness cocoa in the main cocoa producing regions in Indonesia (including Aceh) by involving: (1) good agricultural practices and technology transfer systems; (2) integration of nutrition and gender sensitivity; (3) farmer organizations, access to markets and certification; (4) integrated financing facilities; (5) stakeholder management and network platforms. Extension services to farmers carried out to improve the competence of farmers in the implementation of good agricultural practices (GAP) on cocoa production. The various modules developed in the SCPP program seek to prepare farmers to have competence not only in technical aspects, but also as managers or entrepreneurs on their cocoa farming activities.

The cocoa extension system in Aceh involves several institutions in conducting extension services according to their respective functions. The cocoa agribusiness extension system consists of policy subsystems, generating subsystems, delivery subsystems and receiving subsystems as presented in Figure 1. The policies of cocoa development in Aceh were determined by the regional planning Agency at the provincial level. This institution coordinated with the government on the mapping and determines strategic planning of cocoa commodities in Aceh. Innovation as extension information were produced through research projects under the university and agricultural technology research center. These agencies work to produce innovations based on farmers need. It coordinates with the delivery sub system to produce appropriate technology for farmers.

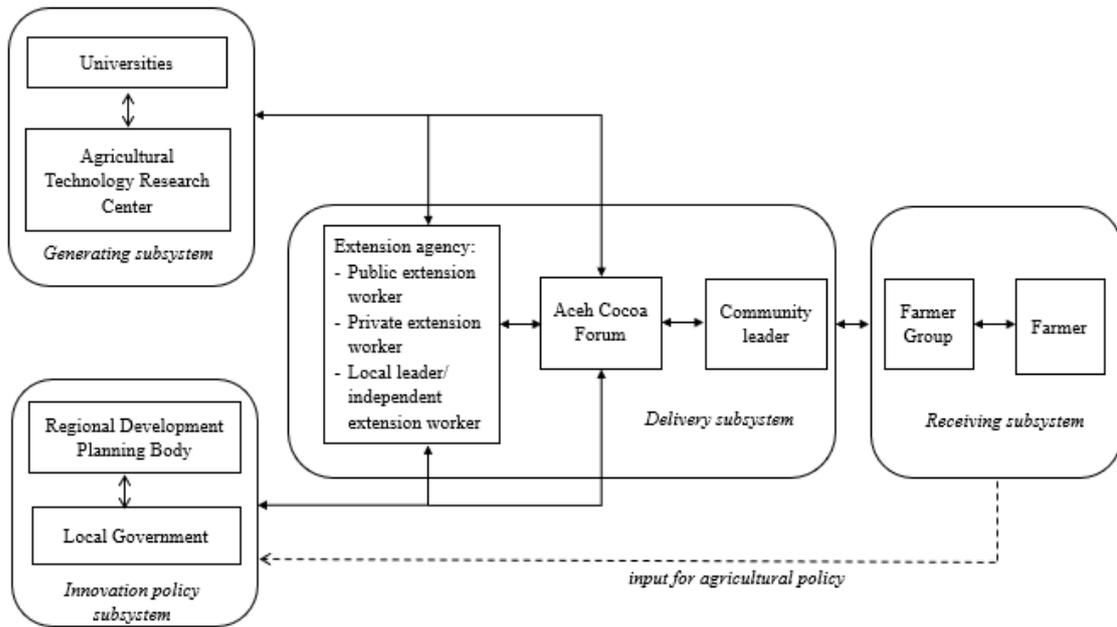


Figure 1. Cocoa Extension System in Aceh Province

Before the enactment of Law number 23/2014, the extension services in Aceh was hold by Food Security and Agricultural Extension Agency. Currently extension activities are executed under the control of the Agriculture and Plantation Agency. Aceh province currently has 3.834 extension workers, by details of 1.741 extension worker as civil servants, 1.074 supporting staff (THL-TBPP) and 1.019 independent extension workers. The ratio of extension workers and target villages in the study area is 1: 2, where one extension worker is responsible for serving two villages in extension services. Implementation of public extension services are technically carried out by the Agricultural Extension Center (BPP) located in each sub district. It also becomes a place for technology assessment before transferred for farmers and a gathering place for farmers in accessing agricultural information.

Private sectors in extension services are dominated by non-local government agencies that have more attention to the development of cocoa commodities in Aceh. Swisscontact served most cocoa farmers by implementing empowerment programs such as the Aceh Cocoa Economic Development (PEKA) and Sustainable Cocoa Production Program (SCPP). Swisscontact employed private extension workers from the target regions and their competency on cocoa management has been increased through training of trainers. Research result found that public extension has served 84% cocoa farmers, meanwhile private sectors facilitate 78% farmers in rural extension services. Farmers leader as independent extension worker served only 11 cocoa farmers. The private extension served more farmers in Pidie Jaya, while public extension and farmer leaders in Southeast Aceh served more farmers than those in Pidie Jaya. Figure 2 shows the number of farmers serviced by extension workers based on the types of extension workers.

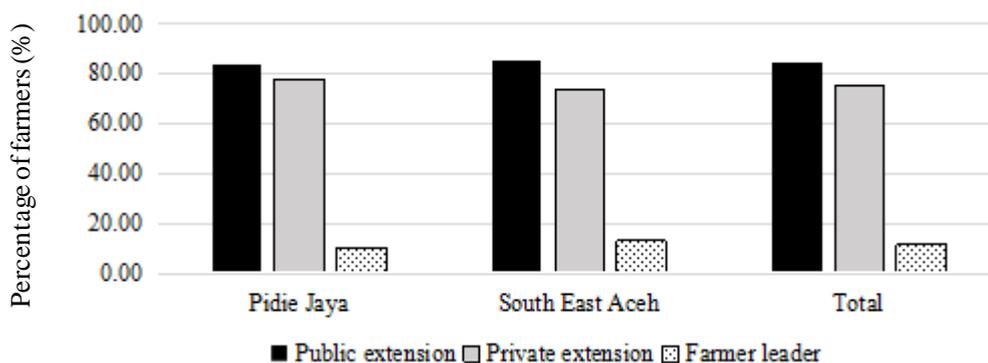


Figure 2. Percentage of farmers served by extension services

Besides public extensions, delivery sub systems in extension services are also supported by community leaders and local forums. Community leaders act as opinion leaders who guide farmers' knowledge and beliefs about the technology. Kusumastuti (2015) stated that farmers will adapt themselves to the decisions of their social environment through cooperation and participation. Therefore, the behavior formed in individuals will be strongly influenced by the opinions or views of other individuals in their environment. Community leaders in Aceh called *Tuha Peut*, which is a local institution that functions as a supervisor and advisor to the *geuchik* (village head) in carrying the duties, including resolving disputes or problems that occur at the village level. The involvement of community leaders in the cocoa extension system includes participation in extension activities, informal information dissemination and pushing farmers' acceptance of the technology. Community leaders who are experts in the cocoa good practices are often enrolled as independent extension workers. They are quite influential in disseminating agricultural information for their community.

The cocoa forum is a local institution consisting of stakeholders involved in the development of cocoa in Aceh from private sector representatives such as cocoa traders, government agencies representatives, research institutions, and cocoa farmer groups. This institution was initiated by UNDP in 2007. The cocoa forum has decided to become an information center and discussion forum related to solving farmers' problems and developing innovation in efforts to improve the quality of Aceh's cocoa. The involvement of Aceh Cocoa Forum focus on bridging collaboration between stakeholders to give their best contribution on the cocoa extension program. It annually organizes in *Duek Pakat Cocoa*, which invites all cocoa extension stakeholders to sit with farmers and solve their problems to get better cocoa farming performance. The results of this activity are considered as priority recommendation for the next cocoa development program.

Ayalew *et al.* (2015) stated the importance of strengthen the relations among all parties in in order to accelerate the transfer knowledge system and increase the effectiveness of the use of disseminated agricultural technology. The constraints in maintaining relationship among those parties in the system will potentially affect extension process, while effective relationships will enable farmers to change their behavior through the effective extension system. So, the system provides two ways of communication from extension agency to receive sub system. The agricultural information produced by innovation agency was delivered through extension worker to the farmers. Instead, information to build the policies was received from farmers and communicated to policy makers. This shows the function of extension worker as a bridge between innovation and policy makers and farmers need.

It was stated by Amanah (2008) that the extension worker is a key actor in the rural advisory system as an implementing agent who is responsible for fulfilling community demands. Then the effective extension system is greatly influenced by the ability of extension workers in building an accurate delivering information process (Hubeis 2007). As Syakir (2016) also stated that delivery sub-system has a strong influence on the process of adoption and diffusion innovations by farmers. Therefore, it is needed an appropriate communication and technology so that farmers as receiving sub-systems can accept and apply technology properly. The main problem in cocoa extension activities is the lack of change agents, especially those who qualified in the plantation sector. As Figure 2 shows that government workers still have not been able to serve all cocoa farmers in extension services. It helps much by the presence of private extension and farmer leader. There is a slightly difference between the availability of extension workers in Pidie Jaya and Southeast Aceh shows that both areas need more extension workers, especially an agent that expert on a cocoa plantation.

Polyvalence demand for extension workers has not been well implemented. This is due to the qualification of extension workers which primarily competent on food crop agriculture; even independent extension workers who expert in cocoa farming practices are still rarely found in the study area. Moreover, generally cocoa farmer also has another source of livelihood in the food crop sector, so they often focus more on crop production which has more intensive extension activities. Therefore, increasing intensive extension services on cocoa is needed to encourage farmers and work with them to develop cocoa production at the farm level so that farmers do not feel left out.

Farmers' Characteristics

The distribution of cocoa farmers based on the farmers' characteristics are presented in Table 2. The average age of farmers in the study area is 45 years, which shows that the cocoa farmers are in the productive age of working as farmers. There are some elderly farmers but they are still managing

cocoa to meet family needs, or do not have other family members who can help to organize their cocoa farm. Cocoa farmers in Pidie Jaya and Southeast Aceh districts have generally completed basic education. Farmers participated in formal education for 10 years on average, which is equivalent to senior high school. A high level of education is related to the ability of individual to receive and analyze the information obtained. Farmer education determines the level of rationality and individual view of innovation, thus affecting their consideration in adopting innovation (Khairuddin *et al.*, 2015). Therefore, a high level of farmer education in the study area is a potential input in extension activities to increase cocoa production through the adoption of good farming practices. Farmer families in Pidie Jaya and Southeast Aceh districts generally have relatively small numbers of dependents with an average of 3 people. There are several reasons for the low number of dependents for farmers' family in the study area. First, young farmers are new marriage and still have small families. Second, elderly farmers generally have independent family members and are no longer dependent to their parents.

Table 2 Cocoa farmers' characteristics in Pidie Jaya and Souteast Aceh

Description	Unit	District		Total (n =352)
		Pidie Jaya (n = 171)	Southeast Aceh (n = 181)	
Farmers' age	Year	44.64	45.34	45.00
Education level	Year	10.25	10.55	10.45
Number of dependents	Person	4	3	3
Farmers' experience	Year	14.62	10.37	12.43
Land size	Hectare	1.10	0.83	0.96

The average of farmers' experience is 12 years, so they are qualified to carry out the technical aspect of cocoa production according to their experience. Farmers interaction with their business environment and their ways of solving problems become the learning process in managing cocoa production and improve their ability. This result is relevant with Hariyani *et al.* (2014) that through the experience farmers involved in the learning process that enhances knowledge in farm decision making and new technology that have never been applied before. Farmers in Pidie Jaya have longer experience than farmers in Southeast Aceh. Based on our observation, there were more farmers who have just started cocoa farming in Southeast Aceh District. This can be an opportunity to encourage new farmers to reach their successful through new ways and technology that increase productivity and environmental sustainability.

Farmers in research area are smallholder farmers since they have narrow land ownership. Farmers in Southeast Aceh have relatively small land compared to farmers in Pidie Jaya. Low land ownership by farmers is an obstacle to the technology adoption. The study of Islam *et al.* (2013) and Utaranakorn & Yasunobu (2014) concluded that small land tenure encourages farmers to carry out conventional production activities, while large-scale farming will encourage farmers to apply innovation and profit-oriented. Therefore, based on the number of land, cocoa farmers in the Pidie Jaya will be easier to adopt technology, but cocoa farmers in Southeast Aceh have high potential to be developed through intensification of cocoa farming.

Cocoa Agribusiness Performance

Pidie Jaya and Southeast Aceh are the largest cocoa producing area in Aceh Province which contribute 40.3% to Aceh's total cocoa production. Southeast Aceh is the highest cocoa producing region, while Pidie Jaya is a national plantation area based on the Decree of the Minister of Agriculture of Republic of Indonesia Number 46/Kpts/PD.300/1/2015. Fostering cocoa farming as a business unit, extension services seek to encourage the development of agribusiness from upstream agribusiness to downstream agribusiness. Farmers were prepared to have a good technical and management skill to be implemented to their cocoa business. Various activities were held in each agribusiness system including farming input, on-farm activities, off-farm activities and marketing performance as shown in Table 3. The highest performance is in on farm activities, followed by input, off farm and marketing.

On farm activity consist of tree pruning, management of shade plants and pest and disease control. There are 49.70% of farmers in Pidie Jaya and 54.60% of farmers in Southeast Aceh have moderate level of pruning capability. Major farmers in Southeast Aceh have pruned their cocoa tree but they do

it conditionally when the cocoa tree is too lush. This condition leads the attacking cocoa pod by pests and plant diseases. According to the results of Angela & Efendi (2015) that pruning affects the number of water buds, flowering pads, the resistance of cherelle (fruit nipple) and fruit to pests and plant diseases.

Shade plant management was carried out by pruning shade plants so they are not overly overgrown and provide enough light for plants. Pruning was done to provide light spots on the garden floor, but unfortunately farmers still rarely do that. The effect is increasing farming area humidity and leading to more diseases and pest attacks. Thus, farmers still use chemical pests and disease control because they need a faster way to save their crops. Can be seen on the Table 1 that more farmers in Pidie Jaya tend to use non-chemical pest and disease control compare with farmers in Southeast Aceh. The prevention way to gain disease and pest attacks implemented was sheathing the cocoa and keeping ants in the cocoa tree. Cocoa pod were sheathed by plastic and banded so cocoa pod were protected inside. Keeping ants useful in preventing pest approaching cocoa pods. However, farmers in the research area tend not to keep the ants well using media like coconut coir or cocoa leaf. They only use ants which naturally come and nest in the cacao tree.

Input performance was assessed from the use of superior clones and organic fertilizer. Farmers believe that good quality of cocoa seed will help them to increase production. Farmers in Pidie Jaya have a better performance in using superior clones. The clones were given by the government through extension workers. Almost all farmers use SUL 1 and SUL 2, the clones were recommended by the government regulation of Ministry of Agriculture Decree No 1964/Kpts/SR.120/12/2008 and No 1965/Kpts/SR.120/12/2008. The use of organic fertilizer in both areas still completed with chemical fertilizer as urea, SP 36 and KCL. The amount of fertilizer applied by farmer still below recommendation. Based on observations not all farmers do fertilization. Farmers who do not cultivate their land intensively only fertilize during planting, and after that the plants are not treated intensively.

Table 3 Farmers percentage based on agribusiness performance in Pidie Jaya and Sout East Aceh

Agribusiness performance	Percentage of Farmers (%)							
	Pidie Jaya				Southeast Aceh			
	Very low	Low	Moderate	High	Very low	Low	Moderate	High
Agro-input								
Superior clones	8.20	33.30	49.70	8.80	11.00	24.30	54.60	11.00
Fertilizer	4.10	18.10	65.50	12.30	0.00	12.70	68.50	18.80
On-farm activity								
Tree pruning	2.90	22.80	49.10	25.10	0.00	13.30	45.90	40.90
Shade plants	1.80	48.00	42.70	7.60	22.70	37.60	32.00	7.70
Non chemical pest and disease control	2.30	23.40	62.00	12.30	0.60	29.30	39.20	30.90
Off-farm activity								
Sortation	7.00	17.50	37.40	38.00	7.20	21.50	44.20	27.10
Fermentation	65.30	17.10	14.70	2.90	61.30	31.50	5.00	2.20
Drying process	46.80	12.90	15.80	24.60	18.20	6.10	64.10	11.60
Marketing performance								
Access to market	0.00	26.90	64.30	8.80	2.20	29.80	57.50	10.50
Marketing through farmer group	14.60	42.10	32.70	10.50	28.20	40.90	23.20	7.70

Extension services on downstream agribusiness focus on the improvement of farmers' abilities in post-harvest processing and product marketing. Farmers were educated to perform post-harvest treatment through training on cocoa fermentation, upgrading cocoa quality according to market demands and strengthening farmer's group in marketing their products. After attending extension services on cocoa post-harvest processing, the number of farmers who perform cocoa fermentation has reached 36.26% in Pidie Jaya and 35.36% in Southeast Aceh. More farmers in Pidie Jaya conduct fermentation compare with Southeast Aceh. This due to the lack of fermented market in Southeast Aceh, while Pidie Jaya has chocolate industry which accommodates farmers' fermented products. Fermentation

process need to handle very carefully and precisely to produce distinctive chocolate flavor, otherwise buyers will reject the product and pay the same price as non-fermented product. Therefore, farmers prefer to sell their products after the drying process without fermentation. The average price at farmers' level was IDR 24.000 per kilograms. The price rate stands below the fermented product, but farmers keep on selling non fermented product to gain faster income and reduce uncertainty.

Drying process usually conduct by farmer conventionally after harvesting for 6-7 days. Those who not perform fermentation and drying process were selling their fresh harvested products without any post-harvest treatment to local traders. Farmers in Pidie Jaya tends to sell fresh product since only 53.80% farmers dry the cocoa bean. However, almost all farmers sorting their harvested fruit by split the rotten and good fruit. It has to be done since the farmer will get cut price when they cannot fulfill the quality demand on cocoa size and the content of foreign matter in the products. The lower product quality the lower price will be determined by the buyer. Marketing channel that are accessed by farmers are generally merchants. Farmers also sell their products to the chocolate industry and cooperatives. There are 64.3% of farmers in Pidie Jaya and 57.5% of farmers in Southeast Aceh who have moderate access to marketing institutions. This level describes farmers' access not only to local traders, but also to agroindustry and farmer cooperatives. High levels of access at 8.80% of Pidie Jaya farmers and 10.50% of Southeast Aceh farmers describe high marketing access to large traders as raw material for industries outside Aceh.

Farmers collaborate with buyers to send fermented products through farmer groups. The ability of marketing products through farmer groups is higher for farmers in Pidie Jaya. As a cocoa agroindustry development area in Aceh, attention to the development of farmer groups in Pidie Jaya is more intense. Farmers are encouraged to develop actively, especially to become community economic groups as cocoa producers.

Correlation Between Supporting Extension Services with Cocoa Agribusiness Performance

Extension services on cocoa are oriented towards strengthening cocoa agribusiness at farmer's level. Therefore, extension services push farmers not only to competent on farming technique, but also to gain more income through quality management and product marketing. Those the materials provided to farmers were focused on the implementation of cocoa best practices which focus on technical and managerial skill. The methods used are farming visits and integrated field school which provide larger practical work in the learning process to push farmer competencies.

The extension services on managing cocoa agribusiness in research areas involved extension workers, community leaders and local forums. The role of extension worker was defined from the efforts of extension services to solve farmer problems, the relationship of extension workers with farmers and extension workers visit to farmers. Extension workers who provide assistance to farmers are primarily government worker and the private sector. Farmers in both study areas considered that extension workers were quite active in trying to help farmers, especially in pest and disease management on cocoa fields.

Community leaders play an important role on cocoa agribusiness performance. The involvement of community leaders in extension services was assessed from their participation in extension activities, discussions with farmers about the technologies and leads farmers' decision making about technology. Farmers generally consider the community leaders to be quite good in their participation and leading their decisions, but they are lack of knowledge about technological developments in cocoa farming. The role of local forum was represented by the implementation of extension activities, farm consulting services and partnership development. Farmers considered that the cocoa forum was quite influential in developing partnership for farmers, but lacked a role in providing counseling and program assistance for farmers.

The correlation between the role of extension worker, community leader and local forum with agribusiness performances were shown in Table 4. The use of superior seeds correlated significantly and positively with the role of extension workers, local leaders and local cocoa forums. The correlation between the use of superior clones and worker extensions was stronger than that of community leaders and local forums. This because the government has more concern in the distribution and supervision of the use of high-quality seeds. Procurement of cocoa seeds were facilitated by the government and local forums so as to increase the use of superior seeds by farmers.

The use of fertilizer only correlates significantly and positively with the role of informal leaders, while the extension workers and local forum does not significantly correlate. This shows that farmers tend to follow community leader direction and decision. Community leader has a strong value to guidance farmer in implementing good farming practices, especially in using superior clones and fertilizer. Extension worker and cocoa forum play a role in assisting the technical use of fertilizers, but the use of fertilizers by farmers is still low and not as recommended. Farmers consider the use of fertilizers to require higher skills, time and costs. Klein & Knight (2005) stated that the implementation of innovation was difficult to farmers when the innovation were: 1) unreliable and imperfectly designed; 2) need advanced technical knowledge and skills; 3) farmers were forced to follow by those higher in the hierarchy; 4) push to change farmers roles, routines and norms; 5) time consuming and expensive; 6) organizations are a stabilizing force.

Table 4 Correlation coefficient and significant value between agro-input performance and supporting extension services.

Description	Supporting Extension Services					
	Extension Worker		Community Leader		Local Forum	
	Coef	Sig	Coef	Sig	Coef	Sig
1. Agro-input performances						
Superior clones	0.312*	0.013	0.258**	0.000	0.297**	0.000
Fertilizer	0.084	0.115	0.139**	0.009	0.078	0.143
2. On-farm performances						
Tree pruning	0.205**	0.000	0.194**	0.000	0.188**	0.000
Shade plants	0.247**	0.000	0.181**	0.001	0.399**	0.000
Non-chemical pest and disease control	0.277**	0.000	0.331**	0.000	0.407**	0.000
3. Off-farm performances						
Sortation	0.202**	0.000	0.224**	0.000	0.237**	0.000
Fermentation	0.150**	0.000	0.200**	0.000	0.266**	0.000
Drying process	0.084	0.117	0.105*	0.409	0.021	0.688
4. Marketing performances						
Access to marketing channel	0.122*	0.022	0.283**	0.000	0.273**	0.000
Marketing through farmer group	0.129*	0.015	0.177**	0.000	0.305**	0.000

** highly significant at $\alpha \leq 0.01$

The role of extension workers, community leaders and local forums proved positive correlate with on-farm activities consist of crop pruning, shade management and non-chemical pest and disease control. The correlations between on-farm performance with extension workers and local forums were higher than that with community leaders. Extension worker more concern on improving the technical abilities of farmers in production processes to increase the number of production. Extension worker provides material about good agricultural practices in extension activities through field schools. This increases the competence of farmers in managing appropriate cultivation techniques. The cocoa forum plays an important role in overcoming farming problems through discussions with farmers. In addition, technical assistances were carried out through forum members in the regions as intermediaries to address farmers' problems to the cocoa forum.

The role of community leaders was to convey environmentally friendly methods of pest control. Information dissemination was done through informal discussions and farmers' meetings. Community leaders are excellent at emotional maturity, empathy and the ability to communicate the development projects to farmers (Michael *et al.*, 2019). Farmers are generally persevering on the direction of their leaders. This is the excellence of community leaders in the research area who are able to build discussions with farmers and change farmers perception to accept and desire to apply technology. This result also supported by Ruliana (2016) that the accuracy of communication in extension activities builds better ways to deliver information to individuals or groups in carrying out activities based on

their competencies. Post-harvest management which include sortation and fermentation were positively and highly significant related to the role of extension workers, community leaders and local forums. Drying process is significantly correlated with the role of community leaders, but not significantly correlated to the role of extension worker and local forums. Extension activities were striving to implement sorting and fermentation to increase product prices. Whereas the extension services limited in giving drying process material to farmers. Drying process conducted conventionally by farmers based on own experiences and knowledge. The material provided in the extension activities affects the ability of farmers to apply technology. This is in accordance with the research of Sapar *et al.* (2014), that appropriate materials, methods and media will improve the performance of extension workers in the application of technology by farmers.

The role of extension worker, community leaders and local forums were significantly correlated with marketing performance. The role of extension workers was pursued through group strengthening and management of group activities. Community leaders played a role in encouraging group member meetings and connecting groups with cooperatives. Local forum support was highly significant with correlation coefficient values of 0.273 and 0.305. Community leaders and local forums have a higher level of correlation with farmers' marketing abilities than extension workers. Based on observations in the field, extension workers prioritized the technical abilities of farming, while processing and marketing activities were supported more by local forums in coordination with farmer leaders. Increasingly the role of the local cocoa forum will increase farmers' access to marketing institutions and the marketing capabilities of farmer groups, vice versa. Local forum plays an important role in developing partnerships and marketing networks on cocoa products. Private sector is currently more efficient alternative to bring products to market and provide benefits to small farmers (Ferroni & Castle, 2011). Therefore, it is important for extension activities to build partnerships between extension workers and local institutions to improve the effectiveness of the extension program in serving the needs of cocoa farming.

Problems on Cocoa Agribusiness Development

The development of farmer capacity as the main actor on small-scale cocoa enterprises faces several significant obstacles. Farmers found the difficulties to provide benefits to their small-scale enterprise. This situation led to poor spirit and motivation to maintain cocoa farming and switch to other commodities or assign cocoa farm as a side business. Some problems and the way to encounter the problems in managing cocoa at the farm level include:

1. The low of cocoa production. Less intensive garden maintenance, pest and disease attacks and the old plants are the main causes of the lack of cocoa production. Therefore, cocoa extension services have to push farmers to apply intensive garden care to produce cocoa continuously. Extension workers must be able to convince farmers that the proper implementation of farming techniques will increase the number and quality of cocoa production to provide higher profits.
2. Limited market for fermented cocoa. Fermented cocoa will have a high taste and become good raw material for the cocoa processing industry. But unfortunately, not all fermented cocoa products will be accepted in the market. Entrepreneurs will be very careful in choosing fermented cocoa to be processed, because besides the higher price, the less fermentation quality will result in imperfect chocolate's taste. Because of the limited buyers of fermented cocoa, farmers tend to sell unfermented cocoa or wet cocoa. Moreover, farmers prefer to sell their products directly without any treatment to get faster income. Selling cocoa bean without conducting fermentation is the best way to receive fast money compared to spend 4-5 days to do the fermentation treatment. Generally, farmers who carry out fermentation are those who have cooperation with traders or entrepreneurs as suppliers of the processing industry. The challenges to extension services to build farmers networking and partnership with buyers to get certainty of marketing product.
3. The low selling price. Product processing and quality influence the price rate of the cocoa bean. The low selling price mainly caused by the inability of farmers to meet the standard quality of cocoa beans. Cocoa farmers in the research area get a low price level because they market their product without post-harvest processing to local traders. The price of unfermented cocoa is even much lower, where fermented cocoa can be sold at a double price of unfermented cocoa. Therefore, extension services need to encourage the fermentation and marketing units of cocoa beans through collaboration with the buyer or industry to break the chain of local traders and give more benefit for farmers.

4. The lack of a cocoa processing industry that is easily accessed by farmers. The low farmer access to the cocoa industry forced farmers to sell their products to local traders at a low price. To lift up cocoa as a superior commodity in the region, the strategy to be implemented is area branding as a cocoa producer. It can be done by produced more processed cocoa as area characteristics. Extension workers need to empower micro enterprises and stimulating cocoa processing industry establishment. This can help the community to receive the added value of cocoa processing, and in the other hand also help in expanding the market for cocoa farming products.
5. Limited extension services on cocoa farming which focused on behavioral change. The extension service seeks to the implementation of good agricultural principles on cocoa to increase productivity. Development of farmer competency to a higher level should be balanced with managerial and problem solving skills so that they are empowered enough and able to conduct sustainable cocoa farming. In one hand extension services were needed to improve the technical ability of farmers, but in other hand change agents also need to concern about increasing farmers' capacity to organize themselves and not depend on another party in managing their cocoa farming. Improving the quality of extension services must be supported by the ability of extension workers not only in delivering innovations, but also in organizing farmers, encouraging them to take an action and rise their need for achievement for a prosperous life through better management of cocoa farming.

CONCLUSION

Extension system on cocoa agribusiness development involved all parties which plays a role in implementing technology at the farm level, consisting of policy makers, research institutions, extension agencies, cocoa forums, community leaders and farmer groups. Extension workers are prominent in helping farmers to find the solution for their farming problems and delivering information for farmers. However, there were the lack of extension workers, especially in plantation commodities because extension workers are commonly specialized in food crop agriculture. The polyvalence policy set by the government needs to be supported by adequate technical training for extension workers. The participation of farmer leader in providing services to farmers was still weak, hence local government need to pay more attention to involve more progressive extension workers and facilitate them to work effectively. Community leaders have a good influence on the dissemination of innovation so that they can be actively involved in extension activities, especially in disseminating new issues and motivating farmers to apply technology.

The role of extension workers, community leaders and local forums were correlated with cocoa agribusiness performance. The role of extension worker more influential in building technical skill to perform on farm agribusiness. Local forum playing an important role in developing farmers partnership and cooperation. Community leader tend to more influential in guiding farmer to accept and implement the technologies. It is potential to invite more participation of community leader in extension process to improve agribusiness performance on cocoa production. Extension services need to link cocoa farming with various stakeholders that benefit farmers, especially in marketing development for fermented product. Market availability will motivate farmers to do post-harvest activities. In addition, production-oriented services for farmers must be completed with the approach to increase farmer's personality and readiness, so they have high willingness to move forward without pinning their hopes on others.

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