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**INCREASING INCOME OF COCOA FARMING THROUGH THE ROLE OF  
AGRICULTURAL EXTENSION AND STRENGTHENING INSTITUTIONAL  
CAPACITY OF FARMERS**

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<http://doi.org/10.35410/IJAEB.2019.4465>

**ABSTRACT**

Cocoa farmers face various obstacles and problems in an effort to increase production and farm income. Therefore, it is necessary to do empowerment related to the adoption of knowledge and skills so that farmers are able to solve the problems encountered in their farming. Adoption of science and skills is more effective if done through an extension program through the Farmer Group. The research aims to determine the level of farmer income, the role of agricultural extension and strengthening the institutional capacity of farmer groups in empowering farmers as competent agricultural development actors so as to be able to develop agricultural businesses that are resilient, better farming, better business and live better lives (better living). This research is a descriptive study using a questionnaire. The results showed that farmers' income was not optimal due to limitations in the aspects of production, capital, farmers' level of knowledge and skills. The role of agricultural extension is still limited to the production aspect and has not yet touched on access to farm financing sources and efforts to increase the added value of cocoa products in efforts to develop rural industries. The performance of farmer groups is not optimal in the development of cocoa farming, especially in production efficiency, competitiveness and product added value. Most farmers continue to depend their lives on farming economy (on farm) which is actually an economic activity that has little added value. While activities that have the greatest added value, namely in the processing of yields and trade in their products (off-farm), are left to those who are not farmers.

**Keywords:** Income, Agricultural Extension, Farmer institutions.

**1. INTRODUCTION**

Agriculture is the production of food and goods through farming and forestry and was the key development that led to the rise of human civilization (Wager, 2011). Agriculture still plays an important role in many developing country economies as the sector is a source of employment for an estimated 60 to 70 percent of the population in most developing countries (Nguyen, Dzator, & Nadolny, 2015). The fundamental role that agriculture plays in development has long been recognized. However, globalization, integrated value chains, rapid technological and institutional innovations, and environmental constraints have deeply changed the context for agriculture's role. A new paradigm is needed that recognizes agriculture's multiple functions for development (Byerlee, de Janvry, & Sadoulet, 2009). Agricultural modernization has a positive

effect on both measures of economic growth and human development (Self & Grabowski, 2007). Global changes in the roles of the public and private sectors and the dramatic advancements in technology have also strongly affected agricultural workforce development needs. The need for new and necessary policy, institutional, and program reform. Agricultural education systems, including extension, formal education, in-service training, and mass media/distance education programs are examined for their importance and their need to network to prepare the agricultural workforce to meet new challenges (Rivera & Gary, 2008). Agricultural extension and advisory services play an important role in agricultural development and can contribute to improving the welfare of farmers and other people living in rural areas (Waddington, Snilsveit, White, Anderson, & Waddington, 2010). The problems of agricultural economic development related to the scarcity of the main resources are decline of quality and quantity of agricultural land resources, the weakness of human resources, that is farmers in adopting technology and innovation affecting the productivity, efficiency, the lack of access to business services, especially that affect farmers in financing their farms business so that the productivity achieved is still below of the potential productivity (S. Jumiyati, Arsyad, Rajindra, Pulubuhu, & Hadid, 2018).

Agricultural extension and advisory services play an important role in agricultural development and can contribute to improving the welfare of farmers and other people living in rural areas (Waddington, Snilsveit, White, Anderson, & Waddington, 2010). Anderson (2007) defines the terms agricultural extension and advisory services as "the entire set of organisations that support and facilitate people engaged in agricultural production to solve problems and to obtain information, skills and technologies to improve their livelihoods". Agricultural extension services are supposed to fulfill many aims, from reducing rural poverty and improved livelihoods for rural households to increasing the overall production and contributing to foreign exchange earnings from exports (Mahaliyanaarachchi & Bandara, 2010).

Advances in agricultural technology represent an innovation challenge in terms of their diffusion into farming practice, and create a new dynamic for research and extension roles (Eastwood, Klerkx, & Nettle, 2017). The role of government is needed in encouraging the creation and adoption of innovations in agriculture (Juma & Juma, 2015). Overall role in developing infrastructure (physical and institutional), technology, capital, price stabilization policies, and extension services (Sudaryanto & Rusastra, 2006).

In making policy, it is essential that extension become more market-driven. This requires that extension allocate more resources to identifying markets where small-scale farmers can be competitive and to assist them with learning how to build value-chains that will effectively link these farmers with markets. Another essential element is that farmers must become organized into groups to achieve economies of scale in supplying these high-value markets (Swanson, 2006). Since farmers are resource-poor and that farmer organizations are constrained by various institutional, technical and investment constraints despite their potential. Farmer groups can be an important institution for the transformation of smallholder farming, increase productivity and incomes thereby reducing poverty (Tolno, Kobayashi, Ichizen, Esham, & Balde, 2015).

Poor farmers are often excluded from groups because of their own passivity and inability to contribute financial resources to joint activities. Farmers to maximize the benefits of collective action, supportive policies are needed to encourage the formation of groups and turn existing ones into business entities to access high-value markets and maybe even export markets. Collective action is important for small farmers in developing countries to access markets sustainably and improve their marketing performance (Ochieng, Knerr, Owuor, & Ouma, 2018). Forming groups will increase farmers' confidence and ability to work more effectively in groups (David & Asamoah, 2011).

Efforts to stimulate and support innovation in agricultural production technology, forms of social organizations, and poor markets are essential elements in the promotion of sustainable rural livelihoods (Butler & Mazur, 2007). It is necessary to increase the role of Farmer Group in order to increase income and household food security based on Farmer Group's needs and potential (Rahmadanih, Bulkis, Arsyad, Amrullah, & Viantika, 2018). Strengthening role of farmer institutional was intended to address the complexity of the opportunities and challenges of agricultural development in the future, advances in information technology, the convergence of communications, future innovation, access to markets, access to productive resources, counseling cafeterias, and farmers institutional competitiveness (Prawiranegara, Sumardjo, Sri, & Harijati, 2015).

Central Sulawesi is the biggest national cocoa producer. The total area of Central Sulawesi's cocoa plants reaches 289 thousand hectares (ha) with annual production reaching 164 thousand tons. The highest areas of Central Sulawesi's cocoa production are Parigi Moutong Regency reaching 69 thousand tons, Donggala Regency reaching 22 thousand tons and Sigi Regency 19 thousand tons. Most farmers in Sigi Regency rely on cocoa as their main source of income and welfare. Therefore, efforts to increase production of cocoa plants continue, however, farmers agreed because of the decline in cocoa production in this year's harvest season compared to previous years. Increased productivity is not accompanied by an increase in farmer competency (Managanta, Sumardjo, Sadono, & Tjitropranoto, 2019).

Based on these conditions, a study was conducted to analyze the income of farmers and study the role of agricultural extension through strengthening the institutional capacity of farmers, in this case farmer groups as a means of increasing farmer competency in efforts to increase productivity and income of cocoa farming in Sigi Regency, Central Sulawesi Province, Indonesia.

## **2. METHODS**

### **Sites of the Research**

The study was conducted in Palolo Subdistrict, Sigi Regency, Central Sulawesi Province. The selection of research locations and the determination of respondents is done by purposive method. A purposive sample is a non-probability sample that is selected based on characteristics of a population and the objective of the study (Crossman, 2017). The purposive method was chosen based on the consideration that the plantation sector with the main commodity of cocoa is

the main source of income for the people who work as farmers. Besides that, most of the cocoa farmers have been incorporated into farmer institutions, namely farmer groups. The number of cocoa farmers who were respondents was 30 people who were members of the Prima Lendaka farmer group.

### Data Collection Technique

Data collection techniques in this study used instruments namely questionnaires. Questionnaire is a data collection technique that is done by giving questions or questions raised to respondents to be answered. The questionnaire used is a type of questionnaire that asks respondents to choose an answer, one answer that has been determined. For alternative answers in this questionnaire, the score given for each option is determined using a modified Likert scale. Likert scale is used to measure the attitudes, opinions, and perceptions of a person or group of people about social phenomena. Respondents can choose one of four alternatives that fit the subject (Sugiyono, 2009). Before it is given to respondents, the validity and reliability of the data are tested. In this study respondents will provide answers in 4 categories including Strongly Agree (SA), Agree (A), Disagree (DA), Strongly Disagree (SDA), with a certain score weighting, as shown in the following table.

**Table1. Score Weight**

<b>Criteria of Answer</b>	<b>Score</b>
Strongly Agree (SA)	4
Agree (A)	3
Disagree (DA)	2
Strongly Disagree (SDA)	1

### Analysis of Data

#### Analysis of Farm Income

Calculations are carried out using descriptive methods to determine the level of profitability and feasibility of farming based on the formula of Farming Acceptance Structure (Soekartawi, 2002) as follows:

$$I = TR - TC \quad [1]$$

I= Income/Provit

TR = Total Revenue

TC = Total Cost

$$TR = Y.Py \quad [2]$$

TR = Total Revenue

Y = Yields

Py = Price of Yields

$$TC = FC + VC \quad [3]$$

TC = Total Cost

FC = Fixed Cost

VC = Variable Cost

**Analysis of the Role of Agricultural Extension and Strengthening Institutional Capacity of Farmers**

The data analysis technique used to analyze the role of agricultural extension and strengthening the institutional capacity of farmers is descriptive analysis with percentages. Descriptive analysis aims to analyze numerical data in order to provide a regular, concise, and clear picture of a phenomenon, event or situation, so that certain understandings or meanings can be drawn (Sudijono, 2010). The analysis is carried out by giving meaning to the scores collected by assigning categories or groups according to levels that have been determined in accordance with the objectives of the study. The defined categories consist of four categories, namely Very High, High, Low and Very Low. The determination of the four categories is carried out with the theory of normal distribution (Syarifudin, 2010).

**Table 2. Normative Test**

Normal Range	Categori
$x \geq M + 1,5 SD$	4
$M \leq x < M + 1,5$	3
$M - 1,5 SD \leq x$	2
$M - 1,5 SD \geq x$	1

Information:

M =Mean

SD = Standard Deviation

Next to find the percentage used the formula:

$$P = F/N \times 100\% \quad [4]$$

Information:

P = percentage

F = frequency

N =number of samples

### 3. RESULT AND DISCUSSION

#### Income of Cocoa Farming

**Table 3.** Income of cocoa farming for 1 year cycle (ha)

Description	Unit	Value (IDR)	Value (IDR)
Total Revenue (TR)			
- Cocoa (kg)	750	27.000	20.250.000
Total Cost (TC)			
Fix Cost (FC)			
- Land tax (year)	1	55.000	55.000
- Depreciation of tools (year)	1	24.500	24.500
Total			79.500
Variable Cost (VC)			
- Manure (kg)	200	2.000	400.000
- Insecticide (liter)			
- Maintenance (HOK)	2	210.000	420.000
- Urea (kg)	3	50.000	150.000
- KCl (kg)			
- TSP (kg)	250	1.500	375.000
- Harvesting cocoa (HOK)			
- Transportation (ton)	150	7.500	1.125.000
	150	2.500	250.000
	10	50.000	500.000
	1	500.000	500.000

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Total	3.720.000
TC = FC + VC	3.799.500
Income (I = TR - TC)	16.450.500

The value of income received by farmers is relatively low at IDR. 16,450,500/year. This value is relatively low if related to the potential productivity of cocoa which can reach 2 tons/ha with an estimated income of IDR. 54,000,000. The low income of farmers is due to the low value of production in terms of quantity and quality. While the low amount of production is related to the low knowledge of farmers from the aspect of cocoa cultivation technology and the limited ability of farmers' capital.

In the 2018 harvest season, farmers complained about the decline in cocoa production compared to previous years. The decline in production was due to the lower yield of cocoa compared to the much higher costs of maintaining plants. Low yields due to more cacao fruit that falls before the harvest period. While the high maintenance costs are due to pests and diseases and decreasing crop productivity due to the age of plants that are old (more than 10 years). But this does not reduce the enthusiasm and interest of farmers in cultivating cocoa plants. Farmers need skills and knowledge innovation, especially technological innovations related to efforts to eradicate pests and diseases and increase production in both quantity and quality. This needs to be done given the large comparative advantage of cocoa plants which is quite large because of the suitability of plants with factors of soil fertility, climate and labour availability.

Based on the aspect of competitive advantage, the competitiveness of cocoa products is relatively low and has an impact on the low income of farmers due to an increase in farmers to improve the quality of cocoa products through post-harvest assistance. In addition to not carrying out the fermentation process of cocoa beans, farmers also do not sort and cleaning before packaging the product in sacks. This causes farmers to directly sell their products to traders, causing large quantities of products not to be guaranteed because farmers do not utilize Farmers Group/Cooperation.

In marketing and price management aspects, farmers are vulnerable to price fluctuations. If there is a simultaneous harvest, the farmers must sell their products at low prices. Farmers also can not delay selling related to demands to meet their immediate needs. In addition, farmers must also deal directly with traders in the marketing process with a low bargaining position. Efforts that can be made to improve the bargaining position of farmers, is to provide access to farmers in the marketing process so that they are dealing with marketing actors who are farmers' side. Government policy interventions are needed because cacao crops are mostly cultivated in smallholder plantations by small-scale local farmers and the management is still traditional, as there is no cultivation in the State Plantation or Private Plantation (Sri Jumiyati, Rajindra, Tenriawaru, Hadid, & Darwis, 2017).

**The Role of Agricultural Extension****Table 4. The role of agricultural extension**

No.	Parameter	Score	Percentage (%)	Information
1.	Farming problem solving (Role of Farmers and Extension workers in Groups)	178	89,00	Very High
2.	Farming financing sources (Farmers themselves)	53	23,00	Very Low
3.	Impact of extension on increasing product added value (post-harvest processing)	56	24,50	Very Low
4.	Motivation of farmers to receive extension (have motivation)	166	79,50	High
5.	The success of agricultural extension	153	76,50	High
6.	The impact of extension on skills improvement	159	78,00	High
7.	The impact of extension on increased production	158	68,50	High
8.	Social relations between farmers and agricultural extension workers	189	93,50	Very High



The role of agricultural extension is very high in the aspect of assisting farmers in providing solutions to farmers' problems due to the high confidence of farmers to extension workers related to the social relationship between farmers and agricultural extension workers. However, this role is still limited to the aspect of production and has not yet touched on access to sources of farming financing and efforts to increase the added value of cocoa products in efforts to develop rural industries. This implies that the extension materials delivered by agricultural instructors still have no connotation on agribusiness. According to Indraningsih, Pranadji, & Sunarsih (2013), In the Extension System Revitalization program implemented by the government is not aimed to support agricultural industry in rural areas. This program is focused on improving extension internal institution and not specifically aimed to enhance extension material disseminated to the farmers. Transformation towards rural agricultural industry is not achieved through the improvement of internal extension institution only, but also through innovation topics specifically designed for extension. It is necessary to improve agricultural extension institution aiming at establishing rural agriculture industry.

In the aspect of production, innovation in knowledge and skills provided to farmers focuses on increasing the production and development of cocoa, including pest and disease control technologies as well as shoot and side-grafting technologies. The side-grafting technique has been proven to be able to improve productivity and quality, this technique is widely practiced by cocoa farmers to rehabilitate old and less productive plants. Adoption of skills and knowledge provided also depends on the ability and motivation of farmers. Fermentation technology provided by agricultural instructors as an effort to improve the quality of cocoa products is relatively not carried out by farmers because it does not provide a significant increase in the price of cocoa on the local market.

**Table 5. Strengthening the institutional capacity of farmers (Farmer Groups)**

No.	Parameter	Score	Percentage (%)	Information
1.	Frequency of group meetings	89	74,60	Medium
2.	Percentage of member attendance at group meetings	78	65,30	Medium
3.	Percentage of extension attendance at meetings	75	62,50	Medium
4.	Initiative/motivation to conduct meetings	64	53,10	Low

5.	Benefits of farmer groups learning for members	108	90,10	High
6.	Recording of group activities	99	82,20	High
7.	Application of recommended technology	88	73,20	Medium
8.	Strengthening and developing business capital	74	61,90	Medium

Efforts to strengthen the institutional capacity of farmers (Farmer Groups) are relatively good except in the aspect of initiative / motivation of farmers to hold meetings. This is related to the characteristics of farmers and farming, especially land area and the role of agricultural extension workers. Farmers will be more motivated if the agriculture instructor is always present at every meeting held by the farmer group (Lowisada, 2014). This desire cannot be fulfilled if the agriculture instructor does not live in his working area or still oversees more than one village as his target village.

According to Hafid Ramdhani, Soni Akhmad Nulhaqim, & Muhammad Fedryansah (2015), the low performance in farmer groups is partly due to the lack of management roles, the low participation of group members, the incomplete and malfunctioning organizational structure and the low productivity of farming. Other causes are the formation of groups that do not contain the potential and interests of farmers and the formation of groups due to projects and assistance from the government such as providing business capital, subsidized fertilizers and other assistance.

The formation and growth of a farmer group must be placed into a broader context, namely economic development and community independence towards the development of sustainable agricultural human resources. Institutional changes then result in the changes in agricultural production and unemployment due to decreased assets owned by farm households (S. Jumiyati, Rajindra, Arsyad, Pulubuhu, & Hadid, 2019).

Empowerment in farming communities includes empowering farmers by changing the behaviour of farmers from traditional subsistence farmers to agribusiness-oriented modern farmers. Farmer institutional empowerment by developing farmer institutions from farmer groups into a unity of Farmer Groups, associations, cooperatives and corporations (farmer-owned enterprises). Empowerment of farming by fostering the institution of farmer souls and entrepreneurship between farmers and other related parties to develop their farming (Asia, 2010).

#### 4. CONCLUSION

Efforts to develop farming and increase the income of cocoa farmers require innovations related to farmers' level of knowledge and skills. Cocoa farming in Sigi Regency, Central Sulawesi is a traditionally managed smallholder plantation with limited capital, farmers' level of knowledge and skills, especially in the aspect of improving the quality and competitiveness of cocoa products. In addition, in farming, farmers experience obstacles outside the production process, especially those concerning the difficulty of access to capital, marketing and distribution of products as well as stability and price standardization. The existence of farmer groups is expected to improve and develop the ability of farmers and their families to deal with existing obstacles and optimize farm production and income. Farmer groups are also a form of farmer association that functions as a more focused extension forum in the process of adopting agricultural technology. However, farmer groups have not maximized the existence of groups. Group members have relatively low initiative / motivation to conduct meetings. The farmer groups that are formed have not performed their roles properly, so that the group's performance is less than optimal in the development of cocoa farming, especially on production efficiency, competitiveness and product added value. Strategies that can be carried out in an effort to strengthen the capacity of farmer groups, among others, by motivating and guiding farmers to be able to work together in groups, grow farmer groups through organizational development and enhancing the capacity of farmer human resources through various extension activities, mentoring and training specifically designed for improving farmers' knowledge and skills in an effort to increase farmers' welfare income.

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