



Identification Of Institutional Actors In Cocoa Agribusiness Planning And Sustainability: Evidence From Bantaeng, Indonesia

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ABSTRACT

Agricultural development and its sustainability is influenced not only by technical farming issues, but also by agricultural institutional issues that have not been well planned. Strengthening and good coordination between institutions are needed to support the success of a program. Improving farmers' knowledge and skills has been done through various methods such as field schools, farmer courses, counseling, and so on. However, farmers' awareness in adopting agricultural information and innovations is still minimal. In addition, the lack of supervision in every implementation of government programs is also mentioned as a cause of the lack of technology transfer to farmers. Processes that involve institutions, both in the form of organizational institutions and institutional norms and arrangements, are generally still centered on a certain scale of development process. There are indications that there are institutions that should play a role, but do not play a significant role, as well as weak management and coordination functions, which are the main focus of this research. This study identifies and analyzes the institutions that play a role in the planning and sustainability of cocoa agribusiness. This research uses Interpretative Structural Modelling (ISM) analysis to explain complex structures based on elements and formulate hierarchical levels of relationships between elements. The results show that the institutions that there are three institutions that are key actors in planning and sustainability of cocoa agribusiness namely, the Department of Agriculture, the Department of Cooperatives, Small and Medium Enterprises & Trade, and also the Agricultural Extension Center. This indicates that the planning and sustainability of cocoa agribusiness is determined by the major role played by the three institutions, which are key actors supported by institutions at lower levels such as the Regional Development Planning Agency, Research Institutions/ Universities, Enterprises, Marketing Institutions, Extension Workers, Farmer Groups ('Gapoktan'), Farmers, Banking Institutions, and Cocoa Organization. Institutions that play a role need to work together to ensure that cocoa agribusiness planning and sustainability are well targeted and coordinated.

Keywords: agribusiness, cocoa, government, institutions, ISM analysis, planning, role, sustainable agriculture

INTRODUCTION

The plantation subsector plays a crucial role as a primary support system for the national economy, contributing significantly to employment, offering additional income for farmers, serving as an industrial raw

material, and contributing to foreign exchange [1]. According to information from the World Atlas, Indonesia achieved a production of 659.7 thousand tons in 2020, securing its position as the third-largest global producer of cocoa. Nevertheless, challenges persist as outlined by the International Cocoa Organization (ICCO), indicating a tendency for cocoa production in Indonesia to both decline and fluctuate over time. Additionally, there is a notable quality disparity between Indonesian cocoa and its African counterparts, necessitating heightened attention to address this issue [2].

Over the past few decades, there has been a decrease in the national production of cocoa commodities in Indonesia, with the production declining from 767,400 tons in 2018 to 667,300 tons in 2022 [3]. This observation is supported by data published by the Directorate General of Plantations in 2013. The fluctuations in cocoa production can be attributed to various factors, including irregular rain patterns, untreated pests, low soil fertility, and excessive use of chemical fertilizers [4]. Concurrently, cocoa beans and their derivative products stand out as prominent national plantation commodities, experiencing a substantial increase in demand in the international market [5].

The potential for national cocoa production in Eastern Indonesia is substantial, particularly in South Sulawesi Province [6]. Bantaeng Regency, within the province, exemplifies this potential, recording a total cocoa production of 2,361 tons and covering an area of 4,746 hectares in 2022 [3]. While Bantaeng Regency may not be the foremost contributor to production in South Sulawesi, cocoa remains a cornerstone commodity, consistently contributing to the region's growing income.

Various government initiatives have been implemented to ensure the sustainability of cocoa development, including Cocoa-Livestock Integration Development activities and the National Movement for Cocoa Production and Quality Improvement program conducted between 2009 and 2014 [7]. This comprehensive program aims to enhance national cocoa productivity by addressing challenges such as plant pests and diseases, involving all stakeholders and making optimal use of available resources [8].

Numerous technologies aimed at cocoa quality development have been promoted to enhance the overall production process [9]. Efforts to increase farmers' knowledge and skills involve diverse approaches, including field schools, farmer courses, and counseling. However, the adoption of cocoa innovations among most farmers in Sulawesi is reported to be limited, primarily due to a lack of understanding of cocoa farming technology and input utilization [10].

The government's voluntary provision of seeds and fertilizers to support cocoa development is considered inadequate, often lacking timeliness and quality. The absence of effective supervision in implementing government programs is cited as a reason for the insufficient transfer of technology to farmers. In the processing sector, concerns are raised about the cocoa fermentation process, which is perceived to lack significant incentives and only adds to the farmers' workload [11]. The agribusiness sector reveals that the majority of cocoa is still acquired by middlemen who control prices, resulting in an inefficient cocoa trade chain [12].

Institutions encompass not only patterns of activities arising from social aspects to meet human needs but also patterns of organization in their implementation [13]. Institutional functions provide guidelines for community behavior and contribute to economic improvement through natural resource management. The current institutional process is primarily focused on coaching at a certain level, with indications that some institutions that should play a role are not significantly contributing. Moreover, there are constraints on management functions and weak coordination between institutions. Consequently, this research aims to identify and analyze institutional actors serving as policy-makers in cocoa agribusiness planning and sustainability, given the aforementioned challenges.

MATERIALS AND METHODS

This research was conducted in Bantaeng Regency, South Sulawesi from March to December 2023. This research is descriptive research using a qualitative approach. The research design is a case study because the researcher explores a unit or phenomenon that is limited by time [14]. The research informants amounted to five people [15], namely experts in the cocoa sector who were selected according to the research objectives. The instrument used in the research was a questionnaire given to informants to be filled in through the interview method.

This study employs Interpretative Structural Modeling (ISM) analysis to elucidate the intricate relationships among elements, establish connections between them, and categorize the elements into four sectors: autonomous, independent, dependent, and linkage [16]. The elements under investigation in this research pertain to institutional actors, encompassing twelve sub-elements [12]. The ISM analysis involves three primary stages, as outlined by Arsyad, et al. [12]:

- (1) The outcomes of the questionnaire are transformed into a Structural Self-Interaction Matrix (SSIM). This matrix represents informant responses using symbols V, A, X, and O. Symbol V indicates that the first sub-element is deemed more important than the second. Symbol A signifies that the second sub-element is considered more important than the first. Symbol X denotes that the first and second sub-elements are equally important. Symbol O indicates that neither the first nor the second sub-element is important.
- (2) The SSIM matrix is converted into the Initial Reachability Matrix by translating the V, A, X, and O symbols in the questionnaire into numbers 1 and 0 in accordance with ISM rules.

- (3) The final matrix undergoes processing to derive the Driver Power and Dependence (DP-D) value, resulting in the formation of a Directional Graph that classifies the sub-elements into four quadrants.

The autonomous quadrant, where the sub-elements have minimal or no relationship with the system. The dependent quadrant, where the sub-elements are highly dependent on the ones above them. The linkage quadrant, where the sub-elements are crucial and necessitate careful study due to unstable relationships between them. The independent quadrant, where the sub-elements are variables exerting a significant influence on other sub-elements.

RESULTS AND DISCUSSION

Interpretation of ISM: Identification of institutional actors

Identification of institutional actors expected to play a role in cocoa agribusiness planning and sustainability was conducted by analyzing expert responses using the ISM analytical tool [17]. The Interpretative Structural Modeling (ISM) analysis begins with an expert interview process to fill out a questionnaire regarding which institutions play a role in cocoa agribusiness planning and sustainability. Then all responses from respondents were processed and resulted in the SSIM matrix as shown in Figure 1.

	12	11	10	9	8	7	6	5	4	3	2	1
1	V	V	V	V	V	V	V	X	X	A	X	
2	V	V	X	V	V	X	V	X	V	X		
3	V	V	V	V	V	V	X	A	V			
4	V	X	X	V	V	X	X	A				
5	V	X	X	V	V	X	X					
6	X	X	X	V	V	X						
7	A	A	X	V	V							
8	A	A	A	O								
9	A	A	A									
10	X	X										
11	X											
12												

Figure 1: SSIM of institutional actors

The SSIM is converted into an Initial Reachability Matrix as shown in Figure 2 by converting the letters V, A, X, O into numbers 1 and 0 according to ISM rules. Then to see the direct and indirect influence between sub-elements, the Initial Reachability Matrix is processed again to fulfill the transitivity law so as to produce the Final Reachability Matrix as shown in Figure 3.

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	0	1	1	1	1	1	1	1	1	1
A2	1	1	1	1	1	1	1	1	1	1	1	1
A3	1	1	1	1	0	1	1	1	1	1	1	1
A4	1	0	0	1	0	1	1	1	1	1	1	1
A5	1	1	1	1	1	1	1	1	1	1	1	1
A6	0	0	1	1	1	1	1	1	1	1	1	1
A7	0	1	0	1	1	1	1	1	1	1	0	0
A8	0	0	0	0	0	0	0	1	0	0	0	0
A9	0	0	0	0	0	0	0	0	1	0	0	0
A10	0	1	0	1	1	1	1	1	1	1	1	1
A11	0	0	0	1	1	1	1	1	1	1	1	1
A12	0	0	0	0	0	1	1	1	1	1	1	1

Figure 2: Initial Reachability Matrix of institutional actors

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	1	1	1	1	1	1	1	1	1	1
A2	1	1	1	1	1	1	1	1	1	1	1	1
A3	1	1	1	1	0	1	1	1	1	1	1	1
A4	1	0	0	1	0	1	1	1	1	1	1	1
A5	1	1	1	1	1	1	1	1	1	1	1	1
A6	0	0	1	1	1	1	1	1	1	1	1	1
A7	0	1	0	1	1	1	1	1	1	1	1	1
A8	0	0	0	0	0	0	0	1	0	0	0	0
A9	0	0	0	0	0	0	0	0	1	0	0	0
A10	0	1	0	1	1	1	1	1	1	1	1	1
A11	0	0	0	1	1	1	1	1	1	1	1	1
A12	0	0	0	0	0	1	1	1	1	1	1	1

Figure 3: Final Reachability Matrix of institutional actors

Description:

- A1 = Department of Agriculture
- A2 = Department of Cooperatives, Small and Medium Enterprises & Trade
- A3 = Regional Development Planning Agency
- A4 = Extension Worker
- A5 = Agricultural Extension Center
- A6 = Research Institution/University
- A7 = Cocoa Company
- A8 = Banking Institution
- A9 = Cocoa Organization
- A10= Marketing Institution
- A11= Farmer Group/Gapoktan
- A12= Farmers

Figure 3 shows the relationship between sub-elements. For example, the relationship between A1 and A3. In Figure 2, the relationship between these sub-elements is 0. This means that A1 is not more important than A3. But in Figure 3, after using the law of transitivity, it shows that both sub-elements have a relationship worth 1. This indicates that indirectly A1 plays a greater role than A3 in cocoa agribusiness planning and sustainability.

After the transitivity rules are met, Driver Power and Dependence are calculated in the Canonical Matrix (Figure 4). The result of driver power is obtained by summing the points of the sub-elements horizontally to the right, while the result of dependence is obtained by summing the points vertically downward. The highest point in driver power, which is 12, is then declared to be ranked 1 and the lowest point is ranked last, the same applies to the dependency section. Summing up the points and determining the ranking is useful for displaying the data in the form of Directional Graph and Level Structuring. Figure 4 shows the three key factors that are in rank 1, namely the Department of Agriculture, the Department of Cooperatives, Small and Medium Enterprises & Trade, and the Agricultural Extension Center.

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	DP	R
A1	1	1	1	1	1	1	1	1	1	1	1	1	12	1*
A2	1	1	1	1	1	1	1	1	1	1	1	1	12	1*
A3	1	1	1	1	0	1	1	1	1	1	1	1	11	2
A4	1	0	0	1	0	1	1	1	1	1	1	1	9	4
A5	1	1	1	1	1	1	1	1	1	1	1	1	12	1*
A6	0	0	1	1	1	1	1	1	1	1	1	1	10	3
A7	0	1	0	1	1	1	1	1	1	1	1	1	10	3
A8	0	0	0	0	0	0	0	1	0	0	0	0	1	6
A9	0	0	0	0	0	0	0	0	1	0	0	0	1	6
A10	0	1	0	1	1	1	1	1	1	1	1	1	10	3
A11	0	0	0	1	1	1	1	1	1	1	1	1	9	4
A12	0	0	0	0	0	1	1	1	1	1	1	1	7	5
D	5	6	5	9	7	10	10	11	11	10	10	10		
R	6	5	6	3	4	2	2	1	1	2	2	2		

Figure 4: Cannonical Matrix of institutional actors

Where:

DP : Driver Power

D : Dependence

R : Ranking (* is the key element)

The Driver Power and Dependence values obtained in Figure 4 produce a Directional Graph of institutional actors in cocoa agribusiness planning and sustainability. The twelve sub-elements of the institution are grouped in three quadrants, namely independent, linkage and dependent. However, there are no sub-elements in the autonomous quadrant.

<i>Driver Power</i>	12					A1	A2	A5						
	11					A3								
	10										A6,7,10			
	9									A4	A11			
	8													
	7										A12			
	6													
	5													
	4													
	3													
	2													
	1												A8,9	
		1	2	3	4	5	6	7	8	9	10	11	12	
		<i>Dependence</i>												

Figure 5: Directional Graph (DP-D) of institutional actors

Figure 5 illustrates that two sub-elements are positioned in the independent quadrant due to their elevated driver power and low dependence—specifically, A1 (Department of Agriculture) and A3 (Regional Development Planning Agency). This signifies that these two sub-elements possess the capacity to influence and exert greater strength than sub-elements in the other quadrants. Their significance underscores the influential role they play in cocoa agribusiness planning and sustainability in Bantaeng Regency. Notably, A1 (Department of Agriculture) holds a pivotal position in this quadrant, boasting the maximum driver power with a score of 12 points, signifying its predominant role compared to other institutions.

Within the linkage quadrant, there exist eight sub-elements: A2 (Department of Cooperatives, Small and Medium Enterprises & Trade), A4 (Extension Worker), A5 (Agricultural Extension Center), A6 (Research Institution/University), A7 (Cocoa Companys), A10 (Marketing Institution), A11 (Farmer Group/Gapoktan), and A12 (Farmers). The sub-elements in this sector necessitate thorough study due to their unstable

relationships with one another. This implies that actions initiated by sub-elements in this quadrant can impact not only sub-elements within its quadrant but also those in other quadrants. The heightened values of driver power and dependence in this quadrant contribute to its interconnected nature. Notably, two key institutions in the linkage quadrant are A2 (Department of Cooperatives, Small and Medium Enterprises & Trade) and A5 (Agricultural Extension Center).

In the dependent quadrant, there are two sub-elements namely A8 (Banking Institution) and A9 (Cocoa Organization). Both institutions have low driver power values and high dependence. This shows that institutions in this quadrant are strongly influenced by sub-elements in other quadrants (linkage and independent). These two sub-elements occupy the lowest position or level in the dependent quadrant because they are actually external institutions that have no special obligations in the planning and sustainability process of cocoa agribusiness in Bantaeng Regency. However, the role of these two institutions can contribute if they have programs that are in line with the government in relation to cocoa agribusiness planning and sustainability. For example, the contribution of banking institutions as a forum for farmers to take People's Business Credit (KUR) or other funding assistance. The presence of cocoa organizations at the district level is also expected to support the development of the cocoa industry in Bantaeng Regency.

The findings of this ISM analysis align with those presented in [18], where it is indicated that the Department of Agriculture and Plantations serves as a key institution in the planning and advancement of oyster mushroom businesses. Additionally, research outcomes from [19] and [20] highlight the significance of the Department of Agricultural and farmer groups/gapoktan as key institutions in the development of agricultural practices within the cocoa sector, both in the Indonesian border region and in Pinrang District.

Nevertheless, these results are not universally applicable in determining key actors. For instance, in a study [16] related to the institutional strengthening strategy for oil palm farmers in Riau and Jambi Provinces, the Indonesian Oil Palm Farmers Association (Apkasindo) emerged as the key institution. Similarly, research [21] identifies foundations as key institutions in the strategy for the development of organic farming. This underscores that key institutions do not consistently originate from government agencies or farmer groups. Instead, each region showcases distinct key institutions based on diverse needs and challenges within their respective systems and conditions.

Structuration Model of Institutional Actors

In this study, the output from ISM includes a level structure model, indicating the presence of six hierarchical levels among institutional actors. Institutions categorized at the first level are considered key institutions, possessing the highest driver power. On the other hand, institutions at the sixth level exhibit the lowest driver power but demonstrate a significant level of dependence on other elements.

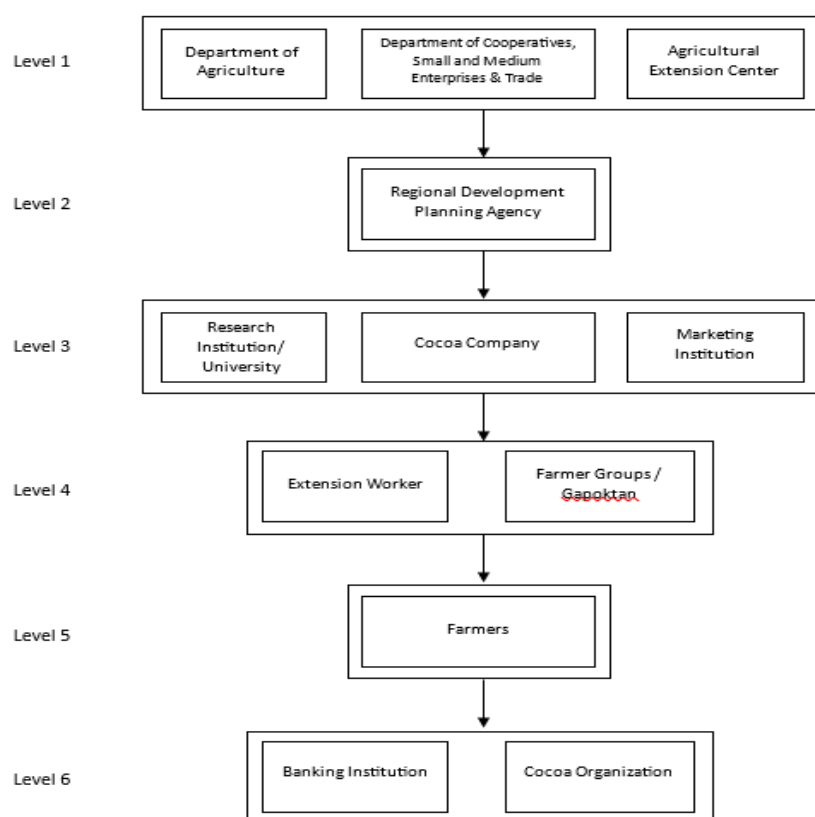


Figure 6: Institutional actors level structuring

According to the information presented in Figure 6, the institutions positioned at the highest level of structuralization include the Department of Agriculture, the Department of Cooperatives, Small and Medium Enterprises & Trade, as well as the Agricultural Extension Center. This signifies that the planning and sustainability of cocoa agribusiness in Bantaeng Regency are predominantly influenced by the roles played by institutions at the top level, complemented by the support of other institutions at lower levels. Conversely, institutions at the foundational level are considered the ultimate determinants in the planning and sustainability of cocoa agribusiness.

The Department of Agriculture is a key institution because it is a government institution that is responsible and plays a role in determining and/or implementing policies formulated by the central or local government, accommodating and facilitating community interests and aspirations related to agricultural development [22]. Based on interviews with farmer groups and the Department of Agriculture, it is known that the department has contributed a lot to the sustainability of cocoa agribusiness through technical activities such as support for production facilities, provision of information data, and field schools. However, these efforts are said to have not been maximized due to limited human resources and limited budget allocated for the implementation of the program.

The Department of Cooperatives, Small and Medium Enterprises & Trade is positioned at level-1, identified as a key institution directly influencing the planning and sustainability of cocoa agribusiness. This role is rooted in its involvement in formulating and ensuring trade policies and market availability [23]. Similarly, another pivotal institution at level-1 is the Agricultural Extension Center (BPP), serving as the central hub for extension workers who act as the forefront in the development of agriculture and plantations, particularly at the sub-district level. The BPP stands out as the institution closest to farmers, tasked with safeguarding and providing solutions to individual farmers or through farmer groups (Gapoktan). According to Law No. 16/2006, the main functions of BPP include providing counseling, providing and disseminating information on technology, production facilities, finance and markets, modeling learning processes and others. Cocoa agribusiness will continue to run if extension workers carry out their duties and functions under the coordination of the Agricultural Extension Center [24].

At level-2 is the Regional Development Planning Agency which is one of the institutions that play an important role in the planning and sustainability of cocoa agribusiness in Bantaeng Regency because this institution is directly involved in accordance with its role and function [25] which is to carry out development planning in its working area. Through this function, the planning process carried out must involve various stakeholders, to be directly involved in the preparation of the program as well as the participatory utilization of the results. The results of this study are in line with research [26] that the Development Planning, Research and Development Agency as one of the technical institutions that also plays a role in facilitating efforts in productivity, quality, market access, and regional downstream industries.

Level-3 includes Research Institutions/University, Cocoa Company and Marketing Institutions. These three institutions have no direct impact on cocoa agribusiness planning and sustainability because they are basically non-governmental institutions. However, these institutions are expected to play a role in cocoa agribusiness development efforts through programs or activities that can support cocoa agribusiness. For example, research institutions/universities in conducting research on the application of Good Agricultural Practice (GAP), can provide research recommendations on the future development of cocoa agribusiness, development of superior varieties, post-harvest management, and so on [27].

Meanwhile, cocoa company and marketing institutions are also expected to play a role in cocoa agribusiness development although they are not bound by certain obligations. For example, private companies such as PT Mars, PT Cargill, Barry Callebaut, PT Olam can provide CSR assistance, agricultural consulting services, and marketing. Cocoa companies are able to increase production along with the increase in quantity and quality of cocoa beans through assistance to farmers. However, the role of private companies is not sustainable due to the time contract of their program in each region. One study [28] emphasizes the importance of partnership networks with companies as one of the cocoa marketing institutions and the need for stakeholders to develop such partnerships.

Institutions at level-4 to level-6 are extension workers, farmer groups, farmers, banking institutions and cocoa organizations. As long as farmer groups still exist, meaning that farmers as actors of agricultural development also still exist, cocoa production will continue even in limited conditions [29]. Farmer groups can also be a forum for diffusion and innovation of agricultural technology. Farmer groups that have a good institutional system will be relatively faster in implementing sustainable innovations.

Institutions at this level are not directly influential because they do not have main tasks and functions as policy makers related to cocoa agribusiness sustainability. However, they are still expected to play a role in cocoa agribusiness development efforts through program contributions such as banking institutions in channeling funds and financial guidance. Research [20] also mentioned the existence of a cocoa organization formed in Pinrang Regency, namely ASKINDO, which aims to discuss local and international cocoa issues. However, specifically in Bantaeng Regency, there is no cocoa organization like this. Therefore, this should be a concern for stakeholders in the future.

The findings of the research highlight the need for enhancements in the institutional arrangements for planning and sustaining cocoa agribusiness. The institutional framework of cocoa agribusiness holds significant importance as it serves as a crucial tool in addressing various agricultural challenges. Furthermore, cocoa

agribusiness institutions play a vital role in ensuring the continuous dissemination of technology and technical knowledge to farmers. Insufficient institutionalization in agribusiness can result in weakened bargaining positions for farmers within the market system. The current arrangements for planning and sustaining cocoa agribusiness through institutions are observed to be incongruent with their intended functions and roles. Given that the success of future agricultural development is contingent on the efficacy of institutional actors, there is a pressing need for a model outlining the institutional arrangement for cocoa agribusiness. Such a model could serve as a valuable recommendation for local governments in their planning and sustainability efforts within the cocoa agribusiness sector.

CONCLUSION AND RECOMMENDATIONS FOR DEVELOPMENT

This study seeks to model the institutional structure involved in cocoa agribusiness planning and sustainability through analysis of institutional actors that play a role. Institutions that become key institutions and are at the top level are the Department of Agriculture, the Department of Cooperatives, Small and Medium Enterprises & Trade, and the Agricultural Extension Center (BPP). These three institutions are key institutions that must be prioritized and are expected to be able to take the right policy in planning and sustainability of cocoa agribusiness. Then, these institutions also need to be supported by other institutions at lower levels such as the Regional Development Planning Agency, Research Institutions/University, Cocoa Company, Marketing Institutions, Extension Workers, Farmer Groups/Gapoktan, Farmers, Banking Institutions and Cocoa Organizations. Institutions that play a role need to understand the main role and function of each in order to synchronize between institutions that are right on target and coordinated.

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Authors' Contributions

All of the authors contributed to this research. N.M contributed to the research instruments, data collection, drafting of the manuscript, data analysis, and data interpretation. M.A contributed to conceptualization of ideas, advice and supervision of data collection and analysis, literature review, and review of the final manuscript. M.H.J, A.N, and A.A contributed to the controlling concept, review of the final manuscript. R.A.R contributed to the data analysis and policy implication.

Conflict of interest: This article has no conflicts of interest.

Table 1: Elements and sub-elements of institutional actors

Element	Sub-Element
Institution	1. Department of Agriculture
	2. Department of Cooperatives, Small and Medium Enterprises and Trade
	3. Regional Development Planning Agency
	4. Extension Worker
	5. Agricultural Extension Center
	6. Research Institution/University
	7. Cocoa Company
	8. Banking Institution
	9. Cocoa Organization
	10. Marketing Institution
	11. Farmer Groups (Gapoktan)
	12. Farmers

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