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Structure Analysis ⁶Of Policy Needs For Sustainable Food Agricultural Land In Banjar Regency, South Kalimantan

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¹Abstract – Agricultural land has an important role in life, especially in providing food for the community, therefore government policies, both central and regional are needed in maintaining its existence. The policy of protecting sustainable agricultural food land was one of the efforts ¹therefore it was necessary to carry out sustainable management of the land. This study aimed to obtain a policy needs structure model on sustainable food agriculture land in Banjar Regency, South Kalimantan. Requirement structure design was needed in the framework of sustainable management policies. Requirement structure modeling was ⁴done using Interpretative Structural Modeling. It was a strategic modeling technique that can map system conditions comprehensively. The results of the analysis showed that there was an element of need that can make the policy successful. There were also, the sub-element of supervision, control, coaching, development and research activities. Based on the driven power, the sub-elements that are the key factors in the elements of the need for sustainable food agriculture land in Banjar Regency were coaching and supervision.

Keywords – Interpretative Structural Modeling, Sustainable Agriculture, Agricultural Land, Policy.

I. INTRODUCTION

Population growth needs attention, because along with the increase, the need for natural resources will also increase. Based on UN estimates by 2050, the world's population will reach more ⁷than nine billion people or abouts 9,725,148,000 inhabitants [1]. In Indonesia, the population has increased from year to year. In 2015, Indonesia's population reached 255,461,700 people with a growth rate of 1,5% and in 2050 Indonesia's population can reach 322,237,000 inhabitants ([2], [3]). One of the problems in population growth is food availability [4]. To maintain food availability in an area, policies that lead to food security are needed. Agricultural development policies of course need to be continuously developed in order to realize sustainable agricultural production.

⁹Agricultural development is closely related to the provision of agricultural land. The problem is currently the use of agricultural land, continues to increase along with population growth [5]. Population growth has led to socio-economic development as well as environmental changes which have resulted in reduced agricultural land in some places ([6], [5], [8]). The reduction in agricultural land in some places is for infrastructure, housing, industrial facilities and other developments. 80% of urban development is carried out on agricultural land. Without policy intervention, housing and infrastructure are predicted to increase from 260 to 420 million ha in 2050 or cover 4-5% of the world's land area, but if there are strong policies, the increase can be reduced to only 90 million ha or an increase of around 3% only [9]. This has resulted in a land resource crisis marked by a decrease in land quality, a faster change

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of agricultural land functions than the addition of new agricultural land, fragmented land per farmer which becomes narrower, more land tenure to a small group of owners ([10], [11]).

The decline in agricultural land area is one of the causes of local food supply that has not been able to meet national food demand. This has decreased national food production and productivity so that it cannot meet the increase in national food [12]. The conversion of agricultural land in Indonesia has been going on for a long time, estimated at 100,000 ha per year [13]. The conversion of this function has resulted in the narrowing of the area for food agriculture, especially rice fields. Rice fields in South Kalimantan, as the main food commodity producer for 15 years, show a decline. The use of land for rice fields in South Kalimantan in 2000 amounted to 427,495 ha while in 2015 the area was 401,217.25 ha and there was a land depreciation of 26,277.75 ha [2]. The decrease in the area of rice fields also occurred in Banjar Regency during the last five years covering an area of 11,634 ha [14].

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The policy for the provision and management of agricultural land for food crops is a must to meet the food needs for the community, because it is an effort to implement the government's responsibilities and obligations ([15], [16]). The Indonesian government made a policy to solve the problem by making a policy in the form of Law (UU) No. 41/2009 concerning the protection of Sustainable Food Agricultural Land (SFAL). Based on Law No. 41/2009 the provincial government of South Kalimantan issued Regional Regulation No.2/2014 concerning the Protection of SFAL. In this regional regulation, South Kalimantan Province 10 stipulates at least an area of 353,803 ha and 76,548.23 ha as reserves spreading across all districts/cities to be designated as sustainable food crop agricultural land. Likewise, the local government of Banjar Regency also issued Perda No.9/2012 on the protection of SFAL. All of these regulations are government efforts to maintain productive agricultural crop lands for food sustainability.

Implementation of land protection policies for SFAL still has many problems both in terms of planning and determining the land in the Regional Spatial Plan (RSP) [12]. It is unclear what land is protected; some areas only determine the extent of it [17]. According to [18], the implementation of the SFAL policy in the regions is still not effective because it appears that the conversion of agricultural land is increasingly happening. Policies on sustainable food crop agriculture already exist within the scope of Perda No.9/2012, however, research is still needed to determine the extent of the implementation of these policies. Based on this, it is necessary to analyze the structure of the policy needs in sustainable food agriculture. Analysis of the structure of policy needs using the Interpretative Structural Modeling (ISM) method which is an analysis to solve complex problems of policy needs [19]. This study aimed to obtain a structural model of demand in policies on SFAL in Banjar Regency.

II. METHODOLOGY

Research was carried out in Banjar Regency, South Kalimantan, Indonesia on paddy field areas designated as SFAL or protected agricultural land. The respondent in the research were from six sub-districts in Banjar Regency. Meanwhile, the research locations were in 5 sub-districts, namely Gambut, Aluh-Aluh, Kertak Hanyar, Beruntung Baru, and Sungai Tabuk. The respondents of this study were determined to three groups of respondents. The first group of respondents were respondents from the farmer group, the second group were stakeholders, and the third group were expert respondents.

The number of respondents was determined to be 10% of each selected sub-district, so the total sample of farmer groups were 65 (sixty-five) farmer groups. The determination of the farmer groups was done randomly ([20], [21]). Stakeholder respondents were stakeholders of SFAL in Banjar Regency, namely the Food Crops and Horticulture Service (FCHS), the Development Planning and Research Service (DPRS), the Public Works and Spatial Planning Service (PWSPS), and National Land Service (NLS). Expert respondents were five experts, namely those related to policy makers (FCHS, DPRS and PWSPS), academics from Lambung Mangkurat University and 2 researchers from the Swamp Land Research Institute. The determination of the number of expert respondents was based on the number of expert respondents who had high level of precisions between five and six experts [22].

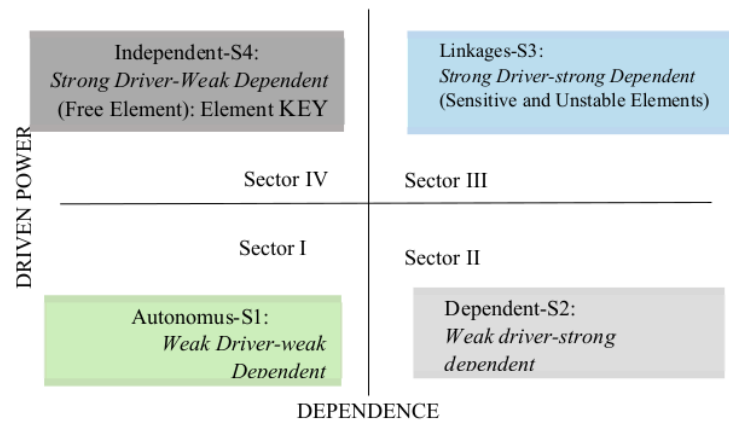


Figure 1. The dependence and driven power matrix

The method of descriptive analysis was conducted to evaluate policies in sustainable food crop agriculture and obtain the leverage factor which was the policy requirement. Analysis of the structure of policy requirements in sustainable food crop agricultural land using Interpretive Structural Modeling (ISM) analysis [19]. The first stage of the ISM analysis was to identify and list the system elements. The element in this research was the need for the SFAL policy program which was a leveraging factor in the SFAL policy. The second stage was the analysis stage which includes the tabulation stage of data from expert respondents. In ISM, compiling a Structural Self-Interaction Matrix (SSIM), converting SSIM to Reachability Matrix (RM). The SSIM arrangement was based on respondents' perceptions of the relationship of the intended elements using the following symbols:

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V: the relation of the element E_i to E_j , not vice versa

A: the relationship of the elements E_j to E_i , not vice versa

X: the interrelation relationship between E_i and E_j (can be vice versa)

O: indicates that E_i and E_j are not related

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Reachability Matrix (RM), namely converting the SSIM symbol into a binary matrix with the following rules:

If the relation E_i to $E_j = V$ in SSIM, then the elements $E_{ij} = 1$ and $E_{ji} = 0$ in RM

If the relation E_i to $E_j = A$ in SSIM, then the elements $E_{ij} = 0$ and $E_{ji} = 1$ in RM

If the relation E_i to $E_j = X$ in SSIM, then the elements $E_{ij} = 1$ and $E_{ji} = 1$ in RM

If the relation E_i to $E_j = O$ in SSIM, then the elements $E_{ij} = 0$ and $E_{ji} = 0$ in RM

Then the initial RM was modified into a final reachability matrix (Final RM). The final RM was a reachability matrix that has been corrected (checked) for consistency with the transitivity role method to show all direct and indirect reachability, i.e. if $E_{ij} = 1$ and $E_{jk} = 1$ then $E_{ik} = 1$.

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The third stage of ISM was the determination of Driven Power and Dependence. The driven power value was obtained by summing the element values horizontally, while the dependence value was obtained by adding the element values vertically. Ranking was based on the highest to low scores, as well as for level determination. Next was the position formulation in the ISM quadrant. Element/sub-element positions was based on Dependence values as X-axis, and Driven Power values as Y-axis.

The dependence and driven power matrix show four sectors. Sector I Weak Driver-Weak Dependent Variables (Autonomous), which was a quadrant that shows elements that have low influence and dependence and have little or no relation to the system. Sector II Weak Driver-Strongly Dependent Variables (Dependent), which was a quadrant that shows elements that have low influence with high dependence, these elements are elements that are tied to the system (not free). Sector III Strong Driver-Strongly

Dependent Variables (Linkage), It was showing an element that has high influence and dependence, this element was unstable, so it must be studied carefully.

III. RESULTS AND DISCUSSION

The policy on SFAL was set forth in a regulation related to sustainable food agricultural land which has been promulgated since 2009 by the central government in the form of Law no. 41/2009 concerning Protection of Sustainable Agricultural Land (SFAL). Evaluation of the implementation of these laws and regulations in Banjar District is seen from the aspects contained in the Law and Perda on SFAL so that the stipulation of SFAL land management policies can be carried out more effectively. There are 11 aspects to evaluate the implementation of SFAL, namely the completeness of rules, planning, stipulation, development, research, utilization, control, transfer of functions of SFAL, supervision and administrative sanctions. Based on the law, the local government of Banjar Regency has stipulated a Regulation in the form of Perda Banjar Regency No. 9/2012. Paying attention to this showed that the aspect of completeness of the rules has been fulfilled (Table 1). Further evaluation of the SFAL policy can be seen in table 1.

Table 1. Evaluation of policies for the Protection of Sustainable Food Agricultural Land in Banjar District

No.	Aspect Assess	Variable	Result
1	Completeness of the rules	There were regulations or not	There has been a regional regulation, namely the Banjar Regency Perda No. 9 of 2012, but there are no implementation instructions and technical instructions.
2	Planning (whether there is an SFAL protection plan or not)	Formation of the SFAL Team Proposed SFAL plan - Preparation of proposals - Socialization of proposals - SFAL response	There was no special team for SFAL. There was a coordinating team within the Regional Spatial Planning for the establishment of a sustainable food agriculture area. There was no socialization of the SFAL proposal at the community level. The response of SFAL at the local government level was quite good but at the community level, especially in the SFAL area, it still tends to be normal because there has been no socialization.
		Determination in the development plan	Nothing has been determined in the Long-Term Development Plan (LTDP) or the Regional Medium-Term Development Plan (MTDP)

No.	Aspect Assess	Variable	Result
3	Determination	Determination in the RSP	The sustainable food agriculture area as referred to in Article 34 paragraph (1) letter e in the Districts of Aluh-Aluh, Gambut, Kertak Hanyar, Beruntung Baru, Sungai Tabuk and Tatah Makmur in accordance with the potential and functional allocated for rice on wet and dry land is less over 15,828 ha; and (2) The land reserved for sustainable food agriculture was in the Districts of West Martapura, Sungai Tabuk, Astambul, Mataraman, and Simpang Empat and Karang Intan.
		In Detailed Spatial Planning (DSP)	The SFAL lands had not been specifically determined in the DSP, because DSP was still in the process of being drafted.
		SFAL area	The SFAL area was established in six sub-districts with an area of approximately 15,828 ha.
		SFAL	There was still no detailed data on the determination of SFAL
		Reserve Area SFAL	It had been established in six districts but the details of SFAL area were not yet known
4	Development	SFAL area intensification and extensification program	The intensification program was carried out continuously but it was a regular program. It was not specific to SFAL area.
5	Research	SFAL research was available or not	The research program in Banjar Regency was the responsibility of Bappedalitbang. There was no research program specifically for SFAL.
6	Utilization	Government obligations	Utilization programs related to the protection of land and water resources which are the responsibility of the government were implemented in general, not yet focused on SFAL land.
7	Coaching	Coordination	Coaching on SFAL related to coordination had been carried out within the scope of Regional Work Units (RWU), especially related to planning and land designation of P2B.

No.	Aspect Assess	Variable	Result
		socialization of statutory regulations	Socialization of legislation had been carried out but it had not been going well at the farmer level.
		providing guidance, supervision and consultation	Guidance, supervision and consultation at the farmer level are still generally not focused on SFAL.
		education, training and counseling	Programs and activities related to education, training and counseling was still being implemented in general, not yet focused on SFAL.
		dissemination of information on Sustainable Food Agriculture Areas and Sustainable Food Agricultural Lands	It had not been implemented optimally because there was still no data
8	Control	Incentives and disincentives	There was no form of incentive specifically for SFAL land, but general assistance according to central and regional government policies such as fertilizer subsidies, input production assistance, infrastructure improvements have been generally implemented.
9	Switching the function of SFAL		The transfer of function of SFAL can be carried out if it was for public facilities. Meanwhile, the transfer of functions for other uses was not allowed.
10	Supervision		Supervision activities including reporting, monitoring and evaluation was generally carried out not specifically for SFAL.
11	Administrative Sanctions	written warning	Administrative sanctions had been carried out in several violations, especially those that violate the RSP

Eleven evaluation variables indicated the extent to which the policy was implemented in Banjar Regency. Based on the descriptive analysis, it was found that eight sub-elements needed to find which elements had substantial influence on the success of the SFAL policy, namely: 1) technical implementation instructions; 2) planning and determining SFAL; 3) special incentives on SFAL; 4) research activities 5) development; 6) coaching; 7) control; and 8) supervision. The eight elements were elements of necessity in the SFAL management policy, described in Table 2.

Table 2. The need for sustainable agri-food land management policies

Code	Requirement Element	Description
C1	Supervision	Supervision activities include reporting, monitoring and evaluation.

C2	Control	Control in the form of disincentives was given if farmers violate the SFAL rules, and change the function of SFAL.
C3	Coaching	Coordination, dissemination of laws and regulations, providing guidance, supervision and education consultation, training and counseling, dissemination of information on Sustainable Food Agriculture Areas and Sustainable Food Agricultural Lands.
C4	Development	Intensification and extensification program in the SFAL area
C5	Research activities	The Sustainable Food Agriculture Land Policy was carried out with the support of research. Those related to agriculture on SFAL.
C6	Special incentives	Special incentives were incentives provided by the government to farmers whose land is included in the SFAL category. Incentives can take the form of improvements to agricultural infrastructure, financing research on superior seeds and varieties, easy access to information and technology, provision of production infrastructure and facilities, assistance in issuing land certificates, awards for outstanding farmers, and land and building tax relief.
C7	Planning and establishing	Planning includes the formation of the SFAL Team, proposals for SFAL plans, preparation of proposals, dissemination of proposals and SFAL responses. Designation of SFAL areas. The determination of sustainable agricultural areas must be stipulated in the district DSP while the determination of SFAL and sustainable agricultural food reserves was stipulated in the Detailed Spatial Planning of the district.
C8	Technical implementation instructions	Implementation instructions and technical instructions in the SFAL policy

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Based on the results of the evaluation above (Table 1), Banjar Regency had made efforts to maintain food agricultural land. From this policy, what had been done well was the determination of the area of sustainable food agriculture, but this area still does not mention in detail the area of SFAL at the sub-district level or at the farmer level (Figure 2). This has resulted in not yet optimal implementation of other SFAL policies. The rice field area in 2018 was 61,113 ha, while the SFAL area was 15,737 ha or 26%. Based on Figure 2, it can also be seen that from 2012 - 2018 there was a decrease in land by 10,073 ha. If it allowed to decline in land area, it would continue to occur. Therefore, the SFAL policy should receive attention from the government.

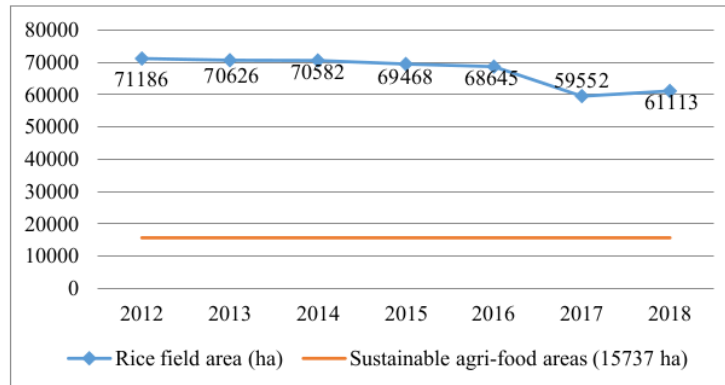


Figure 2. Graph of the area of paddy fields and sustainable food agricultural land

3.1. Analysis of the Structure of SFAL Policy Needs

The results of the respondent's assessment or opinion (expert judgment) regarding the contextual relationship of the eight policy sub-elements obtained the aggregate value of the expert's opinion which was then compiled in the form of a SSIM matrix (Table 3). The SSIM matrix and the results of the assessment were converted into RM matrix. This reachability matrix has not fulfilled the transitivity rules, or was an initial reachability matrix which was then corrected or consistency tests using the law or the transitivity rule of the transitivity role method to show all direct and indirect reachability, i.e. if $E_{ij} = 1$ and $E_{jk} = 1$ then $E_{ik} = 1$. The law of transitivity was related to the consistency of respondents' preferences in giving assessments, for example: respondents considered that "A-element" was more than "B-element" and "B-element" was more than "C-element", so the frequency consistency was "A-element" more than "C-element". The transitivity rule was the completeness of the causal loop [23]. Transitivity rules or transitivity laws are an attempt to assess the consistency of respondents' opinions/judgments (expert judgment) [24]. Examination with the transitivity rule was focused on cells whose value is 0 (zero). The results of the examination using the transitivity rule will obtain a final reachability matrix, which was the revised matrix of the RM matrix.

Table 3. Structural Self-Interaction Matrix

	C1	C2	C3	C4	C5	C6	C7	C8
C1		X	X	11	X	V	V	V
C2			X	X	V	A	V	V
C3				X	V	V	V	V
C4					X	A	V	V
C5						A	V	V
C6							V	V
C7								X
C8								

The final reachability matrix was a RM that had been checked with the law of transitivity, whose value was acceptable and meets consistent preferences. The final reachability matrix then became the basis for calculating the driven power and dependence of the elements studied (Table 4).

Table 4. Reachability Matrix which has cross checked the transitivity rule, driven power calculation and dependence

	C1	C2	C3	C4	C5	C6	C7	C8	Driven Power	Ranking
C1	1	1	1	1	1	1	1	1	8	1
C2	1	1	1	1	1	0	1	1	7	2
C3	1	1	1	1	1	1	1	1	8	1

	C1	C2	C3	C4	C5	C6	C7	C8	Driven Power	Ranking
C4	1	1	1	1	1	0	1	1	7	2
C5	1	0	0	1	1	0	1	1	5	4
C6	0	1	0	1	1	1	1	1	6	3
C7	0	0	0	0	0	0	1	1	2	5
C8	0	0	0	0	0	0	1	1	2	5
Dependence	5	5	4	6	6	3	8	8		
Hierarchy	3	3	4	2	2	5	1	1		

The value of driven power was obtained from the sum of the final reachability matrix values horizontally, and the dependence value was the sum of them vertically. Furthermore, the value of dependence and driven power becomes the ordination for determining the position of the elements in the ISM quadrant, where the dependence value becomes the value on the X-axis and the value of driven power becomes the value on the Y-axis. The ordination positions obtained were then represented in graphs and levels (Figures 3 and 4). Based on the ISM quadrant in Figure 3, it appeared that the sub-elements were scattered according to their ordinates in three sectors, namely Sector 2 dependent, Sector 3 linkage and Sector 4 independent. In the elements of the need for a sustainable agricultural land management policy in Banjar Regency, the sub-elements C1, C2, C3, C4 and C5 represent the sub-elements of supervision, control, coaching, development and research activities were in Sector 3 where the sector includes the linkages variable of the system. This shows that every policy on these sub-elements would lead to successful implementation of policies on sustainable food agriculture.

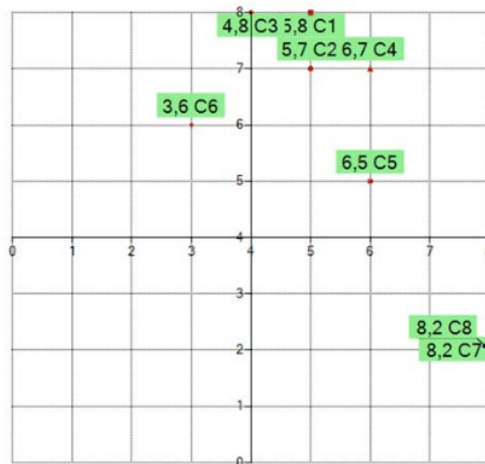


Figure 3. The driven power-dependence matrix for the requirement elements

Further structural analysis in Sector 4 (independent) was the C6 sub-element which represents the special incentive sub-element. In this independent sector, special incentives are included in the independent variable. The special incentives provided to farmers on sustainable food agriculture land have a large driven power, but have little dependence on the program. In Sector 2 there were sub elements C7 and C8 which represent implementation instructions and technical instructions as well as planning and stipulation. Sub-element in the dependent sector which means that the sub-element has low influence with high dependence, this element was an element that was bound to the system.

The form of analysis of the level diagram of the ISM which was determined by the separation of the RM results in the ranking of each sub-element (Figure 4). Based on the analysis results obtained five levels hierarchy. At Level 1 was coaching and supervision, Level 2 development and control, Level 3 special incentives, Level 4 research activities and Level 5 was the

implementation and technical guidance as well as planning and determination. The ranking designation which is based on driven power produces a key element, namely those at Level 1, in this case, coaching and supervision. Policies on sustainable food agriculture will be influenced by the success of coaching and supervision.

3.2. Coaching and supervision

Based on the results of the analysis, coaching is the key to SFAL policy. The coaching here includes coordination between stakeholders, socialization of laws and regulations, providing guidance to farmers, consultation, education, training and counseling and dissemination of information on Sustainable Food Agricultural Land. Coordination between stakeholders, which includes coordination between policy makers, academics, researchers and farmers, was very necessary to avoid conflict. This was in line with [25] which states that coordination between parties related to agricultural land needs to be done well. Based on interviews with respondents, coordination has been carried out between policy makers at the time of planning and determining the area of agricultural land which was designated as a sustainable food agriculture area. However, this coordination needs to be carried out regularly so that policy implementation runs well.

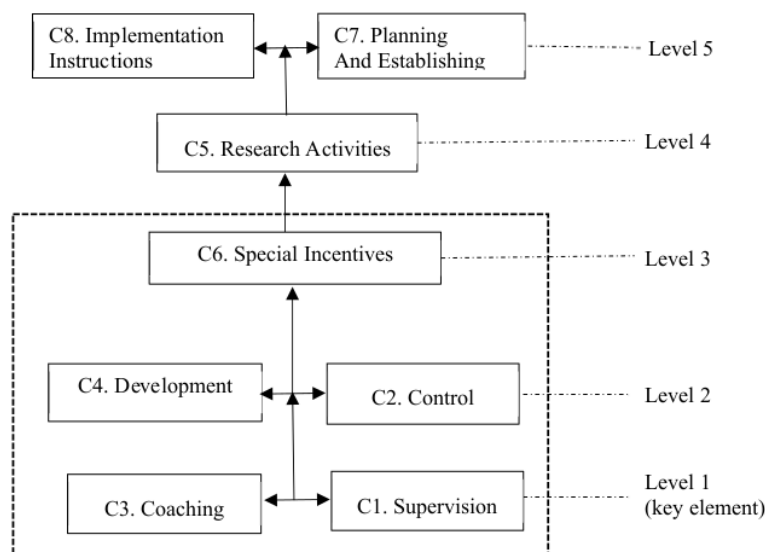


Figure 4. The structural model diagram of the policy program requirements

Socialization of regulations to farmers if their agricultural land was made into sustainable food agriculture has not yet been carried out. The results of this study also confirmed the policy implementation theory of Edward (1980) which states that one of the factors that influence policy implementation was the variable communication. The communication variable was intended as the socialization that policies must be conveyed to the implementer in a precise, clear, accurate and consistent manner ([26], [27]).

Providing guidance, consultation, education, training, and counseling carried out to farmers as a program has been carried out but was carried out in general in accordance with the main duties of the Food Crops and Horticulture Service (FCHS). The program of activities must be carried out in an intend to be given a larger portion to farmers whose land has become protected land (SFAL). This was done so that farmers were willing to defend their land for agricultural activities. Education had a key role in making policies to reduce fragmentation of agricultural land [28]. Coaching activities in the form of guidance, supervision and consultation, education, and training needed to be carried out in a larger portion to increase the knowledge and awareness of farmers so that the results in their rice farming can increase. Farmer's knowledge and awareness had significant role in determining the level of unsustainability in rice farming ([29], [30], [31]).

Agricultural extension in agricultural policy is efforts to change the behavior of farmers and their families, so that farmers had the knowledge and willingness to increase their farming results so that they can improve their lives. In addition, with extension, it was hoped that farmers would be able to solve the problems faced in their agriculture. Based on the results of the research, it was found that extension services are still carried out as a routine program in general, not carried out with more portions or intensely in areas of sustainable food agriculture. The one who plays vital role in agricultural extension was agricultural extension. In general, according to [31] the level of performance of agricultural extension workers in Banjar Regency in empowering farmers and was 78.57% or classified as moderate. The problem faced was the difficulty of changing the culture and mindset in the application of modern technology and planting superior varieties of rice. An effective extension scheme was needed to be applied to farmers in sustainable food agriculture areas. According to [32] counseling can be done effectively and farmer-to-farmer extension programs for smallholders as a cost-effective alternative to conventional farmer training approaches. This can be done considering the limited number of extension agents, so that the success of extension objectives can be increased.

Supervisory activities including reporting, monitoring and evaluation were carried out on SFAL policies. It aimed to evaluate what was or had been implemented so that programs/activities that were or had been implemented can be repaired immediately. Based on the results, the supervision had not been implemented. Supervision is one aspect of management that was carried out by the implementor administratively. Weaknesses in the administrative system can result in low policy success rates [33]. According to [34] the success of policy implementation depends on the implementing element (implementor), either an organization (local government) or an individual (farmer business actor), who was responsible for the management, implementation, and supervision of the implementation process. According to [35] the limitations of monitoring, evaluation and policy analysis affect the success of agricultural development policies.

IV. CONCLUSION

Based on the results of the structural analysis, it can be concluded that the priority in policy on SFAL were supervision, control, coaching, development, research activities, and special incentives. These sub-elements were linkage factors in the system which indicates that any policy will lead to the success of policies on sustainable food agriculture. The sub-elements that were the key factors were coaching and supervision. All elements of policy needs were particularly important to implement so that the goal of protecting SFAL policies can be achieved.

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