



## Reform of development strategy for economic strengthening of seaweed farmers in Bulukumba Regency, Indonesia

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**Received date:** 22 March, **Accepted date:** 18 May 2020, **Online date:** 28 May 2020

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### Abstract

Indonesia's total seaweed production reaches 11.3 million tons or 38% of the total world production of 29.4 million tons (FAO, 2018). South Sulawesi Province is the largest producer of *Kappaphycus* and *Eucheuma* seaweed in Indonesia, with an average of 3.52 million tons or 33% of national production, but most (around 80%) are still processed in dry form (dry-seaweed) which is generally done by exporters/industries (KKP, 20187). However, these conditions have not been able to provide maximum added value for farmers due to: 1) the quality of production has not been standardized for industry / export quality, which still requires further processing to enter the market, 2) low bargaining power due to knowledge, skills, equipment (technology) that is still limited, 3) continuity of production does not guarantee supply to industry / exports, and 4) farmers are generally formed in farmer groups because of family relations, but have not yet built group competence. Solving these problems requires a re-orientation of the farmer's strategy in managing activities at the upstream level (involving farms) involving stakeholders with their respective roles and interests, which are accommodated in joint decisions with the main goal of solving the problem of the economic weakness of seaweed farmers in Bulukumba. This study uses a deep-interview method, Focus Group Discussion (FGD) and questionnaire to respondents from stakeholders: farmers, industry, traders and government. Sampling was done by purposive and representation of the study area. Data processing is done by SWOT analysis for Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) analysis as well as analysis of implementation strategy solutions based on priorities and interrelations in the development system. The SWOT analysis results show that the internal conditions of farmers have greater weaknesses than their strengths (IFE = -0.06035), while the external conditions indicate that threats from outside are greater than their chances (EFE = -0.227). The Cartesian SWOT analysis shows that farmers are currently in a survival quadrant strategy showing recommendations for reforming a strategy (turnaround strategy). The previous strategy showed the work behaviour of individuals and small groups without developing competencies (skills, knowledge, technology, and partnership networks), it was recommended to reform into a new strategy of working in groups based on cooperative institutions and developing group competencies, mutual complementation between members, developing networks, develop opportunities for growth and prosperity together in a sustainable manner. The results of respondents and experts give a weight value of importance to the solution of problems to achieve future changes, starting from the main ones are a) Strengthening cooperative-based business institutions (0.584), b) Increasing partnerships (0.577), c) Strengthening business management (0.526), d) Business management assistance (0.465), e) Providing capital and technology assistance (0.410), f) Increasing Product Innovation (0.336), g) Improving the quality of seaweed and processed products (0.319), and h) Increasing Seaweed cultivation, post harvesting and processing skills (0.279). The recommendations from stakeholders are formulated in priority-based development and involve stakeholders as actors who have their respective roles in achieving the objectives of strengthening the farmer's economy in the context of sustainability of activities.

**Keywords:** SWOT analysis, strategy analysis, farmer's economy, seaweed farmers.



factors (Internal Factor Evaluation (IFE) and external factors (External Factor Evaluation (EFE)). Selected strategies based on priorities were formulated in the agribusiness institutional development model to assess the influence of inputs and outputs holistically with a system approach (Figure 1).

### 3. RESULTS AND DISCUSSION

#### 3.1. Mapping Farmers' Problems

The results of stakeholder interviews found several problems in the management of seaweed agribusiness in Bulukumba Regency as follows:

1) *Seaweed farmers*: a) fluctuations in seaweed prices cause uncertainty to farmers' income, b) Lack of capital for aquaculture infrastructure that causes dependence on capital owners to determine selling prices before harvest, c) Farmer productivity is still low due to technology for pre-harvest and post-harvest still done manually, d) farmers have difficulty reaching the maximum water content of seaweed (45 degrees) so it is difficult in price competition, e) difficulties in the production of seaweed from cultivation to post-harvest, e) lack of availability of regeneration of seaweed seeds so often causes failure production, and f) the low intensity of business assistance. 2) *Traders / collectors*: a) the quality of farmers' seaweed is still low (high water content, high dirt content) so that it defeats the bargaining position of farmer prices, b) low farmer productivity making it difficult to get high prices, and c) quality requirements the tight level at the industry level causes intermediary traders to offer low prices to farmers; 3) *Industry/Entrepreneur/Trader*: a) farmer productivity cannot guarantee safe industrial supply, and b) farmer seaweed quality is still low (high water content, high impurities) so it requires special handling as an industrial raw material which causes costs additional to the industry; and 4) *Government / Fisheries Service*: a) the difficulty of the government to determine the farmer price policy because where it is very varied, so that prices float on the market, b) generally farmers do not have a group with a professional and complementary business structure among group members, so the coaching process cannot implemented effectively, and c) weak control of farmer coaching, among others: seaweed harvest time at a young growth age, seaweed control from farmers is still low because harvests often occur when young is less than 45 days, seaweed sanitation is still very low where it is dried on the sand and is not continuous and the accumulation of seaweed for days in conditions of high water content so that the extraction of carrageenan occurs earlier.

#### 4.2. Conducting Farmer Strength Analysis

Strength and weakness analysis is done by the SWOT method, where this method is an effective qualitative analysis in the selection of strategies, easy, static and subjective in the selection of characters in the system [5] and [6]

The internal analysis includes strengths and weaknesses. The results of the questionnaire to farmer respondents indicate the internal strength of farmers based on the group of problems faced, including a) high availability of labor, b) encouragement to increase income, c) tradition of working in groups, and d) availability of productive labor. While the farmers' internal weaknesses include: a) low skills, b) weak business management, c) limited business capital and d) low capital access.

While the external analysis of farmers includes opportunities (opportunities) and challenges (weakness), the results of the questionnaire to farmer respondents indicate that external opportunities include: 1) cultivation potential can still be maximized, 2) open seaweed market, 3) high seaweed prices with high-quality requirements, and 4) availability of post-harvest technology. While external challenges include: 1) stringent quality requirements, 2) limited availability of capital, 3) price uncertainty and 4) limited market access.

Internal identification (strengths and weaknesses) becomes input in the Quantitative Strategic Planning Matrix (QSP) analysis for internal factor evaluation (Internal Factor Evaluation or abbreviated IFE) and external (External Factor Evaluation or abbreviated as EFE) [7]. IFE identification is shown in Table 1 and EFE in Table 2.

Based on the analysis of variables and indicators on the IFE matrix, it is known that the difference between strengths and weaknesses is -0.6035. This shows that institutional farmers have a more significant weakness than their strengths. While on the EFE matrix, the difference between opportunities and challenges is - 1.7117. This shows that institutional farmers have a more significant weakness than their strengths. The results of the analysis in the IFE and EFE matrices are illustrated in the Cartesian SWOT diagram; the results show that the position of strength, weakness, opportunities, and threats to farmers are in the third quadrant (space G). This shows the need to increase the turning points of strengths and opportunities as well as weaknesses and challenges to current conditions and strategies (turnaround strategy) (Figure 2).

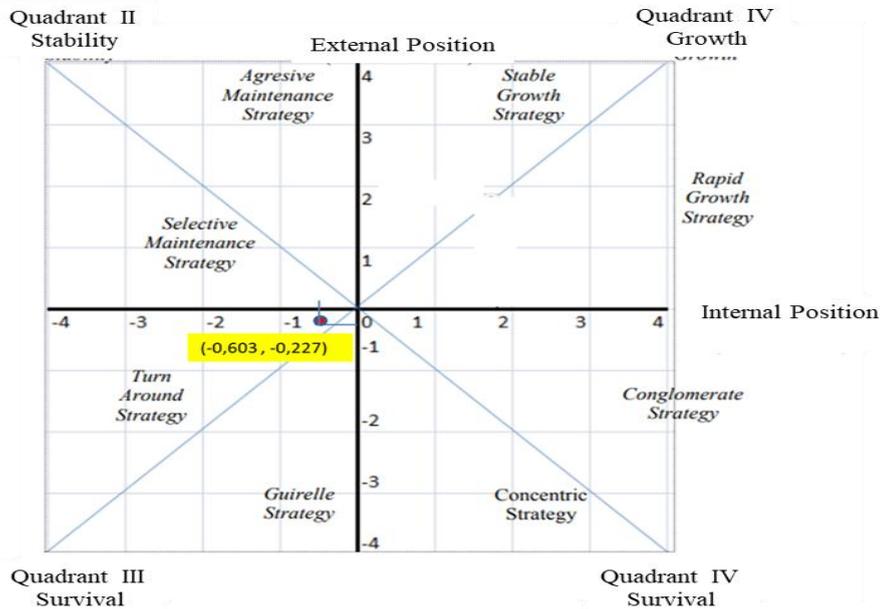
**Table 1.** Results of the Internal Factor Evaluation (IFE) Matrix Analysis

No	Variable categories and indicators	Weigh	Rating	Score	Priority
<i>a</i>	<i>B</i>	<i>c</i>	<i>D</i>	<i>e=cxd</i>	<i>F</i>
<i>Strengths</i>					
1	High availability of labor	0.222	2.8	0.6222	3
2	Encouragement to increase income	0.339	3.2	1.0844	2
3	Limited availability of capital	0.300	3.2	1.9600	1

4	Availability of productive labor	0.139	1.8	0.2500	4
<i>Total strength</i>		1.000		2.9167	
<i>Weakness</i>					
1	Low skills	0.264	3.4	0.8972	3
2	Weak business management	0.274	3.8	1.0424	1
3	Limited business capital	0.257	3.6	0.9250	2
4	Low capital access	0.205	3.2	0.6556	4
<i>Total weakness</i>		1.000		3.5201	
<i>The difference in Strength and Weakness</i>				-0.6035	

Table 2. Results of the External Factor Evaluation (EFE) Matrix Analysis

No	Variable categories and indicators	Weight	Rating	Score	Priority
<i>a</i>	<i>B</i>	<i>c</i>	<i>D</i>	<i>e=cxd</i>	<i>F</i>
<i>Opportunities</i>					
1	Cultivation potential can still be maximized	0.274	3.4	1.933	1
2	Open seaweed market	0.222	3.4	0.754	3
3	High seaweed prices with high quality requirements	0.226	1.6	0.361	4
4	Availability of post-harvest technology	0.278	3.2	0.890	2
<i>Total opportunities</i>		1.000		2.938	
<i>Threats</i>					
1	Stringent quality requirements	0.220	3.8	0.837	2
2	Limited availability of Capital	0.224	3.4	0.761	3
3	Price uncertainty	0.284	3.8	1.078	1
4	They have limited market access.	0.272	1.8	0.490	4
<i>Total threats</i>		1.000		2.963	
<i>The difference in Strength and Weakness</i>				-0.227	



picture 2 Cartesius diagram SWOT analysis on a study of institutional economic analysis of Seaweed farmers in Bulukumba

**4.3. Formulate an Institutional Development Strategy**

Based on the results of the SWOT matrix analysis, 16 strategies were obtained that utilized internal strengths and opportunities and anticipated external weaknesses and threats (Table 3). Strategy analysis includes analysis of strength-weakness (Strength-Opportunity or S-O), weakness-opportunity (weakness-opportunity or W-O), strength-threat (strength-threat, or S-T); and weaknesses (threats or W-T). The selection of strategies was carried out by experts so that 8 selected strategies were obtained to achieve the goal of developing the socio-economic institutional of seaweed agribusiness in Bulukumba, then weighing the results of the selection (Table 3). The weighting results show that the priority of development that can be carried out in succession (the smallest weight indicates the highest priority) are: 1) Strengthening Business Institutions (0.584), 2) Increasing partnerships (0.577), 3) Strengthening Business Management (0.526), 4) Assistance Business management, 5) Provision of capital and technical assistance, 6) Improvement of Product Innovation, 7) Improvement of Seaweed Quality and processed products, and 8) Improvement of Seaweed cultivation, post-harvest and processing skills (Table 4).

Table 3. Swot Analysis: Seaweed Farmers' economic, institutional development in Bulukumba

<b>Internal Factors</b>	<b>Strengths</b> 1. High labor availability 2. Encouragement to increase income 3. The tradition of working groups 4. Workers of productive age	<b>Weakness</b> 1. Low skills 2. Weak business management 3. Limited business capital 4. Low capital access
<b>External Factors</b>		
<b>Opportunities</b> 1. Cultivation potential can still be maximized 2. Open seaweed market 3. High seaweed prices with high quality requirements 4. Availability of post-harvest technology	<b>S-O</b> 1. Increased Cultivation Skills (S1-O1) 2. Seaweed Quality Development (S2-O3) 3. Strengthening Business Institutions (S3-O2) 4. Increased post-harvest skills and processing (S4-O4)	<b>W-O</b> 1. Increased Cultivation Skills (W1-O1) 2. Business management assistance (W2-O2) 3. Provision of venture capital assistance (W3-O3) 4. Provision of Technology Assistance (W4-O4)
<b>Threats</b> 1. Stringent quality requirements 2. limited availability of capital 3. Price uncertainty 4. Limited market access	<b>S-T</b> 1. Technology development (S2-O1) 2. Strengthening business management (S2-O2) 3. Strengthening business management (S3-O3) 4. Improved Processed Product Innovation (S4-O4)	<b>W-O</b> 1. Increased farmer skill (W1-O1) 2. Strengthening business management (W2-O2) 3. Increased business partnerships (W3-O3) 4. Increased market partnerships(W4-O4)

Table 4. Total Attractiveness Score (TAS) the results of the selection of institutional development strategies economy of seaweed farmers in Bulukumba

No.	Alternative Strategies	Weight	Attractiveness	TAS Score	Priority
<i>A</i>	<i>B</i>	<i>c</i>	<i>D</i>	$e=cxd$	<i>f</i>
1	Improvement of cultivation skills, post harvest and seaweed processing	0.087	3.2	0.279	8
2	Quality Improvement of Seaweed and processed products	0.114	2.8	0.319	7
3	Strengthening Cooperative Institutions	0.146	4	0.584	1
4	Strengthening Business Management	0.146	3.6	0.526	3
5	Product Innovation Improvement	0.112	3	0.336	6
6	Business Management Assistance	0.137	3.4	0.465	4
7	Provision of capital and technological assistance	0.114	3.6	0.410	5
8	Increased partnership	0.144	4	0.577	2
	Total weight	1.000			

Institutional strengthening through cooperatives is the chosen alternative to replace individual and group agriculture. According to [8], cooperative institutions encourage cooperative practices between farmers in accordance with their competencies. Agricultural cooperatives are the leading economic organizations for farmers in the food agriculture system. New industrial organization and institutional economic theories explain the existence of agricultural cooperatives and the participation of farmers in them through their ability to develop 'balancing forces' in the market and internalize each transaction cost. The results of research from [9] show the strength of market structures with cooperative institutions is more influential than new institutionalist arguments related to overcoming potential contractual failures. The establishment of cooperatives is influenced by the most influential factors, namely: availability of credit service provision (80%), availability of feeder infrastructure services (51%), relative proximity to main roads (42%) and a number of traders on location (2%).

Through cooperatives, various collaborative practices can occur collectively and have been adopted by small-scale rice farmers in Kurigram Sadar, India. Mechanization of agriculture and the institutionalization of cooperative agriculture can reverse the situation and indirectly contribute to food security [8]. Cooperative membership has a significant and positive influence on farmers' tendencies to adopt production practices that affect food safety and quality [10].

Strengthening cooperative institutions also provides access to technology diffusion for individual farmers and farmer groups. According to [11], a better understanding of the function of cooperatives in promoting the diffusion of agricultural technology can improve policy measures, which are very important for countries with large rural populations dominated by small-scale agriculture, such as China, where cooperatives have is associated with higher technology adoption and has great potential to increase agricultural productivity and income.

#### 4.3. Formulating Policy Recommendations

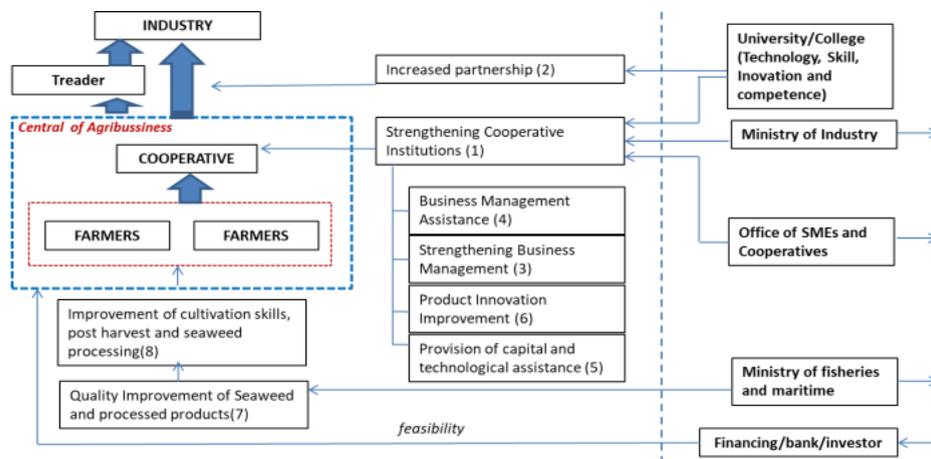
Based on the choice of the main priorities of farmers' economic development strategies from the results of this study, the recommendation of the main policy patterns chosen was the development of cooperative-based institutions. Institutional cooperatives were gathering of several farmer groups. This policy is expected to guarantee the quality and continuity of production in the agribusiness chain and strengthen market networks that focus on the interests of farmers as agribusiness actors and accommodate the interests of stakeholders as a whole (holistic). The results of the formulation of the recommendations are shown in Figure 3.

The results of the selection of strategies produce a sequence of development based on priority (smallest sequence number as a top priority). Strengthening business institutions through cooperatives as a top priority is a recommended development basis. This implementation can be carried out on an ongoing basis through the development of partnerships as a key to the sustainability of cooperatives.

Strengthening farmer institutions in cooperative institutions are directly supported by activities: business assistance, business management development, product innovation and access to capital. This implementation is supported by the industry service in technical guidance and government programs in the development of industrial activities, the Office of MSMEs and Cooperatives in establishing cooperatives and increasing capacity and access to capital and higher education support in developing science and technology, skills, product innovation and competency development whereas the implementation of improved cultivation skills and integrated quality improvement is directly related to farmer groups under cooperative institutional coordination and supported by the Maritime and Fisheries Service Office policy in strengthening the capacity of farmers and groups (under cooperative coordination) on technology, skills and access to financing production facilities and infrastructure. The role of related agencies can also provide recommendations on the feasibility of cooperatives in working with investors or financial institutions. Generally, seaweed management in Bulukumba involves groups based on closeness and family relationships. Strengthening group institutions through cooperatives is a strategy of combining the family as a basic unit with cooperative institutions that provide social services.

According to [12] , agricultural and land policy in China shifted from a market-oriented model to a more balanced model where agricultural governance at the grass-root level underwent a transformation that is uniting cooperatives and family farms as a basic unit of agriculture, while cooperatives offer social services to members of his farm. It was found that the new model increased farmer participation and income so that it had a positive influence on agricultural production. China has adopted "family farming plus cooperatives" as the preferred model of organizations in agriculture that aims to improve rural living standards and strengthen the security of agricultural production.

Furthermore, [13] state that technical efficiency in agricultural production activities is influenced by farmer membership in cooperative institutions. The heterogeneity among family farms, whether they are cooperative members or not, is very significant. Non-cooperative farmers show the lowest technical efficiency and the widest gap between those observed, while farmers who are members of the cooperative show the highest technical efficiency and the narrowest gap between observed production. This shows that cooperative membership enables farmers to learn more advanced technology and take advantage of productivity improvement practices.



Gambar 8. Formulation of priority recommendations for institutional economic development of seaweed farmers in Bulukumba

### 5. CONCLUSIONS

Based on the results of this progress report, it can be concluded that the internal condition of seaweed farmers in Bulukumba shows that the weaknesses of farmers are more dominant than their strengths, while the external conditions show that external threats are more dominant than opportunities.

These conditions justify that the current condition of farmers is in a survival strategy to survive, so it needs to change the old strategy from the form of individual or small group work to work through cooperative institutions (turn around strategy). In order to change the priority strategies that must be carried out successively from the main ones are a) strengthening business institutions through cooperatives, b) enhancing partnerships, c) strengthening business management, d) business management assistance, e) Providing capital and technology assistance, f) Increasing Product Innovation, g) increasing seaweed quality and processed products, and h) Increasing seaweed cultivation, post-harvest and processing skills. In carrying out this strategy, it requires the participation of stakeholders in the context of fulfilling the complementary interests in the agribusiness system. Strengthening the economic interests of farmers through cooperative institutions is expected to increase bargaining-position in order to increase the role and access of farmers as the main determinant of seaweed agribusiness activities in Bulukumba.

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