The Continuous Agribusiness of Blue Swim Crab in Pangkep Regency

[1]Muh. Irfan Aryawiguna, [2]Idris, [3]Aminuddin Saade, [4]M.Isaac Maulana

Sekolah Tinggi Penyuluhan Pertanian,
Gowa, Indonesia

***Abstract*—This research aims to design a model, as well as analyzing the effective policy intervention for the continuity of agribusiness of blue swim crab in Pangkep Regency. This research was conducted in Pangkep Regency, South Sulawesi Province from June until August 2012. Total of research samples is 62 fishermen of blue swim crab. Data gathering was conducted using interview and observation method. Result of the simulation of the model for 15 years (2012 – 2027) shows that the supply of resource blue swim crab was estimated to be in level 0 (zero) in 2016, the fishermen will have material loss at Rp -24,127,734,516 in 2016, and the entrepreneurs of blue swim crab production will have material loss at Rp -47,827,313. This is caused by the attempt of uncontrollable catching. The enforcing of this uncontrollable catching, through the policy intervention of diminishing the catching attempt gradually by 10% since 2012 until 2016, is very effective for the continuity of agribusiness of blue swim crab.**

***Index Terms*—Blue swim crab (portunus pelagicus), continuous agribusiness, policy intervention analysis.**

I. INTRODUCTION

The marine products in Indonesia have high economic value in the export market and to meet the needs of domestic consumers. As well as export market demand. Crab resources are one of the critical commodities of capture fisheries. Various species of crab exist in this world. Some live in freshwater, coastal area, and the sea.

Blue swim crab (*Portunus pelagicus*) is one of the fishery commodities with high economic value and is an export commodity [1]. The manufactured products of blue swim crab, in the form of blue swim crab's canned meat, have been exported to some countries, like United States, Australia, Japan, and the European Union. This export opportunity needs to be compensated by the wise and responsible management of resource blue swim crab. If it does not implement well, the continuity of agribusiness of blue swim crab will be put at risk.

The pressure of exploitation of resource blue swim crab in Pangkep Regency, South Sulawesi, Indonesia tends to increase. According to the data from Department of Maritime and Fisheries Affair of Pangkep Regency, in 2012, the catching attempt increased by 7,81%, but instead, the production of blue swim crab decreased by 3,01%, and in 2007 this attempt increased further by 12.49%, but the production declined by 1,64%. This indicates the supply of resource blue swim crab is getting lesser so that the increasing catching attempts are not comparable with the amount of fish caught. Besides that, it is caused by the fishery resources which are common in the form of open access, so that everybody can take advantage of it [2].

The role of the government as the regulator function through the arrangement of policy intervention is undoubtedly needed so that the agribusiness of blue swim crab can continue well. The arrangement of policy should be built on a foundation of the comprehensive contemplation and system approach. The system approach meant here is the system modeling and simulation of agribusiness of blue swim crab, so that the condition of the system used can be monitored simultaneously now, as well as in the future. For this purpose, this research is conducted to obtain the information related to the condition of the system of agribusiness of blue swim crab use now and in the future to undertake a rational, measured, and transparent policy intervention that can repair the system condition, so that the system can function well continuously. The system approach in this research focused on the interaction between the sub-system of catching and sub-system of production.

Excessive exploitation of these marine resources leads to degradation of natural resources. Due to economic pressure as well as low knowledge about blue swimming blue crab capture in an environmentally friendly way, this population is threatened due to habitat destruction.

This article describes agribusiness sensitivity analysis of the blue swim crab in Pangkep regency and government policies that support the sustainability of agribusiness of blue swim crab in Pangkep Regency.

II. RESEARCH METHOD

This research was conducted in Pangkep Regency, South Sulawesi Province, from June to August 2016. The populations were entrepreneurs and fisherman of blue swim crab production in Pangkep Regency as many as 673 people. Furthermore, the sampling method used a random sampling method to give the same opportunity to the population (Charles 1988). Data were analyzed by sensitivity analysis to calculate changes in production parameters if policy intervention was made to the production system.

The parameters were analyzed by the method are :

Analysis of the system;

Analysis of bio-economy;

Analysis of catching and processing costs and;

Analysis of the fishing and processing business profits.

III. Result and Discussion

Suspect of blue swim crab sustainability of agribusiness system in Pangkep in the future, then the simulation model of agribusiness of blue swim crab for 15 years (2012-2027). Simulation, often used in the process of an experiment on models substitute for real experiments [3]. Reference value which represents the performance of the agribusiness system is a state or an off blue swim crab stock level of resources, production, profits of blue swim crab fishing and processing business.

This of blue swim crab agribusiness model simulations conducted with the assumptions; (a) prices of blue swim crab and blue swim crab meat prices constant over the life simulation, (b) input prices and production costs catching of blue swim crab processing constant over the life simulation.

The simulation results in of blue swim crab agribusiness system performance in the future can be seen in Table 1 below:

Table 1 Results of Simulation Forecasts of Future System Performance

Year	System Performance Indicators				
	efforts to arrest (trip)	***the stock of blue swim crab (kg)***	***produc. of blue swim crab (kg)***	***advantages Fishermen (Rp)***	***Advent. Employer (Rp)***
2012	481,325	33,757	141,35	-11,635,143,511	147,176,054
2013	523,681	10,504	47,856	-16,843,643,052	18,191,338
2014	569,765	493	2,289	-20,292,138,796	-44,669,362
2015	619,905	0	0	-22,176,226,577	-47,827,313
2016	674,456	0	0	-24,127,734,516	-47,827,313
2017	733,809	0	0	-26,250,975,153	-47,827,313
2018	798,384	0	0	-28,561,060,967	-47,827,313
2019	868,642	0	0	-31,074,434,332	-47,827,313
2020	945,082	0	0	-33,808,984,553	-47,827,313
2021	1,028,24	0	0	-36,784,175,193	-47,827,313
2022	1,118,73	0	0	-40,021,182,611	-47,827,313
2023	1,217,18	0	0	-43,543,046,680	-47,827,313
2024	1,324,29	0	0	-47,374,834,788	-47,827,313
2025	1,440,83	0	0	-51,543,820,249	-47,827,313
2026	1,567,62	0	0	-56,079,676,431	-47,827,313
2027	1,705,57	0	0	-61,014,687,957	-47,827,313

The simulation results show that the performance of the system in the future of agribusiness of blue swim crab tendency towards unstable. System performance indicators, namely, the value of the stock of resources, production, profits of blue swim crab fishing and processing business decreased. The decline in system performance indicators is caused by uncontrolled fishing effort carried out by fishermen. Fishing effort has increased at a rate of 8.8% per year. These conditions resulted in the stock of resources continue to be degraded so that the catch decreased, the supply of raw materials processing industry decreased, fishermen and people in business, processing profits declined.

Agribusiness sensitivity analysis model of blue swim crab

The sensitivity of the model is a model response to a stimulus. The response indicated by changes in behavior or performance of the system. Stimulus is done by providing a specific treatment of the element or structure models. Treatment or intervention, as the action, is based on the conditions that may occur in the real world and based on the policy options that might be done. The effects of actions on the system performance were observed in the normal range.

The results of the simulation model of agribusiness of blue swim crab in Pangkep indicate a trend towards an unstable, where the fishing effort increased at a rate of 8.8%. As a result, the stock of blue swim crab, production, profits of blue swim crab fisheries and processing business as a reference value representing the system's performance continues to decline. These conditions need to be anticipated, if not, then the agribusiness of blue swim crab which has contributed to the welfare of coastal communities will not be sustainable. To that end, policy interventions need to be done to improve the system performance.

Intervention Policy

Preservation of fisheries resources for the resource in question can be used advantageously in a relatively unrestricted, need to be implemented to control the intensity of the arrest reached a level that is economically profitable exploitation [4].

Simulate the impact of these policies on system performance agribusiness of blue swim crab; then intervention is functional on models using STEP function on a variable fraction of the rate of fishing effort. A variable fraction of the rate of fishing effort = 12:09-STEP (0088.2012), which means that no additional fishing effort since 2012. The structural interventions carried out by adding a variable outflow on fishing effort by incorporating a variable rate of reduction fishing effort and the fraction of the rate of reduction of fishing effort.

Simulation of the impact of policy intervention to reduce fishing effort by 10%

The simulation results due to the impact of policy interventions in the reduction of fishing effort by 10% against the agribusiness system performance of blue swim crab can be seen in Table 2.

Table 2 Results of the Agribusiness System Performance Simulation of Blue Swim Crab In Pangkep by the Intervention Policies to Reduce Fishing Effort By 10%

Year	System Performance Indicators				advantage. Employers (Rp)
	efforts to arrest (trip)	*the stock of blue swim crab (kg)*	*product. of blue swim crab (kg)*	*advantage. Fishermen (Rp)*	
2012	225,368	340102	666,839	18,277,920,466	872,087,592
2013	202,831	396177	699,107	20,358,731,009	916,601,820
2014	182,548	439600	698,16	21,046,917,118	915,295,123
2015	182,548	479795	761,997	23,568,465,850	1,003,358,776
2016	182,548	437224	694,386	20,897,836,174	910,088,556
2017	182,548	481859	765,274	23,697,913,852	1,007,879,674
2018	182,548	434648	690,294	20,736,215,692	904,444,053
2019	182,548	484039	768,736	23,834,662,121	1,012,655,529
2020	182,548	431884	685,906	20,562,879,659	898,390,391
2021	182,548	486311	772,344	23,977,174,624	1,017,632,697
2022	182,548	428960	681,261	20,379,393,568	891,982,243
2023	182,548	488641	776,045	24,123,354,296	1,022,737,939
2024	182,548	425911	676,42	20,188,170,719	885,303,894
2025	182,548	490988	779,772	24,270,578,101	1,027,879,647
2026	182,548	422792	671,466	19,992,495,658	878,470,054
2027	182,548	493303	783,449	24,415,820,498	1,032,952,155
Total		7,774,872	13,031,630	378,034,689,992	17,068,610,421
Mean		409,204	685,875	19,896,562,631	898,347,917

The simulation results show that the fulfillment of the scheme as a result of policy interventions tend towards a stable and sustainable when compared with the performance system before intervention policies. As a consequence of these policy interventions, efforts to arrest declining since the year 2012 to 2014 and estimated to be at a constant level of 182 584 trips in 2014 until the end of the simulation (2027).

System performance indicators tended to increase since 2012 until 2016, and since 2014 until the end of the age of the simulation (2027) indicator of system performance fluctuates, but is stable and sustainable. Since the year 2012 until the end of the age of the simulation (2027), the value of the stock of resources is estimated at the level of an average of 409.204 kg, the production of blue swim crab is assessed at the level of an average of 685.875 kg, the value of profits of fishermen is estimated at the level of an average of Rp 19,896,562,631 and the value of blue swim crab processing business profit is estimated at the level of an average of Rp 898,347,917. Thus the policy interventions fishing effort reduction of 10% since the year 2009 to 2013 is very effective to improve the performance of the system, so the system can of blue swim crab sustainable agribusiness.

IV. Conclusion

Effective policy interventions to improve the performance of the system to be sustainable agribusiness is controlling fishing effort by gradually reducing fishing effort by 10% since 2012-2016. Consideration should be given to developing of blue swim crab cultivation technology as an alternative raw material supply fulfillment of blue swim crab processing industry, that is not entirely dependent on nature.

References

[1] B. Cicin-Sain, R. W. Knecht, D. Jang, and G. W. Fisk, *Integrated coastal and ocean management: concepts and practices*. Island Press, 1998.

[2] H. S. Gordon, "The economic theory of a common-property resource: the fishery," *J. Polit. Econ.*, vol. 62, no. 2, pp. 124–142, 1954.

[3] Sushil, *System dynamics: a practical approach for managerial problems*. New Delhi: Wiley Eastern Limited, 1993.

[4] J. C. Seijo, O. Defeo, and S. Salas, *Fisheries bioeconomics: theory, modelling and management*, no. 368. Food & Agriculture Org., 1998.