



Alternative policies based on blue economy for the skipjack (*Katsuwonus pelamis*) fishery management of Jayapura City, Papua, Indonesia

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Abstract. The effort to realize a sustainable skipjack (*Katsuwonus pelamis*) fishery is by applying the concept of the blue economy in its management. The purpose of this study is to formulate alternative policies of skipjack fisheries based on the principles of the blue economy in Jayapura City. The approach to regulatory impact assessment developed by the Asian Development Bank (2003) is used to analyze it. The results showed that the second alternative policy in the form of making a new regional regulation (PERDA) concerning the blue economy of skipjack fisheries that is because it generates benefits of USD 149,397,546, greater than the costs incurred in the amount of USD 1,309,116. The concept of a blue economy is an embodiment of ecosystem-based sustainable development and can produce economic growth for the region.

Key Words: economic growth, economy-based ecosystem, policies, regional regulations, skipjack.

Introduction. Skipjack (*Katsuwonus pelamis*) fisheries are one of the commodities that are of interest to global consumers and have high economic value (Lumi et al 2013; Firdaus et al 2018; Tuli et al 2015; Tuli 2018; Suhana et al 2019; Yanglera et al 2016; Amir & Mallawa 2015; Soukotta et al 2017; Hutajulu et al 2019). Skipjack also produce economic contributions to the region (McCluney et al 2019; Johnson et al 2018; Hutajulu et al 2019). To develop the economic value that can continue and be produced by *K. pelamis* fisheries, a variety of appropriate policies are needed. The policies include fishing arrangements based on a standard size of 36.5-84.7 cm (Soares et al 2019; Nurdin & Panggabean 2017; Jamal et al 2011; Jadmiko et al 2015; Wang et al 2012; Asia et al 2015; Asia et al 2015; Kumar et al 2019; Nainggolan et al 2017; Miller et al 2017; Pillin & Tawari 2015). Another policy is to implement sustainable management and to use sustainable fishing gear, including hook and line/tonda fishing line, pole and line (huhate), tuna longline (tuna longline), hand line, kite line fishing etc. (Akmaluddin et al 2015; Akbar & Labenua 2018; Nugraha et al 2020; Khan et al 2019; Najamuddin et al 2017; Akbar et al 2016, Miller et al 2017; Mallawa et al 2018; Saputra et al 2014, Tadjuddah et al 2017).

One form of the efforts to achieve sustainable marine resource management, especially *K. pelamis* fisheries commodity, is to apply the concept of blue economy (Sari 2019; Purbani et al 2016; Nurhayati 2013; Ahmad 2016; Radiarta et al 2015; Sukarniati & Khoirudin 2017; Godfrey 2016; Lee et al 2020; Doyle 2018; Techera 2019; Sari & Muslimah 2019). The concept of a blue economy is a paradigm of economic development based on the principles of ecosystem management and can produce economic growth (Pauli 2010; Cavanagh & Benjaminsen 2017; Doyle 2016; Silver et al 2015).

This paper presents a regulatory impact assessment (RIA) approach which is associated with fisheries development policies based on the blue economy. RIA is a method that systematically and consistently studies the effects of government actions, communicating information to decision-makers (USAID & SENADA 2009; KPPOD 2013). This approach is used to see the benefits and disadvantages of implementing blue economy policies in *K. pelamis* fisheries management. The purpose of this paper is to formulate an alternative policy of skipjack fisheries based on the principles of the blue economy in Jayapura City.

Material and Method. This research was conducted in Jayapura City during the period of August-September 2017. The data used are Primary data, namely fish production data, wages and salaries, number of ships, fishing gear, fish prices, production costs, bank credit, fishermen income, fisheries investment, availability of fuel, equalizer freezer, machine oil, boat engine value, fuel oil, the amount of labor, consumption, electricity, business capital, licensing administration costs, the cost of providing wastewater treatment plants (WWTP), levies, supervision fees, environmental data, the retribution of fisheries. Secondary data is in the form of labor absorption, fish stocks, fishing facilities and infrastructure, fish marketing, fishery human resources, fish waste, water quality, government development programs, fisheries Gross Regional Domestic Product (GRDP), water pollution, business licensing. The analytical approach used is the Regulatory Impact Assessment (RIA).

RIA is a method used to assess the impact of a regulation that can help policymakers to determine the best alternative in the selection of policy and regulatory criteria to be carried out. Specific characteristics in this analysis involve consultation with stakeholders who will be affected if the policy or regulation is realized, as well as those that have a direct and indirect relationship with the planned blue economy implementation of *K. pelamis* fisheries in Jayapura City. The stakeholders include stakeholders directly involved in the development of *K. pelamis* fisheries in Jayapura City, which include: the Jayapura City Maritime Affairs and Fisheries Office, the Development Planning Agency at Sub-National Level (BAPPEDA) in Jayapura City, the Environment Office of Jayapura City, the Office of Cooperatives and MSMEs, Private/Fishery Entrepreneurs, Community Leaders, Experts/Academics/Professionals, NGOs in Fisheries. The purpose of the application is to be able to produce alternatives to overcome the management of *K. pelamis* fisheries that are unsustainable and pose a massive depletion of stocks.

The stages of RIA developed by the Asian Development Bank (ADB) Year (2003) are: 1) problem formulation, 2) policy objectives, 3) identification of alternative solutions to problems, 4) benefit and cost analysis, 5) communication (consultation) with stakeholders, 6) determining the best options (alternative policies), 7) formulating a policy implementation strategy.

Results and Discussion

The problems that hinder the implementation of a blue economy regarding the *Katsuwonus pelamis* fishery of Jayapura City are the following:

- 1) Information about the benefits of the blue economy in the marine and fisheries regional organizations of Jayapura City and Papua Province is not evenly distributed.
- 2) Lack of understanding from regional development organization (OPD) related to the process and working process of the blue economy in *K. pelamis* fisheries.
- 3) Budget limitations of the relevant regional agencies in realizing the program.
- 4) The absence of tools and equipment based on the blue economy.
- 5) The high cost of technology and innovation to realize the program.
- 6) There is no knowledge between fishermen about the concept of a blue economy.
- 7) The level of education and expertise of fishermen is low.
- 8) The lack of willingness of fishermen to try to realize the concept.
- 9) There is no guidance to realize the concept of a blue economy.

- 10) The absence of technical rules for the implementation of the blue economy concept on a national and regional scale.
- 11) There is no socialization about the blue economy for fishermen and fishery entrepreneurs.

The absence of regional regulations regarding the blue economy of *K. pelamis* fisheries in Jayapura City and Papua Province is an opportunity to immediately compile these Regional Regulation documents. Therefore, this research is planned to make a regional regulation design about the blue economy of *K. pelamis* fisheries. The reference that can be used to make the design is the Law of the Republic of Indonesia Number 32 of 2014 concerning marine CHAPTER VI concerning marine management, part one in particular article 14 paragraph 1 which reads: "The Government and Regional Governments by following per under with their authority to conduct maritime management for the greatest prosperity of the people through the utilization and exploitation of marine resources using the principles of the blue economy". The existence of the Law of the Republic of Indonesia Number 23 of 2014 concerning regional governments explains the division of authority in the management of marine and fishery resources between the central, provincial and district/city governments. The context of drafting the blue economy regional regulation must create a close relationship between these stakeholders, because it involves their respective authorities.

Formulation of policy objectives. A problem sometimes cannot be solved by one policy and one agency, but close collaboration is needed between the parties involved. Public policy analysis must be able to identify the objectives to be achieved.

The question that arises in this analysis is what is the purpose and objective of the government to issue a policy? Is setting goals or targets to be achieved a solution to solve some or all phenomena and problems that occur? The analysis in this section discusses the level of authority of the local government in producing a regional regulation on the blue economy which must be tested for consistency and relevance to the central government's policy on the implementation of the blue economy in the fisheries sector. Efforts to achieve these goals, describe some specific goals, namely:

- 1) Efforts and strategies implemented in realizing the blue economy of skipjack fisheries in Jayapura City.
- 2) Development and utilization of local potentials and advantages in the context of the realization of the blue economy of skipjack fisheries.
- 3) Guaranteed availability of facilities and infrastructure based on a well-identified blue economy.
- 4) Guaranteed successful implementation of the blue economy program and the benefits felt by the fisheries stakeholders implementing the program.
- 5) Determination of guidelines, standardization of equipment, and equipment that makes it easy for fishermen and entrepreneurs to understand and realize them.
- 6) The certainty of those who finance the implementation of the blue economy.
- 7) Clarity regarding the involvement and forms of participation that fisheries must carry out in implementing the blue economy.
- 8) Determination of special institutions authorized to handle the program, to facilitate coordination, supervision, and evaluation of implementation.

Identifying alternative solutions to the problem. Identification activities of alternative approaches and strategies to be chosen are expected to produce the effective and efficient application of formal regulations. Another choice is an approach outside the formal rules that can solve the main problem by the Asian Development Bank (2003). Alternative types of problem-solving in making regulations and implementing the blue economy of *K. pelamis* fisheries such as:

- 1) Do nothing. This choice as a basis and prerequisites in making a basis or baseline for conditions if the government as the regulator does not take any action. This means that the regional regulation of Jayapura City Number 1 of 2008 concerning Fishery Business Permits continues. This condition becomes a comparison material if the

local government is involved in solving the existing problems and in achieving the expected goals.

- 2) Acting by issuing rules to ensure problem resolution and the realization of the identified objectives by including alternative implementations of the blue economy according to Dahuri (2015), namely:
 - a) Setting the rate of fishing in the waters of Papua and the City of Jayapura and the provincial Fisheries Management Area (FMA) so as not to exceed the potential for sustainable production (MSY).
 - b) Strengthening and developing industrial technology for handling and processing the results of capture fisheries.
 - c) Development of the biotechnology industry and nano waters technology.
 - d) Strengthening and developing domestic and export markets, to increase fish prices at a more favorable rate.
 - e) Application of the use of technological innovations without waste and carbon emissions.
 - f) Open access to fishermen, marine and fisheries entrepreneurs concerning access to capital and quality fisheries production facilities.
 - g) Improvements to basic infrastructure and fisheries, transportation, connectivity, and logistics including new development if they are not yet available.
 - h) Increasing the capability of fishery human resources (HR).
 - i) Development and increase in the amount of research funding and development (R&D).
 - j) The certainty of the investment in the fishery and marine sector is easy and conducive.

Analysis of benefits and costs. This stage is particularly important in the determination, endorsement to implementation of a rule as a basis for reviewing a rule. The results of the analysis provide an overview of the extent to which the benefits will be received from the existence of a regional regulation as well as the benefits of efforts to revise a regional regulation. Costs become a reflection of the amount that must be borne by the government in the election to revise existing regional regulations or make new regional regulations.

The results of the comparison of benefits and costs become a basis for the regional government of Jayapura City in deciding to choose alternative options to be chosen to realize the blue economy of skipjack fisheries. Another benefit of this stage is that it is a material or tool for clarifying the stages of identification, formulation of the problem until the goal of establishing existing rules is in line with the expectations of all parties. Application of rules that are not based on an appropriate basis, the occurrence of various deviations in the field to the rejection made by the local community will have an impact on the difficulty of evaluating at the same time measuring the success of the rules as well as the benefits and costs of an existing rule (ADB 2003). Alternative policy options in realizing the blue economy of skipjack fisheries in Jayapura City are divided into 2 (two) choices which include the following policies.

Policy Option 1, do nothing. Alternative options do not take any action to overcome the problem of inequality of information about the benefits of the blue economy in the relevant stakeholder environment. This alternative can be used as a basis in overcoming the risks that will arise later if this option is chosen, it can be used as a reference in estimating the benefits and costs that arise at a later stage.

The first policy choice recommendation is to carry out continuous dissemination of information to all relevant stakeholders. The Research and Development Center for Maritime Affairs and Fisheries, Ministry of Marine Affairs and Fisheries (2014) recommends a comprehensive and continuing socialization and education about the blue economy concept of capture fisheries. The amount of the cost of implementing the blue economic policy for skipjack fisheries is guided by the Regional Government Performance Accountability Report of the city of Jayapura, specifically the Maritime Affairs and Fisheries-OPD 2015-2018, and the annual report 2015-2018 (Table 1).

Table 1

Policy option 1, do nothing with the implementation of the blue economy for Fishery business of *K. pelamis* fisheries in Jayapura City (US\$)

| No. | Stakeholder | Types of Benefits / Costs | Alternative I (Do nothing) | Economic quantification (US\$) | Source | | |
|---|--|---|---|---|-------------------------------|--|------------|
| 1 | Fisherman | The benefits are immeasurable | The development program by the regional government is still ongoing | 14,976 | Data processed (2019) | | |
| | | | Development of Capture Fleet, Fishing Equipment, and Catching aids. | 88,059 | | | |
| | | | Strengthening and Development of Fishery Product Marketing | 23,780 | | | |
| | | Measurable benefits | Wages and salaries | 3,372 | | | |
| | | | Short-term benefits | Fish prices have remained stable | | 2 | |
| | | | | Facilities and infrastructure assistance for fish marketing | | 57,126 | |
| | | Long-term benefits | Fishing activities continue | 4,496 | | | |
| | | | Fishermen's welfare stable | 14,906 | | | |
| | | The loss is immeasurable | measurable losses | The decline in fish stocks | | 2,725,073 | |
| | | | | The amount of bank credit is small | | 720 | |
| | | | | Limited human resource capabilities of local fishermen | | 1,080 | |
| | | Short-term loss | Long term loss | The decreased income of fishing communities | | 25,043 | |
| | | | | Fish waste is high and wasted | | 269,510 | |
| | | | | Declining water quality | | 122,813 | |
| 2 | Department of Marine and Fisheries (DKP) | The benefits are immeasurable | Fishing using fishing equipment is not environmentally friendly and hazardous materials | 30,973 | DKP Jayapura City (2015-2018) | | |
| | | | Fisherman Development Program | 16,355 | | | |
| | | | Retribution of fisheries business continues | 3,218 | | | |
| | | | Availability of fishing business employment | 11,836 | | | |
| | | | Long-term benefits | The competitiveness of skipjack fishery products is still low | | 17,505 | |
| | | | | GRDP of fisheries | | 40,354,543 | |
| | | | The loss is immeasurable | measurable losses | | Development of human resources in the marine and fisheries service environment | 37,945 |
| | | | | | | Socialization likes to eat fish | 10,809 |
| | | | | | | Monitoring / Evaluation and Provision of Marine and Fisheries Data / Information | 13,007 |
| | | | | | | damage to ecosystems and the environment is high | 540,505 |
| | | | Short-term loss | Long-term losses | | Water and air pollution continues | 176,235 |
| | | | | | | <i>K. pelamis</i> fisheries business is not efficient yet | 10,110 |
| | | | | | | Supervising operating costs are expensive and with less effective results | 9,306 |
| | | | | | | The amount of fish catch is not sufficient for local consumption | 24,027,887 |
| Provision of employment will be reduced | 7,890 | | | | | | |
| Long-term losses | The benefits are immeasurable | Decreasing the amount of retribution from fishery business | 3,218 | | | | |
| | | Limited facilities and infrastructure for good <i>K. pelamis</i> fisheries management | 5,224 | | | | |
| 3 | Private / Fishery businessman | The benefits are immeasurable | Business and HR Development and Fisheries Development Program (Fishermen and Internal of DKP) | 38,048 | Data processed (2019) | | |

| | | | | | |
|---|--|--------------------------|---|--------|------------------------------|
| | | Measurable benefits | High business production | 71,963 | |
| | | Short-term benefits | The certainty the amount of retribution of business | 48 | |
| | | Long-term benefits | The certainty of business continues (business license) | 37 | |
| | | The loss is immeasurable | Fisheries that are difficult to develop | 34,503 | |
| | | measurable losses | The decline in production and an operating profit | 14,906 | |
| | | | Difficulty getting credit/loans from banks | 7,206 | |
| | | Short-term loss | High business production costs | 57,056 | |
| | | Long-term losses | The production of <i>K. pelamis</i> fisheries is not stable | 70,164 | |
| | | | The quality of local fisheries production is unable to compete with global fish production | 10,133 | |
| | | | Limited investment in capture fisheries due to the low quality of <i>K. pelamis</i> fisheries | 34,071 | |
| 4 | NGOs / Experts / Academics | The benefits | Can support local governments to develop <i>K. pelamis</i> fisheries | 22,767 | Data processed (2019) |
| | | The loss | It is difficult to get data on fishery management | 13,115 | |
| 5 | Agency of regional development | The benefits | Able to evaluate the DKP program on skipjack fisheries development plans | 10,809 | |
| | | The loss | Unable to intervene in the implementation of fisheries development programs | 2,702 | |
| 6 | Regional House of Representatives of Jayapura City | The benefits | Legalization of regional regulations regarding fishery management | 18,015 | Bappeda Jayapura City (2017) |
| | | Kerugian | unable to help accelerate the development of <i>K. pelamis</i> fisheries | 1,801 | |
| | | The benefits | | | 40,833,632 |
| | | The cost | | | 28,230,081 |
| | | Difference | | | 12,603,551 |

Policy option 2, actions in the form of making a new regional regulation (PERDA) concerning the blue economy of skipjack fisheries. The management of capture fisheries that have been taking place all this time in Jayapura City shows problems: ecosystem damage, pollution, decreasing fish stocks, and low welfare of fishermen. The various problems above greatly affect the sustainability of skipjack fisheries. Therefore, the urge to make regional regulations on the blue economy is a necessity that can be a solution in solving these problems. Information about Policy Option 2 is presented in Table 2:

Table 2
Policy option 2, making a new regional regulation (PERDA) concerning the blue economy implementing the blue economy of skipjack fisheries in Jayapura City

| No. | Stakeholder | Types of Benefits/Costs | Alternative II (Making regional regulations for new blue economy) | Total economic quantification (US\$) | Source |
|-----|-------------|-------------------------------|--|--------------------------------------|-----------------------|
| 1 | Fisherman | The benefits are immeasurable | Ecosystem and environmental quality increases | 686,748 | Data processed (2019) |
| | | | Increasing awareness of fishing communities to preserve ecosystems and fisheries and environmental resources | 122,813 | Data processed (2019) |
| | | | Reducing fishing conflicts among fishermen | 21,618 | Data processed (2019) |
| | | Measurable | Increase in wages and salaries | 4,496 | Data |

| | | | | | |
|---|--|-------------------------------|--|------------|-------------------------------|
| | | benefits | | | processed (2019) Data |
| | | | The amount of bank credit increased | 21,618 | processed (2019) Data |
| | | | The activity of processing fish waste into food and fish fertilizer adds to income | 394 | processed (2019) Data |
| | | | The number of fish catches increased | 51,754 | processed (2019) Data |
| | | Short-term benefits | The price of fish increased | 3 | processed (2019) Data |
| | | | Assistance in catching fish processing and processing facilities and infrastructure | 85,689 | processed (2019) Data |
| | | Long-term benefits | Fisherman welfare has increased | 8,209 | processed (2019) Data |
| | | | Water and air pollution can be reduced to near zero | 52,870 | processed (2019) Data |
| | | | Fish waste decreases | 80,853 | processed (2019) Data |
| | | | Water quality is increasing | 61,406 | processed (2019) Data |
| | | The loss is immeasurable | Difficulties in operating new fishing gear | 1,080 | processed (2019) Data |
| | | measurable losses | Difficulty in getting type B-20 fuel oil | 4 | processed (2019) Data |
| | | Short-term loss | Difficulties in obtaining solar cell engine | 43,309 | processed (2019) Data |
| | | Long-term losses | Certainty to work highly depends on the merger of several business units to run a pole and line capture fishery business | 15,132 | processed (2019) Data |
| 2 | Department of Marine and Fisheries (DKP) | The benefits are immeasurable | Processing of fish waste until it reaches zero | 394 | DKP Jayapura City (2015-2018) |
| | | Measurable benefits | Increasing the amount of retribution from skipjack fishery business | 16,979 | DKP Jayapura City (2015-2018) |
| | | Short-term benefits | The use/exploitation of fish is increasingly efficient and sustainable | 100,749 | DKP Jayapura City (2015-2018) |
| | | Long-term benefits | Skipjack fish stocks have increased | 70,693,593 | DKP Jayapura City (2015-2018) |
| | | | Gross Domestic Regional Product is increasing | 72,061,684 | DKP Jayapura City (2015-2018) |
| | | | Time management of skipjack tuna is sustainable | 4,925,406 | DKP Jayapura City (2015-2018) |
| | | The loss is immeasurable | Ecosystem damage and low environment | 459,429 | DKP Jayapura City (2015-2018) |

| | | | | |
|---|-------------------------------|--|---------|-------------------------------|
| | | Difficulties in getting human resources who understand the blue economy | 1,080 | DKP Jayapura City (2015-2018) |
| | measurable losses | Costs of socialization about the blue economy to all stakeholders of capture fisheries in Jayapura City | 16,213 | DKP Jayapura City (2015-2018) |
| | | The costs of surveillance operations are decreasing and with very efficient and effective results | 7,445 | DKP Jayapura City (2015-2018) |
| | | The high cost of training borne by the government to understand new fishing technologies for internal human resources, entrepreneurs, local fishermen and NGOs/academics | 14,412 | DKP Jayapura City (2015-2018) |
| | | The number of fish catches increases and can meet local consumption | 51,754 | DKP Jayapura City (2015-2018) |
| | | Efforts to supply B-20 fuel oil continuously and closely at fish landed base (PPI) Hamadi | 43,237 | DKP Jayapura City (2015-2018) |
| | Short-term loss | Capital difficulties for replacing equipment and fishing equipment based on the blue economy | 57,056 | DKP Jayapura City (2015-2018) |
| | | Increasing the amount of retribution of skipjack fishing business | 16,979 | DKP Jayapura City (2015-2018) |
| | Long-term losses | Difficulties in providing operational costs for the technical team implementing the blue economy | 12,250 | DKP Jayapura City (2015-2018) |
| 3 | Private / Fishery businessman | The benefits are immeasurable | 15,165 | Data processed (2019) |
| | Measurable benefits | Increasing the number of fish caught | 71,963 | Data processed (2019) |
| | | Optimal business production | 89,954 | Data processed (2019) |
| | Short-term benefits | Increase in business revenue | 32,777 | Data processed (2019) |
| | | Increase in operating profit | 18,633 | Data processed (2019) |
| | | Low business production costs | 22,822 | Data processed (2019) |
| | Long-term benefits | The quality of local fisheries production has the competitiveness and can compete with global fish production | 28,464 | Data processed (2019) |
| | | Operational sustainability continues with the support of increased fish stocks | 70,693 | Data processed (2019) |
| | | The company's operating costs decreased | 28,528 | Data processed (2019) |
| | The loss is immeasurable | The availability of human resources who understand and operate new fishing equipment based on the blue economy is limited | 380,485 | Data processed (2019) |
| | measurable losses | Difficulties in obtaining a loan from the Bank | 36,030 | Data processed |

| | | | | | (2019) |
|--------------|--|------------------|---|-------------|------------------------------|
| | | Short-term loss | Difficulties in obtaining sustainable type B-20 fuels | 50,846 | Data processed (2019) |
| | | Long-term losses | The high investment costs for purchasing a large ship complete with main engines, additives, navigation equipment, fishing gear and others based on the blue economy | 79,845 | Data processed (2019) |
| 4 | NGOs / Experts/ Academics | The benefits | Can help the government to train human resources and technical teams about the blue economy | 10,448 | Data processed (2019) |
| | | The loss | Budget limitations provided by local governments to develop blue economy-based capture technology | 18,015 | |
| 5 | Agency for Regional Development | The benefits | Can evaluate the DKP program on the development plan of <i>K. pelamis</i> fisheries based on the blue economy | 10,809 | Bappeda Jayapura City (2017) |
| | | The loss | Real support from the government to research the application of the blue economy and to create technological innovations for fishing based on the blue economy | 2,702 | |
| 6 | Regional House of Representatives of Jayapura City | The benefits | The legislative function can be accelerated, to support the implementation of the blue economy | 18,015 | Data processed (2019) |
| | | The loss | Cannot intervene further about the implementation of the blue economy until the evaluation and effectiveness and efficiency of the implementation of the blue economy program | 1,801 | Data processed (2019) |
| The benefits | | | | 149,415,561 | |
| The cost | | | | 1,309,116 | |
| Difference | | | | 148,106,444 | |

The table above explains that the application of the blue economy in skipjack fisheries provides enormous benefits for economic development and can improve the welfare of fishing communities. The biggest benefit value is an increase in the stock of skipjack fish which is significant in the long term, the value is USD 70,693,593 and an increase in the amount of Gross Regional Domestic Product (GRDP) by \pm 45%, namely USD 72,061,684. The increase in value is caused using environmentally friendly fishing gear, which is a more efficient fishing gear (pole and line), using fuel oil of type B-20 (bio solar), as well as machines using solar cells, thereby reducing the amount of waste and pollution.

Comparison between benefits and costs for the second option, namely the value of benefits amounting to USD 149,415,561, while the total cost is of USD 1,309,116. The value of the first option generates a total benefit of USD 1,480,476,068 while the total cost is USD 801,243,473 and is very feasible to implement. The results of both studies show that *K. pelamis* fisheries in Jayapura City is very feasible to be developed optimally to improve the welfare of fishing communities and support regional economic growth.

The results of the calculation of the selection of policy recommendations using the RIA. The calculation of each aspect in the choice of policy analysis for the first and second options is analyzed based on the sum of the economic value of benefits and costs produced by each option. The two options will be compared between the benefits and the costs generated. Options that generate greater benefits are options that will be chosen in the context of implementing the blue economy of *K. pelamis* fisheries in Jayapura City (Table 3).

Table 3

Calculation of the selection of policy recommendations using RIA (US\$)

| No | Aspect | First option (US\$) | Second option (US\$) | Source |
|----|--------------|---------------------|----------------------|-------------------------------|
| 1 | The benefits | 40,833,632 | 149,397,546 | DKP Jayapura City (2015-2018) |
| 2 | The cost | 28,230,081 | 1,309,116 | DKP Jayapura City (2015-2018) |
| 3 | Difference | 12,603,552 | 148,088,429 | DKP Jayapura City (2015-2018) |

The calculation results in the table above show that the second policy option has the greatest benefit value compared to cost. The Regional Autonomy Implementation Monitoring Committee (KPPOD) study (2013) chose the third option because the measurable benefits of fishery sales received by fishermen in East Belitung province in Indonesia were greater than the costs incurred. The meaning of the two studies shows that if the *K. pelamis* fisheries and other capture fisheries businesses are professionally managed and sustainable, it will generate income for the community and economic growth for the region.

Communication (consultation) with stakeholders. The results of communication (consultation) are expected to receive constructive recommendations in the context of improving the quality of local regulations on the blue economy. The results of suggestions from various relevant stakeholders such as:

- 1) The blue economy can preserve the ecosystem and capture fisheries resources.
- 2) The government is expected to make a pilot project so that it can see the difference in benefits and losses before and after the implementation of the blue economy.
- 3) Providing credit/loans by the government to entrepreneurs for the procurement of new fleets and fishing equipment.
- 4) Providing incentives and subsidies for fisheries businesses that want to try to develop a blue economy.
- 5) The government is building networks and cooperation with banks so that they are willing to finance the implementation of the project.

Determination of the best option (alternative policy). The analysis shows that the best option chosen is the second option, namely the preparation of regional regulations concerning the blue economy of skipjack fisheries. For the Regional Regulation to run well, it is necessary to establish a special agency or work group tasked with handling and running the program, as well as giving consideration and reviewing various policy options. Before the choice is finalized, it is necessary to conduct public consultations with various relevant fisheries actors in Jayapura City.

For the implementation of the blue economy program of skipjack fisheries to run well and smoothly, the fishing groups, fisheries entrepreneurs, and industries that are interested, it is necessary to be given incentives and subsidies. The results of interviews with fisheries stakeholders, they are very enthusiastic and want to try to implement the blue economy. Several benefits and costs arising from the second choice that will result from the approach:

- 1) The legal basis in the form of regional regulations on the blue economy is very precise and relevant to the basic principles of national regulation (Law).
- 2) The increasing desire of fisheries businesses to immediately apply the concept of the blue economy.
- 3) The creation of excellent fishery management standards in Jayapura City.

- 4) The increasing level of sustainability of fisheries and ecosystem resources is getting better.
- 5) Increasing the number of fish caught by fishermen.
- 6) The realization of regional development in the environmental field.
- 7) The creation of a good and sustainable ecosystem.
- 8) Long-term reduction in production costs.
- 9) Reducing air and water pollution and various other benefits.

The results of the comparison between options produce several important things, namely: the first option does not do anything that means fishing activities remain in conventional and unsustainable conditions, thus it does not produce any benefits because the local government does not yet have an interest in implementing the technology. The second option is to develop a regional regulation on the blue economy. The advantages of implementing the blue economy are business efficiency and increasing the number of fish caught, improving the quality of the ecosystem, increasing fish stocks, community welfare, and economic growth in the city of Jayapura. The value of the benefits is greater than the costs incurred from applying the concept of the blue economy.

The strategy of implementing the blue economic policy of skipjack fisheries in Jayapura City. The successful implementation of the blue economy of skipjack fisheries in Jayapura City lies in the implementation strategy developed at this stage. The following will explain the implementation strategy, i.e.:

- 1) Replacement of purse seine and troll fishing gear with special pole and line fishing gear for catching tuna and is more efficient in its operation. The strategy is carried out by conducting socialization for fishermen and fisheries entrepreneurs, so they want to switch to using other fishing gear. The method of procuring fishing gear can be through the assistance of regional governments, or cooperation between the government and fishery entrepreneurs, as well as government cooperation with national banking.
- 2) Replacement of shipbuilding materials from wood to fiberglass or made from fibers that are more environmentally friendly.
- 3) Conversion of fossil fuels (B₀) into fuel oil B₂₀ (vegetable) which is more environmentally friendly. The implementation strategy is cooperation by DKP of Jayapura City and PT. Pertamina in the Papua Regional Region in Jayapura City for the problem of supplying fuel oil to the depot located at fish landing base (PPI) Hamadi.
- 4) The use of environmentally friendly energy (solar cells) to replace the use of conventional electricity and kerosene.
- 5) Making a new regional regulation (PERDA) concerning the blue economy to replace PERDA of Jayapura City Number 1 of 2008 concerning Fishery Business Permits.

Conclusions. The results of the analysis of the regulated impact assessment (RIA) show that alternative policies of *K. pelamis* fisheries based on the selected blue economy are the second option, namely the making of a new regional regulation (PERDA) on the blue economy of skipjack fisheries because it provides benefits of USD 149,397,546 greater than the costs borne by amounting to USD 1,309,116.

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