

CAPTURE OF SEA FISH LIFE IN APPLICATION MARITIME BLUE ECONOMY IN INDONESIA

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Abstract. With the development of information and civilization of human life, it is also necessary to pay attention to the consumption of food, one of which is food that does not use preservatives. At this time, foods that do not use preservatives are difficult to find, such as the need for fish in living conditions for consumption purposes. Due to public awareness of this problem, the need for fish in living conditions for consumption is increasing. So as to result in increased consumer demand for live marine fish for fishermen. Of course this is a good opportunity for fishing communities in Indonesia to improve their welfare. To meet the demand for live marine fish by consumers, the fishing community must make efforts innovate so that fish caught by fishermen can survive during sailing in the open sea. One of the innovation efforts is to circulate water and oxygen in the hold space where the fish caught is collected. The principle of the innovation of water and oxygen circulation in this hold space is to work in accordance with what nature provides efficiently and does not reduce but actually enrich nature, productive, environmentally friendly, and in accordance with the concept of Blue Economy.

Keywords: live marine fish, demand for fish, circulation of water and oxygen.

1. Introduction

Indonesia as the largest maritime and archipelagic country in the world has a very large and diverse potential for marine and fisheries economic development. With Indonesia's geographical conditions that are dominated by the oceans, it becomes a great potential for Indonesia to implement the blue economy concept, because Indonesia is a country with 3/4 the sea. According to Nurhayati (2013) the Blue Economy is a new concept of maritime and fisheries development that will be directed towards balanced economic development between the utilization of marine resources and optimal environmental management efforts.

Consumer demand for live marine fish continues to increase, because of the significant awareness of marine fish enthusiasts to avoid the consumption of foods containing preservatives. This causes them to shift their choices in consuming sea fish with fish that are living conditions rather than dead conditions. At least 30 trucks of live fish gurame enter the Jakarta area, with the capacity of each truck containing no less than 7.5 quintals of live fish gurame. That is, in one day there are 22.5 tons of live fish gurame that enter the Jakarta market. For this reason, it is a good opportunity for fishermen in Indonesia to improve their welfare. Because the price of marine fish lives is much higher than the price of dead sea fish. Due to the many demands of

marine live fish conditions this makes the develop of cafes / restaurants that serve fast food sea fish which are really fresh fish. [13]

To meet the needs of consumers for the demand for live marine fish there needs to be an effort that must be done by fishermen so that fish caught by fishermen during sailing in the sea a few weeks can survive. Of course this is related to the concept of the Blue Economy which combines economic development and environmental conservation. The Blue Economy concept exemplifies the way nature works (ecosystems), works in accordance with what nature and nature provide efficiently and does not reduce but actually enrich nature (*shifting from scarcity to abundance*), waste from one to food / energy source for another. [7]

2. Literature Review

Research by Soccol and Oetterer (2003) and Susanto and Fahmi (2012) states that fish are rich in nutrients such as proteins, minerals and fats, as well as the largest producer of omega 3 fatty acids (PUFA), especially beneficial eicosapentaenoic (EPA) and docosahexaenoic (DHA) for health. Based on the nutritional content and benefits of fish, efforts to increase fish consumption become important things to continue to be carried out continuously. Sokib, Palupi, and Suharjo (2012) state that Indonesia is very likely to

make fish as a major protein source as an effort to improve community nutrition. This is because Indonesia has abundant fish potential, both from catches and from aquaculture. [4]

In Indonesia, the total growth of fisheries production in the 2002-2009 period continued to increase, from 5.5 million tons in 2005 to 9.5 million tons in 2009. In the period 2002-2005 the growth was around 6% per year, but the period 2005-2009 reached around 10% per year. Sea fisheries and public waters tend to be stable. The production of fish caught in the sea this sector is the largest contributor to Indonesian fisheries production in the last 10 years, reaching 75.89% of the total production, far above the contribution of public waters (7.36%) and cultivation (16.75%) per year. This trend illustrates that the supply of fish that can be allocated to meet domestic consumption needs (in addition to export needs) is available in considerable quantities.

When compared to the distribution of fish potential, there is a general difference between Western and Eastern Indonesia. In western Indonesia with an average depth of 75 meters, the type of fish that is mostly found is small pelagic fish. A somewhat different condition is found in the eastern part of Indonesia where the depth of the sea reaches 4,000 m. In Eastern Indonesia, there are many large pelagic fish such as tuna and cakalang. In addition to depth, water temperature is also one of the factors that influence the spread of fish vertically. Temperatures at each depth strata also affect the abundance of tuna in a waters [1, 3, 11]

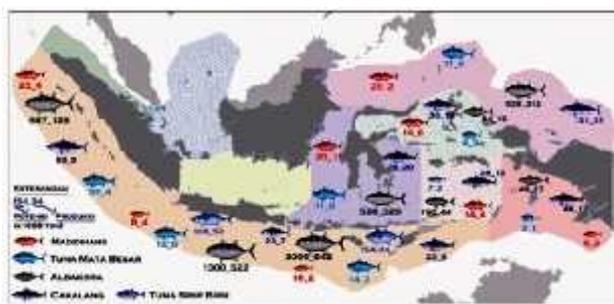


Fig. 1 Fish Distribution Map in Indonesia

Source : <https://www.potensi-dan-persebaran-sumber-daya-laut/173>

Based on Susenas data in 2008, it can be said that most of Indonesia's population in various regions consume more fresh fish than preserved fish or shrimp.

Considering the large enough live fish needs of the community, this is a promising opportunity for fishermen to improve their welfare by making innovations in fishing so that fish can survive until to consumers. There needs to be an innovative effort to keep catch fish alive while sailing on the high seas. Traditional ways that fishermen still do are:

1. Giving ice shards to fish caught.

2. Giving ice fractions mixed with salt to the fish caught. There needs to be a new method with the aim that fish from the catch of fishermen will survive. Examples of business implementation in the maritime industry sector with the Blue Economy model are: the use of various materials / materials and components of ships that are environmentally friendly.[7]

3. Results and Discussion

3.1 Fresh / Life Fish Needs.

In general, the direction of the economic development strategy of the Fisheries Sector is to develop an optimal, sustainable, value-added, and competitive fisheries sector which in this discussion is about live fish / fresh fish. According to Adawyah (2007), fresh fish are fish that have the same characteristics as live fish, both in appearance, smell, taste and texture. In other words, fresh fish is :

- 1) Fish that have just been captured and have not undergone a preservation process or further processing.
- 2) Fish that have not experienced physical or chemical changes or who still have the same properties when captured.

Fresh fish can be obtained through good handling and sanitation, the longer the fish is left after being caught without good handling, it will accelerate the decline in fish freshness.

When viewed based on rural-urban areas, it can be seen that households in the city have a higher preference for consumption of fresh fish and fresh shrimp / aquatic animals than households in the village. On the contrary, the preference of the people in the village is higher for consumption of preserved fish than the people in the city. When viewed based on the expenditure value, the total expenditure allocated for food consumption is almost the same as that allocated for non-food consumption, which is around 50% Table 1.

| Kategori Pengeluaran / Expenditure category | Pengeluaran (Rp/kap/bulan) / Expenditure (IDR/cap/mo) | Kontribusi / Contribution (%) |
|--|---|-------------------------------|
| Total / Total | 486 370 | 100 |
| Pengeluaran Pangan / Food Expenditure | 193 838 | 50.17 |
| Pengeluaran Nonpangan / Non-food Expenditure | 192 542 | 49.83 |
| Ikut terhadap Total Pengeluaran Pangan / Fish to the Total Food Expenditure | 53 315 | 7.90 |
| Jenis Ikan terhadap Total Pengeluaran Ikan / Various of Fish to the Total Fish Expenditure | | |
| Tongkol/Tuna/Cakalang / scamberidges | 1396 | 8.85 |
| Selar / Garana | 444 | 2.90 |
| Kembung / Mackeral | 1104 | 7.21 |
| Banding / Milkfish | 820 | 5.35 |
| Mujur / Tilapia | 780 | 5.09 |
| Mas / Carp | 572 | 3.78 |
| Lala / Conch | 496 | 3.24 |
| Udang / Shrimp | 768 | 5.01 |

Table 1

Source: SUSENAS 2008 processed

Of the allocation of food expenditure, around 8% is allocated for fish consumption. The largest average share of expenditure is for fish (fresh and preserved). Especially for fresh fish, the highest share of Indonesia's population expenditure is used for consumption of tuna / skipjack fish and mackerel (from the sea). In the group of preserved fish the opposite occurs, the greater the class of expenditure the lower the share of expenditure. The figure also indicates that the Engel curve which shows the relationship between household expenditure and consumption level of fresh fish, fresh shrimp, preserved fish and shrimp is not linear.

While the need for fish for consumption in Indonesia each year increases as in table 2.[1,7, 8]



Table 2
Source: Susenas-BPS is processed by the Directorate General of PDS-KKP

This is a very good opportunity to meet the needs of fish, especially fresh fish / live fish.

3.2 Improving Fishermen's Welfare

The impact of the many demands of marine fish living conditions makes the mushrooming restaurant business serving fast food fish that are really fresh fish. Especially from fish types of mud grouper, tiger grouper, grouper stone, grouper god, red grouper and grouper rat in living conditions the local price in 2012 has reached around Rp. 80,000 to Rp. 420,000 per kg. In addition to grouper fish, Baronang and Kakap fish also become a market for consumer demand that is not small. From the high demand for live fish in the community for restaurant and café businesses and the increase in fish consumption in the community every year results in high selling prices for live fish, this is a special advantage especially for fishermen and generally for restaurant and cafe entrepreneurs. Marine & Fisheries Investment Data for 2017 by Province of Destination (Rp. Billion) [2,8]

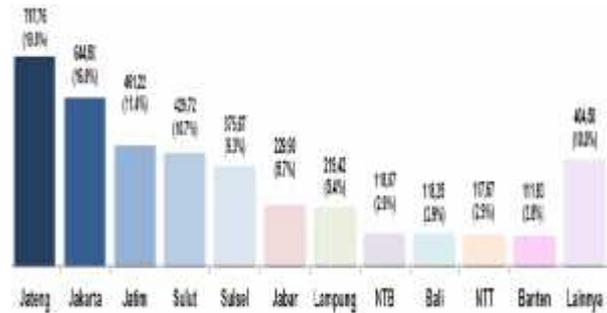


Table 3
Source: BKPM and OJK, processed by the Directorate General of PDS-KKP (until TW 3 of 2017)

3.3 Sea Fish Processing Methods Catching Results

Fish is a commodity that is very easily damaged, relatively faster than other animal products. Therefore, the steps of handling on the ship as soon as the fish is caught, have a huge effect on the process of metabolic damage in the body of the fish in the subsequent handling period. (Dr. Ir. Made Astawan, M.S.). Fish quality can be affected mainly by procedures for handling, processing and storing from catches to consumers. Retention time and post-harvest fish storage temperature are key factors for maintain the final quality of this product. This paper proposes an image processing method fully automatic, efficient and non-destructive for network segmentation and prediction freshness of fish samples [5]

In live sea fish transport, it usually takes a long time, from the time of catching up to the destination. Caught fish are usually not carried out fasting, so there that need for water circulation. With this circulation of water, to avoid accumulating ammonia as a result of metabolism (feces) of fish, because of this circulation the ammonia substance will be transported out of the reservoir. Ammonia occurs because it is produced from digestive and metabolic waste, this substance is toxic if the level in the water reaches 0.6 mg / l, the higher the concentration in the water causes ammonia in the blood of the fish to increase making an increase in high blood pH, thus influencing enzyme chain reactions in the metabolic process of fish. The purpose of the fish is made fasting and the circulation of water is to reduce ammonia expenditure and reduce the level of pollutants in the water that occur. According to Effendi (2003), the source of oxygen dissolved in water is the absorption of oxygen from the air, through contact between the surface and air, and from the photosynthesis process. Water organisms will live well if the dissolved oxygen value is greater than 5.0 - 8.0 mg / l of water. [10,12]

In sea transportation generally requires a relatively long time. Fish that are transported generally without fasting, thus that plays a role for fish survival is the circulation of water which is a very vital thing to supply

new water and transport out metabolic waste (dirt) during the trip. In addition, the supply of oxygen is very important to eliminate ammonia buildup, where ammonia (NH₃) is toxic and endangers the survival of fish, even though each type of fish has different resistance. Therefore the element of ammonia content is immediately possible to be removed by the circulation of water, so that new water changes occur. Solubility of gases in seawater is a function of temperature, the lower the water temperature, the greater the level of solubility. In waters that have a low water temperature will have a greater dissolved oxygen content. [6, 9]

The capture and transportation of live marine fishes is the development of changes in shipload, which was originally used to capture and transport fish in dead condition, make the ship catch fish dead conditions and transport fish in living conditions , which is expected to make the fishermen's income higher and can increase the value of business results. [2]

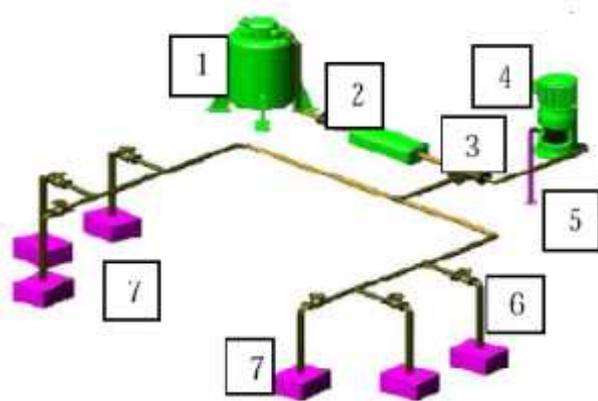


Fig. 2. Water Circulation Installation and Oxygen Suppliers
Source : [2]

In this figure, it describes the cycle shape of the circulating flow of water mixed with air in the storage space of the caught fish. This water and air cycle replaces the old system that uses pieces of ice mixed with salt to keep the caught fish, so that with this cycle fish are expected to survive.

Information:

1. Bottle O₂.
2. Regulating valve O₂.
3. Mixing valve.
4. Water pump.
5. Inlet
6. Valve
7. Outlet

From this discussion an analysis can be taken that the use of water circulation systems on fishing vessels in an effort to keep fish alive less efficiently. On the one hand, it is a simple system and can keep caught fish alive but requires complicated operation. Because in addition to

needing enough space, it also reduces the capacity of the collection of caught fish and also the less practical operating system. Then there needs to be a new idea that is more practical and efficient. For example, the manufacture of electronic devices that can kill bacteria so that fish caught can survive long ,or the addition of additives that can maintain dissolved oxygen levels from 5.0 to 8.0 mg / l of water, so that caught sea fish can survive.

4 Conclusion

Based on data from BKPM and OJK, it can be concluded that most of Indonesia's population in various regions consume more fresh fish than preserved fish or shrimp. With the increasing consumption of fresh fish in various regions, it can increase the value of business results for fishermen in particular and restaurant businesses in general.

Traditional methods of cooling with cheaper ice, more capacity of fish caught in the condition of dead sea fish than methods of circulating water and oxygen for the capture of live marine fish.

The use of water and oxygen circulation methods optimizes and strengthens the capture fisheries industry which is efficient, productive, environmentally friendly, and in accordance with the Blue Economic concept that combines economic development and environmental preservation that works in accordance with what nature provides.

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