

Fish Logistic System Using Value and Cold Chain Approaches

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ABSTRACT

The purpose of this study was to solve the poverty issues prevalent in local fishers' households in the Biak Archipelago, Indonesia. The Value and Cold Chain approaches were used to determine the Government's mandate through Regulation of the Minister of Marine Affairs and Fisheries Number 5 of 2014 on the National Fish Logistics System. This regulation is supported by Presidential Instruction Number 7 of 2016 on accelerating the development of the fishing industry, though limited to socialization in the Biak Islands. The Case study research approach and normative analysis were tested using Porter's theory of value chains. The results showed that the logistics system in the upstream and downstream flow of goods and information was not implemented. Furthermore, the Government focused on appointing third parties to operationalize the Cold Chain and the low competence of human resources to organize and manage the fisheries sector.

ABSTRAK

Tujuan dari penelitian ini adalah untuk memecahkan masalah kemiskinan yang lazim terjadi pada rumah tangga nelayan lokal di Kepulauan Biak, Indonesia. The Value and Cold Chain approaches digunakan untuk menentukan amanat Pemerintah melalui Peraturan Menteri Kelautan dan Perikanan Nomor 5 Tahun 2014 tentang Sistem Logistik Perikanan Nasional. Perpres ini didukung dengan Instruksi Presiden Nomor 7 Tahun 2016 tentang percepatan pengembangan industri perikanan, meski sebatas sosialisasi di Kepulauan Biak. Pendekatan penelitian studi kasus dan analisis normatif, diuji menggunakan teori rantai nilai Porter. Hasil penelitian menunjukkan bahwa sistem logistik di arus barang dan informasi hulu dan hilir tidak diterapkan. Selanjutnya, Pemerintah fokus pada penunjukan pihak ketiga untuk mengoperasikan Cold Chain dan rendahnya kompetensi sumber daya manusia untuk mengatur dan mengelola sektor perikanan.

1. INTRODUCTION

The *Value Chain* and *Cold Chain* relate to the many local fishers' households in the Biak Islands living in poverty. In this regard, Indonesia's Government decided to build a logistics system that integrates producers and consumers. The management of marine resources potential in the Biak Archipelago is not optimal because it is controlled by capital owners while residents only catch fish for consumption.

Geographical problems with the underdeveloped or mismanaged logistics systems integrated upstream and downstream have increased the prices of some necessities. These necessities have great potential to improve people's welfare because of the high market demand in several countries while the systems' local management is poor. Therefore, the Government issued policy number 5 of 2014 ([Minister of Maritime Affairs and Fisheries of the Republic of Indonesia, 2014](#)) concerning the national fish logistics system to solve the problem of costly upstream and downstream fish management.

The two main elements in the logistics system are the flow of goods and information. Furthermore, Setijadi's opinion stated that the logistics system consists of several main subsystems, including inventory, warehousing, transportation, and information. They form a logistics system that needs efficient and effective management for an economical flow of goods and information ([Yolanda, 2019](#)).

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Porter's value chain approach determines the extent to which these economic activities are performed by various interrelated and coordinated business actors, not only one business actor (value chain operator). Therefore, the value chain involves relationships and coordination of business actors, including suppliers of raw materials, primary producers, processing industries, distributors, or traders, as shown by Porter (1985).

The low productivity of marine fisheries has made the government take part in the logistics system's value chain by issuing Presidential Instruction Number 7 of 2016 (Government of the Republic of Indonesia, 2016). The Instruction concerns accelerating the development of the fishing industry to improve the fishers' welfare. This is accomplished by improving processing, marketing, and employment, increasing foreign exchange from the marine fisheries sector.

The worldwide problem of poverty, including in Indonesia, has made several countries schedule poverty reduction as one of the *Sustainable Development Goals* (SDGs), especially in the zero poverty goal. Poverty alleviation is a national agenda in every work plan and government policy in most development planning documents. The national statistics showed that poverty was reduced by 9.66% in September 2018. However, in Papua Province in eastern Indonesia, the poverty rate is high at 27.74%. Therefore, it is necessary to analyze the logistics system to reduce poverty in traditional fishing households in the Biak Archipelago.

Several aspects that surfaced include isolation (topographical conditions), vulnerability (difficulty in accessing basic services), and powerlessness (economic conditions and employment). Other aspects were physical weakness (low quality of human resources), material poverty (low investment inflows), and disaster. Papua Province has a high poverty rate, especially in the Biak archipelago, making its accessibility difficult due to a poor logistics system.

2. METHODS

This research used the case study and normative approaches that combine qualitative methods through several phases. A qualitative approach is used to examine various trends, predict the impact of events, and estimate potential problems to help consider alternative plans.

The qualitative approach is a research and forecasting process based on a methodology that investigates a social phenomenon and human problem. The FGD (*Focus Group Discussion*) methods applied in the qualitative approach to obtain more in-depth information on the relationship between variables. This method stimulates new ideas and concepts based on findings from the qualitative model. Furthermore, FGDs interpret the evaluation results better and examine the behavior and desires of the people being assessed. They were conducted non-strictly and formally to obtain more comprehensive, in-depth, and open information.

3. RESULTS AND DISCUSSIONS

Institutional Management

The field scan results showed that the coastal management of the Biak Archipelago in Indonesia is still weak. This is due to the low collaborative, participatory planning that started from the Biak Customary Furnace used as a seafaring ancestor. Therefore, an institutional analysis was used to diagnose the coastal community institutional problems understood by traditional fishers in the Biak Archipelago.

The field scan found that the main problem was the fishers' low purchasing power due to inaccessibility to information provided by the Regional Government. Moreover, stakeholders in the coastal community development run independently or not coordinated between technical agencies. Therefore, coastal management development requires the support of all parties committed to improving the community's economy. Also, it requires a partnership between the local government, private sector, fishers, non-governmental organizations, and higher education communities.

The Value Chain Approach

The observations of the fishing community in the Indonesian Biak Archipelago showed that collector traders buy the fishers' catch from boat landing sites and sell them to retailers. They play a role in collecting fish and distributing them to advanced traders. Furthermore, field observations female fishers (fishers' wives) collect the catch at the boat landing site and sell to diluent collectors at the district level that sells to wholesalers at the Fish Market.

Diluent traders are actors in the trading system that deal directly with consumers. The key informants in this research were diluent traders, comprising non-local collectors that buy fish at the landing site. There are two forms of trading system, where the first one is conducted by women fishers by collecting

catches to be sold to retailers. The second trading system is conducted by retailers that sell the purchases from the first collectors to wholesalers in the Main Market.

The flow pattern of fresh fish in the Biak Islands consists of fishers, collectors, and traders. The distribution chain in Figure 2 shows that fishers sell their catch directly at the boat landing site to local buyers or collectors (fishers' wives), buyers in the local market. Alternatively, they sell to retailers or collectors that then sell to local consumers. Moreover, the field observations show that the main players selling fresh fish in the Biak Islands are female fishers as local collectors. They sort the catch at the boat landing site and sell it to local markets, retailers, or from house to house.

The Cold Chain Approach

The field scans showed that several sea fish landing points conducted by traditional fishers are centered on several agreements. The landing points are places of movement of goods from fishers as producers to the intermediate district or village collectors. However, district collectors have not provided a positive value because there are no supporting facilities, such as shelters and transportation equipment for fishers to maintain the quality of the catch.

Cold Chain Analysis showed that fish was not the main requirement for fishers in maintaining catch quality. This is due to limited resources that reduced the catch quality and selling price, as theoretically presented by experts that previously wrote about *Cold Chain*. For instance, [Lestari \(2019\)](#) examined the role of logistics services in the fisheries sector. The research found complexities between the production's distribution and consumption in the macro Indonesian marine and fisheries sector. Furthermore, there are *Illegal, Unreported, and Unregulated Fishing activities* coupled with small fishing vessels. The research also found limited facilities and infrastructure and an upstream-downstream production system that has not been integrated.

[Lestari \(2019\)](#) examined the macro data on Indonesian capture fisheries and found that perishable fish commodities result in around 35% losses or wastage. This implies about 10% damage in the distribution process contributed. Moreover, most fishers' ability still needs improvement because they cannot keep the fish in good condition. The delivery facilities and infrastructure in several areas are also constrained.

Based on the Regulation of the [Minister of Maritime Affairs and Fisheries \(2014\)](#), Number 5 of 2014 concerning the National Fish Logistics System, Article 1 point 4 explain that the National Fish Logistics System (SLIN) is a supply chain management system for fish and fishery products, materials, and production equipment. Also, SLIN provides information on procurement, storage, and distribution. It is an integral part of policies to increase capacity, stabilize upstream-downstream fisheries production systems, and control price disparities to meet domestic consumption needs.

There are complexities in marine and fisheries issues in production distribution and consumption, and *Illegal Unreported and Unregulated Fishing activities*. Therefore, the Government issued the Minister of Maritime Affairs and Fisheries Regulation, Number 5 of 2014 ([Minister of Maritime Affairs and Fisheries of the Republic of Indonesia, 2014](#)), concerning the National Fish Logistics System with the various objectives. The first objective was to increase the capacity and stabilization of the national fishery production and marketing system. The second objective is strengthening and expanding connectivity between upstream and downstream production and marketing efficiently. The third objective was improving the efficiency of fish supply chain management, production materials, tools, and information from upstream to downstream.

The Government has appointed the logistics expert members of the *Indonesian Supply Chain (SCI)* to ensure the mandate of Permen-KP/5/2014 runs optimally at the upstream-downstream fisheries production stakeholder level.

This research focuses on the recommendations by Indonesian logistics experts to describe the various complexities of marine fisheries production conducted by traditional fishers. Field scans showed that fishing is performed traditionally with limited catches for local consumption. This is because the Regional Government has not fully implemented the upstream-downstream logistics system. Furthermore, local communities, such as the Bosnik market and people from several villages in the East Biak region of Indonesia, need good infrastructure for landing.

Potential Risks

The analysis is used to determine the potential risks faced by fish value chain actors. The most probable risks traditional fishers face in the value chain are limited fishing gear, labor, and selling prices.

This analysis only focuses on several risk agents in the fish value chain with various occurrence levels that result in significant losses. For instance, risk agents such as climate change and erratic weather

cause decreased catches. Field scans showed several points that produce risk, necessitating the following priority steps:

- a. Low Level of Progress (HR) causes risks such as low catch quality, limited fishing gear, remote market, and operating traditional boats.
- b. Lack of capital causes less catch, low fish quality, labor shortages, traditional fishing gear, and limited storage area.
- c. Long shipping distance causes fewer catches when the weather change and makes shipments to market to be late.

Fish Logistics System in the Biak Islands Indonesia

Based on the distance between the boats' landing area and the fish auction place, the Regional Government should build a distribution system "*Hub-and-Spoke*." The 1970-1980 distribution began using the "*Hub-and-Spoke*" system developed focusing on the origin and destination of goods. In this case, goods delivery is conducted using a point as a hub, enhancing efficiency. Additionally, there is an improvement in the use of the fleet on long-distance routes. The selection of fleet capacity on a route is also adjustable according to its volume.

The Regional Government should maximally support the improvement of the community's economy to unravel the problem of the upstream-downstream distribution system. This is because the marine fisheries sector is the main potential based on local community values. Also, based on regional developments, coastal governance has not sufficiently increased the community's welfare, especially fishing families.

The Government has resolved welfare problems by issuing many policies, including improving basic infrastructure and building land, sea, and air connectivity. This aims to integrate Indonesia's logistics system from west to east to harmonize prices for basic commodities. Additionally, the manufacturers, distributors, and retailers in the logistics chain would receive fair economic benefits.

One of the five priority government programs is Human Resources, which encourages the improvement of community welfare. Therefore, the human resources needed should create and manage the upstream-downstream value chain correctly. A well-managed upstream-downstream logistics system would significantly contribute to the competitiveness of marine fishery production on the Biak Archipelago coast, as well as within and outside Papua, Indonesia.

The opinion of the *Chairman of Supply Chain Indonesia* (SCI) Setijadi published in *Republica* highlighted the inadequacy of human resources in Indonesia's logistics management. According to *Logistics Performance Index* (LPI) and World Bank 2018, the quality and competence of Indonesia's logistics rank 44th. World Bank publications in the *Logistics Performance Index* (LPI) show Indonesia's ranking above the Philippines (69th), Brunei Darussalam (77th), Laos (83rd), Cambodia (111th), and Myanmar (128). However, it is still below Singapore (3rd), Thailand (32), Vietnam (33), and Malaysia (36). Setijadi stated that Human Resources in various ministries or institutions need to master logistics competence. For instance, understanding the supply chain is important in policy-making for the management of basic and essential goods and increasing exports. The *Chairman of Supply Chain Indonesia* (SCI) Setijadi stated that the Regional Government should optimally prepare resource humans that understand the supply chain. This aims to ensure proper use of the fish storage and refrigerating area (*Cold Storage*) with a capacity of 200 tons built Government at approximately Rp. 19 billion. Consequently, this would improve the welfare of fishers' families and the parties in the supply chain. Initial observations were carried out on the information from fishery extension employees. According to research informants, fish management deviations have not been operated because they wait for invited private parties to cooperate in storage management. This is because the fish storage process operated contradicts the parties' expectations. The capacity of *Cold Storage* that reaches 200 tons is insufficient when compared with the available fishing gear. Therefore, the Regional Government should add a large-capacity fishing fleet to fulfill the 200 tons within five to ten years (Yolanda, 2019).

4. CONCLUSION

Field problem diagnosis showed that the upstream-downstream logistics supply chain phenomenon is not optimal. It is not in line with the National Fish Logistics System (SLIM) towards improving the welfare of fishers' households in the Biak Islands, Indonesia.

Local communities or traditional fishers participate only in socializing the benefits of *Cold Storage*. Although this looks reasonable, it is concerning because local governments are considered weak in supporting traditional fishers. The local governments cannot improve fishing gear and strengthen fishers based on the *hub and spoke* system.

Fish production for *Cold Storage's* 200-ton capacity has not been met due to limited fishing gear. As a result, many local fishers still use makeshift fishing gear in the Biak Archipelago, Indonesia.

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