

# Optimizing capacity, occupancy, and turnover rate of fisheries cold storages in Lampung Province: a needs analysis

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**Abstract.** Efficient supply chain management is essential for maintaining the freshness of fishery products and minimizing spoilage. One of the primary methods for extending fish' shelf life is freezing, which relies on a robust cold chain system, including adequate cold storages facilities. Despite a surplus of fish production in Lampung Province, many cold storages facilities are underutilized, with low occupancy and turnover rates. This indicates inefficiencies in capacity management rather than a lack of total storages capacity. An optimal cold storages system typically maintains an occupancy rate of at least 75% and a turnover rate of at least one cycle volume per month. This study, conducted between November 2023 and January 2024, aims to evaluate the current capacity utilization and workperformance of cold storages facilities in Lampung Province, with the goal of strengthening the overall supply chain for fishery products to ensure better product quality and long-term sustainability for the region's fishery industry. The research involves quantitative analysis of occupancy rates, stock turnover, and interviews with cold storages facility managers to identify key operational challenges. The results show that the average occupancy rate is below the optimal 80%, with stock turnover rates also falling short of expectations. Major contributing factors include inefficient management practices and a lack of coordination within the supply chain. Based on these findings, strategies are proposed to improve the efficiency of cold storages, including enhanced stock distribution methods and the integration of technology into cold chain management.

## 1. Introduction

Cold storages plays a very important role for maintaining the quality of fish and other fishery products, and with a perishable nature from the fish, cold storages is one main method to decelerate the spoilage process caused by microbial and enzyme activities. Research shows the low storages temperature able to reduce deterioration rate of product quality in significant numbers and resulted an extended shelf life [1]. Moreover, a cold storages also reduces microbes growth that can cause damage to fish, as showed by research that low temperature gives inhibition act to the activity of spoilage-causing bacteria like *Shewanella putrefaciens* (known as a specific spoilage-causing organism in marine products) [2]. By controlling the microbial growth, cold storages helps maintain the safety and quality of fishery products. A fishery cold storages or cold storages has a vital role in maintaining the quality of fishery products and increasing added value to Indonesian fishery sector. As a large archipelagic country with lengthy coastline and large fisheries potential, development of cold storages facilities becomes essential to support the sustainability of the fishing industry and improves the welfare state from the fishermen [3]. In Indonesia, one of main challenges for this sector is low price for fish since it

undergoes direct sales without adequate storages processes. Therefore, by cold storages facility implementation, it allows fishermen to store their caught fish in optimal condition since cold storages able to extends fish shelf life and maintains the fish quality. In this way, cold storages facility has strong potential to increase the fishermen's income and encourage a price stability in the market [4].

One concrete example from cold storages application came from Aceh, where this facility was proposed as a solution to maintain fish price and to improve the fishermen's income especially during COVID-19 pandemic that worsened market conditions (Fahlevi *et al.*, 2021). Unfortunately, researches in other areas such as Jakarta showed contrast finding although the cold storages facilities have been built by the government, their use was not optimal. There were several challenges emerged such as less interest from the fishing industry players to utilize the cold storages also some operational constraints that became main obstacles which must be overcome immediately to ensure the successful implementation of this facility [5].

In Lampung, cold storages infrastructure acted as useful facility particularly for the fisheries and agriculture sectors since these commodities are the backbone of the regional economy. Fishery products such as fish and lobster, as well as agricultural products

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like cassava for instance require an efficient cold chain system to reduce post-harvest losses and ensure the food safety. Several studies showed the availability of cold storages facility able to maintain the product quality during storages and distribution period which is important to meet the necessities of domestic and export markets [6].

In Lampung, the current condition of cold storages in fisheries supply chain shows significant opportunity along with challenges to deal with. Cold storages is very important utility to maintain the quality and freshness of fishery products by particular consideration of the perishable nature of fish and other marine products. Unfortunately, the cold storages facilities in Lampung are still limited and there are many small businesses do not have access to technology and infrastructure needed for maintaining the quality of their products [7]. Other challenges also present in Lampung such as limited infrastructure and dependence on the often-unstable electricity supplies that hamper the efficiency of the cold chain system. On the other hand, fishery sector in Lampung is also facing other challenges such as destructive fishing practices and pandemic impact, which has reduced demand for fishery products. Therefore, improving cold storages infrastructure in Lampung is not only important to maintain product quality, but also for increasing the competitiveness power of fishery sector in local and international markets [8].

Development of cold storages system must be integrated with a broader fishery management strategy includes efforts in strengthening supply chain, collaboration between fishing ports, also flexible application of environmentally friendly technology to maintain sustainability cycle. Along with more demand for fishery products in particular for export business, increasing capacity and efficiency of cold storages in Lampung becomes urgent matter since the fishery supply chain in Lampung province has great potential to develop, considering its strategic position and abundant fisheries resources. Nonetheless, these potentials facing number of challenges that not only affect the storages quality but also distribution and overall supply chain efficiency. These challenges also impacted on the quality of fishery products that reached consumers, and the welfare of the business doers including fishermen, distributors and exporters. One main apparent challenge of the fishery supply chain in Lampung is quality of fishery product storages. Fish and other marine products known for their susceptibility to damage especially when these products not handled properly during the storages and distribution process. As supported by research that stated quality management and product safety along the supply chain are crucial elements to maintain product quality to consumers [9]. Failure in defending quality standards can lead to product rejection in the market, especially in export markets where the quality standards set in high level and not only brings negative impact on the reputation of Lampung fishery products, it able to reduce the income of business doers in the supply chain [10].

The second significant challenge is a distribution problem. Inadequate infrastructure (especially in remote areas and islands) extends the delivery time of fishery products. Delays in distribution often cause a decrease in product quality, which further worsens the position of Lampung fishery products in the domestic and international markets [11]. Apart from that, efficiency of fisheries supply chain in Lampung also influenced by the lack of collaboration between business doers and access to market information. In many cases, fishermen and small business doers often do not have direct access to the latest market price information, which results in sub-optimal business decisions that are detrimental to them [12]. This condition further widens the gap between market potential that can be exploited and the actual performance of the fisheries supply chain. Strengthening partnerships between fishermen, fishery product collectors, distributors and the government is urgently needed to ensure better information flow, as well as to increase the competitiveness of Lampung fishery products in the global market.

In dealing with these challenges, a comprehensive approach is needed, including to set up development of supply chain performance measurement model which able to identify areas requiring improvement [13]. Through the measurement tool, business doers in the supply chain able to understand their individual contributions to overall performance and take necessary steps to improve their operational efficiency. It also serves as a guide for policy makers in determining appropriate interventions to strengthen the fisheries supply chain in Lampung.

## 2. Method

This research uses qualitative and quantitative approaches to evaluate capacity and work performance utilization of cold storages facilities in Lampung Province. The research carried out from November 2023 to January 2024 in the following stages:

1. Qualitative Data Collection. Qualitative data is collected to analyse the occupancy rate and circulation of stock (turn over) in cold storages facility. Data collection carried out through
  - Direct observation to storages capacity and stock circulation inside the investigated facilities
  - Historical data recording from facility management documents which include storages volume, monthly occupation rate, also frequency and volume of stock circulation.

The primary and secondary data needed to determine frozen fishery products potential in Lampung are:

1. Total capture fisheries production
2. Total aquaculture production
3. Amount of local fish consumption
4. Total installed capacity of cold storages

5. Amount of frozen fish in the existing cold storages
6. Total volume of fish coming from the cold storages every month

Next, the total fishery production in Lampung Province will be calculated under the following formula:

$$TP = PT + PB$$

Where,

TP = *Total Produksi Perikanan*/Total of Fishery Production  
 PT = *Produksi Perikanan Tangkap*/Captured Fishery Production  
 PB = *Produksi Perikanan Budidaya*/Aquaculture Fishery Production

Then, calculating the fishery production surplus by the following formula:

$$SI = TP - TK$$

Where :

SI = *Surplus Ikan*/ Fish Surplus  
 TP = *Total Produksi*/ Total Production  
 TK = *Total Konsumsi*/ Total Consumption

As referred to (Kumar & Gauraf, 2024; Juhari, 2016) [16], the utility/occupation level of cold storages can be calculated under the following formula:

$$U = \left( \frac{V_{Ter}}{V_{Tot}} \right) \times 100 \%$$

Where

U = *Utulitas Gudang Beku*/ Utility of Cold storages  
 V<sub>ter</sub> = *Volume Gudang Terpakai*/ Volume of Used F.Cold storages  
 V<sub>Tot</sub> = *Volume Total Gudang*/ Total volume of F.Cold storages

Whereas the Turnover Ratio is calculated under the following formula:

$$TO = \frac{T_{out}}{RB}$$

Where

TO = *Turn Over Rasio*/ Turnover Ratio  
 T<sub>out</sub> = *Total barang Keluar bulanan*/Total Monthly of Outgoing Product  
 RB = *Rata-rata Persediaan barang gudang bulanan*/ Average Monthly Inventory of Cold storages Product

For calculating the potentiality of fish product that able to be frozen per year, the following formula is employed:

$$PIB = SI - (KPB \times UB \times 12)$$

Where :

PIB = *Potensi Ikan Beku*/Frozen Fish Potential  
 SP = *Surplus Ikan*/ Fish Surplus  
 KPB = *Kapasitas Gudang Beku*/Capacity of Frozen Cold storages  
 UB = *Utulitas Bulanan Gudang*/Montly Cold storages Utility

## 2. In-depth Interview.

To attain a complete quantitative analysis, in-depth interviews were conducted with the cold storages facility managers aimed to:

- Identify operational challenges faced in capacity management and stock circulation.
- Understand constraints emerge in the supply chain, including coordination issues between the parties involved.

## 3. Data Analysis.

Quantitative data was analyzed by descriptive statistical method to calculate the average value of occupancy rate and stock turnover.

## 3. Result and Discussion

Census result to all managers of cold storages in Lampung province found there are 19 cold storages companies operating in Lampung. Entire companies are privately owned with varying cold storages capacities between 5 and 1,200 tonnes with total capacity from installed cold storages in Lampung province of 6,397 tonnes. These cold storages spreading over across 6 city districts where the highest number of cold storages located in South Lampung district amounted to 12 cold storages. More detailed data of cold storages condition in Lampung is presented in Table 1.

The next step is searching for value/the amount of cold storages usage in Lampung. A survey was carried out on the usage utility of cold storages and from the obtained data, utility data of the cold storages in Lampung province also varies between 5 % to the highest value of 100 % with an average level of utility of 46 %. More detailed data of cold storages utility level in Lampung Province are stated in Table 1.

**Table 1.** Total Capacity and Utility of Cold storages in Lampung Province.

Business Unit	Regency\ City	Capacity (TON)	RIT (Month/ TON)	Utility/Occupation (%)
PT 1	Tulangbawang	1,000	400	40
PT 2	South Lampung	80	50	63
PT 3	South Lampung	800	100	13
PT 4	South Lampung	1,200	250	21
PT 5	Pringsewu	50	40	80
PT 6	South Lampung	1,5	1.5	100
PT 7	South Lampung	800	120	15
PT 8	South Lampung	40	20	50

PT 9	Bandar Lampung City	52	3	6
PT 10	South Lampung	1,200	133	11
PT 11	Bandar Lampung City	65	55	85
PT 12	South Lampung	40	2	5
PT 13	South Lampung	5	1	20
PT 14	Pringsewu	60	60	100
PT 15	Pringsewu	50	40	80
PT 16	South Lampung	15	8	51
PT 17	South Lampung	40	11	28
PT 18	Tulang bawang	500	450	90
PT 19	South Lampung	400	51	13
	Total Amount	6,397	Utility Average	46

Note: RIT: *Rata-rata ikan tersimpan*/Average fish stored

The utility figure of 46 % for the average cold storages number in Lampung has not yet reached an optimum figure since the majority of researches stated the optimum figure for cold storages utility number is 70-85 percent. Moreover, Alhori *et.al* in their analysis at Perum BULOG cold storages found the ideal cold storages utility level ranges from 70% to 85 % to guarantee the optimal operational efficiency [22]. This research also revealed that utility level higher than 85 % can cause difficulties in the management and accessibility of the goods, meanwhile, the utility level below 70 % indicates space existence is not optimally used. Optimizing cold storages utility in higher number above 80 % is an important goal in logistic and supply chain management, since high utility rate not only able to add operational efficiency but also able to contribute significant cost reduction and improvement to customer service sector. Several influential key factors are present in the effort to achieve optimal cold storages utility level as include cold storages layout design, use of automation technology and effective inventory management.

Some reasons why cold storages have low utility include overcapacity. Some cold storage facilities have large capacities but low demand, as seen in South Lampung Regency. Additionally, certain regions face distribution challenges, both locally and nationally, making it difficult to efficiently move products to other areas. Several steps can be taken to address this issue, primarily by enhancing market access, expanding distribution networks to other regions, and establishing partnerships with major distributors to absorb production. Furthermore, product and service diversification can be implemented so that if production

is not fully absorbed by the market, it can be processed into value-added products. Another important measure is to increase operational efficiency and conduct feasibility studies before constructing new cold storage facilities to ensure their viability. Low occupancy or utility level of fisheries cold storages often caused by the available source of fishery products are less or below minimum quota. It can occurs due to many factors including problems in the supply chain, product quality and management of the fisheries resources.

The first reason lies on uncertainty in raw materials supply as one of the main cause of low utility of cold storages. As showed by research of Muninggar *et.al*, 2023 uncertainty in raw material supply can disrupt the production process in the fish processing industry, which in turn causes low value of cold storages utility [23]. If the fish supply is unstable, the cold storages cannot operate at optimal capacity, so storages space is not used efficiently.

The second reason lies on the quality of fishery products, which also influences the cold storages occupancy level. It is evident from research of Wahyu *et.al* that reported the freshness level of fish varies greatly depending on the location and handling method which may influence the decision to store the product in cold storages [24]. If the product quality is low, most likely the product will not be stored for a long period, so it will reduce the cold storages occupancy. Apart from that, there is sub-optimal fisheries resource management factors which also contribute to this problem, as noted by Sary and Salampessy that emphasize on the importance of good processing fishery products to meet the export quality standards, which greatly influences the product availability on the market (Sary & Salampessy, 2019). If the fisheries resource management is not carried out well, catches fish will decrease and leading to low supplies for frozen storages.

Moreover, as stated from research by Ashari *et.al.*, the influential factors of price and market demand for fishery products (such as frozen shrimp) can also influence the product availability on the market [25]. When price of the product is expensive or demand is low, fishermen could be reluctant to fish, which eventually lead to reduced supply, and ultimately brings low utility of stores. In this context, it is important for stakeholders in the fishing industry to pay attention at the supply chain, the product quality and resource management in order to increase the cold storages occupancy. By increasing the availability, stock of high-quality products, cold storages utility level can be upgraded which in turn will support the operational efficiency and profitability of the fishery industry.

The next stage for determining level of effectiveness and efficiency of cold storages in Lampung is managed through calculation of turnover ratio where of the 19 existing cold storages, there were 15 cold storages managers provided monthly distribution volume data so the turnover ratio could be calculated. Turnover ratio value ranges between 0.4 to the highest value of 1 cycle with the average value of 0.81 cycle per month. For the further data regarding cold storages circulation (turn over) in Lampung province, is presented in Table 2.

**Table 2.** Monthly Turnover Number at Cold storages in Lampung Province.

Buss. Unit	Regency/ City	RIT (Month/ TON)	Monthly Volume Distribution	Turn Over /Month
PT 1	South Lampung	100	50	0.50
PT 2	South Lampung	250	100	0.40
PT 3	Pringsewu	40	40	1.00
PT 4	South Lampung	23	17	0.74
PT 5	South Lampung	120	50	0.42
PT 6	South Lampung	20	20	1.00
PT 7	Bandar Lampung City	3	3	1.00
PT 8	South Lampung	133	103	0.77
PT 9	Bandar Lampung City	55	45	0.82
PT10	Pringsewu	200	200	1.00
PT11	Pringsewu	40	40	1.00
PT12	South Lampung	8	7.7	1.00
PT13	South Lampung	11	11.25	1.00
PT14	Tulang Bawang	450	400	0.89
PT15	South Lampung	51	31.7	0.63
Average Turnover per month				0.81

Note: RIT: *Rata-rata ikan tersimpan/* Average fish stored

From the data presentation above, it is visible that turnover ratio for cold storages in Lampung is 0.81 cycle per month, where this number is still able to be increased more optimally. Ratio of turnover for frozen fish storages is a significant metric that showed how quickly the product can be processed and reselling. From the context of fish storages, the optimal turnover usually ranges from 6 to 12 times per year, depending on fish type, storages method and market demand.

First, a research by Zhang *et al.*, showed the shelf life of frozen fish usually ranges from 6 to 12 months, depending on storages temperature and freezing method used [26]. Thus, for achieving optimal turnover number, it is important for companies to monitor and manage their inventory in efficient way. If the turnover value below this range, it indicates that products is not selling quickly which can lead to waste and losses due to product damage.

Next, Oveland in his research on frozen storages procedures for salmon and plaice indicated that product quality may decline over time, which implies the need to turn over inventory more quickly to maintain product quality [27]. Quality decline can influence the consumer decisions which later will affect turnover.

Similar finding also noted by Ninan *et al* in statement that fish products stored in frozen condition may experience significant changes in quality, which may affect consumer appeal and, consequently, turnover [28]. Therefore, assuring the product stored in cold storages remain in the best condition is important to increase the chance of sales.

In line with these explanation, Reddy and Bhandary also added that changes in physical and chemical properties of fish during frozen storages can influence the consumer acceptance of the product which also impacts turnover rate [29]. If consumer feel the product quality is decreasing, they might reluctant to purchase the product which could result in low turnover.

In this context, implementing effective inventory management strategies is important for the cold storages managers, including regular monitoring of product quality and adjustments in marketing strategies to increase turnover. In this way, the company able to make sure that they achieve the optimal turnover, which not only improves the operational efficiency but also maximizes profitability. Overall, the optimal cycle turnover of goods in a frozen fish storages cold storages ranges from 6 to 12 times per year, and to achieve this number, companies must focus on product quality management, inventory monitoring and effective marketing strategy.

The next phase after obtaining utility data is calculating total amount of fisheries products in Lampung and potential surplus of fish that can be stored in cold storages. For this reason, data on total fisheries production in Lampung is needed, both from captured fish or aquaculture products. After total result of fisheries products are obtained, the researchers must subtract it with local consumption rate from Lampung to get a production surplus. When the surplus number is obtained, then, the researchers once again subtract it with the installed capacity of the existing cold storages by calculating the obtained average utility value and converting it to annual figures. Result from the mathematical subtraction is potential fish amount that able to be stored in cold storages. From the calculation results, it was found there were 184,987 tonnes of fish products from Lampung that could potentially be frozen. Further calculation is presented in Table 3.

**Table 3.** Calculation Result of Frozen Fish Potential in Lampung Province

Parameter	Number (TON)
Total Production of Capture Fishery	188,721.58
Total Production of Aquaculture Fish.	175,354.54
Total Production	364,076.12
Local Consumption	143,776.91
Production Surplus	220,299.21
Total Capacity of Cold storages	6,397.00

Utility of Cold storages in a Year	35,311.44
Total Frozen Fish Potential	184,987.77

From data above, it can be interpreted that total fish production in Lampung is in high value, with 188,721 tonnes of capture fisheries products and 175,354 tonnes of aquaculture products to sum up total fish production of 364,076 tonnes. From this amount, it is subtracted by the local consumption number, in which, referring to KKP data, the local consumption fish in Lampung is 143,776 tonnes per year. So, there is a surplus of 220,299 tonnes of fish production per year.

By consideration of only 19 cold storages exist in Lampung with a maximum capacity of 6,397 tonnes, which from previous calculations only has utility level of 46 % per month, it can be calculated that maximum holding capacity of fisheries cold storages in Lampung in a year is only 35,311 tonnes of fish. So, Lampung province still lacks of frozen storages for potential of fishery products of 184,987 tonnes per year. This surplus production is utilized by fishermen or the processing industry to create products with very low economic value. For example, it is processed into dried fish, salted fish, or even sold as raw materials for animal feed, all at extremely low prices. In cases of excessive production, many fish that are considered to have low economic value are not utilized at all. This situation significantly reduces the potential income of fishermen.

Data interpretation above showing a contradictory result where on one hand there is a large surplus of fish product while on the other hand, availability of existing cold storages not yet optimum. It understandable since 19 cold storages in Lampung are privately owned which obviously will be used to accommodate their own goods. The majority of existing cold storages also belong to companies that run their business in fish cultivation, or shrimp or other fishery products, so the cold storages cannot be accessed by ordinary fishermen. It becomes the underlying reason of low level utility of fisheries cold storages in Lampung, where in other side there is a shortage of cold storages that can be accessed by fishermen. This is a common problem in the fishing industry of Indonesia.

Low availability of fisheries cold storages in Indonesia still becomes a significant challenge, although potentiality for the fisheries resources in this country is very large. There are several influential factors contribute to low number of fisheries cold storages including inadequate infrastructure, lack of investment, and challenges in supply chain management.

First, inadequate storages infrastructure becomes one of the main obstacles, where according to Setiawan *et.al.*, there are many areas in Indonesia, especially in coastal areas are lacking of adequate cold storages facilities to maintain fishery products quality [30]. It causes may fishery products can not be stored properly, thereby increasing the risk of damage and reducing the market potential.

Second, a very minimum or lack of investment in storages and processing technology is also a problem. As noted by Rami, the food industry including fish storages is facing challenges of high energy

consumption and environmental issues as the impact of inefficient refrigeration methods [31]. Without sufficient investment in a better environmental friendly technology, the fisheries industry will have difficulties to grow and fulfilled the market demand.

Apart from it, obstacle in supply chain management also giving negative contribution to the low number of cold storages. Pohl *et.al.* showed the use of an efficient cold storages management system is very important to increase the operational efficiency [32](Pohl *et al.*, 2011). Without a good system, inventory management becomes difficult which resulted in wasted space and resources. As supported by research of Otero *et al.*, which showing the innovative storages methods such as a hyperbaric cold storages can increase the shelf life of fishery products [33] (Otero *et al.*, 2017). However, application of this new technology still limited in Indonesia and many industry players have not yet adopted more efficient methods.

From overall perspective, although potentiality of frozen fish in Indonesia is very large, the low number of cold storages becomes obstacle to the development of this industry. An investment in infrastructure, better technology and management system is required to increase the storages capacity. Through these controlled steps, Indonesia will succeed in take advantage of its abundant fisheries resources and increase its competitiveness in the global market.

In addition, as stated in the research of Isdaharti *et.al* on sustainable development of coastal areas, it requires integration between aspects of governance and sustainable development through an integrated coastal management framework approach. This process includes stages of preparation, initiation, development, adoption, implementation, refinement, to consolidation. In preparation stage, basic data is collected in the form of a comprehensive and integrated government policy to address environmental problems as reported in the State of the Coast (SOC) report. Purpose in developing SOC report is identifying gaps and review aspects of Governance and Sustainability using 11 elements and 36 indicator adapted to SEA SDG and SDS program for coastal areas. Results of SOC report become a reference for local government in formulating policies for decision making. According to assessment at the research location, governance aspects, policy, strategy and planning are still considered inadequate. Whereas from the perspective of sustainable development, such elements like food security, improvement effort for increasing the livelihood, management and reduction of pollution, utilization and water resources also recovery management still need to be improved [34]. In support with this finding, addition from the research of Nababan *et.al.*, to improve the welfare of small fishermen, needs a formal management mechanism called the Integrated Maritime and Fisheries Center (IMFC) which was introduced by the government, where all resources can be managed in one integrated and efficient manner, with a high quality and acceleration effort, so that the economy regions able to be improved including the welfare of small-scale fishermen [35].

## 4. Conclusion and Suggestion

Result sensus attained from the cold storages managers in Lampung province showed there are 19 cold storages with a total capacity of 6, 397 tonnes that spread across 6 districts or cities. Nonetheless, the average utility rate only 46 % which this number is below the recommendation figure of 70% to 85 % as the optimal standard for operational efficiency. Moreover, the cold storages turnover only reached an average of 0.81 cycle per month, or 9.72 per year. In fact, this value already falls within the ideal range of 6-12 per year, but it can still be improved to reach the optimum value of 12 per year.

In order to give improvement to cold storages management in Lampung province, the researchers provide several suggestions as follow:

1. Increases the cold storages utility and turnover number: Government and private sector in the fish industry could collaborate to increase the level of cold storages utility. It can be achieved by ensuring a stable fish supply and an improvement to the product quality. The improved supply chain governance through efficient inventory management system along with automation technology will bring useful aid to the fish industry.
2. Addition of cold storages capacity and accessibility: With consideration to surplus of fish products, construction of new cold storages with adequate capacity becomes very necessary, especially the cold storages that accessible by local fishermen. Thus, the excess fish products can be stored properly and the cold storages utility level can be increased.
3. Investment to advance infrastructure and technology: improving the quality of fish storages infrastructure through investment of more efficient and environmentally friendly technology will increase durability aspect of fishery products and reduces the environmental impacts.
4. Have supportive policies for resource management: The government needs to encourage better fisheries resource management policies to support a consistent supply of this commodity. The policy could include a sustainable fish farming management as well as improvement to the storages and processing facilities near fishery production centers.

By implementation of these suggested steps, Lampung province is expected to be able to increase the operational efficiency of its cold storages or cold storages systems to support the local fishing industry and maximizing the profitability in the fishery sector.

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