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ADAPTATION OF WEST JAVA TUNA SUPPLY CHAIN IN THE PANDEMIC COVID-19 ERA

ADAPTASI RANTAI PASOK IKAN TUNA DI JAWA BARAT PADA MASA PANDEMI COVID-19

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ABSTRACT

In response to the Covid -19 pandemic imposed by the Indonesian government has impacted supply chains of various important commodities, including fish products. Lockdowns and mobility restrictions forced market players to limit their activities, change strategies or even close their businesses. This research, conducted in June 2020 - February 2021 in West Java Province, aimed to analyze patterns of adaptation taken by business players of the fisheries industry in facing the pandemic. The research methodological approach was the Supply Chain Operations Reference (SCOR) framework, which relied on data collected from 80 respondents proportionally representing impacted groups of fisheries business players in the West Java Province. The results showed that fisheries business players and the government had exercised some supply chain innovative adaptations, some of which can be considered potential adaptation strategies that will improve resilience and ensure the industry's sustainability when similar pandemic crises occur in the future. These are (i) ensuring access to domestic and international supply chains, (ii) connecting fishery production centers with processors to reduce damage to fresh fish, (iii) creating added value using optimizing existing temporary fish storages, and (iv) promoting and delivering products through digital platform or e-commerce.

Keywords: adaptation strategies, pandemic Covid-19, resilience, sustainability, West Java.

ABSTRAK

Langkah-langkah penanganan pandemi Covid -19 yang dilakukan oleh pemerintah Indonesia telah berdampak pada rantai pasok berbagai komoditas penting, termasuk tuna sebagai produk perikanan. Pembatasan mobilitas memaksa pelaku pasar untuk membatasi aktivitasnya, mengubah strategi atau bahkan menutup usahanya. Penelitian ini dilaksanakan pada bulan Juni 2020 – Februari 2021 di Provinsi Jawa Barat bertujuan untuk menganalisis pola adaptasi yang dilakukan oleh pelaku usaha industri perikanan dalam menghadapi situasi pandemi. Pendekatan metodologi penelitian adalah kerangka *Supply Chain Operations Reference* (SCOR), yang mengandalkan data yang dikumpulkan dari 80 responden secara proporsional mewakili kelompok pelaku usaha perikanan yang terkena dampak di Provinsi Jawa Barat. Hasil penelitian menunjukkan bahwa pelaku usaha perikanan dan pemerintah telah melakukan sejumlah adaptasi inovatif rantai pasok, beberapa di antaranya dapat dianggap sebagai strategi adaptasi potensial yang akan meningkatkan ketahanan dan memastikan keberlanjutan industri ketika krisis pandemi serupa terjadi di masa depan, yaitu (i) memastikan akses ke rantai pasokan domestik dan internasional, (ii) menghubungkan pusat-pusat produksi perikanan dengan pengolah untuk mengurangi kerusakan ikan segar, (iii) menciptakan nilai tambah melalui optimalisasi penyimpanan ikan sementara yang ada, dan (iv) mempromosikan dan mengirimkan produk melalui *platform digital* atau *e-commerce*.

Kata kunci: strategi adaptasi, pandemi Covid-19, ketangguhan, keberlanjutan, Jawa Barat.

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INTRODUCTION

In Indonesia, the Corona Virus Disease 2019 (COVID-19) started as a locally circulating infection in March 2020. The pandemic status, declared by the World Health Organization in mid-2020 (WHO, 2020), soon impacted all world regions, including many major fish-producing and fish-consuming countries. While the existing supply chain in the fisheries industry is considered essential in facilitating the product flows from capture fisheries and aquaculture, the measures adopted by the government to contain the spread of the virus infection inevitably caused significant direct and indirect challenges to the chain and hence the sustainability of the industry. Recognizing the excesses of these virus handling measures, the government also sees it necessary to consider the appropriate policies to mitigate the damaging effects on related aspects. In the context of the fisheries industry, the government is committed to supporting the supply chain fisheries in protecting fishers and workers throughout the supply chain. The main concern of the government is the sustainability of small-scale fishers and fishing communities.

Literature confirms the concerns of the government. Nurhayati and Purnomo (2019), for example, reported that fishing communities, which represent critical social and economic groups in the industry, often have to go through a difficult time when there is a disaster, both human and natural origin. Although fishing communities are among economically resilient groups, market closures due to the Covid-19 pandemic have limited their capacity to exercise strategies; only a few commodities, e.g., seaweed, were reported to have rooms of market. Globally, reports (Director General of Aquaculture, 2021) show that there are conditions to concerns about health, security, and human welfare and a recognition that the fisheries community may be the most affected by the pandemic.

Recently, the Indonesian government moved to address the social impact and a call for economic response aiming at sustainable and inclusive recovery based on solidarity. The call also urged cooperation of all sectors at every level, including those of fisheries. In line with this, the government has begun a consulting process with fishers to understand the social and economic circumstances of the Covid-19 pandemic, exploring the needed proper roles of the state. Such potential roles, among others, are a distribution of support for live hold fisherman, mitigation of pandemic effects on health, and supporting local solutions applied by fishers (Nurhayati et al, 2020a).

A range of local solutions has been attempted by business players in fisheries within the supply chain system. Physical distancing measures have inspired them to take adaptation actions to deal with the surrounding Covid-19 pandemic circumstances. These are steps that business players thought it capable of providing protection and opportunities for them to recover from unproductive time (Nurhayati et al., 2020a; Nurhayati et al., 2020b). Some traders found it useful to apply online marketing; meanwhile, some fishermen got a solution from modifying their fishing technique. Some of their attempts were unsuccessful, while others yielded positive results and could be considered a potential strategy for wider application.

In line with the above, researchers approach the issue from a supply chain point of view. A good supply chain can improve product flow and reduce production costs, creating value-added

(Nurhayati et al., 2018; Aramyan et al., 2007; Taylor, 2005; Vorst and Beulens, 2002). The Supply chain fisheries industry may consist of several players who procure fresh fish input production, distribute them, and sell them to final consumers. Fisheries supply chain fisheries analysis is concerned with the upstream to the downstream flow of fish and fish products. All of these players have been ordered and managed such that they have good networking organization, productive collaboration with business actors, and strong leadership (Stadtler, 2005). In fisheries, managing the supply chain has highlighted the symbiotic relationship between management decisions and events in seafood markets (Johnston and Wilson, 1987). This research aims to analyze the fishing industry's pattern of adaptation in dealing with the pandemic situation.

RESEARCH METHODS

This research adopted a statistical quantitative descriptive method following the SCOR (Supply Chain Operation Reference) framework. Following this framework assumed that all supply chain processes in the studied fisheries have some components: planning, source, make, deliver, and return. Planning is a process that balances aggregate fisheries demand and supply to develop a course of action that best meets the established business fisheries. It is necessary to procure production inputs and fulfill the needs of fishery business actors in shipping. The shipping process must be aware of the variability of demand for fishery production across the chain to avoid unwanted effects.

Conducted This research was in West Java Province, including Sukabumi District, Pangandaran District, Indramayu District, and Cirebon District in June 2020 - March 2021 using two types of data: primary and secondary data. The primary data sources were field observations and a questionnaire-guided survey with a balanced allocation of respondents to each region as many as 20 respondents with a total number of respondents as many as 80 respondents representing impacted business players. The sampling technique in this study is a snowball sampling approach, which selects respondents from each group in proportion to the population of each group. Meanwhile, the sources of secondary data were documented files regarding regulations and fisheries statistics.

Data reliability testing was carried out by calculating the value of the Cronbach's Alpha instrument from each of the research variables tested (Sugiyono, 2013).

1. Determine the variance of the scores for each item (Si):

$$Si = \frac{\sum Xi^2 - \frac{(\sum Xi)^2}{N}}{N} \quad (1)$$

2. Calculating the number of item variances (ΣSi):

$$\sum Si = Si\ 1 + Si\ 2 + \cdots + Si\ n \quad (2)$$

3. Calculating the total variance (St):

$$St = \Sigma(\Sigma \mathrm{Xi})^2 - \frac{(\Sigma \mathrm{Xi})^2}{N} \quad (3)$$

4. Determine the reliability coefficient of Cronbach's Alpha:

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum Si}{St}\right) \quad (4)$$

Remark:
α = reliability coefficient
k = number of items
Xi = item answer
Si = item variance
St = total variance
N = number of populatios

The method used to Supply Chain Operation Reference (SCOR) processes namely plan, source, make, deliver, and return which can be seen in Table 1.

Table 1. Supply Chain Operation Reference (SCOR) Matrix

	Supply Chain Fisheries Card			Fisheries Industry Benchmark		
	Overview Metrict	**SCOR LEVEL 1 Metrict**	**Actual Value**	**Parity**	**Advantage**	**Superior**
EXTERNAL	Supply Chain Reliability	Delivery performance fisheries product to commit date	v		v	v
		Perfect Order Fisheries Production Fulfillment	v		v	v
	Responsivities	Order Fulfilment lead time Fisheries Productions	v		v	v
	Flexibility	Supply Chain Response Time Fisheries Production Fisheries Production Flexibility	v		v	v
INTERNAL	Cost	% Total Cost Supply Chain Management Fisheries Productions	v		v	v
		% Warranty Cost Fisheries Production % Value Added Fisheries Productivity	v		v	v
	Assets	Inventory Days Of Fisheries Production Supply	v		v	v
		Cash to Cash Cycle Time Fisheries Production				

RESULT AND DISCUSSION

Research Location

The research location was West Java Province, a province bordering Jakarta and Banten Provinces to the west, Central Java to the east, the Java Sea to the north, and the Indian Ocean to the South (Figure 1).

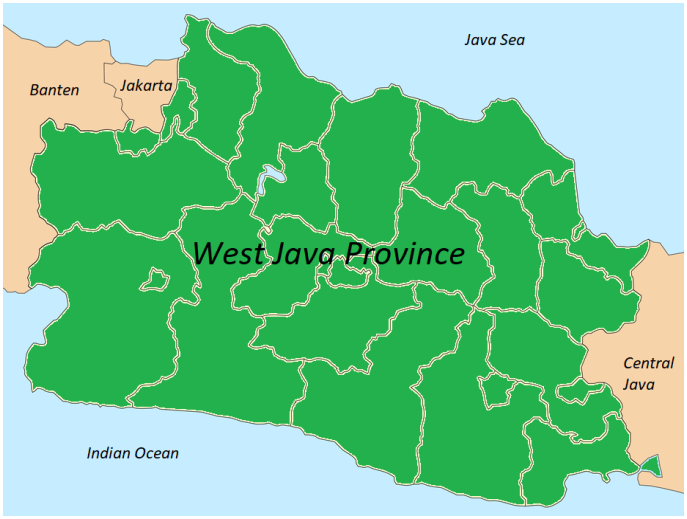

Figure 1. Research Location
(Source: https://earth.google.com/)

As seen in Figure 1, the main justification for selecting West Java Province as the studied case location was the fisheries potential of this province. With a sea area of 15,529 km^2 and a coastline of 833 km (West Java Provincial Planning Agency, 2019), West Java fisheries have become among prime movers for the province economy, and as a matter, is a major contributor to the national fisheries industry.

Profile of Tuna Fisheries Sustainability of West Java Province

In West Java Province, the most important species, which is called an indicator of fishery dynamics, are mackerel tuna (*Euthynnus affinis*) and skipjack tuna (Katsuwonus pelamis), a medium-sized epipelagic, migratory neritic tuna. These two species are consumed fresh, frozen, or made into canned fish. The following is a presentation of the sustainability profile of West Jawa Province fisheries, based on the production figures of the two species.

In the past, mackarel tuna and skipjack tuna fishing, was amont the province most robust industries, however the recent development seems to be discouraging. In 2014, tuna production was 318,873 ton, and 2020 tuna production was 69,650 ton (Statistics of the Ministry of Marine and Fisheries, 2021) (Figure 2). These species are caught using traditional pole and line or handline fishing gears, producing high-quality fresh and frozen tuna (Nurhayati, 2013). It is worth noting though that the situation might be staging a comeback as there is growing awareness of sustainable fishing and eco-friendly fisheries processing practices among fishers. Nurhayati and Purnomo

(2020a) stated that if we can optimize such awarness, then we can push this industry back into the spotlight, including throuh fisheries supply chain adaptation to Covid-19 pandemic circumstances.

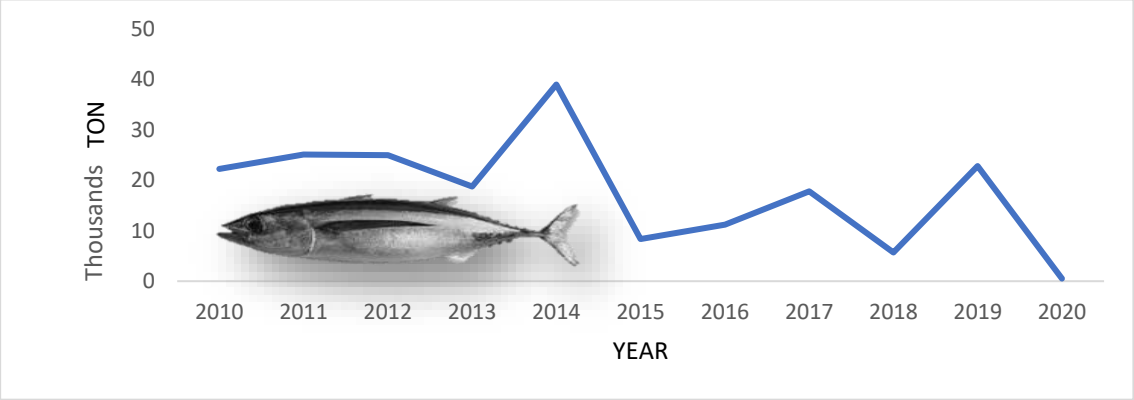

Figure 2. Mackarel Tuna Production In West Java Province, Indonesia
(Source: Statistics of the Ministry of Marine and Fisheries, 2021)

Direct consumption of fish for food provides a vital source of protein, micronutrients, and vitamins. Fish are an especially important source of food and nutrients owing to the fact their seasonal availability is often different from crops. This means that fish can help to reduce seasonal vulnerability, particularly in rural communities (Kawarazuka, 2010).

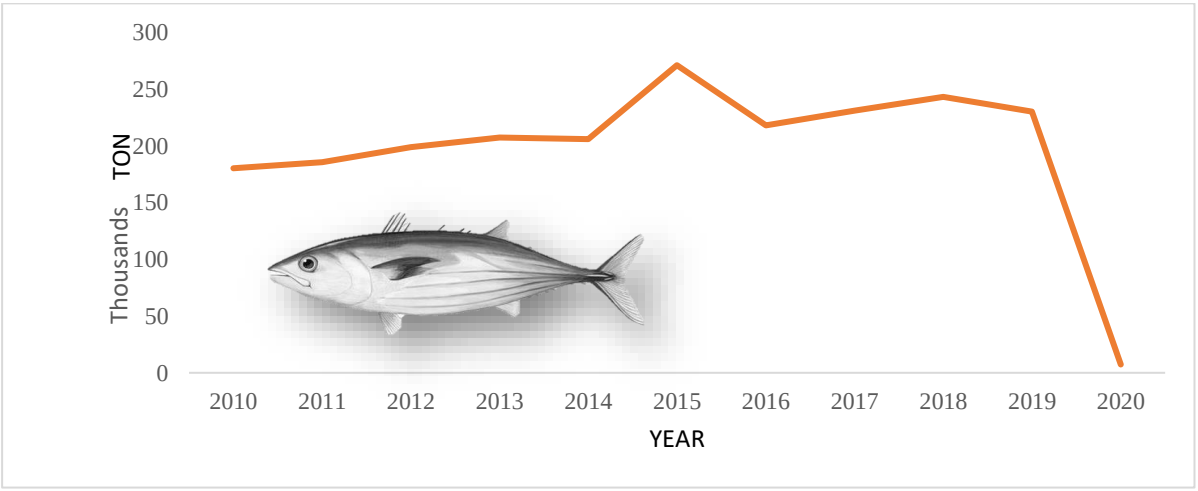

Figure 3. *Skipjack* Tuna Production
(Source: Statistics of the Ministry of Marine and Fisheries, 2021)

These facts suggest that the sustainability aspect should be an important consideration in our supply chain design. In this case, logistics activities are the chain's operational component; this includes quantification, procurement, inventory management, warehousing, transportation and fleet management, and data collection and reporting fisheries production.

Profile of Business Players in the Supply Chain

A supply chain fisheries is a network of fish product-related business enterprises through which fish products move from the point of fisherman to consumption, including pre-production and post-consumption activities. In supply chains, fisheries production is focused on efficient

logistics using upstream and downstream businesses aimed mostly at pushing products to the traditional and moderen markets. Supply chains fisheries are mostly concerned with costs and how long it takes to present the product for sale. A supply chain has three parts important, such as: (1) supplying raw materials to manufacturing units; (2) raw materials into semi-finished or finished products; and (3) distribution to ensure products reach last consumers (De Silva, 2011)

Based on respondents† that were drawn proportional to the group populations, relevant players in the fisheries supply chain in West Java consist of fishers 36%, fish collectors 17%, fish processing 11%, distributor 9%, retail market 5%, and consumer 22% (Figure 4).

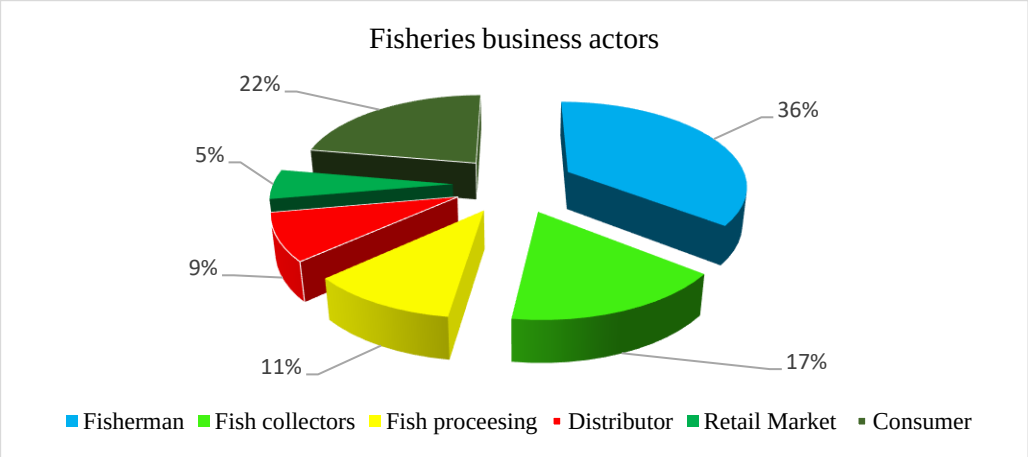

Figure 4. Percentage of Fisheries Business Player Groups

Fishermen represent the first node in this supply chain and are responsible for unloading fresh fish distributed to the following business players. The main fishing methods adopted by these fishermen were pole and line or handline fishing. Fishermen sell caught fish through an auction mechanism; the Fish Auction Place (TPI) manager facilitates this activity. Field observation conducted in this research showed that the supply chain in West Java is rather simple because fishermen sell most of the landings (fresh fish) to local and export markets (Figure 5).

Trading occurs at the fish auction place, where wholesale and retail transactions involve fishers, wholesalers, and agents. Wholesalers then forward parts of the fish to the traditional markets and supermarkets of cities within and neighbouring provinces such as Bandung and Jakarta. Fishermen distribute some of the fish to processing factories and exporters in West Java and the neighbouring province of Jakarta.

† Statistical tests showed that variables contained in questionnaires submitted to responden was considered valid as measuring instruments; meanwhile, Cronbach Alpha coefficient indicated that the questionnaire submitted to the respondent can be trusted

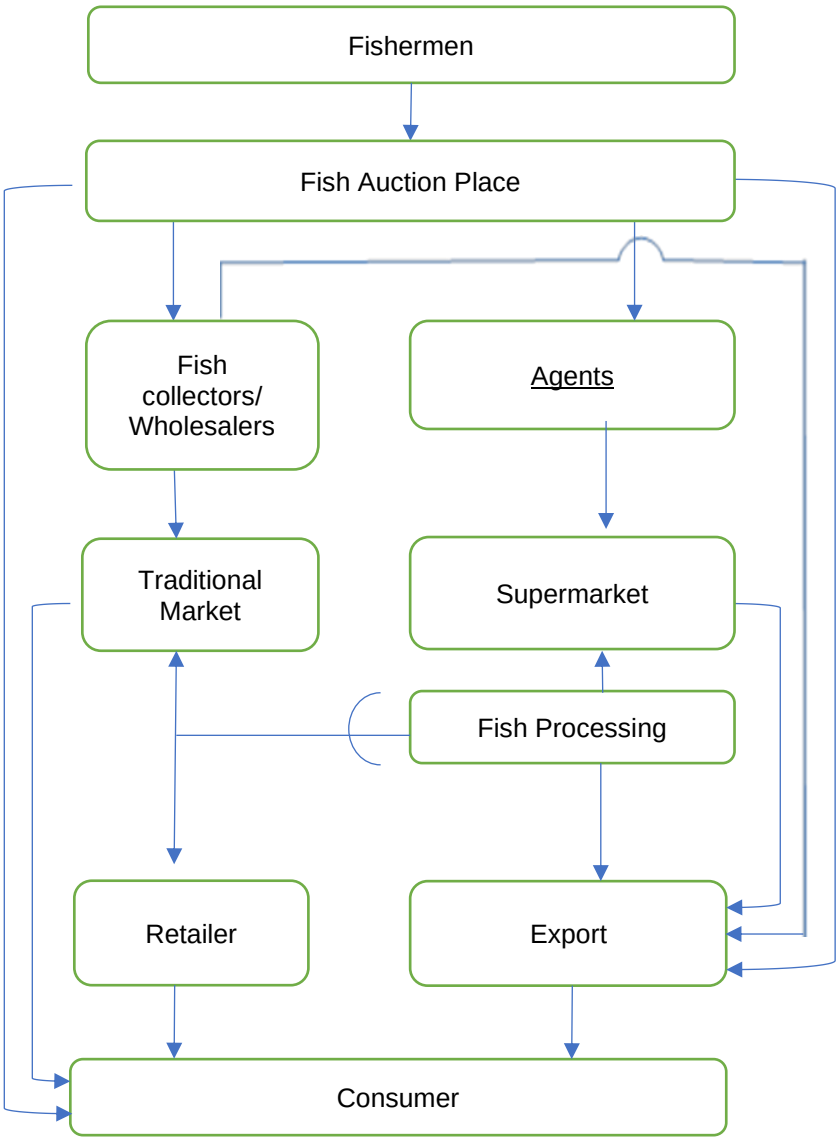

Figure 5. Supply Chain of Capture Fisheries in West Java Province

Fisheries Supply Chain Adaptation to Covid-19 Pandemic

The fisheries supply shock that started the Covid-19 pandemic, and the demand shock that followed as the regional and global economy shut down exposed vulnerabilities in the fisheries supply chain production. This research has resulted in greater political and competitive to their products and minimizes potential financial losses for all marketers, including wholesalers, retailers pressures to the industry to increase domestic production. The solution to the challenge must build a well-designed fisheries supply chain to withstand uncertainties and fluctuation. This case should carry out proper adaptation strategies to ensure access to domestic and international supply chains.

Interviews with respondents in this research revealed that a factor that brought a significant challenge to business players was cash flows. Normally, wholesalers deliver products to the retailers, both within and outside the West Java Province. Before the pandemic, retailers would pay directly in cash; during the pandemic, most wholesalers have to allow retailers to settle payment days or weeks later. Meanwhile, the most significant challenge that came to fishers was the decrease in

demanded volume. In normal times, fishers sell the fish at the fish auction or sell directly to connecting fishery production centers. The decrease in the demand for fish during the pandemic has forced them to provide cold rooms to store products that the auction could not absorb. Fishers do this to reduce damage, and traditional market vendors recently attempted digital marketing to open better opportunities to deliver products to consumers. Fisheries products online marketing now becomes very common among business players in the West Java fisheries supply chain. Aspects of supply chain risk management, there are: (i) identifying distribution the sources of risks and consequences; (ii) overcoming any possible consequences; (iii) outlining the drivers of risks; and (iv) resilience and adopting risk mitigation methods (Jüttner et al, 2003; Tang et al., 2012). This is accordance with the results of research in the field describe risk drivers for inputs, processes and outputs; and resilience and adopt risk mitigation methods.

The risk management and resilience of the supply chain are urgent measures to minimize losses and keep the pathways of distribution channels on the right track. (Omera and Bernard., 2007) The following is further analysis, exploring how fisheries business in this supply chain will likely compete in the pandemic circumstances and the time that follows. The analysis began with Table 2, as presented below.

Table 2. Supply Chain Operations Reference (SCOR) Tuna Fisheries Business

	Supply Chain Fisheries Card			Fisheries Industry Benchmark		
	Overview Metrict	**SCOR LEVEL 1 Metric**	**Actual Value**	**Parity**	**Advantage**	**Superior**
EXTERNAL	Supply Chain Reliability	Delivery performance tuna fisheries product to commit date	60%	70%	80%	85%
		Perfect order fisheries production fulfillment	0%	80%	85%	90%
	Responsivities	Order fulfilment lead time tuna fisheries productions	12 days	7 days	5 days	3 days
	Flexibility	Supply chain Response time tuna fisheries production	7 days	5 days	4 days	3 days
		Tuna fisheries production flexibility	7 days	7 days	5 days	3 days
INTERNAL	Cost	% Total Cost Supply chain management tuna fisheries productions	10%	20%	30%	40%
		% Warranty cost Tuna fisheries production	10%	15%	20%	25%
		% Value added tuna fisheries productivity	5%	20%	30%	40%
	Assets	Inventory Days Of tuna fisheries production supply	5 days	7 days	5 days	3 days
		cash to cash Cycle time tuna fisheries production	14 days	7 days	5 days	5 days

Information input to Table 2, the SCOR card indicates that if the buyers want to place an order, they must wait for 12 days and 7 days for mackerel tuna and skipjack tuna, respectively. The faster the lead time, the better the quality of the fish because it can be handled and processed immediately. In this case, consumers are at risk of not getting their orders as desired due to large-scale social restrictions and during low season.

The value of the perfect order fulfillment matrix shows the ability to fulfill buyer orders perfectly by 70%. The remaining 30% percentage is an order that does not fulfill at all. Supply chain response time fisheries production actual condition is seven days, but the availability of fish from the fishermen can't be sure because it does constrain by season, regional uncertainty fishing, and the number of fish obtained. The implication is that there is a possibility that buyers can't fulfill the increased order. The strategy of stocking tuna and skipjack tuna products in each marketing chain is needed to minimize the scarcity of tuna products. Can disrupt the synergy and existence of the tuna fishery value chain will never happen.

CONCLUSION AND SUGGESTION

Conclusion

Based on the results of the research, it can be concluded tuna fisheries supply chain adaptation strategy during Covid-19 pandemic, Indonesia government is committed to supporting the supply chain tuna fisheries. Tuna fisheries business actors and the government have carried out a number of innovative supply chain adaptations, some of which can be considered as strategies. Mackerel tuna *(Euthynnus affinis)* and skipjack tuna *(Katsuwonus pelamis)*, once among West Java most robust industries. The industry might be staging a comeback as growing awareness of sustainable fishing and eco-friendly fisheries processing. The tuna fishery supply chain in West Java is rather simple, as the bulk of the landings are sold fresh to both local and to export and promote fishery products using digital technology such as e-commerce.

Suggestion

The government's commitment to support the fisheries supply chain in protecting fishermen and workers throughout the supply chain must be carried out continuously because similar pandemic crises may occur in the future. The government's main concern at this time is the sustainability of small-scale fishermen and fishing communities so that they are able to survive in the midst of the Covid-19 pandemic.

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