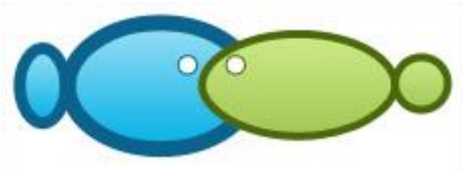

Mapping the fishery industry performance in Central Java to enter the ASEAN market

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Abstract. The purpose of this study is to map the performance indicators in order to create an effective and innovative strategy of the Central Java fishery industry for better competing in the international market, especially in ASEAN. The data were collected using survey methods and comprehensive interviews with 10 shrimp and tuna industries as the representative industries who exported to ASEAN market. The assessment instrument used the Fishery Performance Indicators (FPIs), which are modified, and SWOT analysis. The results showed that the "regulation of the catch and/or the harvest of aquaculture" and "infrastructure handling and the fish landing" were of some particular concerns, being the weakest factors in developing innovation, while "the availability of raw material and supply chains", "access and market network expansion", "international trade access and market network expansion", and "consumer service" were the strongest factors with nearly perfect innovation scores (4.5). As a conclusion, an aggressive and effective strategy by taking advantage of opportunities and strengthening the industry internally will increase the chances of better competing in the ASEAN market.
Key Words: competitiveness, export value, fish product, innovation, international trade access.

Introduction. The Indonesian government through the Ministry of Maritime Affairs and Fisheries (MMAF) stated that Indonesia has adopted an industrialization policy that aims to make Indonesia the largest fisheries-producing country in the world. Industrialization in the marine and fisheries sector is seen as a necessary part, by continuing to improve innovation and technology (Yusuf et al 2015). The fisheries sector a strategic and productive sector in the Indonesian economy. During the last 5 years (2015-2020), the export volumes of Indonesian fishery products has increased by 16.33% (MMAF 2016; MMAF 2021). The export value of Indonesian fishery products in 2020 reached 5.20 billion USD, being dominated by shrimp, tuna, skipjack, and swimming crab (MMAF 2021).

Establishing Central Java as a fisheries giant is considered the right strategy to realize this policy. This condition is strengthened based on data from The 2020 Cilacap Ocean Fishing Port statistical report (COFP 2021), Strategic Plan - Marine and Fisheries Service Central Java for 2018-2023 (MFD 2018), MMAF 2019 report (MMAF 2019), and Technocratic Design 2020-2024 (MNDP 2019). The southern coast of Central Java, directly facing the Indian Ocean, has enormous fishery potential, especially for tuna species, while the northern coast of Central Java is a very abundant shrimp center. China, Japan, and the United States are still export destinations for Indonesian fishery products, which reached 60.28% in 2020 (MMAF 2021). However, the trend of product innovation in the international market puts pressure on Indonesian fishery products, with lower bargaining prices and better quality. The Indonesian fishery industry will slowly find it difficult to compete within the market (Yusuf et al 2018a). The ASEAN market is one of the promising markets besides China, Japan, and the United States, with several advantages such as location, costs, regulations, and lower international competition, which can increase the export value of Indonesian fishery products (Yusuf et al 2021). The export value of Indonesian fisheries for the ASEAN market is known to be still low, due to the low capacity for market-oriented Indonesian fishery product innovation (Yusuf et al 2017; Yusuf et al 2018a; Yusuf et al 2018b).

The export value of fishery products can be increased through an industry vision that is always market-oriented, always focusing on excellence based on consumer desires, competitiveness, and integrity of all functions, or performance in innovation in companies (Trondsen 2012; Yusuf & Trondsen 2013). Innovation development also needs to pay attention to regulations from the government and to the needs of producers and industry, so that fisheries industry governance can be carried out sustainably (Verhess & Meulenberg 2004; McGrath et al 2015). Innovation can be applied to economic, ecological, and social aspects, which are important indicators of the performance of the fisheries industry (Anderson et al 2015). Therefore, it is necessary to map the innovation performance in the fisheries industry, which is then used to design the right innovation strategy, so that it can better compete in the market.

Standard assessment of Fishery Performance Indicators (FPIs) is used to map the strengths, weaknesses, opportunities, and threats in the fisheries industry, which then becomes a comprehensive representation of the innovation performance of a company (Anderson et al 2015). The purpose of this study is to map innovation performance in the fisheries industry in Central Java based on the FPIs assessment standard. The data obtained is an important input in designing a strategy to increase the competitiveness of the Indonesian fisheries industry, especially for the ASEAN market.

Material and Method. The method used in this study is the application of the modified FPIs instrument on the fishery companies (Anderson et al 2015; Yusuf et al 2017). 10 companies engaged in the export of fishery products to ASEAN destination countries were sampled. The companies are scattered on the south coast and north coast of Central Java, with the main products being shrimp and tuna. The data collection process was carried out by conducting field visits, observations, and interviews, directly and in-depth. Local stakeholders and local fishermen were also involved to obtain comprehensive and valid data. Sampling was carried out for 3 months, using the performance indicators that have been prepared. For each metric, a weighted value on a scale of 1 to 5 with limits defined both quantitatively and qualitatively was proposed. The number 5 is the best/very strong/effective performance. Table 1 presents the modified performance indicators of the Central Java fishery industry (Anderson et al 2015; Yusuf et al 2017).

Table 1

Indicators of Central Java fishery industry

No	*Aspect*	*Indicators*
1	Ecological	The availability of raw material and supply chains
2		Regulation of catch and/or harvest from aquaculture
3	Economic	Infrastructure handling and fish landing
4		Risk of product damage
5		Access and market network expansion
6		International trade access and market network expansion
7		Adaptation to regulations
8		Adaptation to market trends
9		Protection against competitor products
10		Product quality and safety
11		Product improvement
12		Costumer service
13		Distribution control
14		Financial capital
15	Social	Social improvement of worker welfare
16		Training on quality improvement of workers
17		Worker health facilities and infrastructure
18		Sanitation and hygiene facilities
19		Corporate social responsibility (CSR) program
20		Increase environmental economic value

Statistical analysis. The summarized data was then analyzed descriptively, then presented in a two-dimensional radar graphic format, which aims to display multivariate data related to the advantages and disadvantages of each factor. The radar graphs with the geometric projection method were prepared to express the distribution of the weakest and strongest factors in a multidimensional space. The data was mapped based on each criterion using the SWOT analysis. The results provide a comprehensive representation of the competitiveness performance of the fishing industry in Central Java.

Results and Discussion. This research was conducted from March to June 2021. Capture fisheries areas in the northern waters of Central Java are concentrated in the Tegal and Pekalongan regions, while the southern waters are concentrated in the Cilacap region. The aquaculture areas for shrimp commodity are located in the Cilacap and Purworejo regions, which are in the southern part of Central Java, while in the northern part, they are concentrated in the Rembang, Jepara, and Kendal regions. The results of the survey and secondary data research showed that the fishery industry in the northern part of Central Java was dominated by the shrimp export industry, while the southern part was it dominated by the tuna export industry. The performance of the fisheries industry in Central Java can be mapped based on the strengths and weaknesses of the available resources, opportunities, and challenges consisting of availability and sustainability, the performance of the harvest (economic), and post-harvest (social) sectors. An in-depth study based on data related to FPIs that have been formulated will result in a performance position for the fishery industry in Central Java for ASEAN exports. Detailed information is presented in Figure 1.

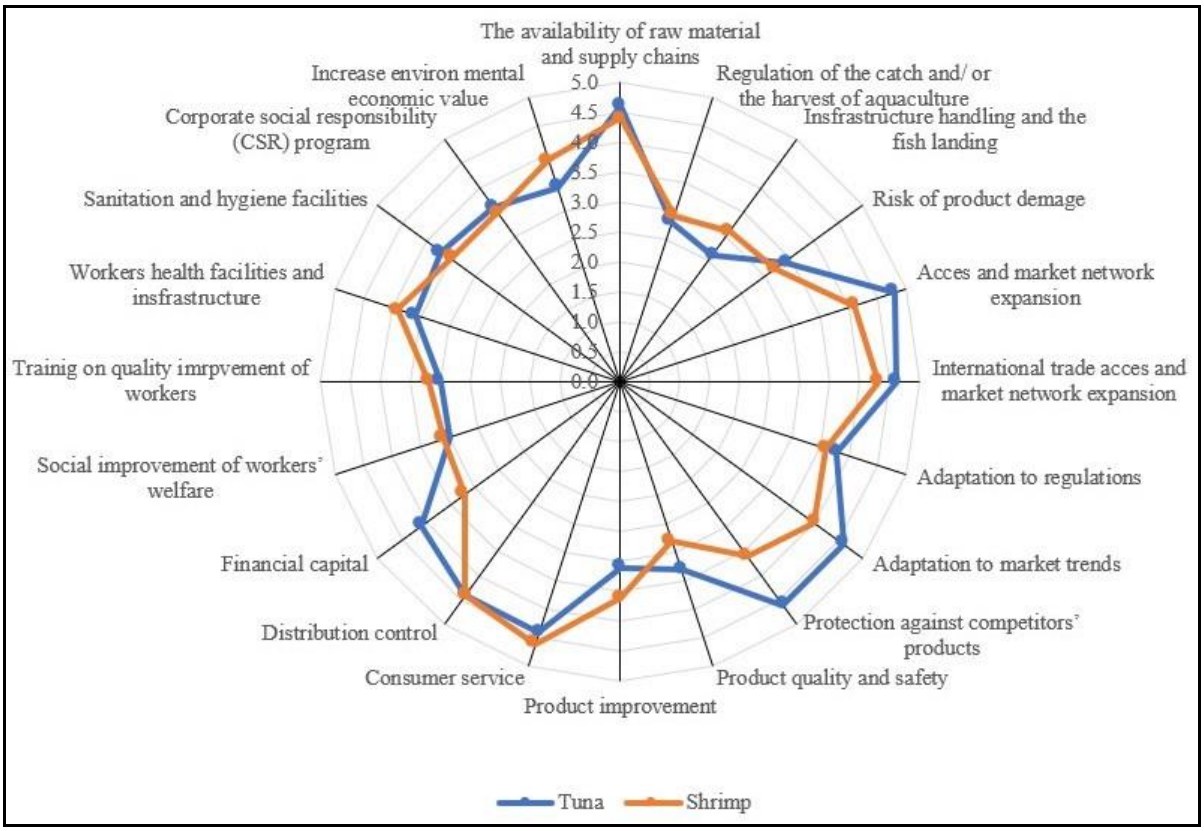

Figure 1. Central Java fishery industry performance map for the ASEAN market.

Ecological factors. Indicators of ecological factors included the availability and distribution channels of raw materials, as well as fishing and cultivation regulations. Production of fishery products in Central Java in 2019 from the capture fisheries sector was 446277 tons, while from the aquaculture sector the production reached 510324 tons. With this high production, the fishery industry had great potential for the ASEAN export

market, especially with shrimp and tuna products. The availability of raw material for shrimp products was not very affected by ecological issues such as overfishing, illegal fishing, and others. This was because shrimp is a fishery commodity that can be cultivated independently. Communities on the north and south coasts of Central Java independently have shrimp ponds with significant production, being able to supply Central Java's shrimp export needs reaching 34000 tons each year (SJTP 2020).

Unlike the case with shrimp exports, the development of the tuna industry faces global issues such as illegal, unreported, and unregulated fishing (IUU), environmental pollution, climate change, competition between tuna-producing countries, and others (Sunoko & Huang 2014). Indonesia is facing the problem of illegal fishing by foreign fishing vessels from Vietnam, Taiwan, Thailand, Cambodia, Japan, and Malaysia. This illegal fishing is carried out in territorial and archipelagic waters in Indonesia (Djunarsjah et al 2021). Collette et al (2011) reported that of 23 species of tuna, only a few have not been exploited. Meanwhile, 60% have been fully exploited and about 35% are overexploited, but the reporting is very little. Lack of facilities and human resources for maritime law enforcement will be a serious threat to the fishery industry in Central Java, especially for tuna fisheries, significantly decreasing the source of foreign exchange from the fisheries sector. Fishing vessels in Central Java are generally relatively small in size, so the fishing process is inefficient. In general, the supervision of marine and fishery resources in Central Java has not been functioning optimally. Regulatory oversight was still weak and, coupled with poor management, it will make it difficult to meet the challenging tuna export requirements of the Western and Central Pacific Fisheries Commission (WCPFC) and of the Indian Ocean Tuna Commission (IOTC) (Bailey et al 2015).

Shrimp and tuna are commodities whose export license has been widely opened by the Indonesian government, including to the ASEAN market. Based on Ministry of Maritime Affairs and Fisheries Regulation No. 18/PERMEN-KP/2018 (MMAF 2018), all types of Indonesian export shrimp and tuna are required to go through the fish quarantine process. This proposed some issues. On one hand, this activity will ensure the quality and safety of the exported products, while on the other hand it will prolong the export process, and increase costs. Central Java benefits from the presence of a port on the north coast directly facing ASEAN countries. This condition provided an advantage for the fishery industry in Central Java. Sitompul et al (2018) stated that the presence of ports had a positive effect on the flow of fisheries exports in Central Java. However, port infrastructure must be further improved to increase export efficiency. Indonesia's competitors, such as Malaysia, were also experiencing serious obstacles, where their fishery stocks had decreased significantly, while market demand had increased. Regulations related to tuna fishing in Malaysia have been also getting stricter, causing problems to local fishermen (Wong & Yong 2020). This condition had a positive impact on the Indonesian fishery industry.

Economic factors. Fishery industry players in Central Java pay special attention to infrastructure aspects both in the fishing and landing processes, the risk of product damage, product quality and safety, product development, financial capital for industry players, especially in small-scale industries. However, other economic aspects remain a concern and cannot be ruled out. The fishing and landing infrastructure in Indonesia was generally still far from optimal. Tuna infrastructure was of particular concern, while shrimp infrastructure is quite good. This deficient infrastructure greatly affected the quality of fishery end products, which results in increased commodity prices. In addition, Central Java fishery products still have difficulties competing in the ASEAN market. Fishermen directly responsible for the quality of fishery products have a low understanding of Good Manufacturing Practices (GMP), Good Handling Practices (GHP), and Hazard Analysis Critical Control Points (HACCP). The impact of low competitiveness will cause working spirit to decrease, accompanied by a decrease in income. The financial impact of the tuna industry is very good, but for the shrimp industry, it is a threat. Access to capital, especially for the small-scale shrimp industry, faces serious obstacles. Most fishermen have capital from the borrowing process. The relatively high credit

interest rate is one of the obstacles to the development of fisheries business in Central Java. As a result, the shrimp fishery industry, especially regarding fishermen, tends to be stagnant.

In addition, Central Java shrimp products still have difficulties competing due to the high use of chloramphenicol (CP) by fishermen (Suseno et al 2016). CP is used as an antibiotic in shrimp products, but consuming shrimp containing CP can cause anemia and cancer, considering that CP will settle and accumulate in the body (Conti et al 2015). The industry has made various efforts to minimize the existence of CP, starting from publicizing to fishermen and cultivators the dangers of CP. However, the use of CP is still high, considering that the supply of captured shrimp is greater than that of cultivated shrimp. The last step taken was the depuration process of shrimp before it is processed or sent to the factory. However, this activity require energy, time, and high costs (Suseno et al 2016). The latest report by Yusuf et al (2021) states that the competitive position of Indonesian shrimp exports (including Central Java) was very good in the Malaysian and Singaporean markets, where 5 out of 7 species of Indonesian shrimp have very good competitiveness. The main competitors of Indonesian shrimp in the ASEAN market were only Thailand and Vietnam (UN Comtrade 2021), while Malaysian shrimp did not have a good comparative advantage (Khai et al 2016). This condition was an opportunity for Central Java shrimp industry players to look to the ASEAN market as a future shrimp market, especially for preserved shrimp, while for the fresh shrimp market in ASEAN, Indonesia has to compete tightly with Malaysia and Thailand (Ismail & Abdullah 2013).

The tuna industry is facing problems related to mercury and histamine contamination. During 2017, there were 27 cases of rejection of Indonesian tuna by the European Union market (Irawati et al 2019). Apart from fish poisoning, mercury is also responsible for food poisoning. The presence of mercury in food products cannot be eliminated, so the prevention process can only be done through monitoring its distribution and content. Meanwhile, histamine was the main indicator of scombrotoxin poisoning. Scombrotoxin itself is a toxin produced by tuna and skipjack commodities (Lehane & Olley 2000). Tuna products exported to the European Union and the United States are often rejected because the histamine content in the products is quite high. According to Irawati et al (2019), apart from mercury and histamine, in several other cases of rejection of Indonesian tuna the causes were inadequate sanitation handling and non-maintenance of cold chains during the distribution process. In addition, the United States, China, and Japan apply the Non-Tariff Measures (NTM) regulations for Indonesian tuna, while the destinations of Vietnam and Singapore do not apply these regulations (Rindayati & Kristriana 2018). Another problem faced by Malaysia was that Malaysian fishery products experienced problems with microplastic waste. This momentum must be optimized considering that the contribution of Malaysian tuna in the ASEAN market is high (Karbalaei et al 2019). In addition, the impact of the pandemic had also hit the Malaysian fishery industry, considering that the small and medium enterprises (SMEs) contributed majorly to the fisheries sector (Waiho et al 2020).

Social factors. Broadly speaking, the social aspects of the fisheries industry in Central Java had a good score, and no bad assessment was seen. However, what is still a concern is improving the social welfare of workers and improving the quality of workers. Although several industries had implemented programs to improve the welfare and quality of workers, some fisheries industries still ignore this. Fishermen are informal workers, so the quality of workers is generally low. Remembering that being a fisherman does not require certain requirements and skills, their ability in terms of knowledge and skills in fishing management, business management, and post-harvest handling are highly dependent on the industry in which they work. Meanwhile, small-scale fishermen who operate independently did not have a strong bargaining value to determine the price of the fish caught. The government was expected to be present by providing adequate training, so that the ability of fishermen, especially small fishermen, could increase (Yusuf et al 2017). If these conditions are ignored, the productivity of aquaculture could decrease, fish could be more susceptible to disease, production costs could increase due

to higher feed conversion ratios, so in the long term, fishery business activities, especially aquaculture would suffer.

SWOT analysis. The mapping of performance indicators for the Central Java fishery industry produces several notes regarding strengths, weaknesses, opportunities, and threats for the development of fisheries industry strategies for entering the ASEAN market. The SWOT analysis from the mapping results was expected to be an important input in designing a strategy to increase the competitiveness of the Indonesian fisheries industry, especially for the ASEAN market. Table 2 presents a SWOT analysis of the Central Java fishery industry based on industry performance indicators.

Table 2

SWOT analysis of the performance of the Central Java fishery industry

No	*Factors*	*Performance indicators*
Strength	Strength – 1 (S1)	Access and market network expansion
	Strength – 2 (S2)	International trade access and market network
	Strength – 3 (S3)	Consumer service
	Strength – 4 (S4)	Distribution control
	Strength – 5 (S5)	Corporate social responsibility (CSR) program
Weakness	Weakness – 1 (W1)	Regulation of catch and/or harvest of aquaculture
	Weakness – 2 (W2)	Risk of product damage
	Weakness – 3 (W3)	Social improvement of workers' welfare
	Weakness – 4 (W4)	Training on quality improvement of workers
	Weakness – 5 (W5)	Sanitation and hygiene facilities
Opportunities	Opportunities – 1 (O1)	Adaptation to regulations
	Opportunities – 2 (O2)	Adaptation to market trends
	Opportunities – 3 (O3)	Product improvement
	Opportunities – 4 (O4)	Workers health facilities and infrastructure
	Opportunities – 5 (O5)	Increase environmental economic value
Threats	Threats – 1 (T1)	The availability of raw material and supply chains
	Threats – 2 (T2)	Infrastructure handling and fish landing
	Threats – 3 (T3)	Protection against competitors' products
	Threats – 4 (T4)	Product quality and safety
	Threats – 5 (T5)	Financial capital

The SWOT analysis showed that fishery products in Central Java have weaknesses, mainly in the regulation of fishing, product handling, improving facilities at the production site and the quality of workers. Considering the strengths and opportunities that exist, Central Java fishery products are expected to be able to enter the ASEAN market and increase competitiveness through alternative strategies (Table 3), one of which is improving regulations related to fishing, improving facilities and infrastructure as well as the ability or quality of workers according to market needs.

Table 3

Strategies alternatives

	Strategies alternatives
	SO strategies
1.	Expanding the export market to Southeast Asia by preparing quality products followed by improved customer service.
2.	Increase the resources owned so that they can read and meet the needs of the global market and develop products according to market needs.
3.	Increase the position of competitiveness by producing value-added products.
	WO strategies
4.	Adapt foreign regulations and eradicate illegal and unregulated fishing.
5.	Improving the quality of human resources through integrated and sustainable training with international standards.
6.	Increase value-added products, adoption, and modification of products from abroad.
7.	Improve worker facilities and infrastructure continuously and periodically.
8.	Improve the quality of worker welfare based on performance, provide bonuses and incentives for productive workers.
	ST strategies
9.	Use of fisheries resources in a balanced and sustainable manner.
10.	Maintain and restore biodiversity in the waters of the Central Java sea.
11.	Determine product quality and safety with global market standards.
12.	Improvement of small fishermen development and empowerment programs.
13.	Increase partnership efforts through mutually beneficial fisheries incubators.
	WT strategies
14.	The effectiveness of law enforcement is increased, followed by the provision of effective firm sanctions for regulatory violators.
15.	Improvement of fishing infrastructure, post-harvest handling to marketing.
16.	Protection of fish resources and the environment in a sustainable manner.
17.	Provide economic stimulus for small fishermen through profitable policies.

Note: SO - strengths-opportunities; WO - weaknesses-opportunities; ST - strengths-threats; WT - weaknesses-threats.

Conclusions. Various problems, both internal and external, must be seriously faced by the Central Java fishery industry to better compete on the export market, especially on the ASEAN market. Based on industry performance indicators, the lowest performance value comes from the factors of "regulation of catch and/or harvest of aquaculture" and "infrastructure handling and fish landing". These factors directly affect other factors, such as the risk of product damage, product quality and safety, sanitation, and hygiene facilities, the level of welfare of workers and the quality of human resources. An aggressive improvement needs to be carried out in all lines. Alternative strategies from internal industry must be considered by looking at the opportunities that exist. This condition must be achieved by the Central Java fishery industry to have a strong, better competitiveness in the ASEAN market.

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Conflict of Interest. The authors declare that there is no conflict of interest.

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