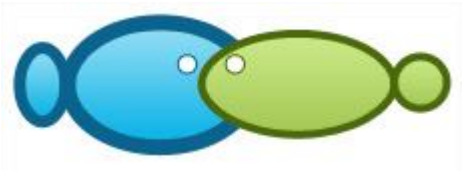

The strategy of capture fisheries development in Rembang Regency

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Abstract. Capture fisheries have a strategic value for the socio-economic development in Rembang Regency in terms of food security, employment, poverty reduction, and economic growth. This study aims to develop a strategy of capture fisheries development in Rembang Regency. The LQ (location quotient), SWOT (Strengths, Weaknesses, Opportunities, Threats), TOWS (Threats, Opportunities, Weaknesses, Strengths) matrix, and QSPM (Quantitative Strategic Planning Matrix) were used for primary and secondary data analysis. The primary data was obtained through observations and interviews. The interviews were conducted with 200 fishermen and 10 bureaucrats. The results revealed that Rembang Regency has 17 superior commodities of capture fisheries. Strategies to be conducted for the development of capture fisheries in Rembang Regency include institutional strengthening in fisheries management, fishery resources monitoring, human resource development, fishing port development (for artisanal and industrial fisheries), fish processing industry development, attracting investment, research and development, integrated public ports and industrial estates, coastal ecosystem management, construction of toll roads and railways, and promotion (for fishery products and business investment).
Key Words: LQ, QSPM, Rembang Regency, SWOT, stakeholder analysis, TOWS.

Introduction. Rembang is one of the Regencies on the northern coast of Java with a coastline length of 61.5 km (BPS-Statistics of Rembang Regency 2020a). The fisheries sector, including capture fisheries, is one of the major economic sources of Rembang Regency. The marine fishery products in Rembang Regency are the largest in Central Java Province (BPS-Statistics of Central Java Province 2021).

The marine and fishery business in Rembang Regency has large employment gains. There are 24,881 fishermen with marine-dependent livelihoods (Department of Marine Affairs and Fisheries of Rembang Regency 2020). The catch is used as raw material for the fish processing industry and trade. The combination of fisheries, agriculture, and forestry sectors is the largest contributor to Rembang Regency gross domestic product (GDP) by 25.02% (BPS-Statistics of Rembang Regency 2020b). Therefore, fisheries development including capture fisheries has a strategic role in the development of Rembang Regency.

The Rembang Regency's Regional Regulation Number 6 of 2019 describes that fisheries development (including capture fisheries) is one of the strategic sectors that becomes a priority in the development of Rembang Regency. According to Medeiros & van der Zwet (2020), success in development is affected by the strategy effectiveness. Strategy is an art and science in formulating, implementing, and evaluating decisions to achieve goals (David 2011). Strategy is required to efficiently achieve long-term goals (Oreski 2012). Development strategy provides direction for achieving development goals. Hence, the development strategy plays a crucial role in the regional development, including in Rembang Regency.

In determining the strategy, a comprehensive study with regard to external and internal environmental factors is needed. Internal environmental factors in fisheries development include fisheries resources, human resources, and infrastructures as input factors in fisheries development. Meanwhile, external environmental factors include market, competition, and social and political conditions that cannot be controlled by

fisheries stakeholders (Rimmer et al 2013; Wijayanto 2016). Several researchers including Rimmer et al (2013), Araya et al (2014), Nicholas & Gunalan (2015), Wijayanto (2016), Adeli et al (2020), and Kurohman et al (2020) have studied strategies of fisheries development. Thus, this study aims to develop strategies of capture fisheries development strategy in Rembang Regency.

Material and Method

Research location. This study was conducted in Rembang Regency from March to May 2021. Rembang Regency has several capture fisheries bases including Coastal Fishing Port (CFP) of Tasikagung (the largest fishing port in Rembang Regency), Fish Landing Place (FLP) of Tunggulsari, FLP of Tanjungsari, FLP of Pasar Banggi, FLP of Pangkalan, FLP of Pandangan, FLP of Karang Lincak, FLP of Karanganyar, and FLP of Sarang (Figure 1). Rembang Regency is located in the Central Java Province. The coordinates of Rembang Regency are at latitude 06°30' to 07°00' South, longitude 111°00' to 111°30' East (BPS-Statistics of Rembang Regency 2020b).

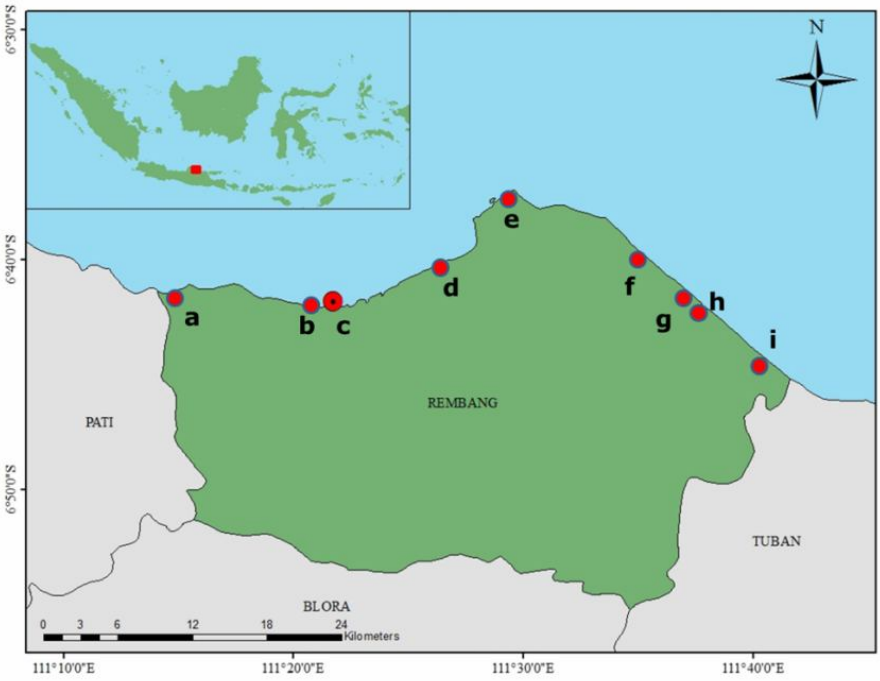

Figure 1. Rembang Regency map. Description: (a) FLP of Tunggulsari, (b) FLP of Tanjungsari, (c) CFP of Tasikagung, (d) FLP of Pasar Banggi, (e) FLP of Pangkalan, (f) FLP of Pandangan, (g) FLP of Karang Licak, (h) FLP of Karang Anyar, (i) FLP of Sarang.

Data collection. Observations, interviews, and literature study were done for data collection. Observations were conducted to fishing ports, fishing gears, boats, and catches. Interviews were conducted with 200 fishermen with various types of fishing gear. Discussions were done with 10 government officials from the Department of Marine Affairs and Fisheries of Rembang Regency. Analyses of relevant statistical data, documents, and publications were carried out as data collection.

Data analysis. This study used a quantitative descriptive analysis. We used the SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) and TOWS (Threats, Opportunities, Weaknesses, Strengths) to develop capture fisheries development strategies. SWOT is one of the most widely used methods in the strategy-making process (Oreski 2012). SWOT analysis started to develop in the 1950s with the increasing intensity of its use in research on strategy in time series (Ghazinoory et al 2011). In general, SWOT may produce four types of alternative strategies such as offensive, defensive, adaptive, and survival (Parraga et al 2014). We also used QSPM (Quantitative

Strategic Planning Matrix) to set the strategic priorities. Several studies have employed SWOT, TOWS, and QSPM in strategy development (Wijayanto et al 2019; Kurohman et al 2020). In this study, stakeholder mapping was conducted using stakeholder analysis. LQ (location quotient) was used to determine superior commodities through a comparison of marine fishery products in Rembang Regency and Central Java Province. LQ was performed using the database of marine fishery products (in kg) and the database of the value of marine fishery production (in IDR).

Results and Discussion

Fisheries resource. There are more than 35 types of fishery commodities of the fishermen from Rembang Regency (BPS-Statistics of Rembang Regency 2020a). Fishermen from Rembang Regency catch fish in the Java Sea and its surroundings of the FMA (fisheries management area) 712. An illustration of the potential fisheries resources in FMA 712 is depicted in Table 1.

Table 1

Potency, total allowable catch, and status of fisheries resource in FMA 712

Category	*Potency (tonnes)*	*Total allowable catch or TAC (tonnes)*	*Status*
Small pelagic fish	364,663	291,730	Over-exploited
Big pelagic fish	72,812	58,250	Fully-exploited
Demersal fish	657,525	526,020	Fully-exploited
Reef fish	29,951	23,961	Over-exploited
Shrimp	57,965	46,372	Over-exploited
Lobster	989	791	Over-exploited
Mud crab	7,664	6,131	Fully-exploited
Swimmer crab	23,508	18,806	Fully-exploited
Squid	126,554	101,244	Over-exploited

Source: Decree of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number 50 of 2017.

Referring to Table 1, the fisheries resources in FMA 712 are in the over-exploited and fully-exploited status. This is partly due to a large number of fishermen in FMA 712 (even the largest in Indonesia). In addition, the government of Indonesia has not played an optimal role in regulating it. The Indonesian government is weak in monitoring fisheries resources. Fishing practices in Indonesia have not strictly paid attention to the minimum landing size. TAC control has not been carried out.

Superior commodity. The results of the analysis of superior fishing commodities using LQ can be seen in Table 2. There are 17 types of fish having an LQ value of more than 1. An LQ value of more than 1 indicates that the commodity has a share of production above the average of other regions (Wahyudi 2017; Manullang et al 2019). This means that this type of fish (in percentage) is produced more in Rembang Regency than in Central Java Province. All coastal regencies on the northern coast of Central Java also exploit fish resources in FMA 712. However, they use various types of fishing gear. Fishermen fish based on experience (learning by doing). Each fisherman has distinctive habits and skills in catching fish. Changing fishermen's habits is doable but difficult. Intensive communication and convincing evidence are needed for coastal communities to accept change (USAID 2018).

An overview of the price and production of leading commodities of marine fisheries in Rembang Regency is delineated in Table 3. Shortfin scad is one of the superior products of marine fisheries with the largest production in Rembang Regency. Mini purse seine is widely used by fishermen in Rembang Regency to target small pelagic fish, including shortfin scad and fringescale sardinella. However, the prices of shortfin scad and fringescale sardinella are relatively moderate. Given the very high production, the processing industry for the shortfin scad and fringescale sardinella needs to be

developed in Rembang Regency. Currently, the two fish are processed into “pindang” (boiled salted fish) or exported as frozen fish.

Table 2

LQ value of superior commodities of marine fisheries in Rembang Regency

No	*Fish species*	*LQ production*	*LQ value*
1	Indian mackerel (*Rastrelliger kanagurta*)	3.29	4.47
2	Flathead grey mullet (*Mugil cephalus*)	3.20	4.28
3	Grouper (*Epinephelus* sp.)	3.09	2.99
4	Fourfinger threadfin (*Eleutheronema tetradactylum*)	2.87	3.28
5	Giant catfish (*Netuma thalassina*)	2.27	2.12
6	Asian seabass (*Lates calcarifer*)	2.14	1.36
7	Red big-eye (*Priacanthus macracanthus*)	1.87	2.05
8	Leaftail croaker (*Johnius trachycephalus*)	1.85	2.16
9	Stingray (*Dasyatis* sp.)	1.76	1.38
10	Longtail tuna (*Thunnus tonggol*)	1.56	2.09
11	Black pomfret (*Parastromateus niger*)	1.46	2.08
12	Redbelly yellowtail fusilier (*Caesio cuning*)	1.23	1.63
13	Ponyfish (*Leiognathus* spp.)	1.20	1.99
14	Kawakawa (*Euthynnus affinis*)	1.18	1.18
15	Yellowstripe scad (*Selaroides leptolepis*)	1.14	1.73
16	Fringescale sardinella (*Sardinella fimbriata*)	1.10	1.55
17	Shortfin scad (*Decapterus macrosoma*)	1.05	1.01

Description: production in kg, value in IDR.

Table 3

Production and Prices of Superior Marine Fisheries Commodities in Rembang Regency in 2020

Rank	*Production base*		*Price base*	
	Type of fish	*Production (kg)*	*Type of fish*	*Price (IDR per kg)*
1	Shortfin scad	12,611,607	Black pomfret	34,631
2	Fringescale sardinella	3,523,329	Yellowstripe scad	15,483
3	Leaftail croaker	2,289,974	Longtail tuna	14,206
4	Giant catfish	2,160,913	Indian mackerel	11,640
5	Red big-eye	2,146,439	Kawakawa	11,316
6	Grouper	2,103,179	Flathead grey mullet	7,000
7	Stingray	2,102,384	Red big-eye	7,000
8	Ponyfish	2,079,978	Shortfin scad	6,931
9	Longtail tuna	2,070,728	Redbelly yellowtail fusilier	6,770
10	Redbelly yellowtail fusilier	1,953,292	Giant catfish	6,145
11	Flathead grey mullet	1,700,298	Stingray	6,027
12	Fourfinger threadfin	1,660,673	Grouper	6,000
13	Yellowstripe scad	1,649,963	Asian seabass	6,000
14	Asian seabass	783,672	Fourfinger threadfin	5,939
15	Black pomfret	461,292	Leaftail croaker	5,886
16	Kawakawa	264,028	Fringescale sardinella	4,717
17	Indian mackerel	216,584	Ponyfish	4,053

Black pomfret is one of the superior fish commodities in Rembang Regency with a high selling price. However, its production is very small compared to shortfin scad. Therefore, the portfolio of marine fisheries industry development in Rembang Regency should be developed in the form of premium products with small amounts (for example black pomfret) as well as moderate products with a large amount of production (for example shortfin scad). Increasing added value and labor absorption are the main keys in developing the capture fisheries industry (Yusuf & Suyanto 2019), including in Rembang Regency.

Infrastructure. The infrastructure of the fishing industry in Rembang Regency is considerably adequate compared to regencies or cities on the northern coast of Java. Rembang Regency has 9 fishing bases. Some are no longer operating such as FLP of Pasar Banggi, FLP of Tunggulsari, and FLP of Karang Lincak. Some of these FLPs are fishing bases for artisanal fishermen. Meanwhile, the CFP of Tasikagung is an active fishing port and has even become one of the largest fishing ports in Central Java Province. CSP of Tasikagung's facilities is relatively adequate, including a pier, breakwater, fish auction place (FAP), fuel station, net repair workshop, fish drying area, ice factory, and other supporting facilities. However, industry players of fish processing in the CFP of Tasikagung need to be improved. The fish processing in Rembang Regency is still dominated by traditional processing. Ships based at CFP of Tasikagung are over 30 GT vessels with fishing gear such as Purse seine, Danish seine, and longline with a trip duration of 2 to 4 months (Wijayanto et al 2020).

Meanwhile, the FLP of Sarang, FLP of Karang Anyar, and FLP of Pandangan are 10 to 30 GT ship bases with the dominant fishing gear used are mini purse seines with a trip duration of 1 to 2 weeks (Wijayanto & Kurohman 2018). FLP of Tanjungsari is used as a base for boats measuring 5 to 10 GT (one-day fishing) with fishing gear used include 'arad' (very small trawl) and gillnets. Meanwhile, fishermen living around FLP of Tunggulsari, FLP of Pasar Banggi, FLP of Pangkalan, and FLP of Karang Lincak are mostly artisanal fishermen who use boats less than 5GT (one-day fishing) with fishing gears of 'bubu' (trap), gillnets, trammel nets, and 'arad'.

The supply of electricity, water, and communication networks in Rembang Regency is well fulfilled. Rembang Regency is also traversed by the North Coast road, which is one of the busiest trans-provincial routes in Indonesia. However, Rembang Regency is far from airports and public ports to support marine fishery product exports. The closest ports and airports to Rembang Regency are in Semarang City (118 km) and Surabaya (279 km). The railway passing Rembang Regency has been unused for a long time but currently, there is a plan for its reactivation (www.jatengprov.go.id).

Stakeholder mapping. The survey results with fishermen revealed that the important actors influencing the fishing community (Figure 2). They are the head of neighborhood or hamlet, village head, and religious leaders. For non-artisanal fishermen, large-scale fish traders and ship owners are the economically and socially influential actors. The patron-client is indeed common in Indonesia's fisheries. Meanwhile, according to the government official, other actors who also have a big influence include fisheries cooperative managers, fisher association leaders, NGOs director, politicians, and fish processing (big scale) owners. The results of stakeholder mapping are presented in Figure 3. All parties with an interest in the development of capture fisheries in the Rembang Regency need to be involved in planning, implementing, and evaluating the process.

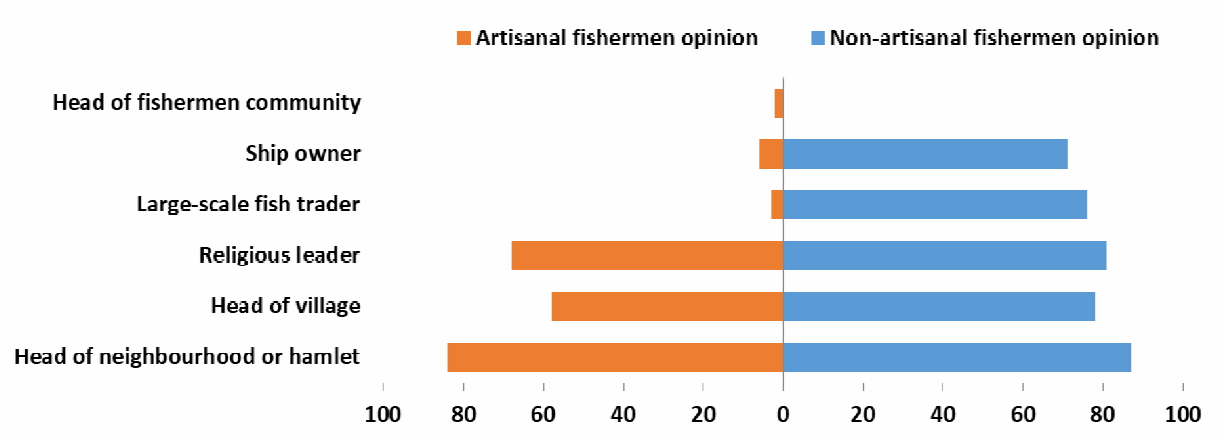

Figure 2. The survey result of influential actors.

Interest	High	• Small-scale fish traders; • Small-scale fish processors; • Artisanal fishermen; • Fishermen crew.	• Shipowners (large scale business); • Large scale fish traders; • Large scale fish processors; • Fishery company owner; • Fisheries cooperatives manager; • Fisherman union officials; • Government officials in the fisheries sector.
	Low	• Coastal residents (non-fisheries profession).	• Politicians; • Religious leaders; • NGO leaders; • Local formal leaders (head of the village, head of neighborhood, head of hamlet).
		Low	High
		Influence	

Figure 3. Stakeholder analysis.

Stakeholder participation is a key component in fisheries management (Krupa et al 2018). According to Medeiros & van der Zwet (2020), stakeholder involvement in strategic planning has a positive impact on increasing the effectiveness and efficiency of development strategies. Thus, development does require the support and participation of stakeholders. Several key actors need to get priority to be involved because they have high interests and influence such as large-scale business owners (ship owners, traders, and fish processors), fishery company owners, and formal leaders (cooperative managers and fisher association leaders). Even so, small-scale business actors need to be supported as well, among others, by reactivating the unused FLPs and fish auction places.

SWOT analysis

A. Strengths

1. Priority for policies to develop the fisheries sector. The policy for fisheries development in Rembang Regency became a priority of the Rembang Regency Government. There is a legal regulation that forms the basis for fisheries development in Rembang Regency at the national and regional levels. The Regional mid-term development plan of Rembang Regency has determined fisheries as a priority that has been stipulated in the Rembang Regency Regional Regulation Number 6 of 2019.
2. The availability of fishing ports (including fish auction places). The facilities in fishery ports in Rembang Regency are relatively more adequate than several other coastal regencies in Central Java Province. CFP of Tasikagung in Rembang Regency is one of the most active fishing ports in Central Java Province. The port facilities at CFP of Tasikagung are adequate as a base for industrial-scale fishing above 30 GT to 200 GT. There are also 3 FLPs that are also active, including FLP of Sarang, FLP of Kragan, and FLP of Pandangan. The three FLPs are the bases for fishing vessels measuring 20 to 30 GT using mini purse seine. However, it must be admitted, several small FLPs are no longer active, especially those serving artisanal fisheries.
3. The role of fisheries cooperatives. Many fishery cooperatives in Indonesia are not active. However, fisheries cooperatives in Rembang Regency are still active. The lethargy of fishery cooperatives in Indonesia is due to regional autonomy. After the issuance of the Regional Autonomy Law in 2014 (Law Number 23 of 2014), the management of Fish Auction Places (FAPs) does not have to be managed by fisheries cooperatives. Even though, FAP is one of the main sources of income for fisheries cooperatives. Prior to the enactment of the regional autonomy law, 144 fisheries cooperatives were managed by FAPs. However, in 2018 there were only

48 fishery cooperatives left (www.keuangan.kontan.co.id). Several fisheries cooperatives are still active in Rembang Regency, including the Fisheries Cooperative in FLP of Kragan, FLP of Sarang, FLP of Pandangan, and CFP of Tasikagung. Fishery cooperatives play a significant role in empowering small-scale fisheries business actors. According to Loera & Zulawska (2013), fisheries cooperatives can empower their members with the principles of togetherness, common interest, and cooperation. Fisheries cooperatives require active participation from their members.

4. A number of marine fisheries business actors. The number of marine fisheries business actors in Rembang Regency is relatively large. There are 3,849 fishermen (ship owners), 21,032 fishermen crew, and 1,523 fish traders (Department of Marine Affairs and Fisheries of Rembang Regency 2020). Continuity in production is affected by many factors, including the number of business actors.
5. Availability of supporting infrastructure. Industrial supporting infrastructure in Java, including in the Rembang Regency, is relatively adequate for fisheries industrialization in providing electricity, water, fuel, transportation, and communication. The electricity in Java and Bali is connected. According to the Strategic Plan of the Ministry of Energy and Mineral Resources for 2020-2024 (Minister of Energy and Mineral Resources Regulation Number 16 of 2020), Indonesia's electricity ratio continues to increase, it was 88.3% in 1985 to 98.9% in 2019, while in Java it had reached 100%, including Rembang Regency. Regarding the fulfillment of clean water needs, people in Rembang Regency use several water sources from wells and local water companies. There are 49 springs in Rembang Regency. The local water company in Rembang Regency has served 23,988 customers with a volume of water distributed 4,110,862 m^3 in 2019 (BPS-Statistics of Rembang Regency 2020b). Water desalination technology can be developed to meet the needs of clean water in coastal areas. Fuel supply in Java, including Rembang Regency, is relatively smooth with an affordable price. Roads in Rembang Regency are good since they are on the busiest transportation route among provinces in Indonesia.

B. Weaknesses

1. Several FLPs for artisanal fishermen are inactive. This condition could hamper the economy of artisanal fishermen. Therefore, FLP and FAP for artisanal fisheries need to be revived. This is essential for employment, economic growth, and poverty reduction.
2. Rembang Regency does not have a public port and airport to support national and international trade. If a business actor in Rembang Regency wants to export, they must send it via Semarang, Surabaya, or Jakarta (600 km). The Rembang Regency Government is trying to develop a public port in Sluke District. These ports will be used for inter-island services, not for international use. The policy of reviving the north coast railway in Central Java (which was active before Indonesia's independence) can be a solution for mass and freight transportation in Rembang Regency to Semarang City. This strategic infrastructure development provides an opportunity for the acceleration of development in Rembang Regency. In addition, there are plans to build toll roads from Semarang City, Demak Regency, to Tuban Regency that pass through Rembang Regency (www.esradiorembang.com). Thus, port and airport access in Semarang City will be smoother. Meanwhile, the Rembang-Pasuruan toll road was inaugurated on June 21, 2018, which can smooth the Rembang Regency route to Surabaya (www.cnbcindonesia.com).
3. Rembang Regency does not have an integrated fishing industry estate. In the medium-term development plan of Rembang Regency, there is an integrated industrial estate development plan that is synergized with the construction of the Sluke Port. If this is realized, it can increase the competitiveness of industries in the Rembang Regency, including the fisheries industry.

4. The number of large-scale modern fish processing companies is still small. Fish processing in Rembang Regency is dominated by traditional processing. Several types of processed fish products produced by Rembang Regency include salted fish, dried fish, boiled salted fish, smoked fish, shrimp paste, fish crackers, 'petis' (fermented fish or shrimp), and processed soft bone. Several fish processing industries that have the potential to be developed in Rembang Regency include canned fish, frozen fish, surimi, and fish fillets. Dried fish, salted fish, and boiled salted fish are the largest processed fish produced by fish processors of Rembang Regency (Department of Marine Affairs and Fisheries of Rembang Regency 2020).
5. Quality of human resources. The formal education of fisherman families tends to be low. This affects their mindset. The poverty in coastal communities is still a challenge for development in Indonesia, particularly in Rembang Regency. Coastal areas are included in the poverty zone. The percentage of poor people in Rembang Regency in 2019 was 9.8% (BPS-Statistics of Rembang Regency 2020b). The saving culture is still low. Fishermen are also part of society that is difficult to accept change.

C. Opportunities

1. Potential fisheries resources. The potential of fisheries resources in Rembang Regency is high, which is currently the largest marine fishery producer in Central Java Province. The marine fishery production of Rembang Regency has an increasing trend. In 2010, marine fishery production in Rembang Regency was 34.4 thousand tonnes, then increased to 54.7 thousand tonnes in 2019 (BPS-Statistics of Rembang Regency 2020a).
2. Market potential. The market potential for fishery products tends to increase locally, nationally, and globally. Fish consumption in Indonesia tends to increase in line with population growth and increase people's purchasing power. The total population of Indonesia has increased from 258.7 million in 2016 to 270.2 million in 2020. The purchasing power of the Indonesian people also increases as reflected from the GDP per capita of IDR 47.9 million per year in 2016 to IDR 56.9 million per year in 2020 (BPS-Statistics Indonesia 2021). Fish consumption per capita in Indonesia increases by 38.14 kg per capita per year in 2014 and to 46.49 kg per capita per year in 2017 (Ministery of Marine Affairs and Fisheries 2018a). Likewise, the world's apparent per capita fish consumption has also increased. In 2006, world fish consumption reached 111,697 thousand tonnes and is estimated to increase to 151,771 thousand tonnes in 2030 (The World Bank 2013).
3. The progress of communication technology and the internet. The progress of communication technology and the internet can be used to expand markets and promotion in national and global markets (Wijayanto 2016). Trade communication among regions and among countries has intensified with advances in communication technology and the internet. E-commerce has become a necessity for almost all business actors, especially those engaged in retail trade. According to Khan (2016), with E-commerce, buyers, and sellers get access to global markets. Buyers can compare prices and product quality using the internet. Likewise, sellers do not need to have physical stores to access global markets. This is an opportunity for fishery business actors in Rembang Regency to expand their marketing.
4. The advanced technology of capture fisheries production and fishery product processing. The technological development of capture fisheries can be optimized to encourage business efficiency. The use of appropriate technology has encouraged a more efficient use of energy. Energy costs are among the highest operational costs in fishing operations. The existence of fishing gear, GPS, and satellite has been able to reduce fishing costs per trip and increase the productivity of capture fisheries which in turn can increase fishermen's income and welfare (Araya et al 2014). The use of fishing gear technology can encourage more environmentally friendly fishing practices.

5. Political support. The fisheries sector in Rembang Regency has a significant contribution to regional gross domestic product and employment. This causes stakeholders to care about fisheries development, including politicians who have a strong influence in determining public policy.

D. Threats

1. Overfishing. Several fisheries resources in Indonesia are overfishing, including in FMA 712. There are still many fishermen on the northern coast of Java. The number of fishermen in Central Java Province is the largest in Indonesia (Ministery of Marine Affairs and Fisheries 2018b) and the northern coast of Java is the main fishing base for fishermen from Central Java Province (BPS-Statistics of Central Java Province 2020). Weak monitoring of fisheries resources in Indonesia results in uncontrolled exploitation.
2. Destructive fishing. The fishermen in Rembang Regency use non-selective fishing gear, including 'arad' (very small trawl) and Danish seine. This also occurs in several other water areas in Indonesia (Kurohman et al 2020; Muzakir & Suparman 2016; USAID 2018). This shows that the performance of the Indonesian government in managing and monitoring fisheries resources is still weak.
3. Conflict of interest in coastal areas. Coastal areas are prone to conflicts of interest, among others for fish and shrimp cultivation, salt production, fishing bases, fish processing, public ports, trade, settlements, and factories. Therefore an integrated spatial arrangement is needed, both in coastal and marine areas (Nurhidayah 2011).
4. Competition among regions, be it national and international. Pati Regency is a neighboring regency of the Rembang Regency. The marine fishery business in Pati Regency is also growing. There are also several areas on the coast of Java that increase the competitiveness of their marine fishery industry, including Demak Regency (86 km), Batang Regency (216 km), Pekalongan City (225 km), Tegal City (291 km), and Lamongan Regency (115 km). The business competition also occurs at the national and international levels with tighter competition, including for fishery commodities.
5. Patron-client relationship. The phenomenon of patron-client relationship occurs in the fishermen community in Rembang Regency. Artisanal fishermen depend on fish traders. If they need money, they borrow from fish traders, but as a consequences, they are obliged to sell the fish catch to fish traders to pay off debts. The fish selling price is determined by the fish trader. Patron-client relationship is a consequence of high-risk and uncertain fishing activities. For clients, patron-client relationship is considered social security. On the other side, patrons need clients for social, economic, and political interests. This phenomenon also occurs in various regions in Indonesia (Hefni 2009; Aida et al 2020; Kurohman et al 2020).

E. Alternative strategies. The right strategy of capture fisheries development can increase economic growth and employment. In 2019, the economic growth rate of Rembang Regency was around 5.2% per year and the unemployment rate was 5.3%. The poverty rate for the population of Rembang Regency was also high compared to Central Java Province and Pati Regency which is a neighbor of Rembang Regency (BPS-Statistics of Rembang Regency 2020b; BPS-Statistics of Central Java Province 2021). According to Rimmer et al (2013), capture fisheries play an important role for the Indonesian economy, including strengthening food security through primary production, a source of income for rural people, and a source of income from exports. Unfortunately, most of the capture fisheries in Indonesia are fully exploited and over-exploited. Overfishing is also a global fisheries problem. Therefore, the global development of the seafood industry needs to consider the condition of fisheries resources, fish processing capability, and growth in world fish consumption (Nicholas & Gunalan 2015). Optimizing the use of fish resources requires the participation of stakeholders, both local

government, central government, business actors, and the community (Muzakir & Suparman 2016). The results of the SWOT and TOWS matrix can be seen in Figure 4. Several alternative strategies in the TOWS matrix can be combined as long as they do not conflict, while the strategic priorities can be seen in Table 4.

	S (S1 to S5)	W (W1 to W5)
O (O1 to O5)	SO1. Development of fishing ports for industrial fisheries (S1, S2, S4, S5, O1, O2, O5); SO2. Institutional strengthening in fisheries management (S1, S3, S4, O1, O2, O5); SO3. Promotion (S1, O1, O2, O3).	WO1. Fishing port development for artisanal fisheries (W1, O1, O2, O5); WO2. Fish processing industry development (W3, O1, O2, O5); WO3. Construction of toll roads and railways (W2, O2, O5); WO4. Investor gathering (W2, W3, W4, O1, O2, O3, O4); WO5. Integrated public ports and industrial estates (W2, W3, O5).
T (T1 to T5)	ST1. Coastal ecosystem management (S1, T1, T2, T3); ST2. Research and development of innovative products and technologies (S1, T4).	WT1. Human resource development (W5, T1, T2, T4, T5); WT2. Monitoring of fisheries resources (W5, T1, T2).

Figure 4. TOWS matrix.

Table 4

Priority strategy

Priority	*Type of strategy*	*Score*
1	Institutional strengthening in fisheries management (code: SO2)	3.28
2	Monitoring of fisheries resources (code: WT2)	3.25
3	Human resource development (code: WT1)	3.24
4	Development of fishing ports for industrial fisheries (code: SO1)	3.11
5	Fishing port development for artisanal fisheries (code: WO1)	3.11
6	Fish processing industry development (code: WO2)	3.09
7	Investor gathering (code: WO4)	3.06
8	Research and development of innovative products and technologies (code: ST2)	3.03
9	Integrated public ports and industrial estates (code: WO5)	2.96
10	Coastal ecosystem management (code: ST1)	2.94
11	Construction of toll roads and railways (code: WO3)	2.81
12	Promotion (code: SO3)	2.76

Each stakeholder has a different opinion on strategic priorities. For artisanal fishermen, they consider that fuel subsidies need to be a priority because artisanal fishermen are the recipients of the fuel subsidy programs. Meanwhile, non-artisanal fisheries business actors who do not receive fuel subsidies think that this program is not a priority. Monitoring fisheries resources, building fishing ports, working capital loans, and scholarships for fishermen's children are considered to be priorities according to artisanal and non-artisanal fishermen. Meanwhile, according to fisheries bureaucrats, strategies related to limiting vessel permits, monitoring fisheries resources, revitalizing inactive fish auction places, counseling, training, promotion, conservation, and attracting investors are strategies that deserve priority. The construction of toll roads and railways is not considered a priority by artisanal fishermen, non-artisanal fishermen, and bureaucrats.

Fishery cooperatives can be used as a driving force in strengthening fisheries institutions. Cooperatives can be optimized to mobilize fishermen (Araya et al 2014). The cooperative principle is 'from the members, by the members, and for the members'. Fishery cooperatives can increase the bargaining power of fishery business actors with

small capital. Fishery cooperatives can provide micro-credit to avoid patron-client practices that are detrimental to fishermen. Fishery cooperatives can also become a marketing channel for fishermen catches and processed fish without becoming a major competitor for fish traders. Cooperatives can partner with modern market business actors and fish processing factories so that the principle of business equality occurs. Fishery cooperatives can provide saving so that micro-entrepreneurs wonted to saving. Fishery cooperatives can provide consumption and production needs for coastal communities, such as selling diesel fuel, fishing machines, ice cubes, fishery supplies, and shipyard services. Fishery cooperatives can manage pension funds for fishermen.

The government can implement a fisheries resource monitoring system (FRMS). Advances in communication technology and the internet can be used to monitor the exploitation of fisheries resources. TAC quotas and minimum sizes policies need to be implemented, even though fishermen wonted to conditions of open access and weak enforcement of regulations by the government. However, this is important in the long term (Wijayanto et al 2019). The provision of facilities (including patrol boats), human resources, and funds for monitoring and management of fisheries resources is urgent considering that several types of fish have been overexploited.

Human resource development is one of the keys to successful development. The abundance of natural resources will not be utilized optimally if the quality of human resources is not adequate. Human resource development can be done through education, counseling, and assistance. Several issues that can be selected to empower fisheries business actors include environmentally friendly capture fisheries practices, product quality improvement, saving habits, environmental sanitation improvement, and fishermen family business extension. Fishermen family businesses extension is needed to anticipate fishery scarcity. This alternative business can be related to fisheries or not by empowering fishermen's wives (Kurohman et al 2020). Scholarships for fishermen's children are needed to break the cycle of poverty. Improving the quality of education can increase productivity (Wekke & Cahaya 2015). Therefore, the development of vocational education for fisheries in the Rembang Regency is urgently needed.

Fishing ports need to be developed for the fishing industry and artisanal fisheries considering that ports have a central role in fishery economics. The management of fish auction place for artisanal fishermen needs to be taken over by the government considering that it is not profitable if it is managed by the private sector or cooperatives. Even though fish auction places can increase prices that are reasonable for the welfare of fishermen (Junaidi et al 2018). Port facilities for the fisheries industry need to be strengthened so that the industrialization of fisheries in Rembang Regency can be accelerated, including the land for fish processing factories, ship repair, and sewage treatment plant. The development of the fish processing industry is not only carried out for large-scale business actors, but also micro and small business actors for better economic structure. Thus, there is different types of processed products with traditional and high value-added. The development of the fish processing industry can use several superior fish commodities produced by fishermen in Rembang Regency. The development of the fish processing industry in an integrated industrial estate can increase the competitiveness of Rembang Regency so that investors are interested to invest. Integrated industrial estates need to provide complete packages to attract investors, including land, warehousing, drainage, industrial transportation (including public port, airport, train or toll road), clean water, electricity, public transportation, sewage treatment plan, green area, as well as daycare. The plan of the Rembang Regency Government to develop a public port in Sluke that is integrated with an industrial estate can be continued because it can increase its attractiveness to investors.

Local investors with limited capital can still attract national and international investors. However, it is necessary to regulate the types of investment that are allowed so that local business actors with small capital can develop their business. Some types of investment that can be offered by outside investors include the export-oriented fish processing industry, infrastructure facilities, ice factories, and cold storage which require large capital.

Regarding research and development of innovative products and technology, stakeholders in Rembang Regency can collaborate with universities and research institutions. The Rembang Regency Government can also optimize regional research and institutions to develop various innovations for processed fish products, market research, environmentally-friendly fishing gear, and coastal ecosystem restoration.

Stakeholders in Rembang Regency also need to protect small islands, coral reefs, mangroves, and nursery grounds. Some of the efforts that need to be done include coral transplantation of damaged coral reefs, making artificial coral reefs, and planting mangroves. This will improve the quality of the coastal ecosystem (Rahman & Pramanik 2015; Onrizal et al 2019). Artificial reefs and 'fish apartments' can serve as the nursery grounds for fish resources. This effort requires the involvement of community groups to develop in Rembang Regency.

The Rembang Regency Government needs to support the Indonesia Government program to build a toll road and railroad through the Rembang Regency. The industrial transportation system cannot only rely on the inter-provincial route (the north coast road). It causes a traffic jam and road damage which can lead to regional economic inefficiency. According to Albalate & Fageda (2019), public transportation is proven to have a positive impact in the form of efficient transport time and accident reduction. Regarding promotion, stakeholders in Rembang Regency can optimize the internet by creating attractive and informative websites. Various types of marine products, processed fish, and investment opportunities can be promoted. The website can also provide the latest product price information to expand the market beyond the local market. Promotion can also be done by participating in and holding exhibitions.

According to Adeli et al (2020), the right strategy for the development of capture fisheries in Rembang Regency is a combination of offensive (SO value is greater than WT) and competitive (WO value is greater than ST). Meanwhile, according to Parraga et al (2014), the right strategy for the development of capture fisheries in Rembang Regency is an adaptive strategy to capture prospective opportunities. In this study, the use of SWOT analysis does not choose a strategy of SO, ST, WO. or WT strategies. However, an integrative strategy can be carried out if the combination of strategies does not conflict with one another (Ghazinoory et al 2011). In this study, several of the resulting strategies can be combined because they are complementary.

Conclusions. This study proved that Rembang Regency has 17 superior commodities, including shortfin scad (the largest production) and black pomfret (the most expensive price). Several strategies that need to be carried out for the development of capture fisheries in Rembang Regency include institutional strengthening in fisheries management, monitoring fisheries resources, developing human resources, developing fishery ports (for artisanal and industrial fisheries), developing the fish processing industry, attracting investment, research and development, development of public ports, and integrated industrial estates, management of coastal ecosystems, construction of toll roads and railways, and promotion (fishery products and fisheries business investment)

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