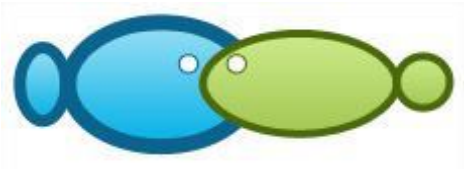

Financial analysis of the Danish seine fisheries business in Rembang Regency, Indonesia

Dian Wijayanto, Indradi Setiyanto, Hendrik A. Setyawan

Department of Capture Fisheries, Faculty of Fisheries and Marine Sciences, Diponegoro University, Prof Soedarto SH Street, Semarang, Indonesia, 50275.
Corresponding author: D. Wijayanto, dianwijayanto@gmail.com

Abstract. Danish seine ('cantrang') fisheries practices have become a sensitive issue in Indonesia because of conflicts between stakeholders, including in Rembang Regency. The ban of Danish seine has been declared by the Indonesian government. This is related to manage the sustainability of fish resources. Danish seine in Indonesia has been modified by fishermen to increase their fishing power and could be referred as a mini trawl. The purpose of this research was to make the financial analysis of Danish seine fisheries in Rembang Regency. The research was conducted through observation and interview to the representatives of Danish seine fisheries businessmen from 30 ships. In this research, we used CR (cost revenue) ratio in financial analysis. Our research results showed that the CR ratio of Danish seine fisheries based on the 'Tasik Agung' fishing port was 0.71 or equivalent to RC (revenue cost) ratio of 1.41. The relatively large income of owner, captain, technician and crews of Danish seine fisheries causes them to reject the regulation of Danish seine ban. Nevertheless, Danish seine fisheries practices still need to be controlled to protect the sustainability of fish resources in the long term and to protect the progress of artisanal fisheries.
Key Words: CR ratio, cost structure, Danish seine, profit sharing, Rembang Regency.

Introduction. Fisheries is one of the strategic sector for Indonesia. In 2016, the contribution of fisheries in GDP of Indonesia was 2.56% and the wild capture fisheries of Indonesia was the second largest in the world with the production value of 5.9 million tons (CEA 2018). The Danish seine ('cantrang') is one of main fishing gear that is used by Indonesian fishermen.

The Danish seine is an active demersal fishing gear and has a high fishing power (Herrmann et at 2016; Madsen et al 2017; Wijayanto et al 2019). Danish seine in Indonesia has been modified by fishermen and not suitable with Indonesian national standard, including in Rembang Regency. The modified Danish seine can be categorized as a mini trawl (Badan Standarisasi Nasional 2006; Riyanto et al 2011; Sasmita 2013; Adhawati et al 2017). Trawl is the most productive fishing gear to exploit a demersal fish stock (Purwanto 2015).

At the present, Danish seine fisheries practices have become a sensitive issue in Indonesia, including in Rembang Regency. The government of Indonesia through Ministerial Regulation No. 2/2015 has banned trawls and seine nets, including Danish seine. That is a consequence of the MMAF's (Ministry of Marine Affairs and Fisheries) policy, i.e. sovereignty, sustainability, and prosperity (CEA 2018). The modified Danish seine is categorized as unenvironment friendly fishing gear because it catches an unselected fish size. The modified Danish seine also could destruct the water substrate thus having a significant negative effect on the benthic environment (Adhawati et al 2017). The banning trawl has the multiple objectives, including to reduce a juvenile catch and reduce conflicts with other fishermens who use the passive gears, i.e. gill net, trammel net, hook and line (Wijayanto et al 2019). The modified Danish seine damages coral reefs and the seabed ecosystem (CEA 2018). Trawl also has a negative impact, i.e. bycatches, seafloor pressure and intensive fuel use (Hammarlund et al 2018). Bottom trawl is the major threat to the biodiversity of vulnerable deep-sea ecosystems (Gianni 2004).

However, the Danish seine ban is rejected by Danish seine fishermen, because economic reason (Adhawati et al 2017; CEA 2018). The purpose of this research was to make a financial analysis of Danish seine fisheries in Rembang Regency. The results of this study can provide an illustration of the impact of the Danish seine ban in Rembang Regency.

Material and Method

Description of the study site. The study was conducted from March to June 2019 in Rembang Regency. The main location of our research was at 'Tasik Agung' fishing port (Figure 1) as the fishing base of the industrial Danish seine fisheries (ships size over 30 gross tonage or GT) in Rembang Regency. We have collected data, both technical and business of Danish seine fisheries.

Figure 1. Map of Rembang Regency.

Data analysis. We have interviewed (in-depth interviews) 30 Danish seine fishermen (owners and captains). In-depth interviews can be used to obtain detailed information from respondents (Boyce & Neale 2006). We made observations in fishing base ('Tasik Agung' fishing port) and fishermen settlements. We have also conducted literature studies, both relevant research and documents, including statistical data published by the Marine and Fisheries Agency ('Dinas Kelautan dan Perikanan' or DKP) of Rembang Regency. We made financial analysis by collecting data on investment, working capital, revenue and also made analysis of cost revenue (CR) ratio.

The CR ratio is commonly used by researchers. Several researchers who used revenue cost (RC) ratio and CR ratio were including: Sutanto (2005), Pio et al (2016), Primyastanto (2016), Hapsari & Fitri (2016), Najamuddin et al (2017), Damayanti et al (2017), Batchimeg (2017) and Budiasa et al (2018). RC ratio is the opposite of CR ratio. The CR ratio formula is as follows:

$$\text{CR ratio} = \text{total cost} / \text{total revenue} \quad (1)$$

In this research, revenues and several type of costs were converted in units of 'IDR per trip'. The business of Danish seine fisheries is considered profitable if the CR ratio is less than 1.0. If using the RC ratio, the value greater than 1.0 is considered profitable. It means the revenue is greater than the cost.

Results and Discussion

The progress of Danish seine fisheries. Indonesian capture fisheries production tends to grow positively, but the growth rate of capture fisheries production is lower than aquaculture (CEA 2018). The production growth of Danish seine in Indonesia also has a positive trend. However, the Danish seine ban has caused a decline in Danish seine production, although several fishermen have ignored the rule of Danish seine ban and still use it. The progress of Danish seine fisheries can be seen in Figure 2. The number of Danish seine (unit) and its production in Rembang Regency decreased significantly in 2016. This was influenced by the Danish seine prohibition regulations issued in 2015.

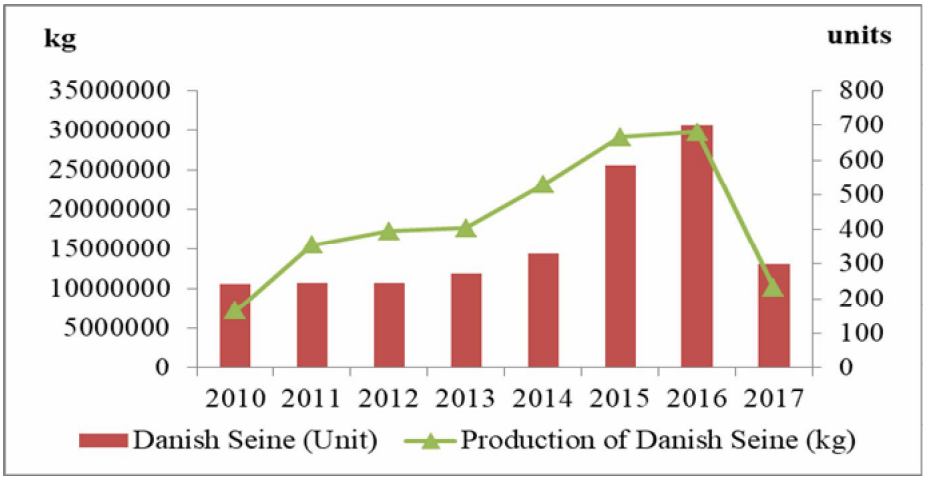

Figure 2. The progress of danish seine in Rembang Regency.

The Danish seine ban become sensitive issues between fishermen. The research of Andryana (2016) showed that non-Danish seine fishermen (especially artisanal fishermen) in Tegal City (a distance of 277 km from Rembang Regency) tended to agree toward the Danish seine ban (96.7% respondens), while Danish seine fishermen absolutely refused the Danish seine ban. The results of interviews in this research also showed that Danish seine fishermen rejected the ban of Danish seine. The ban of Danish seine was considered detrimental, both for owners and crews of Danish seine fisheries business. Moreover, several owners of Danish seine have credit at the bank for investment in Danish seine business (Suryawati & Pramoda 2015). The crews of Danish seine are workers with low education and limited skills, so it is not easy to switch to other professions (Sutanto 2005; Andryana 2016; Adhawati et al 2017).

Fish processing industries that depend on fish supply of Danish seine fisheries are also affected by Danish seine ban, especially in the short term. Likewise the supplier of production factors from Danish seine is also affected, such as supplier of rice, fresh water, energy for vessels, and including fish unloading and transportation services (Suryawati & Pramoda 2015). With broad and complex implications, that prohibition is rejected by the counter party, although it is also supported by the pro party (Wijayanto et al 2019). The ban of Danish seine has reduced the income of Danish seine fishermen, but also increased the income of non- Danish seine fishermen. And, the more severe physical degradation of ecosystems can be prevented through the Danish seine restriction (Suryawati & Pramoda 2015; Andryana 2016).

Based on the results of interviews, Danish seine fishermen want to continue to operate Danish seine because their catches are relatively stable and can be operated throughout the year as long as weather is not extreem (bad weather). Danish seine is actively sweeping fish resources in the sea waters. This is different from passive fishing gears that are more selective and more influenced by the fishing season, for example gill net, trap, longline and trammel net. Each type of fish has a migration pattern. On the coast of Java, the fishing season is also influenced by the monsoon (Sadhotomo 2007; Subarna 2018). With strong fishing power, Danish seine fisheries is considered profitable,

even though the selling price of fish is lower than the fish price that is caught from a more selective fishing gear.

The operation of Danish seine in Rembang Regency. The Danish seine fisheries in 'Tasik Agung' fishing port have vessels size over 30 GT. That vessels operate for 1 month per trip and 8 trips per year. The fishing ground of the Danish seine from Rembang Regency is in Fisheries Management Areas (FMA) of 712 (Java Sea). The composition of fish resources on the northern coast of Java (including Rembang Regency) is small pelagic fish of 39.3%, demersal fish of 27.6%, big pelagic fishes of 13.2%, molluscs 11.5%, crustaceans 5.1%, reef fish 2.9% and other aquatic animals 0.3%. Danish seine is the second largest producer in the northern coast of Java after purse seine as the largest. Several types of fish resources in FMA of 712 have also been overfishing, including types of fish caught with Danish seine, among others: *Rastrelliger brachysoma* (Yusrizal et al 2018).

The Danish seine vessels from Rembang Regency are operated by 15-20 men. The vessel is led by a captain, and assisted by one engineer. A portion of the fish catch from Danish seine is damaged because of the physical pressure during towing process of net. The composition of damaged fish can even reach 75% of the total catch (Tarsono & Prasetyo 2017). Therefore, the price of catch fish of Danish seine tends to be cheap even though the quantity of the catch is relatively large. According to respondents interviewed, the size of their vessels is in the range of 35 to 78 GT with a fish capacity around 20 to 50 tons per trip.

In the Danish seine fisheries of Rembang Regency, the profit sharing is based on gross income minus fuel, oil and consumption costs, namely 'raman bersih' (net income). Then, the owners get 50% of net income, while the captain, engineers and crews get 50% of net income. If the personnels of Danish seine are 20 person, then the profit sharing for all crews (non-owner) is divided into 23 parts. The captain get 3 parts, the engineer get 2 parts, while 18 crew members each get 1 part. That profit sharing is also used by the Danish seine fisheries in Pemalang Regency (Sutanto 2005).

The Danish seine operation begins with the process of finding a fishing ground. Then to be continue with setting process a net in the sea waters, then towing and hauling process. When towing, the net is pulled by a vessel, so that its operation is similar to trawling. Fish caught at the end of the towing process are still intact, while others tend to be damaged, especially fish caught at the beginning of the towing process. The Danish seine made by fishermen are adjusted to the size of ship and the fishing operation area. The Danish seine fishermen modified their tools by trial and error to increase the fishing power, including in Rembang Regency. Therefore, the shape and construction of Danish seine used by fishermen is very diverse (Sasmita 2013). The research of Sutanto (2005) has proven that the size of fishing gear and the amount of fuel have a significant impact on Danish seine fisheries production.

The Danish seine fishing power is high and it causes this gear to be a main fishing gear in various coastal areas in Indonesia. The Danish seine production in Demak Regency reached 50.15% of total production of demersal fish (Cahyani 2013). Whereas in Rembang Regency, Danish seine production was 27.89% (second largest), that the largest production of purse seine was 72.07% in 2017 (DKP Kabupaten Rembang 2017).
The type of fish that is caught by Danish seine is relatively varied, both demersal and pelagic fish. It means that the Danish seine has low selectivity level. The composition of Danish seine catches in Rembang Regency can be seen in Table 1. Based on the research of Cahyani (2013), the dominant type of fish that is caught by Danish seine in Demak Regency are *Leiognathus* sp., *Trichiurus* sp., *Scianidae* sp., *Upeneus* sp. and *Priacanthus* sp.. Several type of fish caught by is caught seine are under legal size. For example, the length at first maturity (Lm) for *Priacanthus tayenus* is 19.4 cm fork length (Nugroho et al 2016). The length at first maturity can be used to set a minimum size of fish can be caught (Triharyuni et al 2017).

The by-catch of Danish seine fisheries is relatively large. The Danish seine in Rembang Regency also tends to be complained by traditional or artisanal fishermen

because their catches tend to decrease with increasing Danish seine operations (Wijayanto et al 2018).

Table 1

The Danish seine catch composition in Rembang Regency, 2017

Aquatic animal type	*Production (kg)*	*Proportion (%)*
Priacanthus sp.	940,279	9.30%
Nemipterus sp.	780,843	7.72%
Lutjanus spp.	702,392	6.95%
Odontoglypis sp.	702,101	6.94%
Saurida sp.	664,790	6.58%
Leiognathus sp.	659,542	6.52%
Gerres sp.	659,463	6.52%
Caranx sp.	641,459	6.34%
Netuma sp.	639,536	6.33%
Gymnara sp.	632,872	6.26%
Cephalopholis sp.	630,072	6.23%
Selar sp.	214,768	2.12%
Megalaspis sp.	181,076	1.79%
Trichiurus sp.	107,594	1.06%
Johnius sp.	56,829	0.56%
Loligo sp.	43,516	0.43%
Amblygaster sp.	41,760	0.41%
Sphyraena sp.	35,971	0.36%
Coryphaena sp.	4,080	0.04%
Rastrelliger sp.	958	0.01%
Selaroides sp.	74	0.00%
Miscelaneous	1,769,932	17.51%

Source: DKP Kabupaten Rembang (2017).

Financial analysis. The investment cost of a Danish seine fisheries business based in the 'Tasik Agung' fishing port includes the procurement of ship, machineries, freezer, fishing gear and fishing aids. The biggest investment cost is the ship, with an average value of IDR. 765.5 million. The investment costs, asset depreciation, and asset maintenance can be seen in Table 2.

In cost per trip, the largest proportion of Danish seine fisheries costs are profit sharing, consumption and fuel cost. The average cost composition of Danish seine in Rembang can be seen in Table 3 and Figure 3. The result of this study is relatively similar to the research of Sutanto (2005) in Pemalang Regency, that the largest costs were fuel (33%), profit sharing (29%) and consumption (23%). Thus, saving energy costs will make significant cost efficiency. Therefore, the captain must be able to determine the fishing ground area optimally to make cost efficiency.

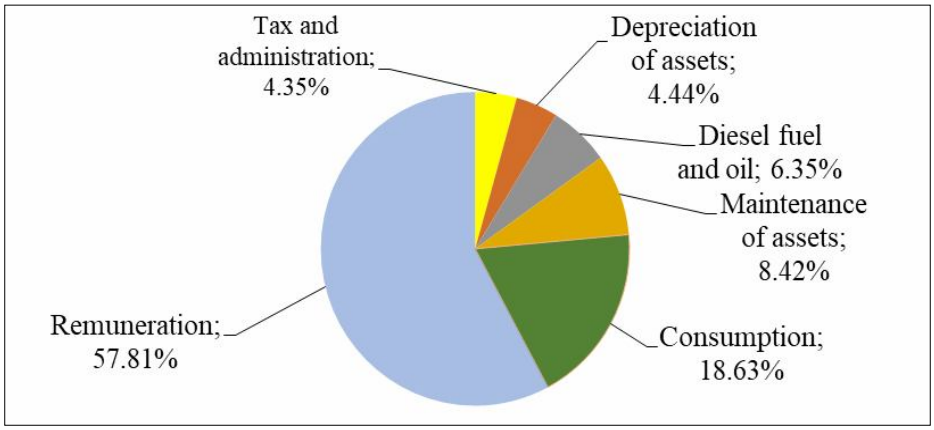

Figure 3. The composition of cost per trip.

Table 2

The cost structure

Type of costs	*Min*	*Average*	*Max*
Investment			
Vessel (IDR)	700,000,000	765,500,000	850,000,000
Main machine (IDR)	50,000,000	52,700,000	55,000,000
Supporting machine (IDR)	35,000,000	35,800,000	38,000,000
Freezer (IDR)	250,000,000	308,300,000	350,000,000
Fishing gear (IDR)	18,000,000	19,475,000	23,000,000
Fishing aids (IDR)	15,000,000	16,100,000	18,000,000
Assets depreciation			
Vessel (IDR per trip)	5,833,333	6,379,167	7,083,333
Main machine (IDR per trip)	625,000	658,750	687,500
Supporting machine (IDR per trip)	437,500	447,500	475,000
Freezer (IDR per trip)	3,125,000	3,853,750	4,375,000
Fishing gear (IDR per trip)	450,000	486,875	575,000
Fishing aids (IDR per trip)	375,000	402,500	450,000
Maintenance costs			
Vessel (IDR per year)	87,000,000	93,050,000	98,000,000
Machines (IDR per year)	30,500,000	33,560,000	38,000,000
Freezer (IDR per year)	25,000,000	30,830,000	35,000,000
Fishing gear (IDR per year)	6,500,000	7,450,000	9,000,000
Fishing aids (IDR per year)	1,500,000	1,960,000	3,000,000
Administration and licences costs (IDR per year)	15,000,000	18,375,000	23,000,000
Operational costs			
Diesel fuel (IDR per trip)	14,300,000	16,347,500	19,500,000
Oil (IDR per trip)	720,000	1,125,000	1,350,000
Consumption and others (IDR per trip)	43,000,000	51,300,000	59,000,000

Notes: assuming the economic life for ship of 15 years, engine of 10 years, freezer of 10 years, fishing gear of 5 years, and fishing aids of 5 years; the assumption of danish seine trip is 8 trips per year.

Table 3

Analysis cost and revenue

Costs, revenue, RC ratio and CR ratio	*Min*	*Avearge*	*Max*
Gross revenue (IDR 000 per trip)	321,281	387,111	415,875
Costs (IDR 000 per trip)			
Vessel depreciation	5,833	6,379	7,08
Main machine depreciation	625	659	687
Supporting machine depreciation	437	447	475
Freezer depreciation	3,125	3,854	4,375
Fishing gear depreciation	450	487	575
Fishing aids depreciation	375	402	450
Vessel maintenance	10,875	11,631	12,250
Machines maintenance	3,812	4,195	4,750
Fishing gear maintenance	812	931	1,125
Fishing aids maintenance	187	245	375
Freezer maintenance	5,000	6,166	7,000
Diesel fuel	14,300	16,347	19,500
Oil	720	1,125	1,350
Consumption and others	43,000	51,300	59,000
Administration and licences	1,875	2,297	2,875
Retribution or tax[1]	8,032	9,678	10,397
Profit sharing[2]	131,631	159,169	168,012
Total cost IDR 000 per trip)	231,091	275,314	300,280
Profit sharing (IDR 000 per trip per person)			
Owner (net income)	90,190	111,798	115,585
Captain	17,169	20,761	21,915
Engineer	11,446	13,841	14,610
Crews	5,723	6,920	7,305
RC ratio	1.39	1.41	1.38
CR ratio	0.72	0.71	0.72

[1]Retribution is calculated from 5% of gross revenue; [2]The basis for profit sharing is 50% of gross revenue that is reduced by costs of fuel, oil and consumption.

The average income of the crew is IDR. 6.9 million per trip. As a comparison, Andryana (2016) explained that the net income of Danish seine fishermen was IDR. 4,604,537 per month, while owner of IDR. 73,394,257 per month. The income of the crew is a relatively large because most of the Danish seine crew have low education. If the crew is working in a factory, the minimum wage in Rembang Regency is IDR. 1,660,000 per month. Therefore, Danish seine fishermen, both owner and crew, tend to reject Danish seine restriction because of economic motivation.

The average value of CR ratio of Danish seine fisheries is 0.71 or equivalent RC ratio of 1.41, that shows that Danish seine fisheries are profitable with high profit margins. The research result of Sutanto (2005) showed that the RC ratio for Danish seine fisheries in Pemalang Regency is 1.18 or equivalent to CR ratio of 0.85.

The problem of Danish seine fisheries in Rembang Regency shows again that fisheries resource management is a very complex problem (Padilla & Charles 1994; Évora 2016). It is important to maintain fish resources sustainability, alleviate the poverty, create the jobs, and supply food as the simultant process, but in the case of Danish seine fisheries in Indonesia it cannot be carried out jointly. For this reason, a consensus is needed between stakeholders, so that a win-win solution can be obtained, because it cannot absolutely satisfy all parties. However, it is recommended that Danish seine fisheries to be controlled for the long term interest and protect the artisanal fishermen (Wijayanto et al 2019). The control of Danish seine can be in the form of restrictions on fishing areas, size of fishing gear, methods of operation, and licences (number of fishing gears).

Conclusions. This reseach proved that the CR ratio of Danish seine fisheries (vessel size between 35-78 GT) in 'Tasik Agung' fishing port was 0.71 or equivalent to RC ratio of 1.41. Profit sharing, fuel and consumption costs have the largest proportion in the cost composition of Danish seine fisheries. The income of owner, captain, engineer and crews of Danish seine are relatively large so they tend to reject toward Danish seine ban. Nevertheless, Danish seine fisheries in Indonesia, including in Rembang Regency, still need to be controlled to maintain the sustainability of fish resources in the long term and protect the artisanal fishermen.

Acknowledgements. We would like to thank the Faculty of Fisheries and Marine Sciences, Diponegoro University, who has funded our research. We also thank to Aditya Dio and Ryo Firman as enumerators in our research.

References

Adhawati S. S., Baso A., Malawa A., Arief A. A., 2017 Social study of *cantrang* (Danish trawl) fisheries post Moratorium at Makassar Straits and Bone Gulf, South Sulawesi Province, Indonesia. AACL Bioflux 10(5):1140-1149.

Andryana M. R., 2016 [Fishermen adaptation strategy in facing Danish seine prohibition regulations]. Master Thesis, IPB University, 97 pp. [in Indonesian]

Badan Standarisasi Nasional, 2006 [Indonesian national standard forms of Danish seine construction]. SNI 01-7236-2006, Jakarta, Badan Standarisasi Nasional (BSN), 5 pp. [in Indonesian]

Batchimeg B., 2017 Financial performance determinants of organizations: the case of Mongolian companies. Journal of Competitiveness 9(3):22-33.

Boyce C., Neale P., 2006 Conducting in-depth interviews: a guide for designing and conducting in-depth interviews for evaluation input. Pathfinder International 16 pp.

Budiasa I. W., Santosa I. G. N., Ambarawati I. G. A. A., Suada I. K., Sunarta I. N., Shchegolkova N., 2018 Feasibility study and carrying capacity of Lake Batur ecosystem to preserve tilapia fish farming in Bali, Indonesia. Biodiversitas 19(2):613-620.

Cahyani R.T., 2013 [Study of the use of Danish seine on demersal fish resource conservation (analysis of dominant catches landed at Wedung fish landing place, Demak Regency)]. Master Thesis, Diponegoro University, 89 pp. [in Indonesian]

CEA, 2018 Trends in marine resources and fisheries management in Indonesia, a 2018 review. California Environmental Associates, 146 pp.
Damayanti H. O., Susilowati I., Boesono H., 2017 Analysis of squid net fisheries business production. Journal of Economics and Policy 10(1):30-47.
DKP Kabupaten Rembang, 2017 [Data of Fisheries, Rembang Regency, 2017]. (Unpublished). [in Indonesian]
Évora A. F. O., 2016 Bioeconomic analysis: a case study of the industrial pelagic fisheries in Cape Verde. United Nations University Fisheries Training Programme, Iceland (final project), 44 pp.
Gianni M., 2004 High seas bottom trawl fisheries and their impacts on the biodiversity of vulnerable deep-sea ecosystems. Report prepared for IUCN/the World Conservation Union, Natural Resources Defense Council, WWF International and Conservation International, 7 pp.
Hammarlund C., Jonsson P., Valentinsson D., Waldo S., 2018 Economic effects of reduced bottom trawling: the case of creel and trawl fishing for *Nephrops* in Sweden. Working Paper 2018:4, AgriFood Economic Centre, 24 pp.
Hapsari T. D., Fitri A. D. P., 2016 Technical and economic analysis of modified payang fishing gear in the fishing port of Tawang Beach in Kendal District, Indonesia. Aquatic Procedia 7:254-264.
Herrmann B., Krag L. A., Feekings J. P., Noack T., 2016 Understanding and predicting size selection in diamond-mesh cod ends for Danish seining: a study based on sea trials and computer simulations. Marine and Coastal Fisheries 8(1):277-291.
Madsen N. A. H., Aarsñther K. G., Herrmann B., 2017 Predicting the effect of seine rope layout pattern and haul-in procedure on the effectiveness of demersal seine fishing: a computer simulation-based approach. PLoS ONE 12(8):e0182609.
Najamuddin, Baso A., Musbir, Akmaluddin, Nelwan A., Sudirman, Hajar I., Palo M., Zainuddin M., 2017 Performance of fishing gear on skipjack tuna *Katsuwonus pelamis* in south Sulawesi, Indonesia. AACL Bioflux 10(2):164-171.
Nugroho D., Patria M. P. Supriatna J., Adrianto L., 2016 Biological characteristics on three demersal fish landed in Tegal, north coast of Central Java, Indonesia. Biodiversitas 17(2):679-686.
Padilla J. E., Charles A. T., 1994 Bioeconomic modeling and the management of capture and culture fisheries. NAGA, The ICLARM Quarterly 17(1):18-20.
Pio V. M., González-Poblete E., Pezzuto P. R., Wahrlich R., 2016 A cost-benefit analysis of three gillnet fisheries in Santa Catarina, Brazil: contributing to fisheries management decisions. Latin American Journal of Aquatic Research 44(5):1096-1115.
Primyastanto M., 2016 Feasibility study of fish capture with payang tool before using electronic onjhem FADS in Madura Strait Indonesia. IJABER 14(10):6615-6628.
Purwanto, 2015 Potential production of demersal fish stock in the Malacca Strait of Indonesia. Indonesian Fisheries Research Journal 21(1):45-52.
Riyanto M., Purbayanto A., Mawardi W., Suheri N., 2011 [Technical analysis on the operation of Danish seine net in Brondong waters, Lamongan Regency, East Java]. Buletin PSP 19(1):97-104. [in Indonesian]
Sadhotomo B., 2007 Size distribution of pelagic fishes in the Java Sea by means of target strength analysis. Indonesian Fisheries Research Journal 13(2):81-99.
Sasmita S., 2013 [Conformity of cantrang design and construction on 20 GT ships for operational performance improvement]. Sekolah Pascasarjana, Institut Pertanian Bogor, 111 pp. [in Indonesian]
Subarna D., 2018 The effect of monsoon variability on fish landing in the Sadeng Fishing Port of Yogyakarta, Indonesia. IOP Conference Series: Earth and Environmental Science 139(1):012027, 11 pp.
Suryawati S. H., Pramoda R., 2015 [Economic impact of enforcement of regulation of the minister of marine and fisheries No. 2 2015 operating activities against fishermen in Probolinggo cantrang, East Java]. Buletin Ilmiah 'Marina' Sosial Ekonomi Kelautan dan Perikanan 2(2):45-55. [in Indonesian]

Sutanto H., 2005 [Efficiency analysis of gillnet and Danish seine fishing gear (study in Pemalang Regency, Central Java)]. Master Thesis, Diponegoro University, 95 pp. [in Indonesian]
Tarsono A., Prasetyo S., 2017 [An alternative of environmentally friendly fishing gear as a replacement solution for Danish seine]. RISTEK: Jurnal Riset, Inovasi dan Teknologi 2(1):77-84. [in Indonesian]
Triharyuni S., Utama A. A., Zulfia N., Sulaiman P. S., 2017 [Composition, size distribution and length-weight relationships of some pony fishes (Leiognathidae) in Jakarta bay]. Bawal 9(2):75-83. [in Indonesian]
Wijayanto D., Bambang A. N., Kurohman F., 2018 [Bioeconomic modeling of multi-gears fisheries (case of Danish seine and gill net in Rembang Regency)]. Undip Press, 89 pp. [in Indonesian]
Wijayanto D., Sardiyatmo, Setyanto I., Kurohman F., 2019 Bioeconomic analysis of the impact of 'cantrang' (Danish seine) toward gill net in Pati regency, Indonesia. AACL Bioflux 12(1):25-33.
Yusrizal, Wiyono E. S., Simbolon D., Solihin I., 2018 Estimation of the utilization rate of fish resources in the northern coast of Java, Indonesia. AACL Bioflux 11(6):1807-1824.

Received: 11 June 2019. Accepted: 10 September 2019. Published online: 29 October 2019.
Authors:
Dian Wijayanto, Department of Capture Fisheries, Faculty of Fisheries and Marine Sciences, Diponegoro University, Prof Soedarto SH Street, Semarang, Indonesia, 50275, e-mail: dianwijayanto@gmail.com
Indradi Setiyanto, Department of Capture Fisheries, Faculty of Fisheries and Marine Sciences, Diponegoro University, Prof Soedarto SH Street, Semarang, Indonesia, 50275, e-mail: indradifpik@gmail.com
Hendrik Anggi Setiawan, Department of Capture Fisheries, Faculty of Fisheries and Marine Sciences, Diponegoro University, Prof Soedarto SH Street, Semarang, Indonesia, 50275, e-mail: hendrikanggisetyawan@gmail.com

How to cite this article:
Wijayanto D., Setiyanto I., Setyawan H. A., 2019 Financial analysis of the Danish seine fisheries business in Rembang Regency, Indonesia. AACL Bioflux 12(5):1823-1831.