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Productivity of Yellow fin Tuna (*Thunnus albacares*) catches on Hand line Vessels before the Continuation of the Covid-19 Pandemic in PPS Bungus West Sumatra Province

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ABSTRACT

Hand line is the simplest type of fishing gear. It consists of a fishing rod, fishing line, and weight or bait. The Coronavirus outbreak has had an impact on capture fisheries marketing, where fish prices have decreased by up to 50%. The purpose of this study is to determine whether there is an effect of the Covid 19 pandemic on the number of yellow fin tuna *(Thunnus albacares)* catches on hand line vessels at PPS Bungus, West Sumatra Province. Productivity of hand line trip and per crew in 2019 has the highest results and there is always a decrease in 2020, productivity per trip and crew in 2020 has decreased from 2019, again there is an increase in productivity results from 2020 - 2021 although not significant. The decline in average productivity from 2019 - 2021 is the impact of the Covid 19 Pandemic, and the factors for the decline in catch productivity are the fishing season, bad weather so that the water conditions are murky (brown) which makes it difficult to catch.

Keywords: Productivity, Long line, Fishing Gear

1. INTRODUCTION

Fisheries resources are one of the great assets owned by Indonesia. Indonesia is known as a maritime country and an archipelago with vast marine waters. Indonesia's fisheries production has continued to increase since the period from 2011 to 2018 with an average growth of 4.4%. Indonesia's fisheries production since 2011 amounted to 5.3 million tons/year and increased to 6.7 million tons/year in 2018 (KKP, 2018).

Bungus Ocean Fishing Port (PPS) is located in Bungus Barat Village, Bungus Teluk Kabung District, Padang City, West Sumatra Province. Geographically, PPS Bungus is located at coordinates $01^0$00' 023- $01^0$00' 15"LS and $100^0$00' 233-100^0 00'34" East. One type of fish that is widely taught in West Sumatra waters is yellow fin tuna, which is one type of tuna that is widely taught in West Sumatra waters and includes a type of tuna that has good quality in West Sumatra Waters (Kantun & Mallawa, 2015). One of the sources of foreign exchange for the Indonesian State from the fisheries sector is the catch of tuna fish. Tuna fish is ranked as the second largest contributor to foreign exchange from the fisheries sector after shrimp (Widianto & Nikijuluw, 2003).

Capture fisheries productivity is the productivity (vessel/boat) of capture fisheries, which is the level of ability of fishing vessels to obtain fish catch per year. Hand line is one type of fishing gear that is often used by West Sumatra fishermen to catch fish at sea. The main structure of hand line fishing gear consists of a fishing line, swivel, fishing line, weight, and bait.

According to the Directorate General of Disease Prevention and Control 2020. During the Covid-19 pandemic, to prevent a greater impact on people's lives, the Indonesian government prepared various steps to implement the Covid-19 health protocol. The Coronavirus outbreak has impacted the marketing of capture fisheries, where fish prices have decreased by up to 50%. The impact of the Covid-19 pandemic that is most felt by capture fisheries business actors such as fishermen and marketers of capture fisheries products is the decline in fish prices, higher operational costs, capture fisheries products that are difficult to sell due to limited access to transportation and physical distancing and regional quarantine in several areas so that

many markets and restaurants are closed or limit their operational time, which results in a decrease in demand for capture fisheries products (Nurhayati *et al.* 2020).

2. RESEARCH METHODS

Capture fisheries productivity includes the input/output ratio approach, the input/output ratio approach is the simplest measurement model, and the data obtained is measured and calculated using a formula (Gaspersz, 2000):

$$\text{Productivity} = \frac{\text{Output produced}}{\text{Input used}}$$

Description:

Output produced : the amount of catch obtained

The input used : number of trips and number of crew members

Based on the formula above, the productivity calculation is done to find out:

$$\text{Productivity} = \frac{\text{Output}}{\sum \text{trips/year}}$$

$$\text{Productivity to crew} = \frac{\text{Output}}{\sum \text{ABK/year}}$$

After obtaining the production value, the correlation value is calculated to see the level of effectiveness of the correlation between the variables used with the correlation interpretation criteria, according to Sugiyono (2010) as follows:

Table 1. Coefficient interval

Coefficient Interval	Relationship Level
0,00 - 0,199	Very Weak
0,20 - 0,399	Weak
0,40 - 0,599	Medium
0,60 - 0,799	Strong
0,80 - 1,000	Very Strong

The results of the analysis then use the normality test method and paired samples test or T-test with the SPSS application to determine whether there are differences in the two samples from before the ongoing Covid-19 pandemic and then discussed using supporting data and existing literature.

Normality Test

Ghozali (2016) states that "to detect data normality, it can also be done with non-parametric statistics with the Kolmogorov-Sminorv test". Data normality aims to test whether, in a regression model, the dependent variable, independent variable, or both have a normal or near-normal distribution.

The supporting data obtained is displayed in the form of tables and graphs showing the number of catches from 2019 to 2021 and can be compared to the number of catches per year. The form of relationship between supporting data and time efficiency will be seen through regression equations using Microsoft Excel.

3. RESULT AND DISCUSSION

Hand line or Reel Fishing Fleet

The hand line fishing fleet located at Bungus Ocean Fishing Port based on logbook data starting from 2019 to 2021 is 173 fleet units, in 2019 there were 79 vessels, in 2020 there were 45 vessels and in 2021 there were 73 vessels making catches. The size of hand line vessels located at Bungus Ocean Fishing Port averages 26 and 30 Gross Tonnage (GT). The sample of hand line vessels studied amounted to 7 sample vessels, because of all hand line vessels operating at PPS Bungus, only the 7 vessels were actively catching in the 3 years from 2019-2021. Can be seen in Table 2.

Table 2. Handline vessels

No.	Respondents	Ship Tonnage (GT)
1	KM Tiar Jaya 01	30
2	KM Purse Seine 01	26
3	KM Purse Seine 02	26
4	KM Wilujeng	30
5	KM Tiar Jaya 02	30
6	KM Bina Sumber Jaya	30
7	KM Bahana Marine	30

Hand line vessels located at Bungus Ocean Fishing Port usually fish for yellow fin tuna for 10-15 fishing days. Hand line boat fishermen make trips or catches in a month 1-2

times and sometimes in a month, no one makes a catch due to weather and internal factors from the ship owner himself. Usually, hand line boats operate fishing gear at night until morning starting from 19.00 WIB - 07.00 WIB. The hand line is the simplest type of fishing gear. Consists of fishing rods, fishing lines, and weights or bait.

Fishing Line Catch

The catch of hand line fishing landed at the Bungus Ocean Fishing Port of West Sumatra based on 2019, 2020, and 2021 logbook data is the type of yellow fin tuna, which is one of the main catches in hand line fishing gear, even yellow fin tuna landed at the Bungus Ocean Fishing Port of West Sumatra is exported abroad with a high value, the catch of yellow fin tuna hand line vessels in 2019 reached 434.145 tons/year, with a production value of IDR 21,890,479,500, in 2020 it reached 147,696 tons/year, with a production value of IDR 5,875,056,000 and in 2021 it reached 158,281 tons/year, with a production value of IDR 21,890,479,500. IDR 21,890,479,500, in 2020 it reached 147,696 tons/year, with a production value of IDR. 5,875,056,000 and in 2021 it reached 158,281 tons/year, with a production value of IDR 5,935,265,00.

Productivity of Yellow fin Tuna Hand line Vessels

Hand line fishing productivity is the production capability of hand line fishing gear in time, volume, and effort. Catch or production per unit of effort is a value that reflects the productivity of the hand line fishing fleet in Bungus, West Sumatra. Capture fisheries productivity includes productivity per trip or CPUE and productivity per crew. Calculations were taken from 7 sample vessels in 3 years, namely 2019, 2020, and 2021, to compare productivity results between before the pandemic and the pandemic. These 7 vessel samples were taken by taking into account the representation of the entire size of the hand line vessel fleet at Bungus Ocean Fishing Port, West Sumatra.

Hand line Vessel Productivity

The productivity of hand line tuna vessels at Bungus Ocean Fishing Port, West Sumatra Province in 3 years, namely 2019, 2020, and 2021, the productivity results of the three years are different, the productivity of tuna hand line vessels varies every year or month due to weather factors or the tuna season itself, for more details, a comparison of the number of productivity results of yellow fin tuna hand line vessels starting from the total value of fish production can be seen in Table 3.

The value of yellow fin tuna production on hand line vessels was the largest in 2019 with a value of IDR 10,546,345,600, - and decreased considerably in 2020 amounting to IDR 4,659,536,000, after which it increased slightly in 2021 with a value of IDR 4,754,905,000, -.The total catch of Yellow fin Tuna on hand line Vessels 2019-2021 can be seen in Table 4.

The value of yellow fin tuna catches on 7 hand line vessel samples has a different IDR/kg value, for 2019 the highest IDR/kg value is IDR 60,304/kg and the smallest is IDR 44,759/kg, and in 2020 the highest value is IDR 45,000/kg and the lowest is IDR 32,168/kg while in 2021 the highest value is IDR 41,000 / kg and the lowest is IDR 35,000/kg, there is a decrease in the number of fish prices/kg in 2020.

Table 3. Production value of yellow fin tuna on hand line vessels 2019-2021

Ship Name	GT	Production Value (IDR)		
		2019	2020	2021
KM Wilujeng	30	3.649.076.500	-	1.149.988.000
KM Purse seine 01	26	1.077.075.000	885.864.000	829.069.000
KM Purse seine 02	26	1.332.535.000	989.680.000	911.240.000
KM Tiar jaya 01	30	1.975.758.500	553.515.000	-
KM Tiar jaya 02	30	1.678.275.800	1.026.185.000	822.323.000
KM Bina sumber jaya	30	542.851.600	466.160.000	807.209.000
Bahana marine	30	290.773.200	738.132.000	226.076.000
Total		10.546.345.600	4.659.536.000	4.745.905.000

Table 4. Total catch of yellowfin tuna on *handline* vessels 2019-2021

Ship Name	GT	Catch (kg)		
		2019	2020	2021
KM Wilujeng	30	69.365	0	30.872
KM Purse seine 01	26	23.935	24.598	22.376
KM Purse seine 02	26	29.625	26.333	24.738
KM Tiar jaya 01	30	37.925	12.606	0
KM Tiar jaya 02	30	32.575	24.402	21.991
KM Bina sumber jaya	30	10.308	10.931	21.354
Bahana marine	30	6.243	17.636	5.617
Total		209.976	116.506	126.948

Table 5. Number of hand line vessel trips 2019-2021

Ship Name	GT	Number of Trips		
		2019	2020	2021
KM Wilujeng	30	9	0	16
KM Purse seine 01	26	16	18	17
KM Purse Seine 02	26	19	16	18
KM Tiar Jaya 01	30	9	4	0
KM Tiar Jaya 02	30	5	5	14
KM Bina Sumber Jaya	30	4	4	13
Bahana marine	30	3	5	4
Total		65	52	82

Productivity per Trip Hand line Vessel

The productivity of a hand line fishing unit per trip is the ability of a hand line fishing unit to produce fish per trip, meaning the amount of fish catch produced by each time a hand line vessel deploys fishing gear (Rajagukguk, 2018). Productivity per trip 2019-2021 can be seen in Table 6.

Table 6. Trip count productivity 2019-2021

No.	Ship Name	Productivity per Trip of Hand line Tuna Vessels at PPS Bungus		
		2019	2020	2021
1	KM Wilujeng	405,452,944.44	-	71,874,250.00
2	KM Purse Seine 01	67,317,187.50	49,214,666.67	48,768,764.71
3	KM Purse Seine 02	70,133,421.05	61,855,000.00	50,624,444.44
4	KM Tiar Jaya 01	219,528,722.22	138,378,750.00	-
5	KM Tiar Jaya 02	335,655,160.00	205,237,000.00	58,737,357.14
6	KM Bina Sumber Jaya	135,712,900.00	116,540,000.00	62,093,000.00
7	Bahana Marine	96,924,400.00	147,626,400.00	56,519,000.00
Total Amount per Year		1,330,724,735.22	718,851,816.67	348,616,816.29
Average Amount per Year		190,103,533.60	102,693,116.67	49,802,402.33

There is a comparison of the productivity of the number of trips from 2019 - 2021 with the highest productivity of the number of trips on 7 sample vessels in 2019 with a total production value of IDR 1,330,724,735.22 and the lowest productivity of the number of trips on 7 sample vessels in 2021 with a total production value of IDR 348,616,816.29. The data (Table 6) above are tabulated in graphical form, which can be seen in Figure 1.

Productivity per trip of hand line tuna vessels at Bungus Ocean Fishing Port in 2019 is the highest value between 2020 and 2021; in 2021 the productivity results per trip of hand line tuna vessels are the smallest.

Productivity per Hand line Vessel Crew

The number of crew members does not have a significant effect on the catch. Thus, increasing the number of crew members will not necessarily increase production/catch. In general, the results obtained show that the amount of productivity per crew member produced is not directly proportional to the

number of crew members dispatched (Suryana *et al.* 2013). The number of crew members on hand line vessels can be seen in Table 7.

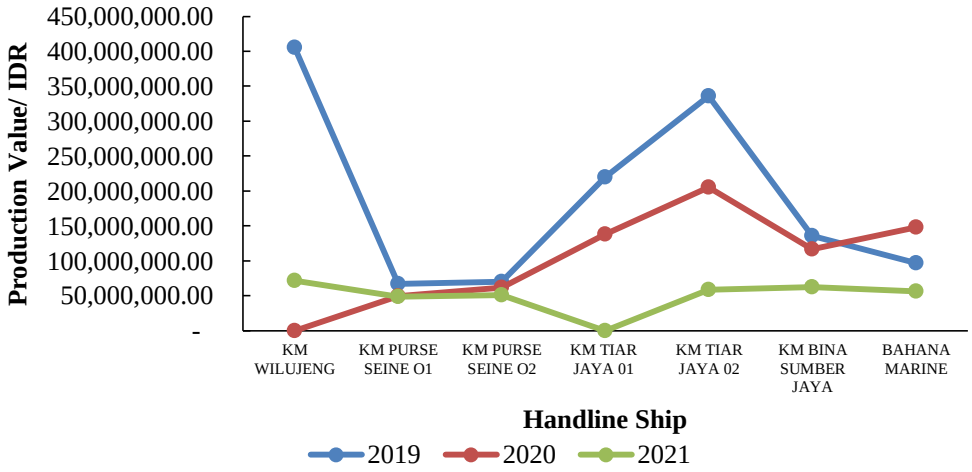

Figure 1. 2019-2021 Productivity per trip graph

Table 7. Number of crew on *handline* vessels 2019-2021

Ship Name	GT	Number of children with disabilities (people)		
		2019	2020	2021
KM Wilujeng	30	58	0	48
KM Purse Seine 01	26	56	62	52
KM Purse Seine 02	26	63	50	52
KM Tiar Jaya 01	30	48	31	0
KM Tiar Jaya 02	30	32	29	56
KM Bina Sumber Jaya	30	22	13	60
Bahana Marine	30	16	31	11
Total		295	216	279

The number of crew members in Table 14, in 2019 was 295 people, then decreased in 2020 by 216 people and increased again in 2021 by 279 people. To find out the value of productivity per crew member in 2019-2021 can be seen in Table 8.

Table 8. Crew Productivity 2019-2021

No.	Ship Name	Productivity per *Handline* Tuna Vessel Crew at PPS Bungus		
		2019	2020	2021
1	KM Wilujeng	62,915,112.07	-	23,958,083.33
2	KM Purse Seine 01	19,233,482.14	14,288,129.03	15,943,634.62
3	KM Purse Seine 02	21,151,349.21	19,793,600.00	17,523,846.15
4	KM Tiar Jaya 01	41,161,635.42	17,855,322.58	-
5	KM Tiar Jaya 02	52,446,118.75	35,385,689.66	14,684,339.29
6	KM Bina Sumber Jaya	24,675,072.73	35,858,461.54	13,453,483.33
7	Bahana Marine	18,173,325.00	23,810,709.68	20,552,363.64
Total Amount per Year		239,756,095.31	146,991,912.48	106,115,750.36
Average Amount per Year		34,250,870.76	20,998,844.64	15,159,392.91

There is a comparison of the productivity of the number of crew members from 2019 - 2021 with the highest crew productivity on 7 sample ships in 2019 with a total production value of IDR 239,756,095.31 and the lowest crew productivity on 7 sample ships in 2021 with a total production value of Rp. 106,115,750.36. The data (table 7) above are tabulated in graphical form, which can be seen in Figure 2.

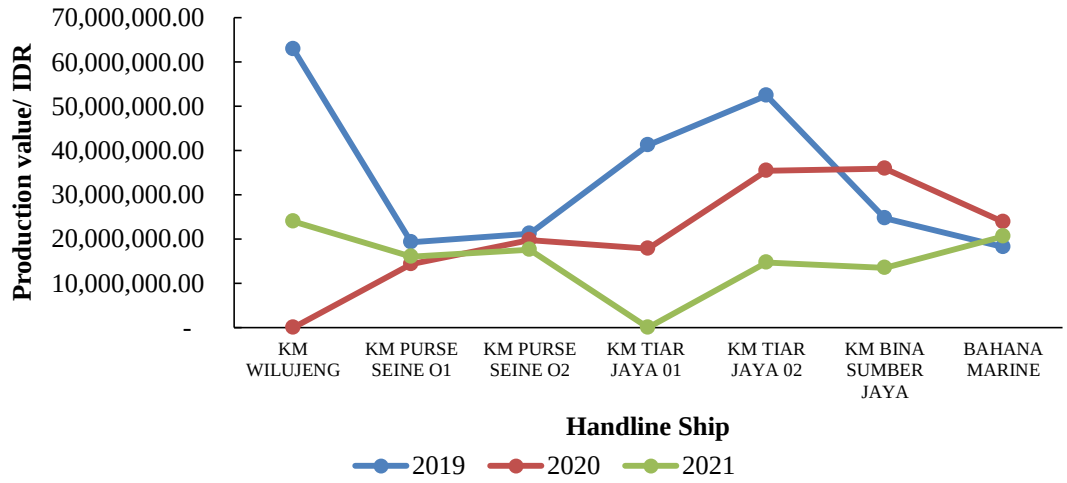

Figure 2. Productivity graph per crew 2019-2021

Productivity per crew at Bungus Ocean Fishing Port starts from 2019 - 2021, 2019 is the highest year of productivity value per crew compared to 2020 and 2021, while in 2020 the value of productivity per crew decreases slightly and in the third year or 2021 is the year with the lowest productivity value per crew of the three years.

4. CONCLUSIONS

Based on the productivity data above, the productivity results of the hand line trip and per crew in 2019 have the highest results and there is always a decrease in 2020, productivity per trip and crew in 2020 has decreased from 2019, and there is again an increase in productivity results from 2020-2021 although not significant. The decline in average productivity from 2019 - 2021 is the impact of the Covid 19 Pandemic, but the impact of the Covid 19 Pandemic on productivity lasts until the lockdown period is over because the yellow fin tuna caught will be exported abroad so there are obstacles from abroad to receive yellow fin tuna catches because the catch comes from outside, the biggest factor in the decline or change in productivity and catches is the fishing season, bad weather so that the water conditions are murky (brown) which makes it difficult to catch, then the number of ship trips also has a big effect on productivity results.

REFERENCES

[KKP] Kementerian Kelautan dan Perikanan Republik Indonesia. (2018). *Sistem Informasi Diseminasi Data dan Statistik Kelautan dan Perikanan*.

Gaspersz, V. (2000). *Manajemen Produktivitas Total*. Jakarta: Penerbit PT. Gramedia Pustaka Utama.

Ghozali, I. (2016). *Aplikasi Analisis Multivariete dengan Program IBM SPSS 23.* Edisi 8. Semarang: Penerbit Badan Penerbit Universitas Diponegoro

Kantun, W., Mallawa, A. (2015). Respon Tuna Mandidihang (*Thunnus albacares*) terhadap Umpan dan Kedalaman pada Perikanan Handline di Selat Makassar. *Jurnal Perikanan (J. Fish. Sci)*. 17(1): 1–9.

Kementerian dalam Negeri. (2020*). Pedoman Umum Menghadapi Pandemi COVID-19*. Jakarta: Tim Kerja Kementerian Dalam Negeri.

Nurhayati, A., Pical, V., Erfani, A., Hilyaa, S., Saloko, S., Made, S., Purnomo, A.H. (2020). Manajemen Risiko Perikanan Tangkap (Studi Kasus di Tengah Pandemi Covid-19). *Journal of Fisheries and Marine Research*, 4(3), 417-427.

Rajagukguk, K. (2018). *Produktivitas Perikanan Tangkap Pukat Cincin (Purse Seine) di Pelabuhan Perikanan Nusantara Pekalongan Kota Pekalongan Provinsi Jawa Tengah*. Pekanbaru: Universitas Riau.

Sugiyono. (2010). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, kualitatif,dan R&D*.

Bandung: Alfabeta.

Suryana, S.A., Rahardjo, I.P., Sukandar. (2013). Pengaruh Panjang Jaring, Ukuran Kapal, PK Mesin dan Jumlah ABK terhadap Produksi Ikan pada Alat Tangkap Purse Seine di Perairan Prigi Kabupaten Trenggalek-Jawa Timur. *PSPK Student Journal*, 1(1): 36–43.

Widianto., Nikijiluw, V.P.H. (2003). *Pedoman Investasi Komoditas Tuna di Indonesia*. Direktorat Sistem Permodalan dan Investasi. Direktorat Jenderal Peningkatan Kapasitas Kelembagaan dan Pemasaran Departemen Kelautan dan Perikanan. Jakarta. pp 6.