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DETERMINANT AND CONVERGENCE OF FISHERS TERM OF TRADE IN INDONESIA WITH SPATIAL APPROACH

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Abstract: This study aims to analyze the determinants and convergence of the Fishers Term of Trade (FiTT) and analyze government policies supporting increasing FiTT in Indonesia. The analysis used is the global moran index, dynamic spatial panel data regression, and descriptive analysis. The analysis results show spatial dependencies of FiTT with a clustered pattern. Provinces in quadrants III and IV in quadrant analysis indicate the need to evaluate government assistance policies. The determinants of FiTT in the short and long term are the CPI, government assistance, production value, and labor in the capture fisheries sub-sector. There is a convergence of provincial FiTT with a relatively high speed of 152 percent per year, assuming no significant external shocks exist. The time required to close half of the FiTT is 0,46 years. Policies can be carried out by encouraging programs to increase production, exports, and consumption of capture fisheries. They were maximizing the functions of the Central Information Control Team (CICT) and Local Information Control Team (LICT) in controlling the inflation of consumer goods in rural areas and maintaining the policy of subsidized fuel for small-scale fisheries. Maintain fish price stability at the fisherman's level by strengthening the National Fish Logistic System (NFLS), accelerating the implementation of the Warehouse Receipt System (WRS) for fishery commodities, and improving infrastructure that supports cold storage development, especially electricity availability. In addition, expanding the scope of the business area of PT Perikanan Indonesia and increasing its role as a logistics agency for fisheries.

Keywords: convergence, fishermen, FiTT, spatial, welfare

Abstrak: *Penelitian ini bertujuan untuk menganalisis determinan dan konvergensi Nilai Tukar Nelayan (NTN) dan menganalisis kebijakan pemerintah dalam mendukung peningkatan NTN di Indonesia. Analisis yang digunakan adalah indeks moran global, regresi data panel spasial dinamis dan analisis deskriptif. Hasil analisis menunjukkan bahwa terdapat dependensi spasial NTN dengan pola mengelompok. Provinsi yang berada pada kuadran III dan IV pada analisis kuadran menunjukkan perlu adanya evaluasi terhadap kebijakan pemberian bantuan pemerintah. Faktor penentu NTN dalam jangka pendek dan jangka panjang adalah IHK, bantuan pemerintah, nilai produksi, dan tenaga kerja subsektor perikanan tangkap. Terjadi konvergensi NTN provinsi dengan kecepatan yang relatif tinggi yaitu 152 persen per tahun dengan asumsi tidak ada guncangan eksternal yang signifikan. Waktu yang dibutuhkan untuk menutup setengah ketimpangan dari NTN adalah 0,46 tahun. Kebijakan yang dapat dilakukan dengan mendorong program-program yang dapat meningkatkan produksi, ekspor, dan konsumsi perikanan tangkap. Memaksimalkan fungsi Tim Pengendalian Inflasi Pusat (TPIP) dan Tim Pengendalian Inflasi Daerah (TPID) dalam pengendalian inflasi barang konsumsi di pedesaan. Mempertahankan kebijakan BBM bersubsidi bagi nelayan kecil. Menjaga stabilitas harga ikan di tingkat nelayan melalui penguatan Sistem Logistik Ikan Nasional (SLIN), percepatan implementasi Sistem Resi Gudang (SRG) komoditas perikanan, dan peningkatan infrastruktur yang mendukung pengembangan cold storage, khususnya ketersediaan listrik. Memperluas cakupan wilayah usaha PT Perikanan Indonesia dan meningkatkan perannya sebagai badan logistik perikanan.*

Kata kunci: *kesejahteraan, konvergensi, nelayan, NTN, spasial*

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INTRODUCTION

The important role of the fisheries sub-sector in fulfilling the food needs of the Indonesian people can be seen in the share of the fishery sub-sector's GDP to the agricultural sector's GDP, which reached 18,44% in 2020 (BPS, 2022). The high production of the fisheries sub-sector, especially the capture fisheries sub-sector, has created many job opportunities. In 2019 the number of fishers in Indonesia reached 1,4 million (KKP, 2021). The high production and availability of jobs are expected to improve fishers' welfare, which is dominated by small-scale fisheries. Wicaksono and Fahmi (2021) suggest that the capture fisheries sub-sector is closely related to small-scale capture fisheries, so improving the welfare of the capture fisheries sub-sector is nothing but improving the welfare of small-scale fishers.

One approach to measuring fishers' welfare is the Fishers Term of Trade (FiTT) (BPS, 2020). FiTT is the ratio of the price index received (IR) of fishers to the index of the price paid (IP) of fishers (BPS, 2021). Sembiring (2017) argues that FiTT is a measuring tool to see the ability of fishers' fish catches to the goods or services needed by fishers for household consumption and catching fish. The increase in NTN is expected to have an impact on improving the welfare of fishers. FiTT published by BPS only measures the purchasing power of fishers but cannot be a proxy for fishers' welfare. Based on research conducted by Siregar (2004) and Rachmat (2013), FiTT published by BPS need to be reformulated with corrections to growth in production and labor. Production growth is calculated by the Capture Fisheries Production Index (CFPI) using the Paasche Index, while labor growth is calculated by the Labor Index (LI) using the Chain Index (BPS 2020). So that the reformulated FiTT can proxy the welfare of fishers. This study uses a reformulated FiTT.

Several factors can influence the dynamics of FiTT. One of them is the GRDP of the capture fisheries subsector. Bafadal (2014), in his research, shows that the GRDP of the agricultural sector is one of the factors that affect the Southeast Sulawesi Farmers' Term of Trade (FTT). There are two types of inflation: urban inflation, calculated by the Consumer Price Index (CPI), and rural inflation, calculated by the Household Consumption Index (HCI). In this study, the CPI was the CPI of the fish subgroup. The higher the CPI of the fish subgroup, the higher the FiTT by increasing IR. Research conducted by Zulham (2011) shows that the CPI positively affects national FiTT. HCI indicates living costs in rural areas (BPS, 2021). The higher the HCI, the lower the FiTT through an increase in IP.

Producer surplus is total revenue minus total cost (Mankiw, 2008). In the fishery economy, producer surplus or profit is also called economic rent (Fauzi, 2017). Based on a survey conducted by BPS, transportation and wages are the largest share in the cost structure of household capture fisheries businesses and are the prices of production input factors. Transportation is a component of fishing costs for fuel oil with a proportion of around 20-30%. Meanwhile, research conducted by Wijaya (2015) shows that the fuel cost for fishing is 50%. Wages are a component of fishing costs to pay the wages of crew members or labor fishers with a proportion of around 40-50% (BPS, 2016). The higher fuel prices and wages for crew members in the fishing process will reduce FiTT. Increasing the productivity of fishers and crew members will increase the income of fishers, one of which is by increasing the technical skills of crew members/human resources, which can be done through technical guidance and management.

Regarding FiTT, the Government is making efforts to increase FiTT, one of which is the export policy. The Government can implement operational policies to increase demand for export capture fishery products in an area by building facilities and infrastructure for capture fisheries exports. In addition, it is necessary to encourage the construction of a fishing industry that exports capture fishery products. Demand for capture fisheries exports will increase FiTT in terms of fishers' income (Ratnasari dan Rijanta, 2020). From the domestic side, another effort made by the Government to increase FiTT is to increase the domestic Fish Consumption Rate (FCR). Local communities absorb capture fisheries production that is not exported for direct consumption or in processed form. Arthatiani's research (2018) explains that an increase in the share of spending on fish consumption will increase the demand for fish.

In fiscal policy, the government makes policies, one of which is distributing Government Assistance (GA) to fisher and related stakeholders with a total GA realization of 1,6 trillion rupiahs. The GA provided is in the form of fishing facilities assistance in the form of fishing gear, fishing boat engines, fishing vessels, port facility development, and insurance premium

assistance. GA aims to support the increase in capture fisheries production and FiTT, so it is necessary to evaluate its distribution. It can be realized when the government considers fishing habits, fishing gear, ship size of coastal communities, and transfer of knowledge (Mira, 2018).

Based on the distribution of FiTT data in Indonesia, the FiTT is getting further away from Java, and the FiTT is getting smaller. Besides that, the FiTT in the eastern part of Indonesia is relatively low. It indicates that there is spatial proximity or economic proximity, which results in spatial dependencies between provinces. The estimation procedure without considering the dependencies between regions can be invalid and cause the estimation results to be biased and inefficient (Arbia et al. 2005). FiTT is an indicator to see development in the capture fisheries sub-sector. Development in the capture fisheries sector at the national level is inseparable from development at the regional level. In addition, development in the region aims to catch up with developed regions in various economic indicators, including FiTT. This condition is known as inter-regional convergence (Sodik, 2016). Every year, the province's FiTT inequality gets higher. Based on the identification stated above, this study aims to analyze 1) Government policies to support the improvement of FiTT in Indonesia and 2) Determinants and convergence of FiTT in Indonesia.

METHODS

The data used in this study is secondary data published by BPS-Statistic Indonesia and the Ministry of Marine Affairs and Fisheries (MMAF). The data type used is panel data from 33 provinces from 2015-2019. The study was conducted from August 2021 to March 2022. Table 1 presents each variable's operational definitions, units, and data sources.

The data analysis method used is descriptive analysis and econometric analysis. Descriptive analysis determines the government's performance on FiTT through quadrant analysis between GA and FiTT per province. Econometric analysis is the global moran index to see spatial dependencies and dynamic spatial panel data analysis to overcome spatial dependencies and determine the long-term and short-term effects on the determinants and speed of the convergence of FiTT.

Spatial Dependency Analysis

A spatial weighting matrix is a standard form of spatial dependencies obtained from the proximity of geographical relationships between observations through spatial contiguity, inverse distance, and social and economic closeness of relationships (Anselin, 1988). The value of the global Moran index (I) can be calculated using the following equation:

$$I = \frac{n \sum_{i=1}^{n} \sum_{j \neq i=1}^{n} w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\sum_{i=1}^{n} (x_i - \bar{x})^2 \sum_{i=1}^{n} \sum_{j=i}^{n} w_{ij}}$$

where n is the number of provinces, $\bar{\chi}$ is the average value of χ_i from 33 provinces, χ_i is the value of the observations in the i-th province, χ_j is the value of the observations in the j-th province, and w_{ij} is the weighting matrix element spatially the i-th row and j-th column.

The hypothesis used for the FiTT spatial autocorrelation test is as follows:

$H_0 : I = 0$ and $H_1 : I \neq 0$

The value of I is in the range between -1 and 1. If $I > 0$ then the autocorrelation value is positive (the data pattern is clustered), and if $I < 0$ then the autocorrelation value is negative (the data pattern is spread out).

Dynamic Spatial Panel Data Regression Analysis

Dynamic spatial panel data regression is a regression method that adds a dependent variable lag to serve as an independent variable and the effect of spatial dependencies (Jacobs *et al.,* 2009). The dynamic spatial panel model equation is defined as follows:

$$y_{it} = \alpha + \gamma_{i(t-1)} + \rho W_1 y_{it} + X_{it}\beta + W_2 X_{it}\theta + \mu_i + \nu_t + u_{it} \quad .. (2)$$

with $u_{it} = \delta W_3 u_{it} + \varepsilon_{it}$

Parameter estimation on dynamic spatial panel data use Spatially Corrected Arellano-Bond (SCAB). The parameter significance test aims to determine the significance of the relationship between the independent variable and the dependent variable in the model (Baltagi, 2005). Wald's test was used to test the model parameters' significance simultaneously. The Z test was partially used to test the model parameters' significance

partially. The model specification test uses the Panel Unit Root test, Arellano-Bond test (consistency test), Sargan test (test instrument validity), and unusualness (Arellano dan Bond, 1991). The interpretation of the dynamic spatial panel model can see the short-term, long-term effect, speed of convergence, and half-time of convergence.

Research Model

The use of natural logarithm transformation (Ln) to facilitate data processing, interpretation, and overcoming the nonlinear relationship between the dependent variable and the independent variable as well as overcoming the data distribution abnormality (Benoit, 2011).

$$LnToFf_{it} = \alpha + \gamma LnToF_{i(t-1)} + \rho \Sigma^{n}_{i=1} W_{ij} LnToF_{it} + \beta_1 LnEXP_{it} + \beta_2 LnCPI_{ij} + \beta_3 LnHCI_{it} + \beta_4 LnFCR_{it} + \beta_5 LnFRODVAL_{it} + \beta_6 LnVESSEL_{it} + \beta_7 LnLABOR_{it} + \beta_8 LnGA_{it} + \beta_9 LnTRANS_{it} + \beta_{10} LnWAGE_{it} + e_{it}$$

The potential of abundant natural resources and the availability of job opportunities in the capture fisheries sub-sector are important things to analyze the welfare of fishers. The welfare of fishers can be proxied by the Fishers Term of Trade (FiTT). FiTT published by BPS only describes the purchasing power of fishers and does not yet describe a proxy for the welfare of fishers, so it needs to be reformulated with growth in production and labor. FiTT reformulated can be formulated as follows:

$$FiTTref_t = \sqrt[2]{\frac{IR_t}{IP_t} \chi \frac{CFPI_t}{LI_t}} \; x\,100$$

remark: $FiTTref_t$ (Fishers Term of Trade reformulated of the t-th year); $CFPI_t$ (Capture Fisheries Production Index of the t-th year); LI_t (Labor Index of the t-th year).

Government assistance is made to improve fishers' welfare and support equitable distribution of FiTT. The movement of FiTT inequality in Indonesia can be seen from the convergence of FiTT using dynamic spatial panel data analysis, which is also used to determine the determinants of FiTT both in the short and long term. The limited natural resources and production factors of a province cause movement and spatial interaction between provinces in Indonesia. The formulation of appropriate policy implications for the increase and convergence of FiTT in Indonesia and the problem of inequality in the development of the capture fisheries sub-sector are expected to be generated from this research. Reasearch framework in Figure 1.

Hypotheses

Based on the background, problem formulation, and objectives described previously, the hypotheses in this study are:

1. There are spatial patterns and dependencies of FiTT in Indonesia.
2. There is FiTT convergence in Indonesia
3. There are significant long-term and short-term effects on the determinants of FiTT

Table 1. Operational definitions, units, and data sources

Variable	Operational definitions, units, and data sources
FiTT	FiTT reformulation per province per year with base year 2012 (Index) (BPS) (MMAF)
EXP	Export value of capture fisheries commodities per province per year (US$) (MMAF)
HCI	HCI per province per year with base year 2012 (Index) (BPS)
CPI	CPI per province per year with base year 2012 (Index) (BPS)
FCR	FCR per province per year (Index) (MMAF)
PRODVAL	Production value of capture fisheries per province per year (Rp) (MMAF)
VESSEL	Percentage of motorized fishing vessels per province per year (%) (MMAF)
LABOR	Fishers per province per year with base year 2012 (Index) (BPS) (MMAF)
GA	accumulation of GA per province per year (Rp) (MMAF)
TRANS	Index of transportation per province per year (Index) (BPS)
WAGE	Index of wage per province per year (Index) (BPS)

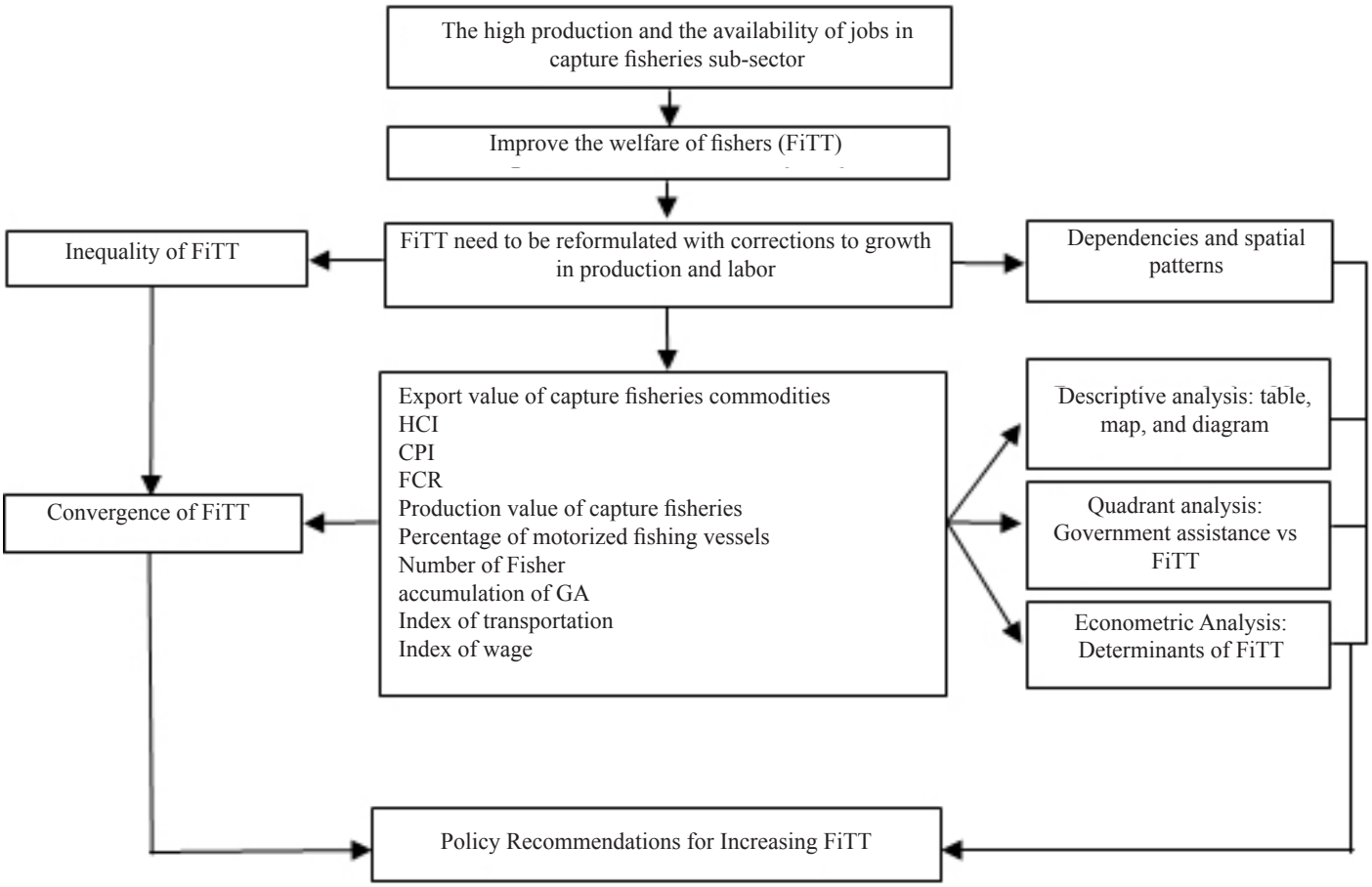

Figure 1. Reasearch framework

RESULTS

FiTT, CPI, HCI, Transportation Index and Wage Index in 2015-2019

Table 2 shows the average FiTT of the province in 2015-2019 BPS publications is 109.73, while the average of the province's FiTT reformulated is 104.82. Banten Province has the highest average FiTT, and South Sumatra Province is the lowest. The province with the highest average FiTT reformulated is DI Yogyakarta Province, and the lowest is Central Java Province. The disparity of FiTT between provinces can be seen from the coefficient of variance. The average disparity of FiTT is relatively low at 4.45 compared to the average disparity of FiTT reformulated at 21.00. It is because the FiTT published by BPS is only influenced by price changes and is not followed by growth in production and labor. Furthermore, the discussion of FiTT will refer to the FiTT reformulated because FiTT reformulated can better describe fishers' welfare since it considers production growth and labor growth.

The average provincial CPI in 2015-2019 was 131.25, with a standard deviation of 3.05, indicating that the increase in fish prices in each province did not vary. Figure 2 shows the province that has the lowest average CPI, namely Riau Islands Province at 125.43, while the highest average CPI is East Java Province at 140.3. The average provincial HCI in 2015-2019 was 137.24, with a fairly high standard deviation of 12.93, indicating that the increase in the price of household consumption goods in rural areas was relatively diverse between provinces. The province with the lowest average HCI is East Nusa Tenggara Province at 93.95, and the province with the highest average HCI is Banten Province at 155.37.

The average provincial transportation index in 2015-2019 is 119.87, with a relatively small standard deviation of 3.81. The average standard deviation of the transportation index shows that the increase in transportation prices in the form of fuel prices between provinces does not vary. Figure 3 shows the province with the lowest average transportation index, Papua Province, at 111.48, and the province with the highest transportation index average, Jambi Province, at

129.02. The average provincial wage index for 2015-2019 was 105.67, with a relatively small standard deviation of 5.14. The average wage index's standard deviation shows that the wage increase between provinces does not vary. The province with the lowest average transportation index is West Sulawesi Province at 100,41, while the province with the highest average transportation index is Bengkulu Province at 121.26.

Production Value, Export Value, Labor, Fishing Vessels of Capture Fisheries, and Fish Consumption Rate and in 2015-2019

The average production value of capture fisheries in 2015-2019 is 166 trillion rupiahs. Figure 4a shows the province with the highest average capture fishery production value, North Sumatra Province, at 16 trillion rupiahs. North Sumatra Province, apart from having capture fisheries production at sea, also has the potential for capture fisheries production in inland waters originating from Lake Toba. The province that has the lowest average production value of capture fisheries is DI Yogyakarta Province, at 153 billion rupiahs.

The average value of capture fisheries exports in 2015-2019 reached 2,754 billion US dollars, with the highest average export value of capture fisheries coming from Java Island of 1,908 billion US dollars. Figure 4b shows the province with the highest average export value of capture fisheries, namely East Java Province, at 926 million US dollars, reaching 33.45 percent of Indonesia's total exports. The high export of capture fisheries in Java is due to the large number of fishing industries exporting capture fisheries. The Maluku Islands and Papua Island have the lowest average capture fishery export value of 24 million US dollars. Building facilities and infrastructure for capture fisheries exports can increase the average export of capture fisheries in Maluku and Papua. Provinces that do not export capture fisheries are Bengkulu Province. Capture fisheries commodities in Bengkulu Province are exported through ports and airports of other provinces due to constraints on facilities and infrastructure.

Table 2. Descriptive statistics of FiTT published by BPS and reformulated FiTT

Descriptive statistics	2015-2019	
	FiTT BPS	FiTT reformulated
Average	109.73	104.82
Deviation Standard	4.89	22.01
Coefficient of Variance (CV)	4.45	21.00
Minimum	97.23	69.69
Maximum	118.85	146.72

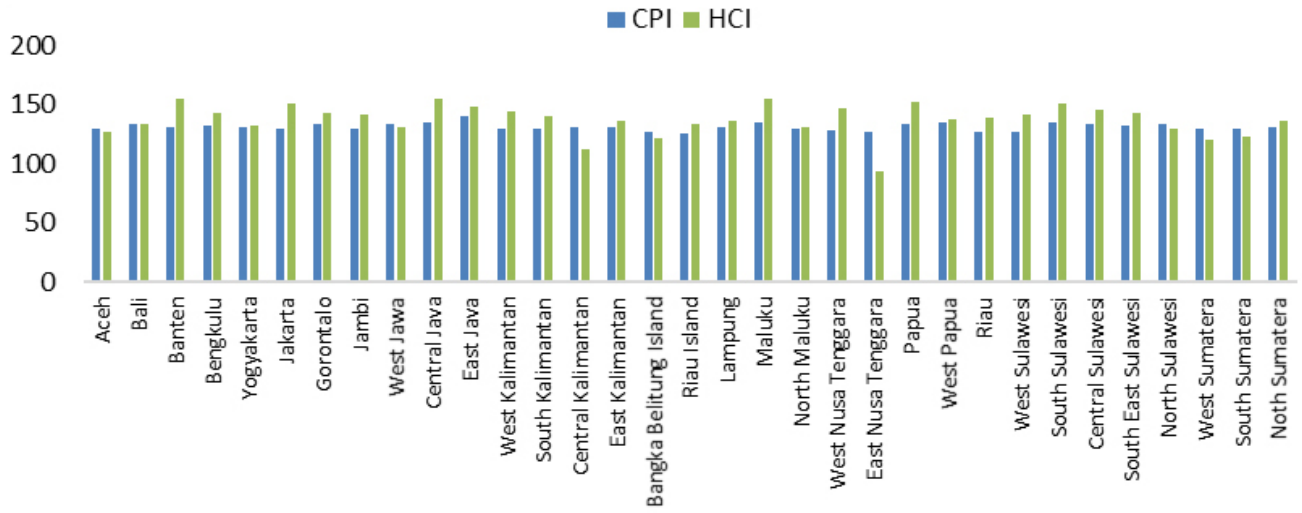

Figure 2. Average provincial CPI and HCI, 2015-2019

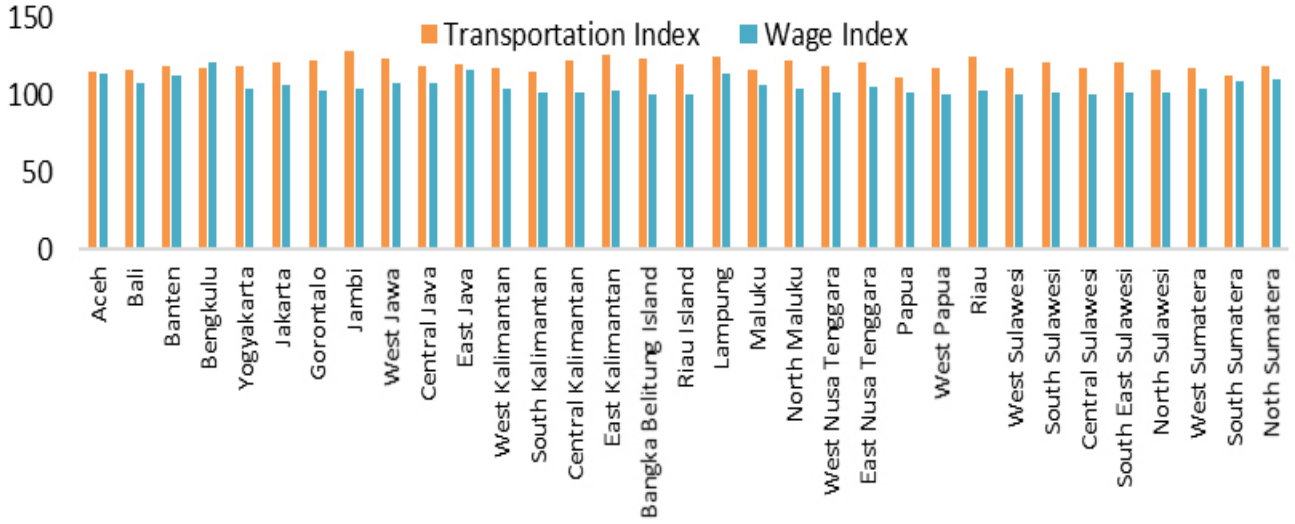

Figure 3. Average provincial transportation index and wage index, 2015-2019

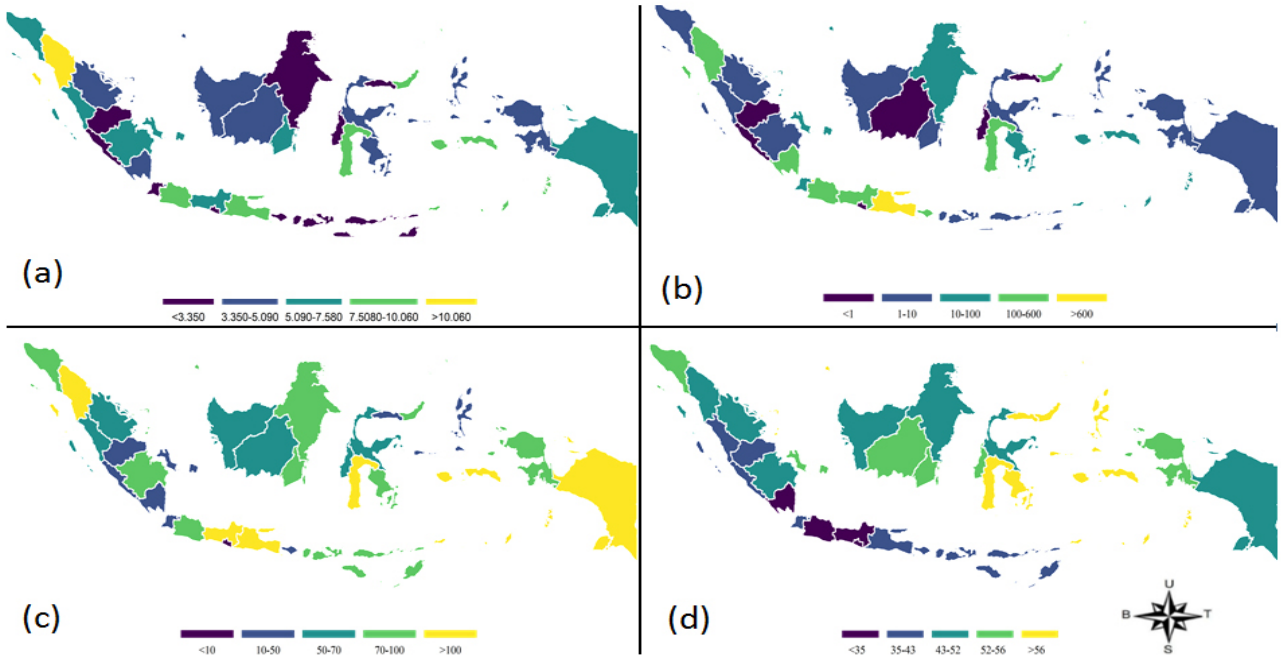

Figure 4. Map of the average production value (billion rupiah) (a), export value (million US$) (b), labor in the capture fisheries sub-sector (1000) (c) and fish consumption rate (kg/capita/year) (d), 2015-2019

The average number of workers in the capture fisheries sub-sector in 2015-2019 was 2.7 million. Figure 4c shows the province with the highest average workforce, namely East Java Province, at 239.177, while the lowest province, namely DI Yogyakarta Province, is 4724 people. The fishing vessels in East Java Province have a fairly large ship size, requiring a lot of labor/crew.

Indonesia's average fish consumption rate from 2015-2019 reached 47.28 kg/capita/year (KKP, 2022). In 2016 household fish consumption in Indonesia consisted of 48.53 kg/capita/year of fresh fish and 4.22 kg/capita/year of processed fish (Arthatiani et al. 2018). Figure 4d shows that the provinces with an average fish consumption rate above the national average fish consumption level are nineteen, and the highest is Southeast Sulawesi Province at 60.13 kg/capita/year. There are fifteen provinces with an average consumption level below the average national consumption level, and the lowest is DI Yogyakarta Province at 29.93 kg/capita/year. The people's preferences strongly influence the high and low fish consumption rates in a province for fish.

The average percentage of motorized capture fishing vessels in 2015-2019 is 65.4 percent. The province with the highest number of motorized fishing vessels is South Sulawesi Province, with 48,101 vessels, while the lowest is Bengkulu Province, with 645 vessels. Figure 5 shows the province with the highest average percentage of motorized fishing vessels, namely DI Yogyakarta Province at 96.9 percent, while the lowest is East Nusa Tenggara Province at 21.1 percent. The percentage and number of motorized vessels representing technology will result in differences in products from different regions (Zulbainarni and Khumaera, 2020) so that the price of fish will experience differences between regions.

Spatial Dependencies, Determinants and Convergence of FiTT in Indonesia

Hypothesis testing of the global moran index from 2015 to 2019 showed significant positive results, so it can be concluded that there is a positive spatial autocorrelation with a clustered pattern. The unit root panel test (stationarity) using level data in natural logarithms shows a p-value < 0. It can be said that the dependent and independent variables are stationary. Based on Table 3, the coefficient of the lag of FiTT is 0,218 and lies between the values of 0.042 and 0.484. It shows that the estimation model using SCAB is unbiased. The results of the sargan test in Table 3 show a p-value of 0.775 > 0.05, so it can be said that the instrument variable used is valid. The Arellano-Bond test results (m^2) showed a p-value of 0.303 > 0.05, so it can be said that the model is consistent. Overall, the dynamic spatial panel model with SCAB estimation has met the best model specifications.

Table 4 shows the spatial effect of FiTT, FCR, and the production value of capture fisheries have a significant effect on FiTT. The higher the proximity between regions, the higher the spatial influence. The value of capture fisheries production has a significant positive effect on FiTT in the short and long term. The elasticity coefficient of capture fisheries production value is 0.410 in the short term and 0.524 in the long term, which indicates that every 1 percent increase in the value of capture fisheries production in a province will increase FiTT by 0.410 percent in the short term and 0.524 percent in the long term. It is in line with research conducted by Bafadal (2014), which states that the GRDP of the agricultural sector has a positive effect on FiTT in Southeast Sulawesi Province.

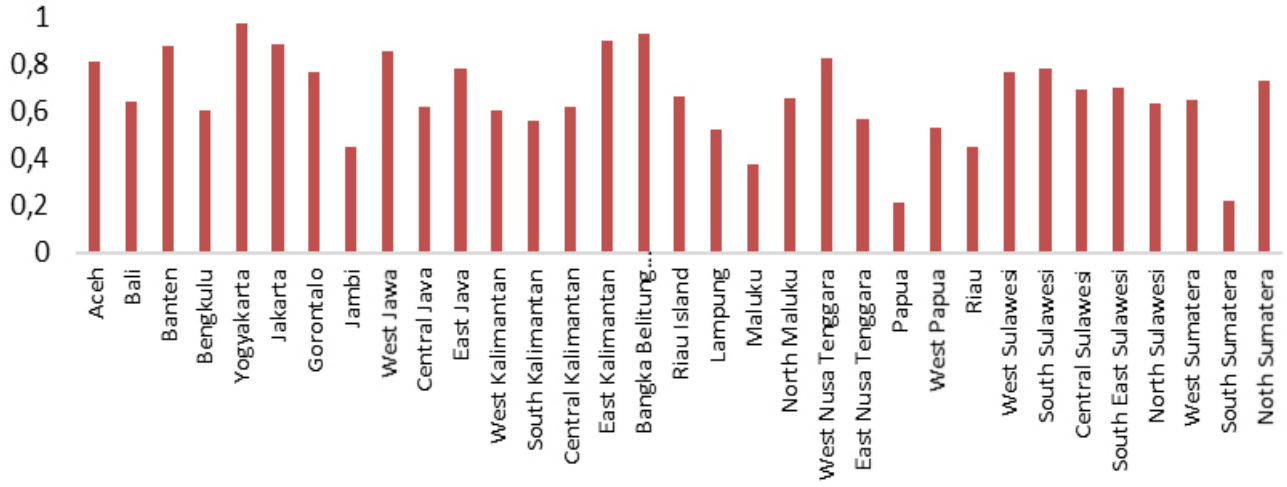

Figure 5. Average percentage of motorized fishing vessels, 2015-2019

Table 3. Model specification test results

Criteria	Criteria Value	P-value
Coefficient of lag (FEM)	0.042	0.600
Coefficient of lag (SCAB)	0.218	0.0007
Coefficient of lag (PLS)	0.484	0.000
Sargan test	18.567	0.775
Arellano-Bond test (m1)	-3.5591	0.000
Arellano-Bond test (m2)	-1.031	0.303

Table 4. Significance and elasticity of independent variables

Variable of Independent	Long term		Short term	
	Coefficient	P-value	Coefficient	P-value
WLNFiTT	0.664**	0.000	0.848**	0.000
WLNFCR	0.979**	0.000	1.252**	0.000
WLNPRODVAL	-0.439**	0.000	-0.561**	0.000
LNCPI	0.252x	0.068	0.322x	0.008
LNHCI	0.814	0.171	1.040	0.166
LNPRODVAL	0.410**	0.000	0.524**	0.000
LNFCR	-0.234	0.110	-0.299	0.102
LNEXP	-0.004	0.492	-0.005	0.480
LNGA	-0.259**	0.000	-0.331**	0.001
LNLABOR	-0.421**	0.000	-0.538**	0.000
LNWAGE	-0.184	0.291	-0.235	0.279
LNTRANS	0.277	0.189	0.354	0.199
VESSEL	0.025	0.776	0.032	0.779

Notes : ** significance at α= 1%, * significance at α = 5%, x significance at α = 10%

The number of laborers in the capture fisheries sub-sector significantly negatively affects FiTT in the short and long term. The elasticity coefficient of the number of laborers in the capture fisheries sub-sector is -0.421 in the short term and -0,538 in the long term. Every one percent increase in the number of workers in the capture fisheries sub-sector in a province will reduce FiTT by 0.421 percent in the short term and 0.538 percent in the long term. Increasing the number of workers in the capture fisheries sub-sector reduces FiTT by the FiTT reformulated. Small fishers dominate the capture fisheries sub-sector, so the capture fisheries sub-sector is a labor-intensive sub-sector. An increase in the number of workers will increase the operational costs of fishing. An increase in the supply of labor will reduce the wages of workers. Therefore, when the increase in the number of workers is higher than the decrease in wages, the FiTT will decrease. Research conducted by Runtunuwu (2020) shows the same result: the number of workers significantly negatively affects FTT in the Province of North Maluku. The increase in the number of laborers in the capture fisheries sub-sector must be balanced with an increase in fishing productivity to increase profits.

The CPI has a significant positive effect on the FiTT. The coefficient of elasticity of the CPI is 0.252 in the short term and 0.322 in the long term. The increase in FiTT due to an increase in CPI follows the definition of BPS, and previous studies have shown that the general CPI has a positive effect on FiTT (Zulham et al. 2011; Ratri, 2018). Another result is shown by a study conducted by Faridah and Syechalad (2016) that inflation has a negative effect on the Farmers' Term of Trade of food crops in the Province of Aceh Government policies in the form of government assistance have a negative effect on the FiTT. The elasticity coefficient of government assistance is -0.259 in the short term and -0.331 in the long term. The government must evaluate the type of assistance, recipients of assistance, and the mechanism for helping to support the improvement of both provincial and national FiTT.

A study by Riyadh (2015) showed that wages had a negative effect on the FiTT of food crops, but in this study, wages had a negative and insignificant effect on FiTT. It is because the wages of labor fishers are rigid, so the increase in the wages of labor fishers does not affect the increase in FiTT. HCI describes the development of prices for goods and services consumed in rural areas. HCI does not have a significant positive effect on FiTT and is in line with the research results by Amanda et al. (2021). A large or small increase in the price of consumption goods in rural areas will not affect the consumption level of fishers.

Fish consumption rate has no significant effect on FiTT. People's preferences strongly influence fish consumption rates for fish and the price of fish itself. Capture fisheries exports have no significant effect on FiTT, and research conducted by Ratnasari and Rijanta (2020) shows no significant relationship between agricultural product exports and FTT. The percentage of the number of motorized tangka fishing vessels has no significant effect on FiTT. This research is in line with that conducted by Samsudin (2021), which shows that the number of fishing vessels does not have a significant relationship to capture fisheries production, so an increase in the number of vessels will not affect FiTT. Changes in fuel input prices have no significant effect on FiTT, and the results of research conducted by Handayani (2014) show that changes in fuel prices do not affect IP and FTT.

The convergence used is conditional convergence because it considers other variables in determining the FiTT convergence (Yuniasih et al. 2013). The value of the convergence speed of 152 percent per year or 12.67 percent per month means that every month there is a 12.67 percent reduction in the FiTT gap between provinces. This value is smaller than the research conducted by Amanda et al. (2021), which reached 17.21 percent per month. The time required to close half the FiTT gap is 0.46 years or 5 to 6 months and is longer than research conducted by Amanda et al. (2021) for four months.

Government Policy to Improve FiTT

This study's discussion of government policy focuses on Government Assistance (GA). GA, especially in the field of capture fisheries, which the Directorate General of Capture Fisheries manages, Ministry of Maritime Affairs and Fisheries (DGCF - MMAF), consists of assistance for fishing facilities, assistance for construction/rehabilitation of buildings/buildings in fishing ports and inland public waters, assistance for fisher insurance premiums, development of integrated marine fisheries center and fishery sanctuary assistance. Assistance for fishing facilities has the largest share of 77.75% of total GA. The objectives of the assistance for fishing facilities include improving the welfare of fishing communities through increasing fishing business capacity, increasing fishing business productivity, improving the quality of fishery products, and increasing fishers' income (Perdirjen, 2017). Research conducted by Mira (2018) shows that with government assistance, there is an increase in technology used, especially for assistance for fishing facilities in the form of fishing vessel measuring over 30 GT so that the productivity of fishers increase. However, the impact of increasing productivity on small fisheries does not improve fishers' welfare. It is in line with research conducted by Mira (2018).

Assistance for fisher insurance premiums is a form of protection for fishers for the sustainability of the fishing business to provide guaranteed protection to avoid the risks experienced by fishers in the future and provide assistance for heirs (Perdirjen, 2019). BPAN recipients are expected not to worry when there is an accident at sea (death or disability) or death due to illness that results in not meeting the needs of their family. Families can look for alternative livelihoods because fishers die or are disabled. Assistance for fisher insurance premiums has a share of 14.26% of total GA.

The development/rehabilitation of buildings/buildings at fishing ports and inland public waters, as well as the development of SKPT, are expected to expedite the capture fisheries business process. Fish price has stabilized due to good supply and demand, and fish quality has also improved due to good advice and infrastructure at the port. The assistance group for the development/rehabilitation of buildings/buildings both at fishing ports and inland public waters, as well as the development of an integrated marine fisheries center, has a share of 7.15% of the total GA. Fishery reserves at sea and in inland waters aim to preserve fish resources. The fishery asylum aid group has a share of 0.84% of the total GA.

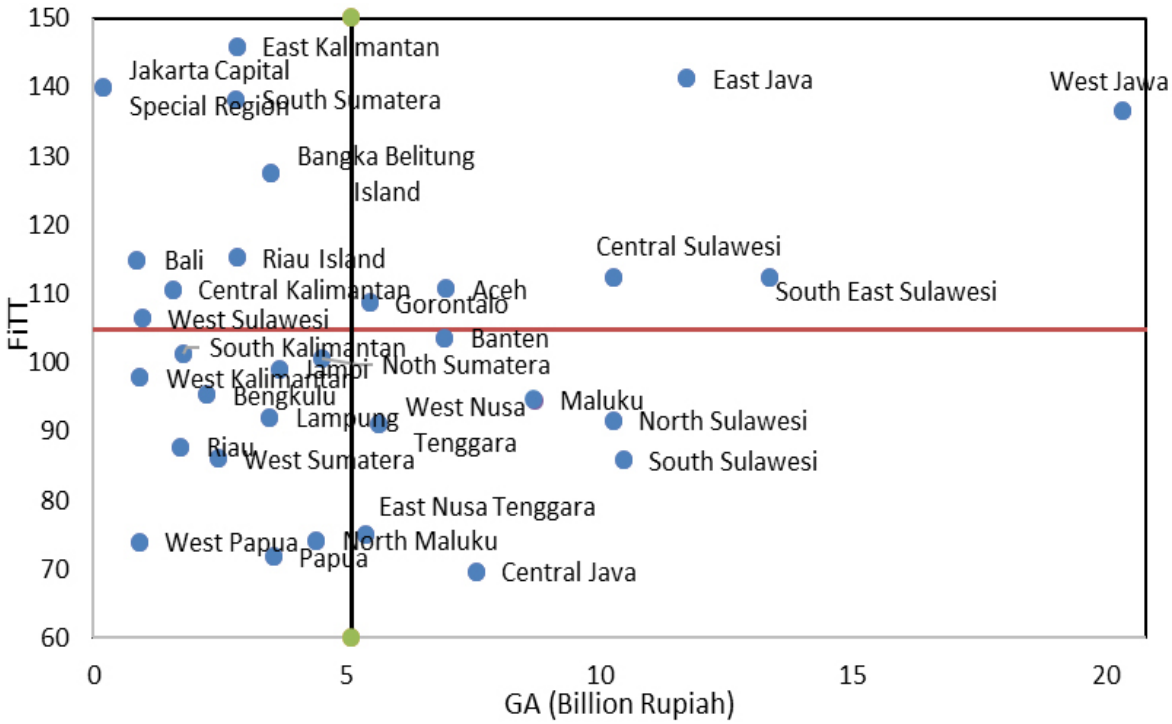

Figure 6. Plot of government assistance and average FiTT per province, 2015-2019

Quadrant analysis shows the average government assistance performance against the province's average FiTT. Figure 6 shows that quadrant I is a quadrant that describes the high value of government assistance provided and results in high provincial FiTT performance as well. This quadrant shows that the government has been right on target in aiding the provinces in quadrant I. Provinces in quadrant I must maintain the performance of government assistance in order to have a positive impact on the national FiTT. Quadrant II is a quadrant that describes the value of government assistance provided as low but results in high provincial FiTT performance. Quadrant II shows that although fishers in the province in Quadrant II receive relatively small assistance, fishers in the province in Quadrant II can produce relatively high FiTT. The performance of the provincial FiTT in quadrant II must be maintained, and it is possible to improve it so that when government assistance is given again, it can positively impact the national FiTT.

Quadrant III is a quadrant that describes the value of government assistance provided as low and results in low provincial FiTT performance. Quadrant III shows that the government has not optimally aided the provinces in quadrant III. Provinces in quadrant III are the main priority for assistance to improve FiTT further to impact national FiTT positively. Quadrant IV is a quadrant that describes the high value of government assistance provided but results in low provincial FiTT performance. Quadrant IV shows that there is a need for evaluation by the government because government assistance has not been optimal for the provinces in quadrant IV. It needs to be done so that the provinces in Quadrant IV can contribute to improving the provincial FITT to impact the national FITT positively.

Managerial Implications

The implications of the results of this study are addressed to the main stakeholders of the fisheries sector, namely the central and local governments, fishers, and entrepreneurs, including exporters. The Government should provide support for increasing capture fisheries production. One form of support is to provide government assistance in the form of fishing vessels and fishing gear for fishers to increase their production and productivity following the local fishing culture. The government assistance must pay attention to the shape of the ship in the shape of a V or U, the material of the ship from fiber or wood, and the type of material to the size of the mesh. In protecting fish resources, the Government needs to carry out regulations related to fishing permits for vessels above 30 Gross Tonnage by considering the utilization of fish resources based on fishery management areas and fish species. The Government provides tax incentives or licensing regulations related to the construction of fish

processing factories for export, builds infrastructure at airports and seaports to export fishery products, increases fish promotion, improves service delivery, and bureaucratic reforms to administration for processing permits and exports of fishery products. It will increase the number of exporters and processing entrepreneurs of fishery products. Training support for fishers regarding the operation of aid vessels, repairs to fishing gear, especially fishing nets. Support training for fisher's families to diversify fishing businesses such as simple fish processing when fish are abundant, including drying, salting, or making fish processing in pindang.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

FiTT published by BPS only describes the purchasing power of fishers as measured by changes in the price of the index received and the index paid. Reformulation of the calculation of FiTT is carried out by considering the growth of capture fisheries production and labor in the capture fisheries sub-sector so that FiTT can be used as a proxy for fishers' welfare. FiTT between provinces has significant spatial dependencies and clustered spatial patterns.

Government Assistance (GA) is one of the policies designed to improve the welfare of fishers. GA of 77.75% in the form of assistance for fishing facilities to increase the capacity of fishers businesses, increase the productivity of fishing businesses, improve the quality of fishery products, and increase fishers' income. Quadrant analysis between government assistance and FiTT shows that provinces in quadrants III and IV need to be evaluated on the policy of providing government assistance. Government assistance has not been effective in increasing FiTT. Many provinces with high GA have low FiTT. In this study, BP only sourced from the State Budget (excluding the Special Allocation Fund) and did not source from the regional revenue and expenditure budget.

The independent variables that significantly affect FiTT in the short and long term are the CPI, the value of capture fisheries production, government assistance, and the number of workers in the capture fisheries sub-sector. There is a convergence of provincial FiTT with a relatively high rate of 152 percent per year or 12.67 percent per month. The increase in convergence speed can occur when each independent variable has the same convergence in the 2015-2019 period, and there are no significant external shocks. The time required to close half of the FiTT inequality is 0.46 years or 5 to 6 months.

Recomendation

Policies can be carried out by encouraging programs from the government that can increase capture fishery production and cooperation between the central and local governments so that the mechanism and implementation of government assistance can be channeled properly. Maximizing the functions of the Central Inflation Control Team (CICT) and the Local Inflation Control Team (LICT) for controlling consumer goods inflation in rural areas and maintaining the policy of subsidized fuel for small scall fisheries. More intensive socialization of the Promotes Eating Fish Movement (GEMARIKAN). Launching programs that can support capture fisheries exports. Maintaining fish price stability at the fisherman's level by strengthening the National Fish Logistics System (NFLS), accelerating the Warehouse Receipt System (WRS) implementation for fishery products, and improving infrastructure that supports cold storage development especially the availability of electricity. The central government, through PT Perikanan Indonesia, must expand the scope of its business area and increase its role as a logistics agency for fisheries. However, there is a limitation in this study because it does not include fishers' household income. Therefore, in subsequent studies, household income changes are needed to reform FiTT.

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